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EFFECTS OF FLOOD ON RURAL HOUSEHOLD LIVELIHOOD ACTIVITIES IN KANO STATE, NIGERIA

OLAGUNJU, O.E.,[1] *ARIYO, O.C.,[1] FADELE, O.K.,[2] ALABI, O.F.,[3] AND OLAGUNJU, O.S.[4]

[1]Department of Entrepreneurship and Innovative Agriculture, Federal College of Forestry Mechanization, P.M.B. 2273, Afaka, Kaduna, Nigeria

[2]Department of Agricultural Engineering Federal College of Forestry Mechanization, P.M.B.2273, Afaka, Kaduna, Nigeria

[3]Department of Agricultural Extension and Management, Federal College of Forestry Mechanization, P.M.B. 2273, Afaka, Kaduna, Nigeria

[4]Department of Agricultural Technology, Federal College of Forestry Mechanization, P.M.B.2273, Afaka, Kaduna, Nigeria

*Correspondent author: ask4ariyo@yahoo.com

Abstract

Floods are natural events with negative economic and social consequences. This study assessed the effects of flood on rural household livelihood activities in Fagge Local Government Area (LGA) of Kano State. The objectives were to describe the socio-economic characteristics, find out the livelihood activities, assess the causes and effects of flood and describe the coping strategies of flood by rural dwellers. Multi-stage sampling procedure was used. Out of ten (10) districts in Fagge LGA, three districts were purposively selected, forty (40) household heads were randomly sampled from each district to give a total of one hundred and twenty (120) respondents. Structured questionnaire was used for data collection. Data were analyzed using simple descriptive statistics. Pearson Product Moment Correlation (PPMC) and Chi-square (χ^2) were used to test the hypotheses. The mean age was 35.7 years. PPMC result showed that age (r= 0.227, p= 0.013) was significant to livelihood activities while Chi-square (χ^2) test revealed that sex (χ^2 = 26.286, p = 0.002) was significant to livelihood activities. Chi-square (χ^2) test also revealed that deforestation (χ^2 = 22.44, p = 0.002), overgrazing (χ^2 = 28.459, p = 0.004) were significant to farming activities. The study concludes that livelihood activities that increase deforestation like overgrazing and poor drainage maintenance should be discouraged.

Key Word: *Flood, Kano State, Livelihood activities, Rural household*

Introduction

Human beings are highly dependent on the natural environment for their livelihood activities. The world has suffered and largely withstood natural disaster throughout its long history. Natural disaster displace and disrupt thousands of families and having more dramatic effect in the poorest of nations crippling what are often already woefully inadequate and destroying infrastructure (Delaney *et al*., 2004). Natural disasters

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are happening more often with dramatic effect on the world in terms of human and economic losses. Natural disaster causes havoc on human lives and the aftermath results in trauma, misery, destruction and death (Abada, 2001). One of the major repercussions that natural disaster has, is on agriculture. Unlike other livelihood activities, agriculture is exposed to a large variety of risks and uncertainties from the vagaries of nature such as adverse weather conditions, pests and diseases, flood, thunder-storm, erosion, and fire outbreak. The impact of environmental variability has significantly affected the livelihood of rural dwellers in developing countries and the poor are more vulnerable to natural disaster such as drought, floods and the ongoing impacts of environmental degradation (Assan and Kumar, 2007; Kremen, 2007).

The effects of natural disaster leads to the disruption of the rural farmers' livelihood activities causing a vicious circle of diminishing farm incomes and adding to the risk, damage and stress of disaster (Kolawole, 2011). The rural farmers are more exposed to natural disasters because they tend to live in marginal areas and depend on high risk, low return livelihood systems such as rain fed agriculture also face many source of vulnerability including little physical infrastructures (Egboka, 2004). Many fields, farms and regions suffer from the absence of sufficient resources to invest in soils and to improve the growing conditions; as a consequence, farmers are caught in a spiral of unsustainability (Rabbinage, 2015). Farming systems in Africa are characterized by their diversity, thus it is virtually impossible to identify one farming system with the best opportunities for improvement (Amleson, 2004).

According to Egboka (2004) flooding is a natural process and can happen at any time in a wide variety of locations. It constitutes a temporary covering of land by water and presents a risk only when people, their property and/or environmental assets are present in the flood area (Adetunji and Oyeleye, 2013). Floods are part of people's lives in various regions of the world, recurring with varying magnitudes and frequencies to which people have adapted for centuries. These floods are generally expected and welcomed in many parts of the world, since they enrich the soil and provide both water and livelihoods (Brouwer *et al*., 2007).

