Assessment of Substantive Causes, Effects and Mitigation Strategies of Flood Scenario in Yola South LGA, Adamawa State, Nigeria.

Sadiq A.A[1], Sulaiman, U. Bello [2] Hadi Mohammed [3]

1. Department of Agricultural Technology, College of Agricultural Technology, Adamawa State Polytechnic, Yola Adamawa State, Nigeria. P.M.B 2146
2. Department of Urban and Regional Planning, College of Environmental Sciences, Adamawa State Polytechnic, Yola, Adamawa State, Nigeria. P.M.B 2146.
3. Department of Disaster Management, College of Environmental Sciences, Adamawa State Polytechnic, Yola, Adamawa State, Nigeria. P.M.B 2146.

Corresponding Author E-mail: **sadiqhsadiq6@gmail.com** **070-680-36-372**

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Abstract

Yola South LGA is one of the probable flood prone areas in Adamawa state which seriously cause damages to the inhabitants seasonally. Therefore, this study saddled to assess the substantive causes, effects and mitigation strategies of flood scenario in Yola South LGA, Adamawa state. The study adopted quantitative survey techniques where 385 inhabitants were selected as the respondents from eight different flood prone areas. Well-structured and defined questionnaires were randomly administered to the sample respondents and data obtained were analyzed using descriptive statistics. The findings in respect of socio-economic characteristics indicated that most inhabitants of the areas were in low income cadre earning less than a minimum wage salary (< 18000 naira) from farming and artisan work. Heavy rainfall (18 %) and river over flows (17%) were the major factors that caused flooding in the area. It was also revealed that Sabon Pegi D/L and Modere (20 % and 17 %) were the utmost dominant flood prone areas due to their proximity to River Chochi. In terms of effects caused by the flood scenario in the area loss of properties was found to be more destructive conceived by 23 % of the respondents and 17 % of them revealed that farmlands were also damaged by flood. The months of August and September were the prominent where flood found to occur seasonally. Thus, this study therefore recommends that government should establish resettlement project scheme to relocate the affected people to safer terrain and to integrate effort towards construction and expansion of drainage system in the most flooded areas. Buildings should be ensured legally planned and constructed under intensive supervision of the agencies concern. Environmental problems and consciousness should be enlighten to the inhabitants by both state and federal ministries of environment

***Index Terms*:** Floods, Causes, Effects, Mitigation and Yola South LGA.

INTRODUCTION.

Flood is a natural event or occurrence where a piece of land (or an area) that is usually dry, suddenly get submerged under water. (Nigeria Hydrological Services Agency: Annual flood Outlook. NIHSA: AFO: 2016). Similarly, Bwala, Oladosu and Nghalmi, (2015) had explained that flood is simply seen as an environmental hazard that occurs when there is an overflow of water that submerges land which is usually dries. The increasing need for human development through rapid urbanization has led to a wide spread horizontal development especially in the developing countries (Adewumi, 2013) .Thus, Nigeria is not an exceptional. Floods

are the most common environmental hazard in Nigeria. (Etuonovbe, 2011: in Dama, Ishaku, and Abdurrahman. 2014). In Nigeria, flooding is the most frequent and most widespread natural hazard accounting for about one-third of all disasters arising from geophysical hazards and adversely affecting more people than any other natural hazard (Adebayo and Oruonye , 2012: in Obeta, 2014). Moreover, in Nigeria, Adamawa state is one of the most occurring flooded states over the decade with a large extent of vulnerability leading to devastating loss of lives, properties, farmlands, displacement and negatively affecting the socio-economic activities in the state (Sadiq and Hena, 2018). Similarly, in Adamawa state, there are areas that are highly prone to flood for the past decades with a peculiar high extent of a particular year which might be associated with an indiscriminate human/ anthropogenic activities and their proximity to the River Benue Plains coupled with some natural climatic phenomenon such as high rainfall or precipitation, Evaporation Rate, Low atmospheric temperature, High Relative Humidity, River flow, Run-off, gauge height, etc (Sadiq and Hena, 2018). Thus, Yola South LGA is not exceptional in the state.

CAUSES OF FLOODING IN NIGERIA

Nwigwe and Emberga, (2014) stated that, generally, causes of flood in Nigeria could be as a result of natural cause or human cause. Adeyanju (2008) stated that 90% of flooding in our locality is human induced; mostly caused by blockage of drainages by silts and debris, building of houses along river banks and on drainage systems. These channels' obstruction always keep the flood plain soil saturated with water, making them areas liable to flooding giving the slightest rise in channels' flow (Moffat and Linder, 1995). Also human factors like deforestation and overgrazing are some of the causes of flooding, adding however that, flood could be as a result of collapse of dams leading to water overflowing their banks. It may also be as a result of heavy storm or storm surge and it is equally today attributed to climatic change. According to Folorunsho and Awosika, (2001) floods in Nigeria occur in three main forms: coastal floods which occur in mangrove and delta coastlines; river floods which occur on the flood plains of large rivers; and flash floods which are short lived events developing in less than 6 h from rainfall to the onset of flooding. Floods have been identified to be caused by many factors including surcharges in water level due to natural or man-made construction on flood plains, sudden dam failure, inappropriate land use planning, mudflow, inadequate drainage capacity, ice jam, snow fall, and deforestation of catchment basins (Odemerho, 2004 and Nwafor, 2006.). Similarly, Nwigwe and Emberga, (2014) stated that, coastal flooding occurs in the low-lying belt of mangrove and fresh water swamps along the coast river flooding occurs in the flood plains of the larger rivers flash floods are associated with rivers in the inland areas where sudden heavy rains can change them into destructive torrents within a short period. Urban flooding occur in towns located on flat or low lying terrain especially where little or no provision has been made for surface drainage, or where existing drainage has been blocked with municipal waste, refuse and eroded soil sediments, extensive urban flooding is a phenomenon of every rainy session in Lagos, Maiduguri, Aba, Warri, Benin and Ibadan. Virtually every Nigerian

