AN ASSESSMENT OF FLOOD HAZARD RESPONSES AMONG THE RESIDENTS OF KATSINA METROPOLIS, KATSINA STATE, NIGERIA

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ABSTRACT

This study has assessed flood hazard responses among residents of Katsina metropolis. Primary data was collected from households residing in the four wards of Wakilin Yamma, Wakilin Gabas, Wakilin Arewa and Wakilin Kudu. 156 questionnaires were administered to randomly sampled households. Questions were related to respondent's socio-economic situation, flood experience as well as coping strategies. Data were analyzed using descriptive statistics. The study reveals that gender, duration of stay has significant impact on flood hazard response experience. These impacts of flood includes damage to farmland, damage to culverts, and damage to building, siltation of waterways/channels and causes outbreak of disease. Forty-seven respondents (31.3%) agreed that their buildings are located at places safe from flood while 66% respondents said their buildings are liable to flood. The coping strategies employed by the respondents include raising their building above flood level and building a flood infrastructure in place.

Keywords: Flood, Hazard Responses, Responses, Residents, Katsina.

INTRODUCTION

Flood is defined as high water stages in which water over flows its natural or artificial banks onto normally dry land, such as a river inundating its flood pain (SAARC, 2005). Floods are among the most destructive natural hazards causing extensive damage to the built and natural environment. Hazard is a dangerous phenomenon, substance, human activity or condition that may cause loss of life, injury or other health impacts, property damage, loss of livelihoods and services, social and economic disruption, or environmental damage (UNISDR, 2009). Morristown (2010) defined flood as an overflow of water onto normally dry land, the inundation of a normally dry area. In the same vein, Caldwell (2012) affirmed that flood is any high flow, overflow, or inundation by water which causes or threatens damage. Flooding can rise from overflowing rivers (river flooding), heavy rainfall over a short duration (flash flood) or an

unusual inflow of sea water onto land (ocean flooding). Flood is an overflow of water that comes from a river or other bodies of water and causes or threatens damage.

Flood hazard in (Alkema, 2005) is defined as the chance that a flood event of a certain magnitude will occur in a given area within a given period of time. Oxford advanced Learner‟s Dictionary defined flooding as „a large amount of water covering an area that is usually dry‟‟. According to Sordlin (2007), flooding can be defined as the accumulation of excessive quantity of water in an area without flowing away easily.

The major causes of flooding in Nigeria are; heavy rainfall, severe winds over water, unusual high tides and failures of dams and other structure that return the water (Aina, 1989).

1). Heavy rainfall: During times of steady heavy rainfall, periodic floods occur on many rivers, forming a surroundings region known as the flood plain and the rest travels over the land as surface run-off floods occur when ponds, lakes, riverbeds, soil, and vegetation cannot absorb all the water due to heavy rainfall. Water then runs off the land in quantities that cannot be carried within stream channels or retained in natural ponds, lakes and manmade reservoirs.

2). severe wind over water: Even when rainfall is relatively light, the shorelines of lakes and bays can be flooded by severe winds - such as hurricanes that blow water into the shore areas. This is not often experienced in Nigeria.

3). unusual high tides: Coastal areas are sometimes flooded by unusually high tides, such as spring tides especially when compounded by high winds and storm.

The actual amount of flood damage generated by a specific flood event is time and again a driving force that stimulates politicians to strengthen flood policy measures – usually soon after flood events. Flood damage refers to all varieties of harm caused by flooding. It encompasses a wide range of harmful effects on humans, their health and their belongings, on public infrastructure, cultural heritage, ecological systems, industrial production and the competitive strength of the affected economy. Some of these damages can be specified in monetary terms, others – the so called intangibles – are usually recorded by non-monetary measures like number of lives lost or square meters of ecosystems affected by pollution.

Flood damage effects can be further categorised into direct and indirect effects. Direct flood damage covers all varieties of harm which relate to the immediate physical contact of flood water to humans, property and the environment. This includes, for example, damage to buildings, economic goods and dykes, loss of standing crops and livestock in agriculture, loss Flood damage, vulnerability and risk perception of human life, immediate health impacts, and contamination of ecological systems. Indirect or consequential effects comprise damage, which occurs as a further consequence of the flood and the disruptions of economic and social activities. This damage can affect areas quite a bit larger than those actually inundated. One prominent example is the loss of economic production due to destroyed facilities, lack of energy and telecommunication supplies, and the interruption of supply with intermediary goods. Other examples are the loss of time and profits due to traffic disruptions, disturbance of markets after floods (e.g. higher prices for food or decreased prices for real estate near floodplains), reduced productivity with the consequence of decreased competitiveness of selected economic sectors or

regions and the disadvantages connected with reduced market and public services (Smith/Ward 1998, 34ff.; Green et al.1994, 39ff.).