Flood is described as an overflow of water that submerges land, low-lying villages and towns or an unusual condition affected by inflow of the tide (Sivakumar, 2006). Flooding may occur as an overflow of water from water bodies, such as a river or lake, sea or large natural water basins, it may also occur due to an accumulation of rainwater on saturated ground in an aerial flood, thereby submerging land areas (Sivakumar, 2006; Carey, 2005). Flood takes place when ponds, river beds, soil and vegetation cannot absorb all the water, making excess water run-off the land in volumes that cannot be carried within stream channels or retained in lakes, natural ponds or man-made reservoirs. Flooding can be exacerbated by increased amount of imperious surface or by natural hazards, with fire or deforestation which reduces the supply of vegetation that can absorb rainfall (Ayooso, 2012).

The causes of flood are very complex, and stem from different levels - from global and national, to individual farms and households (Commonwealth Secretariat, 1992). Recent demographic

pressures have changed the way that people use land, water and forests, and have contributed to a widespread deterioration in the condition and productivity of these resources. The usual universal cause of floods is heavy or excessively prolonged rainfall or even both, it can manifest along marine coasts from wind-driven storm surges and rain-swollen streams associated with tropical typhoons and hurricanes; flooding can also occur on the shorelines of large inland lakes (Agbonkhese *et al*., 2013). Human activities such as industrialization, technology development, urbanization, deforestation, burning fossil and agricultural activities, and other natural factors such as solar radiation quality and quantity, astronomical position of the earth are notable causes of climate change. Climate change is making weather less predictable, especially in developing countries like Nigeria where facilities to predict and manage weather conditions are not adequate (Gormerly, 2007). The unpredictability of rainfall in recent times has caused untold hardship during the raining season (Greg, 2013). Natural flooding through streams which is caused primarily by excessive down pour is the most regular or common form of flooding in Nigeria.

Flood Initiative (2003) pointed out that floods are the most taxing of water related natural disasters to humans, material assets as well as to cultural and ecological resources affecting people and their livelihoods and claiming thousands of lives annually worldwide. The floods have led to loss of human life, destruction of social and economic infrastructure and degradation of already fragile ecosystems. Some impacts of floods are intangible and are hard to place a monetary figure on (Nott, 2006). The hazards tend to hit communities in developing countries especially the least developed countries, increasing their vulnerability and setting back their economic and social growth, sometimes by decades (Nelson, 2001). Intangible losses include increased levels of physical, emotional and psychological health problems suffered by flood-affected people. Disease outbreak is common especially in less developed countries. Malaria and Typhoid outbreaks after floods in tropical countries are also common. It has been estimated that in Nigeria and Ghana that one million people live in areas that are affected by floods (Nott 2006). The physical damage to property is also one of the major causes for tangible loss in floods. These includes the cost of damage to goods and possessions, loss of income or services in the floods aftermath and clean-up costs. Different population segments can be exposed to greater relative risks because of their socioeconomic conditions of vulnerability. Ariyabandu and Wickramasinghe (2005) emphasized that some groups are more vulnerable to floods than others are in rural areas. Vulnerability is not just poverty, but the poor tend to be the most vulnerable due to their lack of choices. The influences of both poverty and development process on people's vulnerability to disaster are now well established. Class, ethnicity, gender, disability and age are some of the factors affecting people's vulnerability (Gwary, 2008). Usually, elderly people on low incomes whose houses were deeply flooded were the most ill- affected (Flood Plain Management, 2010).

According to Food Agricultural Organization (FAO, 1999) general impacts of natural disasters on agriculture include reduction in soil fertility, decreased livestock productivity directly

(through higher temperatures) and indirectly (through changes in the availability of feed and fodder), increased incidence of pest attacks, resulting from increase in temperature, the manifestation of vector and vector borne diseases, negative impacts on human health affecting human resource availability, disruption of subsistence agriculture leading to famine and severe loss of livelihood. All these impacts are detrimental to agricultural productivity and also to the nation as a whole. Not only will this affect the agricultural productivity, but also the income of the farmer and in the long run, the Gross Domestic Production (GDP) of the nation, knowing the contribution of agriculture to the GDP of the nation.

Conventional cropping (mono-cropping) has been intensified due to geometric increase in population. This has resulted in increased demand for cultivable land, which has in turn resulted in pressure on land, and consequent cultivation of marginal lands. The breakdown of traditional systems of agriculture such as rotational bush fallow and shifting cultivation, due to population pressure, it has compelled peasant farmers to continuously cultivate the land, damning the consequences of loss in soil fertility, soil erosion and reduced productivity (Beets, 2010; Kary, 2015). Nigeria is suffering from low agricultural output and this could be due to the effect of flooding/natural disasters on the industrial areas, residential areas and agricultural lands. The rural farmers have suffered dearly during the occurrence of this natural disaster in the past and still suffering the effect presently. Not only do these disasters destroy crops and disrupt food supplies, they also affect land quality and production potential (Stephen, 1994).