is vulnerable to disasters, natural or man-made. Every rainy season, wind gusts arising from tropical storms claim lives and property worth millions of naira across the country. Flash floods from torrential rains wash away thousands of hectares of farm land. Dam bursts are common following such flood. In August 1988 for instance, 142 people died, 18,000 houses were destroyed and 14,000 farms were swept away. When the Baguada Dam collapsed following a large flood. Urban flooding such as the Ogunpa disaster which claimed over 200 lives and damaged property worth millions of naira in Ibadan, are common occurrence. Floods paralyze economic activities in many towns and cities in the country. Major roads, some linking states are flooded causing hardship to motion sits. When these roads were constructed, the flooding problems were not there, and the companies that constructed the roads probably did not anticipate the problem. As noted by Oyegun, 2001 and. Angillieri, (2007) flood may be induced by a variety of factors, most notably heavy precipitation (intensity, duration, amount, or snow). In urban areas, flooding is induced by inadequate drainage, incompatible land-use practices, weak control mechanism and high concentration of impervious surfaces which lead to remarkable increases in the volumes of runoff even at the instance of a little downpour of a short duration (Lazaro, 1990 and Adelekan, 2010 and Adewale, Sangodoyin and Adamowski, 2010).

EFFECTS OF FLOODING IN NIGERIA

According to Obeta, (2009) flood disasters accounted for about 38% of all the federally declared natural disasters between 1995 and 2005 in Nigeria. Floods have been a recurring phenomenon in Nigeria and has had devastating effects in Ibadan (1985, 1987 and 1990), Yobe (2000) and Akure (1996, 2000, 2002, 2004 and 2006). The most recent experience of floods which occurred in 2012 claimed an estimated 431 people, displaced over 2.1 million people and damaged properties worth millions of Naira in Benue, Bayelsa, Delta, Borno, Cross River Ebonyi, Bauchi, Gombe, Katsina, Kebbi, Kaduna, Plateau, Taraba and Adamawa States. It is reported by the NIHSA: AFO: (2013) that, during recent years there has been an alarming rise in economic losses due to flooding in the country. In 2012 alone, Nigeria recorded a total estimated loss of N 2.29 Trillion (National Emergency Management Agency, NEMA: 2013 in NIHSA; AFO; 2016). Moreover, In many parts of Nigeria flooding continue to be an increasing problem, catching individuals and communities by surprise in a repeatedly exasperating way and causing disruption of social activities, damage of infrastructure and even death of people and livestock (Ayoade, 1985 and Okeke 2006). In many parts of Nigeria, flooding continue to be an increasing problem, catching individuals and communities by surprise in a repeatedly exasperating way and causing disruption of social activities, damage of infrastructure and even death of people and livestock (Ayoade,1985 and Okeke,2006). Similarly, In Nigeria, Adamawa state is one of the most occurring flooded states over the past decades with a large extent of vulnerability leading to devastating loss of lives, properties, farmlands, displacement and negatively affecting the socio-economic activities in the state (Sadiq and Hena, 2018). Similarly, William (1999) in his study of Loko river basin in Adamawa State flood disaster of August 1998

asserted that properties, animals and houses worth millions of Naira were destroyed. He further explained that the effects included structural and erosion damages, loss of lives and contamination of water and the destruction of other socio-economic activities. However, in Adamawa state, Yola South LGA, is among the probable flood prone area for all most a decade with a peculiar high extent of a particular year which might be associated to human induced factors such as poor or absence of drainage, illegal building structures on/across drainage channels, blockages of canals/drains, dumping of waste in gutters and culverts, illegal channelization of channels, poor waste management and poor physical planning. Plates below show the evident of human induced factors of flood in Yola South LGA.

Plates1.Show unplanned construction of buildings on water ways and improper waste disposal at Modere and Anguwan Tabo areas of Yola South LGA which aid flood reoccurrences.

The repeated occurrence of catastrophic flood episodes in Adamawa state, particularly in Yola South LGA the impacts of flooding have increasingly assumed from significant to threatening proportions, resulting in losses sustained by the urban dwellers and flood victims, have been sustained by the citizen of the study area due to what has become perennial anthropogenic disaster. Houses,

schools buildings, bridges, markets places were submerged and collapse by flooding in the study area as depicted in the plates 2,3 and 4 below;

Plates 2. Shows the Submerged Tashan Sani Market in Yola South LGA which halt people from the market and economic activities.

Plate 3.Shows the flooded area at Modere in Yola South LGA .