The actual amount of flood damage of a specific flood event and the possible responses by the victims depends on the vulnerability of the affected socio-economic and ecological systems, i.e., broadly defined, on their potential to be harmed by a hazardous event (Cutter 1996, Mitchell 1989). Generally speaking, an element at risk of being harmed is the more vulnerable, the more it is exposed to a hazard and the more it is susceptible to its forces and impacts. Therefore, any flood vulnerability analysis requires information regarding these factors, which can be specified in terms of element-at-risk indicators, exposure indicators and susceptibility indicators. In this regard, natural and social science indicators are highly significant.

Response to flood hazards is an issue because it is related to coping strategies by individuals and societies. Nigeria in 2012 experienced an unprecedented flood disaster that affected half of the 36 states with 21 million people displaced, 597,476 houses destroyed or damaged, over 363 people killed and an estimated loss of USD 19.6 billion or 2.6 trillion naira (NEMA, 2013). However, studies on assessments of responses to these hazards in Nigeria is at national level initiated and carried out by foreign donors, hence are characterized by indicators chosen based on assumptions about the factors and processes leading to the vulnerability and responses of government, NGOs, communities and the victims themselves.

STUDY AREA

Katsina State is one of the 36 states of Nigeria created from Kaduna State on 23rd September, 1987. The state is located approximately between latitude 11^0 07' 49" and 13^0 20' 00"N and between longitude 6^0 52' 03" and 9^0 02' 40"E. it is boarded to the North by Niger Republic, to the East by Jigawa and Kano States, to the south by Kaduna State and to the West by Zamfara State. The State covers an area of about 24,192km^2. Figure 2.1 gives the main LGAs in Katsina state while Figure 2.2 gives the detailed morphological structure of the study area (Katsina metropolis). The major geological features of the state are the continental sediments of Katsina plains, mainly feldspatic clayey sandstones and grits with small basal pebble beds.