Flood causes salinization of agricultural land with greater effects on cropping and yield (Noji, 2014). Floods, which deposit layers of alluvium on cultivated land, may bury crops and change soil quality. Farmlands and houses have been washed off by erosion in Northern and Southern parts of the country and these rural farmers have more or less been rendered jobless too because of the effects of flooding causing rural-urban migration (Nyong, 2005). Rural dwellers account for 59% of the population of the developing world and play a vital role in provisioning cities and regional markets with food stuffs and other resource such as renewable fuels (Alabi, 2006). In addition, destructive land use practices of the past are resulting in present-day reduced productivity of farmlands, forests, pastures, and fisheries, thereby increased poverty and hunger (Brown *et al*., 2017). When severe floods occur in areas occupied by humans, they can create natural disasters which involve the loss of human lives and property plus serious disruption to the on-going activities of large urban and rural communities. Flood losses are therefore essentially human interpretations of the negative economic and social consequences of natural events. The impact of the flood hazard will, in part be determined by the magnitude of the events and the duration of the event. But the true significance of the flood disaster will depend primarily on the vulnerability for the local community. The relationship between physical exposure and human vulnerability is highly dynamic and can change through time (Smith and Ward, 2015). Flood results in reduction of food supply and increase the level of poverty.

Although natural disasters cannot be prevented from occurring, however,

practical action can be taken before hand to reduce the potential impact of hazards on a community so that they do not always lead to disaster. This is known as mitigation. Mitigation can be carried out through sustainable management system for land that increases overall production, combines agricultural crops, tree crops and forest plants and/or animals sequentially and applies management practices that are compatible with cultural patterns of local population (ICRAF, 1993). It is against this backdrop, the study was undertaken with the following objectives:

i. To describe the socio-economic characteristics of rural dwellers in Fagge Local Government Area of Kano State
ii. To find out the livelihood activities of rural dwellers in Fagge Local Government Area of Kano State.
iii. To assess the causes and effects of flood in Fagge Local Government Area of Kano State.
iv. To describe the coping strategies of flood by rural dwellers in Fagge Local Government Area of Kano State.

The hypotheses are stated in null forms

$H_{01:}$ There is no significant relationship between the selected socio-economic characteristics and livelihood activities.

$H_{02:}$ There is no significant relationship between causes and effects of flood and livelihood activities.

Research Methodology

Study Area

This study was carried out in Fagge Local Government Area (LGA) of Kano State, Nigeria (Figure 1). Fagge LGA covers an area of about 470 Km and lies between the latitudes 11° 59′ and 7.368′ N and longitudes 8° 33′ and 7°61′ E of the equator (Shaib *et al*., 1997). Fagge LGA is situated in the Northern Guinea Savanna Zone. The ethnic system comprises of Hausa predominately, Fulani, Igbo and Yoruba. It is an African society. The kinds of crop planted include millet, cowpeas, sorghum, maize and rice. The type of livestock reared include, cattle, goat, sheep and poultry (Gaadi, 2014).