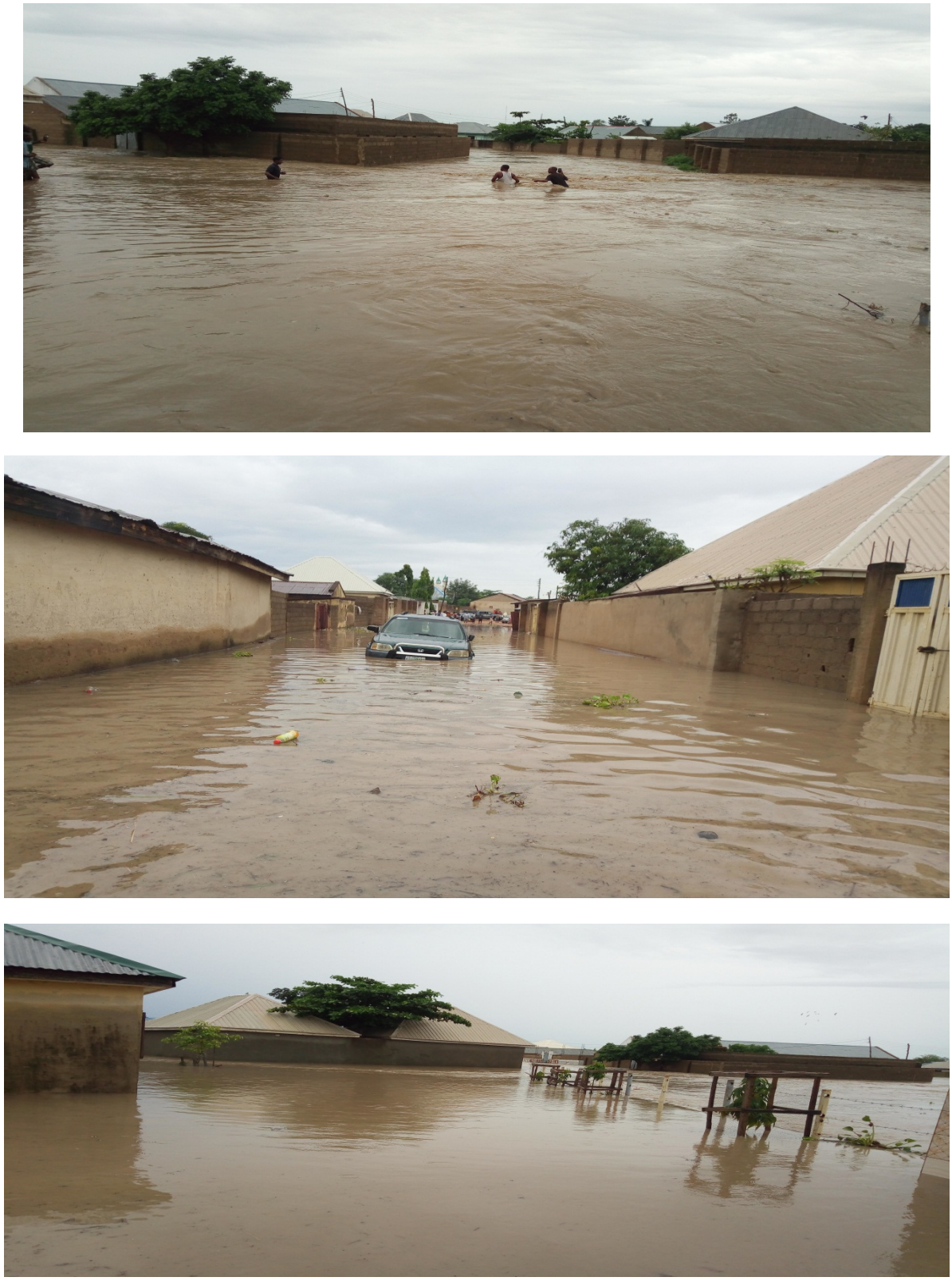

Plate 4. Shows the flooded area at Sabon Pegi D/L in Yola South LGA.

The devastating effect of floods was not limited to houses and people in the study area. Many farmlands both arable and agro-foresting were swept and mapped away by soil creeping, solifluction and siltation effects as shown on plates 5 below;

Plates 5.Shows the submerged farmlands along Chochi bridge in Yola South LGA .

Hence, this justifies the ardent and pivotal need of comprehensive understanding of these human induced activities that leads to annual exacerbated flooding scenarios and its effects on lives and properties in the study area. This study therefore saddled to assess the substantive causes, effects and mitigation strategies of 2018 flood scenario in Yola South LGA, Adamawa State. The specific objectives of this study are to identify both climatic and human causes and effects of flood in Yola South LGA with a view to induce mitigation strategies for protection and sustainable development in the area.

THE STUDY AREA

The study will be conducted in Yola South LGA of Adamawa State which lies on latitude 09^0 14'N and 09^0 20'N of the equator and longitude 12^0 25'E and 12^0 28'E of the Greenwich meridian, it has total population of 336, 648 persons as of 2010 (NPC; 2006). The average annual rainfall in the study area ranges between 850mm-1000mm with over 41% of rain falling in August and September. Temperature also has a significant temporal variation in the study area; with an average maximum temperature of 42^0C with an average relative humidity of about 29%. (Upper Benue River Basin Development Authority, 'UBRBDA' 2018).