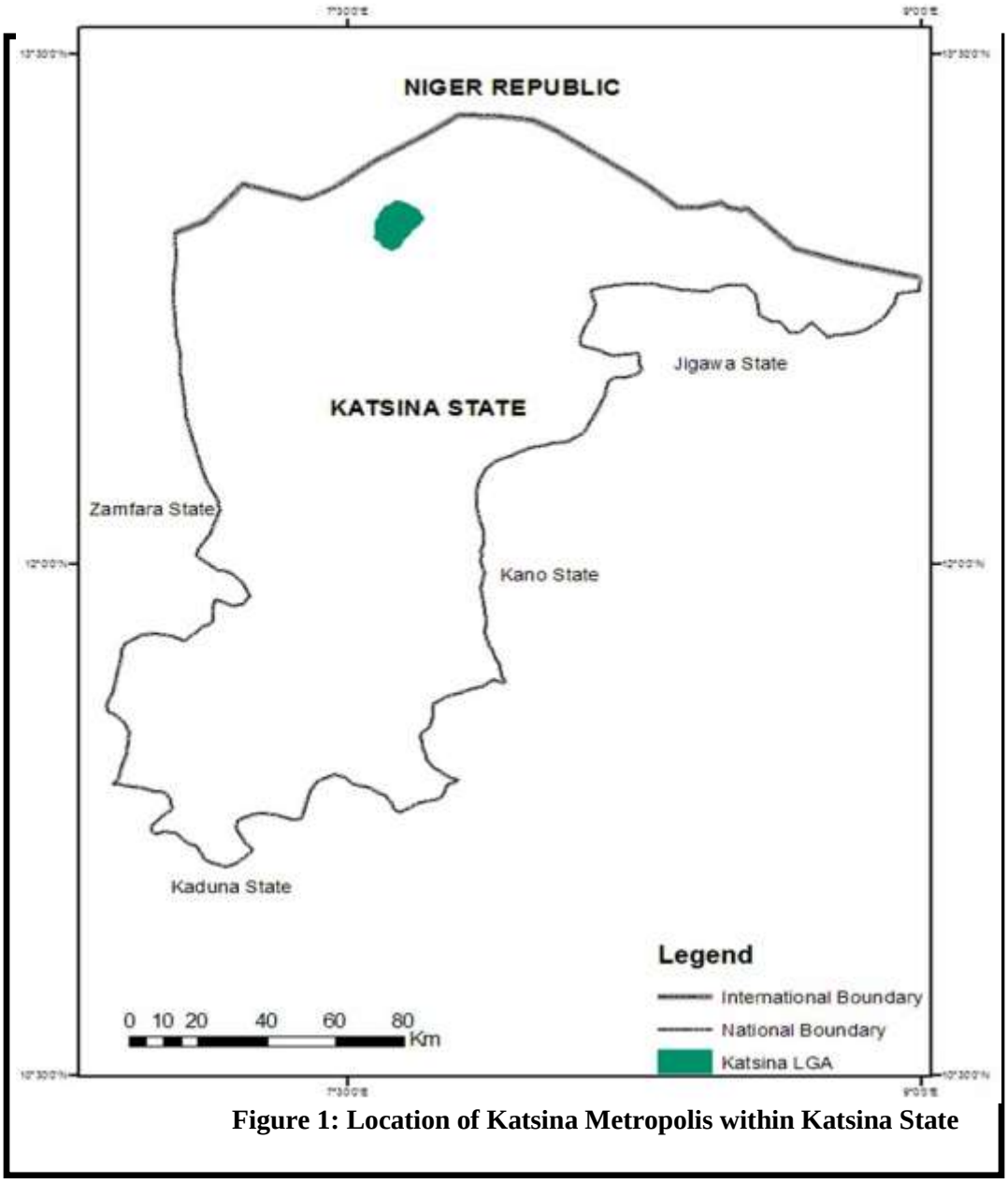

Figure 1: Location of Katsina Metropolis within Katsina State

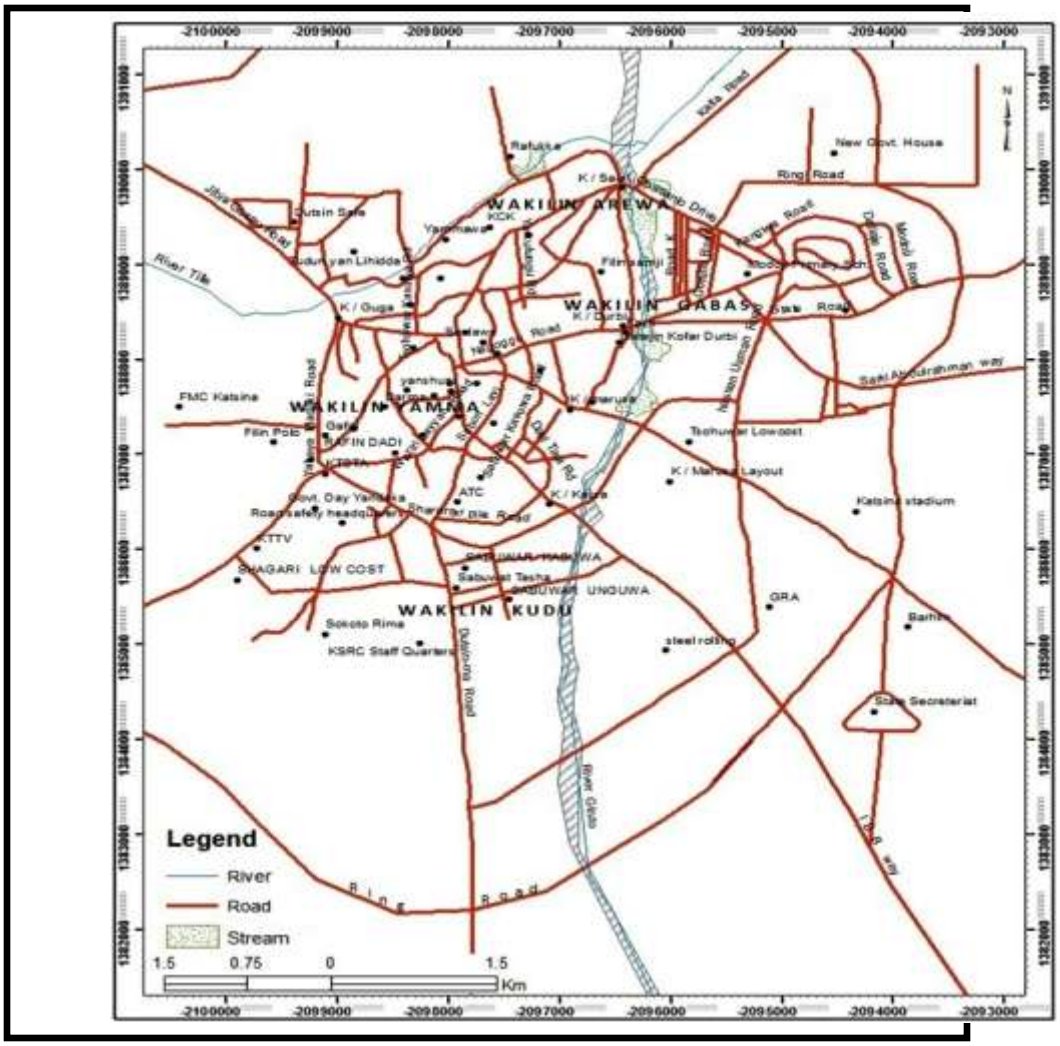

Figure 2: Morphological Units of Urban Katsina

The sediments have maximum thickness of about 100m and the regional dip is to the north-west. The sediments thin to the south and, in places, only the pebble beds remain on the higher interfluves. The southern boundary is diffuse and outliners are frequent, south of the main body. The sediments have been equated with the Gundumi formation of the Illummenden Basin and are therefore mid cretaceous in age (Ologe, 1985).