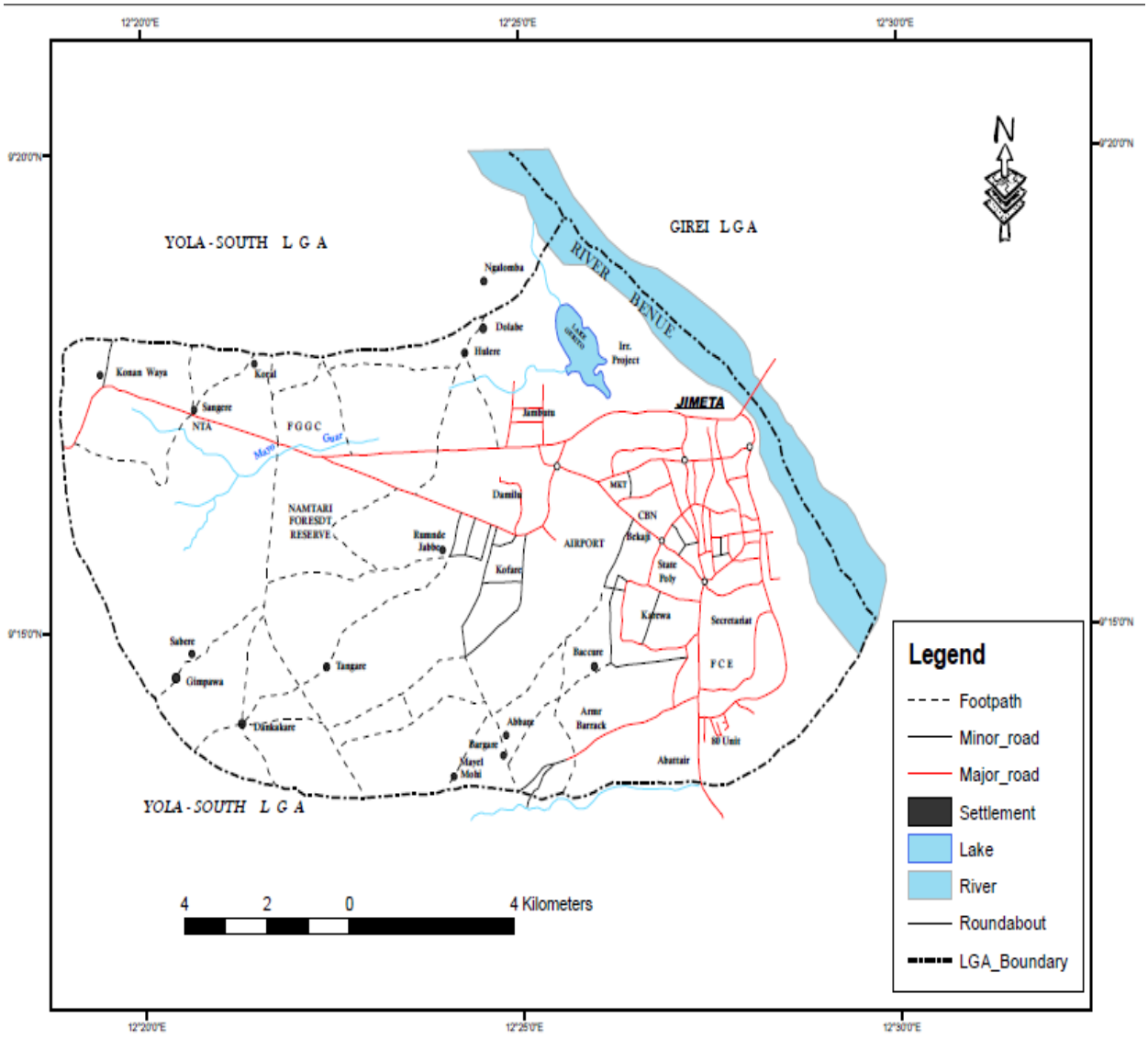

Fig 2. Shows the map of the Study Area (Adopted from Festus, 2016)

SAMPLING TECHNIQUES AND DATA COLLECTION

Both primary and secondary sources were explored to obtain the required data for this study. The primary sources were the raw data that was collected through Field Survey Assessment (FSA), questionnaires and oral interview. A set of questionnaires containing open and close-ended questions were well-structured and administered randomly to the sampled size of 385 respondents in the study area. The Journals, textbooks, internet, unpublished thesis and maps were obtained from the library and institutions which formed the secondary sources explored in the study.

DATA ANALYSIS

To achieve the objectives of this study, the data obtained was analyzed using descriptive statistics where frequencies, percentages and charts were assessed and presented clearly.

RESULTS

Table 1 Demographic Data of the Respondents.

VARIABLES	CATEGORY	FFREQUENCY	PERCENT %
	≤ 20	8.085	2.1
Age of the Respondents	21-30	46.2	12.0
	31-40	92.785	24.1
	41-50	117.425	30.5
	51-60	70.455	18.3
	61-70	35.55	9.0
	≥70	15.4	4.0
		TOTAL N = 385	**TOTAL P=100**
Age of staying in the area	< 3years	35.55	9
	3-5 years	69.3	18
	6-8 years	80.85	21
	9-11 years	107.8	28
	>11 years	92.4	24
		TOTAL N = 385	**TOTAL P = 100**
	Never been in school	65.45	17.0
	Religion school	77	20.0
Level of Education	Primary school	100.1	26.0
	Secondary school	82.775	21.5
	Tertiary school	59.675	15.5
		TOTAL N = 385	**TOTAL P = 100**
	Civil servant	57.75	15
Occupational status	Private servant	38.5	10
	Business	73.15	19.
	Pensioner	42.35	11.
	Farmer	92.4	24
	Artisan	80.85	21
		TOTAL N = 385	**TOTAL P = 100**
	< 9000	84.7	22.0
	9001-18000	111.65	29.0
Monthly Income level(Naira)	18001-27000	81.62	21.2
	27001-36000	72.38	18.8
	>3600	35.55	9.0
		TOTAL N = 385	**TOTAL P = 100**

Source: Author's Field Observation Assessment, (2018)

Occupational Status of the Respondents

From the result presented in table 1, only 10 % of the respondents were private servant, 11 % of them were found to be pensioners and most of them (24%) were farmers and Artisan formed 21 %. The remaining 19 % and 15 % of them were engaged in business and civil servant as their occupational status respectively**.**

Monthly Income Level (Naira)

29% of the respondents earn monthly income of N 9001-18000 and 22 % of them obtained N < 9000 as their monthly income. This result revealed that majority of the inhabitants in the study area earn below the current minimum wage benchmark of N18000.00 in Nigeria which defined the nature of their occupation as peasant farmers and artisan. This perhaps suggests the different reasons they gave for their continuous stay in the area despite the annual threat of flood experienced in most part of the area.

Age of the Respondents

The result of the findings revealed that majority of the respondents which formed 30.1 % were within the age of 41-50 years which still they are within the active age group that mostly affected by flood and participates in flood mitigation strategy. Similarly, 24.1 % of them were found at age bracket of 31-40 years.

Age of Staying in the Area

Majority of the respondents (28 %) stay in the area for a period of 9-11 years despite the flood incidences experienced, while 24 % of them leave for > 11 years and 21 % accommodates the areas for a period of 6-8 years respectively.

Level of Education

26 % of the respondents formed the majority had obtained primary school, those with secondary school certificate assessed to be 21.5 % and 17 % of them had not been to school, the remaining 15.5 % formed those with tertiary certificates.

Table 2 What are the major affected areas by flood in Yola South LGA.

Flood Areas in Yola South LGA	Frequency	Percentage %
Yolde- Pate	50.05	13
Modere	65.45	17
Tashan Sani	57.75	15
Sabon Pegi D/L	77	20
Shagari Phase 2	57.75	15
Bole Phase 2	30.8	8
Lakare	15.4	4

Wurochekke	23.1	6
Others	7.7	2
	TOTAL N = 385	**TOTAL P = 100**

Source: Author's Field Observation Assessment, (2018)

Findings on the major affected areas by flood in the study area were presented in table 2 above. From the result 20 % of the respondents pointed out that Sabon Pegi D/L was found to be the major area affected by flood annually then followed by Modere area (17 %) of the respondents while Tashan Sani and Shagari Phase 2 each forming 15 % respectively.

Table 3 What are the reasons of occupying the flood affected areas in Yola South LGA.

Variables	Frequency	Percentage %
Inadequate finance	65.5	17
Family origin	50.05	13
Cheaper rent	77	20
Cheap land	100.1	26
Unavailability of land	77	20
Others	15.4	4
	TOTAL N = 385	**TOTAL P = 100**

Source: Author's Field Observation Assessment, (2018)

26 % of the responses from the respondents revealed that cheap land of the area is the main reason for the inhabitants for occupying the area, while unavailability of land and cheaper rent recorded 20 % each as shown on table 3. Inadequate finance among respondents (17 %) prompted them to stay in the area despite the annual flood scenarios experienced, while only 13% of the respondents were leaving in the area as family origination.

Table 4 What are the major causes of the floods in Yola South LGA

Variables	Frequency	Percentage %
Absence and poor drainage system.	61.6	16
River over f lows	65.45	17
Heavy rainfall	69.3	18
Illegal buildings on drainage channels	50.05	13
Improper dumping of waste in gutters	38.5	10
Topography	30.8	8
Poor physical planning	46.2	12
Others	23.1	6

	TOTAL N = 385	**TOTAL P = 100**

Source: Author's Field Observation Assessment, (2018)

Findings of the study revealed that many factors are responsible for flooding in Yola South LGA, as expressed by the respondents in table 4 above. From the result 18 .0% of the respondents attributed it to heavy rainfall, 17 % conceived it to be river over flows, while absence and poor drainage system was revealed to have 16 % and 13 % of them had attributed it to illegal buildings on drainage channels.

Table 5 Which type of flood does Yola South LGA usually experienced

Variables	Frequency	Percentage %
River	130.72	34
Urban	88.55	23
Flash	107.8	28
Dam	26.95	7
Coastal	19.25	3
Others	11.55	2
	TOTAL N = 385	**TOTAL P= 100**

Source: Author's Field Observation Assessment, (2018)

From table 5 above, it was revealed that the river flooding is the major type of flood experienced in the area with 34 % of the respondents. 28 % said that flash flood is the type of flood noted annually in the area while urban flooding revealed to have 23 % of respondents. The remaining 12 % of them had attributed it to dam, coastal and others respectively.

Table 6 Which Months does the flood reoccurrence usually was at peak.

Variables	Frequency	Percentage %
May	7.7	2
June	38.5	10
July	57.75	15
August	127.05	33
September	115.5	30
Others	38.5	10
	TOTAL N = 385	**TOTAL P = 100**

Source: Author's Field Observation Assessment, (2018)

The result presented on table 6 revealed that, the peak month of usual flood occurrence in Yola South based on responses of the respondents in the studied areas was the month of August with 33 %, respondents, while 30 % had conceived it to be in the month of September and 15 % revealed to occurred annually in July.

Table 7 What are the types of effects or damages that usually caused by the flood in the area.

Variables	Frequency	Percentage %
Loss of lives	23.1	6
Destruction of farmland	65.45	17

Spread of diseases	26.95	7
Loss of livestock	50.05	13
Destruction of buildings	53.9	14
Loss of properties	88.55	23
Paralyze of socio-economic activities	50.05	13
Contamination of water	26.95	7
	TOTAL N = 385	**TOTAL P = 100**

Source: Author's Field Observation Assessment, (2018)

From the result on table 7, 23 % of them had the opinion that huge properties were lost annually in the area due to flood. Similarly, 17 % of the respondents had conceived to had destruct farmlands in the area, while 14 % of the respondents had attributed the flood damage on destruction of buildings. Loss of livestock and Paralyze of socio-economic activities were due to flood forming 13 % each.