Alluvial deposits are associated with the present valleys. The older alluvium, which is partly colluvial in origin, forms a valley fill and may be contemporaneous with a high terrace found along Ginzo River. Aeolian deposits overlie the older alluvium. The Aeolian mantle lacks definite pattern and also shows a marked variation in thickness. The younger alluvium occurs along the Tille River within the present floodplain. Recent alluvium deposits are associated with the present floodplain of the major rivers in the area (ibid).

The Landforms reflects the sedimentary rock formation of the area. The landscape is relatively flat, almost featureless, typically less than two degrees, and of about 510m at the Katsina city

center (MLSK, 2008). The plain is underlain by clayey sandstones and grits with small basal pebble. Rock-out crops are generally absent, other than into the small inliers of Basement complex. Laterite capping only occur frequently and drainage texture is considerably much coarser than on basement complex plains further south of the area (Zayyana, 2010).

Katsina State partly falls in the Sudan and partly in Sahel savannah zone which are characterized with semi-arid climate. However, the boundary between the Sudan and Sahel now gradually shifting due to climatic factors (Tucker et al, 1991) thereby resulting in most of the areas falling in the Sahel region.

The pool of rainfall data for Katsina shows that the climate is humid tropical, characterized by a relatively long dry season and somewhat smaller seasons. The rainfall, and indeed throughout West Africa, depend upon the interaction of the warm moist Tropical maritime air mass and the hot and dry tropical Continental air mass. The two air masses met along the Inter-Tropical Convergence Zone (ITCZ) which moves in response to the seasonal disposition of the overhead sun. Rainfall amounts are generally related to the thickness of the Tropical Maritime air mass. The tropical Maritime air mass is wedge-shaped and thins northwards. Consequently, when the ITCZ moves northwards over the study area in May, rainfall becomes progressively heavier and more steady, reaching its peak at about August. In September, as the ITCZ moves southwards, rainfall becomes lighter and sporadic.

The rainfall is concentrated in the months of July, August and September, with figures generally from 700 to 800mm annually. Despite this however, rains have been noted to start from the month of May and June of each year with very limited intensity and duration. Similarly, monthly total, or annual total, can vary considerably. The pattern shows a very strong seasonal cycle, the large variability from year to year, and periods of relatively high and relatively low rainfall. The period from 1926 to 1965 was one of the relatively wet spell while the period from 1966 to 1997 was one of the dry spell, and period from 1998 to 2007 a wet spell again.

The low total amount and sporadic nature of rainfall often results in such problems as excessive or early inundation or desiccation of Fadama, middle-season water stress, multiple seed planting, etc. The mean monthly dry season temperatures are above 30^0C, but significantly drop in the harmattan periods which stretch from November to February when the dry North East trade winds prevail. During this period, the ambient air mass is very dry and cold, dusty during the day and chilly dry at night. During this period, nigh temperatures can drop as low as between 18 and 21^0C, resulting in a relatively high diurnal range of temperature. In the rainy season month of July and September, temperatures of about 22 to 280C prevail. Four distinct seasons are experienced in the area, these are: dry and cool, dry and hot, wet and warm and dry and warm seasons respectively.

Relative humidity in Katsina and its environs never exceed 20-25%, the highest humidity in the area occurs in the months of August and September, while the lowest occur in the months of February and March (Zayyana, 2010).

The relief is generally undulating with an elevation of between 305-610m with isolated inselbergs and residual ironstone capped hills that are 610-905m above mean sea level. The

climate of Katsina state is determined by its geographical location as it lies between the upper part of Sudan savannah and the lower Sahel region of Nigeria. The prevailing of the southwesterly Trade winds (SWTW) influences the rainfall and temperature conditions around this area. Accordingly, the movements of these SWTW across the state influence its rainfall which comes between the months of May and October. The mean annual rainfall is between 1016-1143mm in the southern part of the state and <635mm in the Northern part.

The mean relative humidity is <50% between January and February but could be as high as 80% between June and July. Temperatures are high for most times of the year, reaching a daily maximum of over 40^0C in April and a daily maximum of 21^0C between December and January (Adamu, 2000). With regards to the drainage pattern across the state, it can be said that extensive drainage basins with long slow flowing rivers occur seasonally which take their sources from the dissected basement complex plains and numerous streams with high discharge emptying into the major rivers such as Rima and Kaduna Rivers, respectively. Some tributaries, however, have been harnessed with dams built on them.

The main river draining the town is River Ginzo, which passes through the town and move northwards. Drainage pattern of the area is dendritic to sub-parallel and northward in direction, with widely space drainage lines. Stream flow in the area strongly reflects the climatic environment and, in particular, the season and torrential nature of the rainfall. Thus, three main types of stream flow pattern have been recognized in the area;

1. **Perennial flows**: Low dry season discharges with flash floods superimposed on high rainy season discharges. This flow pattern occurs on the largest river i.e. Ginzo and major tributaries.
2. **Seasonal flow**: Zero dry season flow, flash floods superimposed on rainy season flow which may be high or low depending on catchments area. The river along which Tille is located to this category
3. **Flash flow only** i.e., there is flowing water in the stream channel only during and for a short while after run-off producing storms.