Table 8 What is the Possible Practical Workable Mitigation Strategy of Flood in Yola South

Variables	Frequency	Percentage %
Legal building of houses	88.55	23
Proper construction of drainages	134.75	35
Proper disposal of waste	73.15	19
Good waste management	34.64	9
Physical planning	53.9	14
	TOTAL N = 385	**TOTAL P= 100**

Source: Author's Field Observation Assessment, (2018)

The mitigation strategies of flooding destruction in Yola South LGA were suggested by the respondents in the study as depicted on table 8 above. Proper construction of drainages is the most workable mitigation strategy to flood reoccurrence in the area as conceived by 35% of the respondents, while 23 % of them linked the solution to legal building of houses by the inhabitants, proper disposal of waste formed the 19 % of the respondents and the remaining 9 % attached it to good waste management.

DISCUSSIONS

From the results presented above, it was discovered that Sabon Pegi D/L, Modereare and Yolde Pate were the major flood prone places in Yola South LGA. This might be attributed to the steep nature of slope and were all lies along River Chochi which is one of the minor tributaries to River Benue. Similarly, in a technical report of Gangunen, (2018) explained that the level of devastation of flood at Yolde Pate and Modire was very severe which over topped the bridge and the surrounding culvets on the main road leading to Yolde Pate from Yola town.

The cheapness amount of the land and rent in the area were the major reasons for most of the inhabitants to continue staying in the flood prone areas of Yola South. This is because the multiple increase in population density in Yola South coupled with the migrants

as well as internally displaced persons (IDPs) from the Northern part of the state due to Boko Haram insurgency prompted them to patronize the flooded areas . Thus, it is affordable looking at its menace of flooding seasonally which consequent led to its cheapness. This findings concord with what Ayoade, (1988) noted; Floods disasters are man-made, as they occur where and when man puts himself at risk by developing and occupying floodable areas. He also noted that, man develops and occupies flood plains at risk of flooding out of ignorance or for economic reasons. Among the factors that caused flooding in the study area heavy down pour and river overflows were the two major factors revealed from the study. Despite the climatic region of Yola south with low amount of annual rainfall, the area from the last decade (2008-2018) was experienced an increase in total amount of rainfall of more than 800 mm with more than 60 days number of rainy days as shown in the figure below respectively.

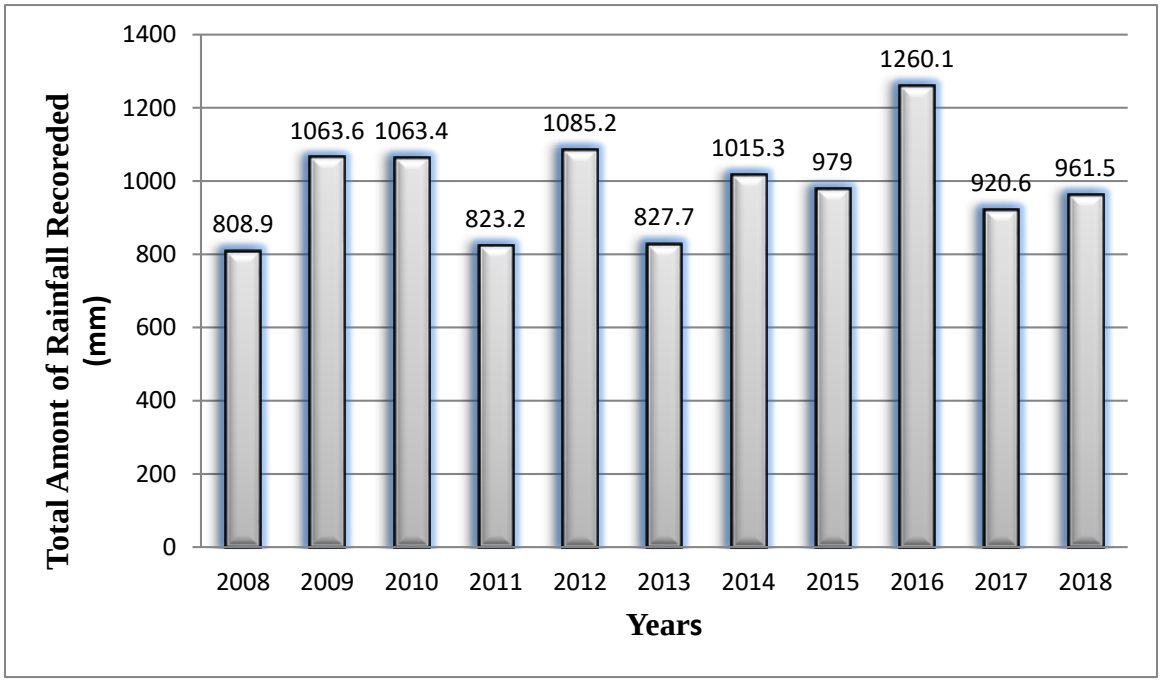

Fig 1. Shows the total amount of rainfall for a recent decade (from 2008-2018) of Yola South LGA. (Source: UBRBDA, 2018).