The alluvial sediments in the flood plains, which range from gravels to clay with coarser material along present and old river beds, become saturated during the rainy season and may drain away along the river course during the dry season or, become dammed by impervious rock or clay barriers.

Water in local wells tapping aquifers is usually at a depth of between 25 to 45m, and residents draw water from such deep wells throughout the year. However, farmers and pastoralists alike frequently make shallow wells along the bed of Ginzo river tributary straddling the area, to 5m, and obtain water from this depth at least into late January. The nature and amount of the water supply, together with availability of grazing resources, dictate the movement of cattle, goat and sheep in the area (Zayyana, 2010).

Soils in the area, as elsewhere in Nigeria, represent an interface between intensive chemical weathering of rocks, and an active and intermittent surface and subsurface denudation system, fuelled by intensive rainfall and rapid runoff. The properties of the soils, therefore, represent complex interrelationships between intensity of weathering and rate of lateral and vertical

eluviations of materials, which are in turn related to lithology, topography, climate, vegetation and other environmental controls (MLSK,2008).

Lying within the Northern Sudan savanna, the vegetation is dominated by fine-leaved Acacia spp. and their associates. These trees include Adonsonia digitata, Parkia bigloboza, Anogeissum leiocarpus, Afrormosia laxiflora, Bombax costatum, Boswellia dalzielii, Burkea africana etc. The common shrub and shrubby species include Annona senegalensis, Bridelia ferruginea, Gardenia spp, Grewia mollis, Hymenocardia acida, Lannea kerstingii, May tenus senegalensis, Nauclea latifolia, Pillostigma thonningii etc.

The trees characteristically grow long tap roots and thick barks both of which make it possible for them to withstand the long dry season and bush fires. The grass cover is mostly perennial, with durable roots, which remain underground after stalks are burnt away or wilted in the dry season only to germinate with the first rains. The precise and mixture of the various species is determined by such factors as soil type, moisture conditions, and the degree of human disturbance. The main physiographic communities encountered in order of importance are: cultivated parkland, shrub savanna and floodplain grassland. This biodiversity has been strongly modified as a result of urban expansion and construction (MLSK, 2008).

The State has a population of 5,792,528 (based on 2006 population census), a growth rate of 32% and a population density of about 160 people per square kilometers. Except very few wealthy individuals, most of the rural people in the state are peasant farmers and nomadic herders exploiting most of the little agricultural lands, thereby making it more vulnerable to soil and gully erosion.

Land use in the study area is dominated by urban activities, such as residential, institutional, commercial and industrial land uses, with small area mostly undeveloped for farming. Aside from major urban land uses mentioned above, other land uses such as livestock production and gathering are also carried out in the area.

Residential area cover most part of the study area, different land uses such as commercial, institutional, and educational are all located within the residential areas. Sabuwar Unguwa extension is the major area functioning as industrial layout. Industries such as steel rolling, packaging, beverages processing etc are found in this area.

Commercial activities happened to be growing very fast in the area. There are many smalls and one major central market. The popular markets here are Katsina central market, Kofar Marusa market and old market. Also there are many departmental stores, shopping centers and supermarkets- where local, national and foreign commodities are sold.

Institutional land uses can be found at various locations within urban Katsina. Tertiary institutions include Umaru Musa Yar'adua University, Federal College of Education, Hassan Usman Katsina Polytechnic, and School of Nursing and Midwifery in addition to numerous nursery/primary and secondary schools both governmental and privately owned.

Agricultural activities are confined to open spaces within the built-up areas and at suburb, and on the stretches of flood plains and the little floodable plains of the little floodable part of the low terrace depressions that retains water in the area and other undeveloped lands within the area and other extensive areas just outside the city. The most common market gardening crops grown are Okra, Cabbage; Spinach etc Perennial crops and fruits.

The area also supports large number of cattle, sheep and goats. All livestock in the area graze on natural pastures and shrubs for their nutritional needs, and supplementary feeding from the owners.

Gathering of non-timber forest products (NTFPs) form a small but important part of human activities in the area. Such items provide subsistence goods and services, as well as items of trade. Throughout the area, plant medicines are used for both curative and preventive treatments. Fuel wood constitutes the main energy source for cooking. Besides, gathering processing and trading of the products provides a good source of supplementary income to many households in the area (Zayyana, 2010).

MATERIALS AND METHODS

The stages involved in the research were: 1). Pre-field stage 2). Field-work stage. 3). Post-field work.

Stage1: Pre-Field work

The first stage of this research was to carry out reconnaissance survey by conducting a field visit to the study area to acquaint myself with the terrain nature of the study area and decisions on the modality to be used was adopted. The map of the study area was also sourced from the office of Surveyor-General of Katsina State.