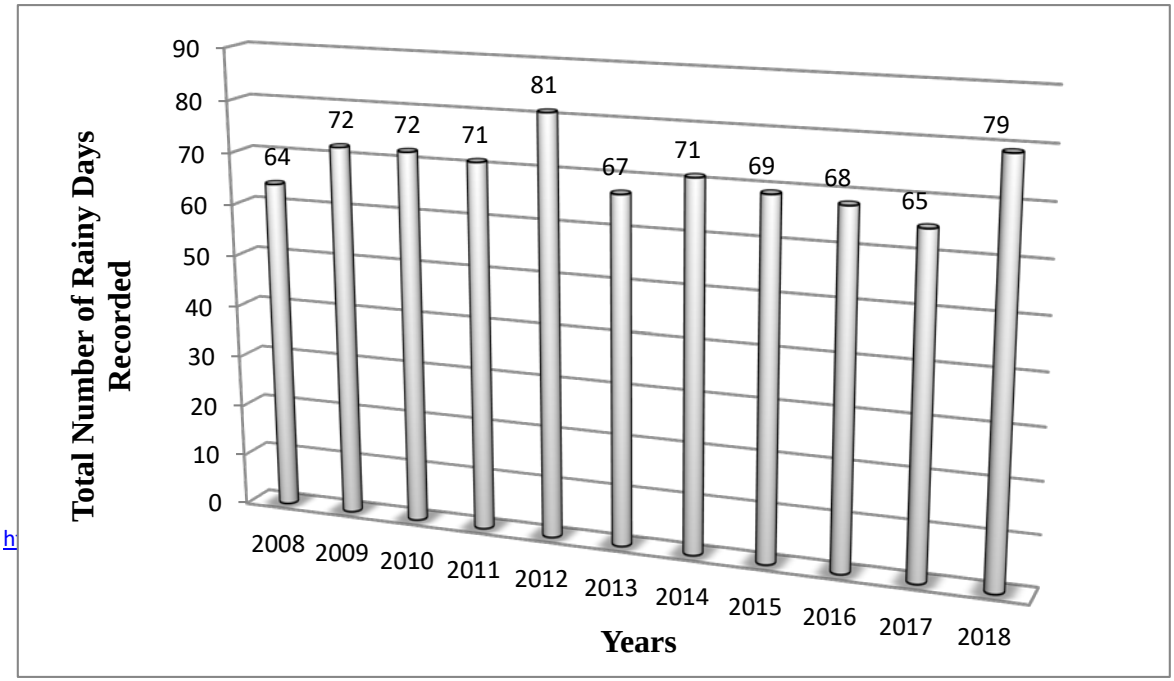

Fig 2. Shows the total number of rainy days for a recent decade (from 2008-2018) of Yola South

(Source: UBRBDA, 2018).

This finding is in conformity with the verdict of Ward and Robinson, (1990) where they explained that quick flood are those usually caused by intense or prolonged rainfall or snow melt or combination of these two in a given area. Similarly, it was noted also by Oyegun, (2001) and. Angillieri, (2007) that flood may be induced by a variety of factors, most notably heavy precipitation (intensity, duration, amount, or snow) Thus, Changes in precipitation events will affect flow rates and timing (Constantine, 2009) and also Knapp (1979) looked time to time heavy rainfall resulted in flood occurrence. Similarly, river flows been the second factor might be as a result of proximity of the area to River Chochi. The river was originated from Verre Hill South-eastern part of Yola. It has a river bed 158.461 m above mean sea level on latitude 09^{0} 13 and longitude 12^{0} 28 which carries substantial amount of water beyond its capacity after heavy down pour consequently submerged the area. In addition, Obeta (2014) added that, the release of water from the Lagdo dam upstream of the River Benue led to the flooding of the entire length and breadth of the downstream catchment of the basin. (Obeta, 2014). The study area seasonally experienced River flood and Flood flash which was sourced from River Chochi and also Wuro-chekke area along River Benue. Hence, all the settlements (both rural communities and townships) along the River Benue were flooded (Adebayo and Oruonye, 2012). Thus, the study area was situated on low undulating terrain at the south western bank of River Benue and South eastern part of River Chochi with some patches liable to flood when the discharge is high. The months of August and September were the months where flooding usually was at peak in the area. This followed the heavy precipitation usually experienced in the two months than the remaining months of the rainy season in the study area. Similarly, the number of rainy days

was maximum in the months of August and September. The figures below shows the variation of total monthly amount of rainfall recorded in 2018 in Yola South LGA.

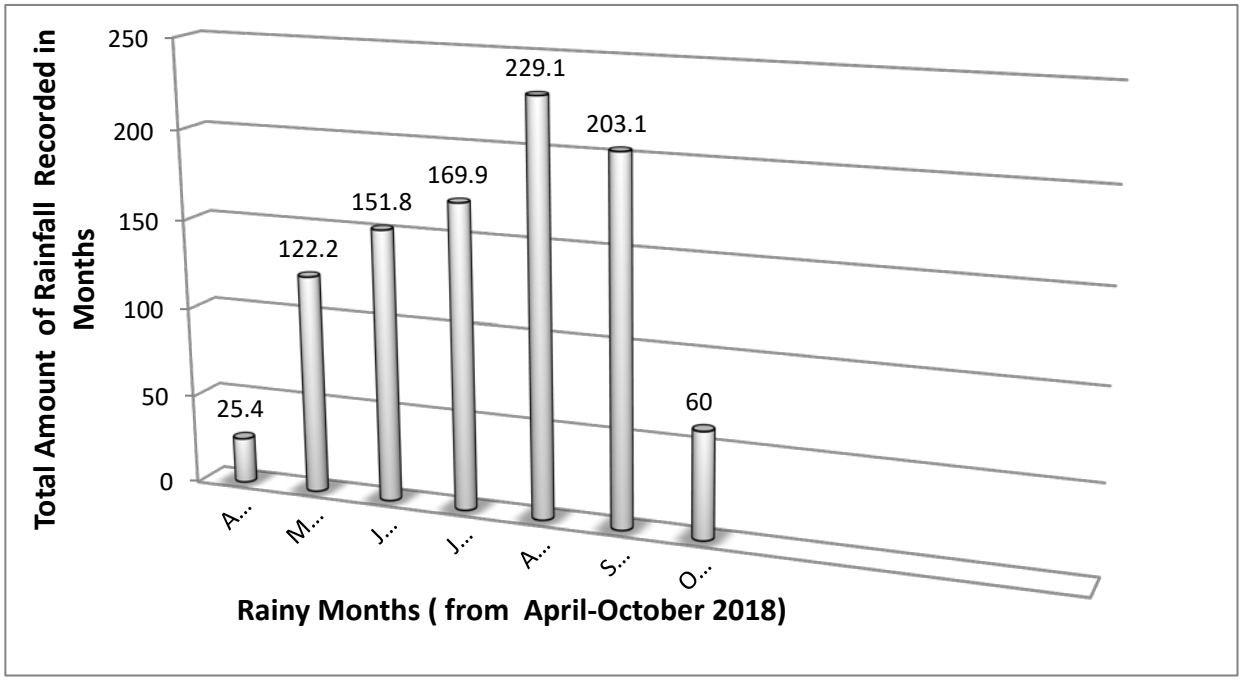

Fig 3.Shows the monthly variation of total amount of rainfall recorded in 2018 in Yola South LGA. (Source: UBRBDA, Yola 2018).

Loss of properties worth of hundred thousand naira was the major threat attached to the flooding in the areas. These properties include cloths, food items, utensils, vehicles among others. Similarly, hundreds hectares of farmlands were been lost seasonally, where cereals such as maize, rice and sorghum were destroyed by sediment materials (on-site effects) while some were been removed by run-off (off-site effects) as shown on plates 6 and 7 below respectively.

Plate 6.Depicts the on-site effects of flooding on rice farm along River Chochi at Auguwan Tabo in Yola South LGA during 2018 flood. (Field Observation Photo. 7th September, 2018)

Plate 7. Depicts the off-site effects of flooding on maize farm at Tashan Sani in Yola South LGA during 2018 flood. (Field Observation Photo. 17th Auguts, 2018)

Maigari, (2002) explained that flood is the most universally experienced natural hazards involving greater loss of lives and properties. Similar findings was reported by Williams, (1999) who pointed out that Loko flood in Song LGA, of Adamawa State that occurred in August, 1989 was the worst where properties worth millions of naira and farmlands were destroyed. However, destruction of buildings was not severe during the flooding but few houses were recorded destroyed at Modere during the 2018 flood scenario as shown on plates 8 and 9 below.

Plate 8. Shows the destruction of buildings leading the inhabitants homeless by flood in Modere.

(Field observation Photo, 17th August, 2018)

Though, flood destruction varies from time to time and place to place depending on its intensity and magnitude respectively. Generally, this flood usually results in the destruction of properties worth millions of Naira (Areola and Akintola, 1980). Private and public properties worth millions of Naira were lost (Daura, Gisilambe and Waziri.,2001). For mitigation strategy proper construction of drainages is the most ardent practical solution identified by the respondents in the study area. This is because the area does not have adequate and well capacitated drainages that will accommodate smooth flow of flooded water as a result of heavy rainfall experienced in the area. This finding agreed with the what Mazumder (1983), pointed out that when there is heavy downpour in short period of time with poor drainage system in a given area will lead to stagnation of surface run off for some period consequently leading to flooding. Also, legal buildings by the inhabitants are a second major solution to the menace in the area suggested. This suggestion agrees with the conclusion drawn by Habitat (1996) who provides guidelines for sitting building construction in flood prone areas as structural measures of flood control.

CONCLUSION

Flood is one of the most natural disaster affecting people in Nigeria, most especially in Adamawa state where thousands of houses, farmlands and properties worth of millions of naira were destroyed. In Adamawa state, Yola South LGA is among the probable flood prone areas where flooding occurs annually submerging most areas due to different factors. Findings from this study revealed that the key principal factor that caused flooding in Yola South LGA was found to be heavy rainfall experienced then followed by river overflows as well as poor drainage system. Similarly, Sabon Pegi D/L, Modere and Tashan Sani were the major affected flood prone areas in Yola South LGA where majority of the inhabitants stay in the areas due to the cheapness nature of the land and rent. Similarly, it was also assessed that river and flash floods were the types of flood usually experienced in the area usually in the months

of August and September where properties worth of millions of naira was found to most affected and farmlands destruction been the second affected. Suggestions were made by the respondents where proper construction of drainage system considered as the fast workable solution to the threat. Additionally, legal buildings were also reflected effective as mitigation strategy.

RECOMMENDATIONS

Consequent upon the analysis of the results obtained from the data collected in respect of the demographic characteristics of the inhabitants, field observation and investigation of the physical setting, topographical features, effects and mitigations as well as the inferences drawn from the study, the following recommendations were observed for effective mitigation of the menace;

1. An integrated approach involving relocating those living along flood prone areas to a safer terrain through establishment of well secured and comprehensive resettlement scheme project should be considered by the government of all levels through it agencies such as Ministry of Urban and Regional planning.
2. Government should embarked as a matter of emergency on construction of larger drainages and to complete the drainage system along Sabon Pegi D/L and Modere areas which linked River Chochi at the Southern eastern part of Yola South LGA.
3. Illegal buildings and dumping of refuse into drainages and culverts should be waged against anyone found involved among the inhabitants.
4. Public enlightenments and sensitization program on environmental problems and consciousness should be conducted by the related agencies such as Ministry of environment, National Orientation Agency (NOA) among others.

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