Further, the research concept and methodology was strengthened through intensive literature review from related books, journals, reports, magazines, newspaper, and previous studies. Identification of data needed and its measurement was done by designing the questionnaire.

Table 1: Data Availability

SN	Research Activity	Data Requirement	Source
1	Determine sampling technique, population & samples	Map of Katsina state	Office of Surveyor-General, Katsina State
2	Flood risk perception analysis	Perception of threat or future flooding	Field work
3	Coping strategies analysis at household	Technological, social, economic and cultural coping strategy	Field work

Table 2: Sampling Wards and Size

Ward	Household Size (N)	Sample Size (n)
Wakilin Arewa	8492	18
Waklin Gabas	23530	50
Wakilin Kudu	30494	65
Wakilin Yamma	12330	26
Total	**74846**	**159**

Source: Primary Healthcare dev agency, Katsina office

Stage 2:Fieldwork

Field work stage involved the collection of primary data from the households. The field survey was carried out from February to March, 2014.

i. Primary Data: The primary data collection was conducted through in-depth interview with households using questionnaires. Data related to socio-economic condition, flood experience, including risk perception and coping strategies from the households were collected.
ii. Secondary data: the secondary data was collected from health care development agency for the population of households in the four zones in Katsina metropolis as shown in table.

Sample Frame and Sample Size Determination

The total household population of the study area based on table 2 above stands at seventy-four Thousand, eight hundred and forty six (74,846). This represented the sample frame of the questionnaire survey. Furthermore, the mathematical method was used to determine the sample size for the survey. Below is the procedure.

Mathematical method of determining sample size:

Formula, $n = \frac{N}{1 + N(\alpha)^2}$

Where:

n=sample size,
N=sample frame **(74,846)** and
α represented the margin of error which is 0.05with confidence level of **92%.**
By substituting 74,846 and 0.05 into the formula, **n=156.**

Therefore, the sample size for the survey was one hundred and fifty six (156). This was to ensure that the sampled mean was closer to the population mean and minimize errors. The sampling techniques employed for the study was random sampling. First, the study area was zoned into four wards namely: Wakilin Yamma, Wakilin kudu, Wakilin gabas, Wakilin arewa.

A total of 156 respondents were interviewed and asked to fill in questionnaire of open and closed ended questions. Information on socio-economic characteristics, flood experience, location of respondents, knowledge of flood risk perception and strategy to deal with flood were explored. Since some of the respondents did not understand English language, I engaged the indigenous interviewer who understand and speak Hausa language very well to translate the questions in Hausa since the questionnaire was designed in English. Out of the 156 questionnaire administered, only 150 were recovered from the respondents.

Stage 3: POST FIELD WORK

The data collected were analyzed in three parts; contributing factors analysis, risk perception assessment and coping strategies analysis. Descriptive analysis was also used to describe the contributing factors such as socio-economic profile and flood experience. Multivariate correspondence analysis statistical tool was used to evaluate the perception levels of the respondents.

RESULT AND DISCUSSION

The data collected were analyzed in three parts; contributing factors analysis, risk perception assessment and coping strategies analysis. Descriptive analysis was also used to describe the contributing factors such as socio-economic profile and flood experience. Multivariate correspondence analysis statistical tool was used to evaluate the perception levels of the respondents.

Duration of Stay of Respondents in the Study Area

The length of stay of respondents by wards according to table 4 shows that, 7.3% of the respondents from Wakilin Yamma, Wakilin Arewa (4.7%), Wakilin Gabas (5.3%) and 2% of the respondents from Wakilin Kudu have stayed in the area for between 1-3years. Also 2.7% of the respondents from Wakilin Yamma, Wakilin Arewa (6%), Wakilin Gabas (3.3%) and Wakilin Kudu (2.7%) have stayed in the area for between 4-6years. 4.7%% of the respondents from Wakilin Yamma, Wakilin Arewa (4%), Wakilin Gabas (1.3%) and Wakilin Kudu (4%) have lived in the area for between 7-9years.8% of the respondents from Wakilin Yamma, Wakilin Arewa (11.3%), Wakilin Gabas (14%) and Wakilin Kudu (18.7%) have stayed in the area for between 10 years and above.

Table 4: Duration of Stay

Occupation Type	Frequency				Total	Percentage				Total
	Wakilin Yamma	Wakilin Arewa	Wakilin Gabas	Wakilin Kudu		Wakilin Yamma	Wakilin Arewa	Wakilin Gabas	Wakilin Kudu	
1-3yrs	11	7	8	3	29	7.3%	4.7%	5.3%	2%	19.3%
4-6yrs	4	9	5	4	22	2.7%	6%	3.3%	2.7%	14.7%
7-9yrs	7	6	2	6	21	4.7%	4%	1.3%	4%	14%
I0yrs above	12	17	21	28	78	8%	11.3%	14%	18.7%	52%
Total					150					100

Ownership of Property by Respondents

Table 5 shows that 20.7% of the respondents from Wakilin Yamma, Wakilin Arewa (10%), Wakilin Gabas (12.7%) and 18.7% of the respondents from Wakilin Kudu are owned their property.Also 8.7% of the respondents from Wakilin Yamma, Wakilin Arewa (6%), Wakilin Gabas (7.3%) and Wakilin Kudu (16%) are on a rented property.

Table 5: Ownership of Property

Ownership Type	Frequency				Total	Percentage				Total
	Wakilin Yamma	Wakilin Arewa	Wakilin Gabas	Wakilin Kudu		Wakilin Yamma	Wakilin Arewa	Wakilin Gabas	Wakilin Kudu	
Owner	31	15	19	28	93	20.7%	10%	12.7%	18.7%	62%
Rent	13	9	11	24	57	8.7%	6%	7.3%	16%	38%
Total					150					100

Table15:Respondents' Strategies of Avoiding Flood Impact

	Frequency				Total	Percentage				Total
	Wakilin Yamma	Wakilin Arewa	Wakilin Gabas	Wakilin Kudu		Wakilin Yamma	Wakilin Arewa	Wakilin Gabas	Wakilin Kudu	
Moved property to higher ground	9	6	12	7	34	6%	4%	8%	4.7%	22.7%
Evacuated/ abandon flooded area	4	-	-	-	4	2.7%	-	-	-	2.7%
Relocating completely	1	-	2	-	3	0.7%	-	1.3%	-	2%
Clearing of waterways	37	17	29	25	108	24'7%	11.3%	19.3%	16.7%	72%
Others	-	1	-	-	1	-	0.7%	-	-	0.7%
Total					**150**					**100**

RESPONDENTS' EFFORTS TO REDUCE FUTURE FLOOD IMPACTS

It could be seen in Table 16 that 14% of the respondent from Wakilin Yamma, Wakilin Arewa (7.3%), Wakilin Gabas (12.7%) and Wakilin Kudu (16%) raised their houses up above flood level, 2% of the respondent from Wakilin Yamma, Wakilin Arewa (6%), Wakilin Gabas (3.3%) and Wakilin Kudu (3.3%) raised utilities up above flood level,1.3% of the respondent from Wakilin Yamma, Wakilin Arewa (0.7%), Wakilin Gabas (2.7%) relocated away from the flood plain.

Table 16: Efforts Made To Reduce Future Flood Damages

Activity	Frequency				Total	Percentage				Total
	Wakilin Yamma	Wakilin Arewa	Wakilin Gabas	Wakilin Kudu		Wakilin Yamma	Wakilin Arewa	Wakilin Gabas	Wakilin Kudu	
Raised house up above flood level	21	11	19	24	75	14%	7.3%	12.7%	16%	5%
Raised utilities up	3	9	5	5	22	2%	6%	3.3%	3.3%	14.7%

above flood level										
Relocated out of flood plain	2	1	4	-	7	1.3%	0.7%	2.7%	-	4.7%
Flood-proof home	-	-	-	-	-	-	-	-	-	-
Others	12	9	11	14	46	8%	6%	7.3%	9.3%	30.7%
Total					**150**					**100**

CONTINGENCY PLANS OF THE COMMUNITY TOWARDS RAINY SEASON FLASH FLOOD EVENTS

Field investigations were also conducted of the contingency plans that communities do undertake to prepare for rainy season flood events. The results obtained (Table 17) indicate that 4.7% of the respondent from Wakilin Yamma, Wakilin Arewa (3.3%), Wakilin Gabas (2.7%) and Wakilin Kudu (2%) of the respondents agreed that there are no efforts at community level in preparation for the rainy season while 23.3% of the respondent from Wakilin Yamma, Wakilin Arewa (18%), Wakilin Gabas (29.3%) and Wakilin Kudu (15.3%) agreed that the community is making effort in preparation of the rainy season.

Table 17: Whether there are Contingency Plans of the Community towards Rainy Season Flash Flood Events

	Frequency				**Total**	**Percentage**				**Total**
	Wakilin Yamma	Wakilin Arewa	Wakilin Gabas	Wakilin Kudu		Wakilin Yamma	Wakilin Arewa	Wakilin Gabas	Wakilin Kudu	
Yes	7	5	4	3	19	4.7%	3.3%	2.7%	2%	12.7%
No	35	27	44	23	129	23.3%	18%	29.3%	15.3%	86%
No response	1	-	1	-	2	0.7%	-	0.7%	-	1.3%
Total					**150**					**100**

The respondents were also asked to indicate the ways in which they have been receiving external intervention to help them cope with flood and the responses received are summarised in Table 4.25. It could be seen from the that 4.7% of the respondent from Wakilin Yamma, Wakilin Arewa (9.3%), Wakilin Gabas (22.7%) and Wakilin Kudu (5.3%) indicated that they receive intervention in the area of flood warning. 2% of the respondent from Wakilin Yamma, Wakilin Arewa (6%), Wakilin Gabas (4%) and Wakilin Kudu (9.3%) got intervention in the area of development control.

Table20: Ways of External Intervention to Communities

Ways Of Intervention	**Frequency**				**Percentage**			
	Wakilin Yamma	Wakilin Arewa	Wakilin Gabas	Wakilin Kudu	Wakilin Yamma	Wakilin Arewa	Wakilin Gabas	Wakilin Kudu
Flood warning	7	14	34	8	4.7%	9.3%	22.7%	5.3%
Evacuation	-	-	-	-	-	-	-	-
Development control	3	9	6	14	2%	6%	4%	9.3%
Emergency response	1	3	-	-	0.7%	2%	-	-
Careful planning	-	-	-	-	-	--	-	-

of flood prone areas								
Careful rehabilitation of flood prone areas	-	-	-	-	-	-	-	-
Provision of relief materials	11	8	16	1	7.3%	5.3%	10.7%	0.7%
Provision of alternative houses	-	-	-	-	-	-	-	-
Resettlement of flood victims	-	-	-	-	-	-	-	-
Provision of transit camps	-	-	-	-	-	-	-	-
Local authorities	-	-	-	-	-	-	-	-
Flood diversions	-	-	-	-	-	-	-	-
Clearance of blocked drainages and water ways	-	-	-	-	-	-	-	-
Using science to understand flood and help the people	-	-	-	-	-	-	-	-
Creating awareness on flood issues	6	3	4	2	4%	2%	2.7%	1.3%
Provision of loans and grants to help people to start new lives	-	-	-	-	-	-	-	-

0.7% of the respondents from Wakilin Yamma and Wakilin Arewa (2%)got intervention in the area of emergency response from the government.7.3% of the respondent from Wakilin Yamma, Wakilin Arewa (5.3%), Wakilin Gabas (10.7%) and Wakilin Kudu (0.7%) were provided relief materials. 4% of the respondent from Wakilin Yamma, Wakilin Arewa (2%), Wakilin Gabas (2.7%) and Wakilin Kudu (1.3%) said the intervention they receive was in the area of creating public awareness.

Plate 1: Construction of retaining wall/raising house up above flood level as a coping strategy to flood (*Picture Location: behind Alliance bread, Kofar Kaura, Katsina).*

Plate 2: Damage to culverts by flood
(*Picture Location: Near Lambun Sarki, Kofar Marusa, Katsina).*

CONCLUSION

The flood perception was measured through the perception of threat or perception of future flooding. In this case, people gave their own judgment related with flooding in the future which they consider to be levels that are: low risk, moderate and high risk. It is found out that 19.3% of the respondents considered living in the area with low risk of flood, 72.7% with moderate risk of flood and 7.3% of the respondents considered living in a high risk of flood (Table 4-2).

Findings from this study indicated that there is much no difference of risk perception among people within the different zones of Wakilin Yamma, Wakilin Arewa, Wakilin Gabas and Wakilin Kudu in Katsina metropolis. Meanwhile, the flood risk perception of the people living in Katsina metropolis are influenced by these factors as gender, length of stay and type of roofing and floor materials..

Most of the socio-economic factors tested in this study show little or no significant influence on risk perception. Only gender and duration of stay are the only variables of socio-economic characteristics which play a role of the variability of people perception towards flood risks. Economic factors do not seem to play a significant role in risk perception. Both income and ownership of building have no influenced on risk perception.

Before flooding, keeping the clothes and valuable things in the plastic bags or container is the most common coping strategy applied by the households at all zones. Some people move household properties and valuable things such as television, radio, clothes to higher place in preparation before commencement of flash flooding during the rainy season. The main technological/physical coping strategy being used is raising the house or strengthening its foundation, especially in areas where the houses have been inundated.

The people of the study area have a good social bonding with each other. This condition is also pointed out in their cooperation when dealing with flood problems. Activities such as discussing the best action to protect the community from flood, sharing flood information obtained from monitoring post and night patrol are common activities in Katsina.

The perception of flood threat has a direct bearing on the type of coping mechanism applied by the respondents. Infact the way the respondents apply some type of coping mechanism is strongly affected by the way they perceived of flood threat in their area.To reduce the impact of flood across the study area, the Katsina state Government has constructed some flood control measures prominent of which is the stream side embankment constructed at Sabuwar Unguwar where a long drainage line and a bride locally called Gadan Nayalli was constructed. The Government constructed dike to strengthen the river embankment.

RECOMMENDATIONS

In light of the major findings of this study, the following recommendations are considered appropriate here:

i. There is need for a bottom up participatory involving all stakeholders in order to aid decision makers more effectively to achieve flood hazard reduction against the top down approach where the government alone feels it has the monopoly and expertise to managing flood.
ii. There is need for creation of more flood risk awareness and flood warning signs to further educate the people.
iii. At present, flood disaster management is at national level and done by NEMA but its effects are felt at local level. There is need for national spread in order to better tackle flood hazard.

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