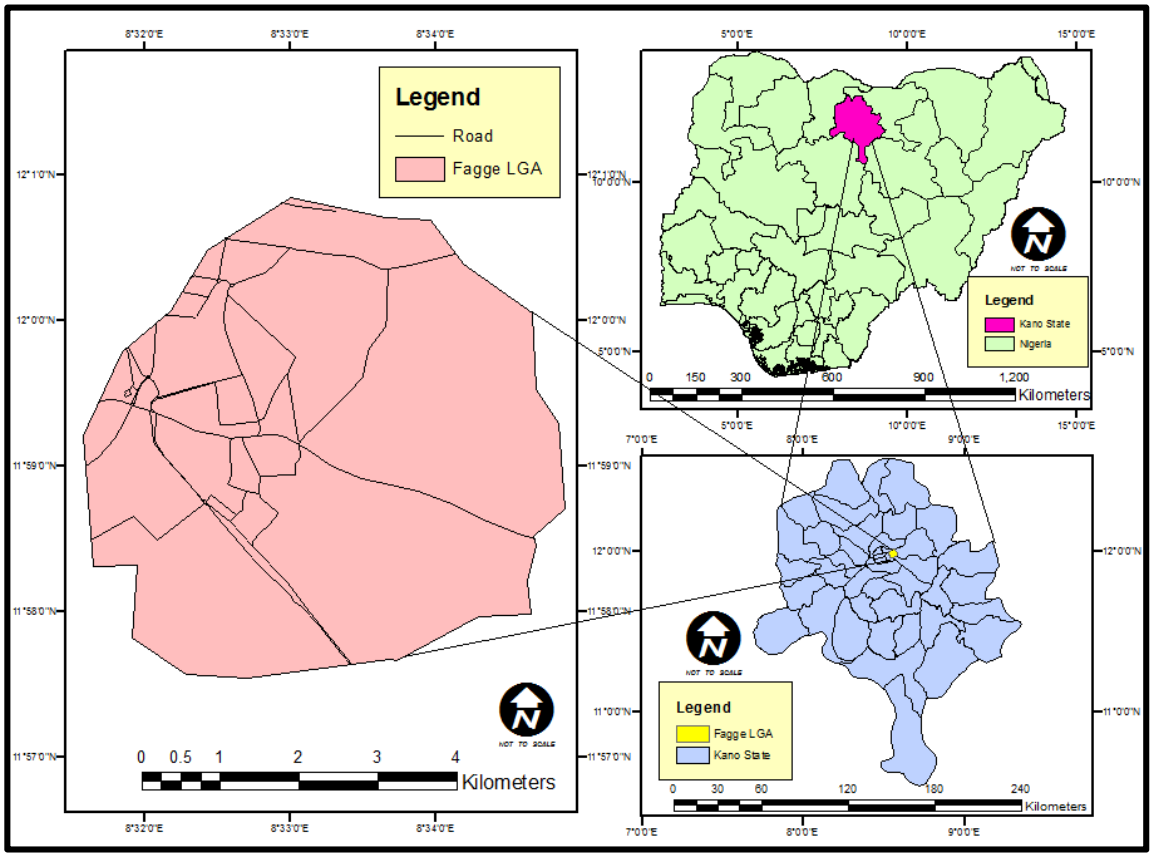

Fig. 1: Map of Nigeria showing Kano State and the Study Area (Fagge LGA)

Sampling Techniques

Multi-stage sampling procedure was used for this study. Out of ten (10) districts in Fagge LGA, three districts were purposively selected because they are prone to floods regularly. Within each district, forty (40) household heads were randomly sampled from each household to give a total of one hundred and twenty (120) respondents. Primary data was used for this study. The primary data was collected through the use of well-structured questionnaires which were administered through interview methods.

Data Analysis

The data collected were analyzed using simple descriptive statistics such as frequency distribution, tables, percentages, and charts. Pearson Product Moment Correlation (PPMC) and Chi-square (χ^2) were used to test the hypotheses.

Result and Discussion

Socio-economic Characteristics of the Respondents

The socio-economic characteristics of the respondents are presented on Table1. The table showed the mean age of 35.7years, the respondents were in their young and active age. Majority (87.5%) of the respondents were male while few (12.5%) were female. This because men were expected to engaged in livelihood activities in other to earn more income to cater for their family, while most women were in purdah, this restrict them from personal, social and economic activities outside their homes. This result agrees with Aderogba (2012) that the rate at

which women participate in farming and livelihood activities is gradually reducing. Women contribute to food and nutrition security in significant ways; they are mostly responsible for food production and preparation for their families. Women as producers of food are central towards achieving food security through empowerment (Ajani, 2009; Abdullahi *et al.*, 2012). In the same vein, malnutrition in Nigeria especially in the North is a growing problem and this is strongly linked to social and economic issues. The educational and employment achievements of women were attributed to the prevalence of "purdah" found in the northern part of the country. The practice of "purdah" reduces women's mobility and their participation in various aspects of life, whether in education, employment or access to information. The practice of purdah enhances dependence and women's lack of empowerment, thus preventing them from being self-reliant (Sultana *et al*., 2009). In terms of marital status, 84.2% of the respondents were married, while few 15% were single. This implied that they get support from their family members in their livelihood activities thereby reducing their cost of labour. This agreed with the findings of Adetunji and Oyeleye (2013) that, family labour helps in reducing cost of labour and expenses. The table further showed that majority (92.2%) of the respondents was Muslim faithful in Islamic religion. In the northern parts, especially in Kano state there are more Muslims engaging in farming and livelihood activities than the Christians which make the study area to be a homogenous community in terms of religion. The household size revealed that most of the respondents (38.3%) had household size of 6-10 members on the average. Larger household size helps in farming activities and it also reduce cost of labour because there will be no need for hired labour. Table 1 also revealed that most (53.3%) of the respondents had Qur'anic education, 22.5% and 15.0% had secondary and primary school education while 5.0% had tertiary education. The percentage of respondents that had non-formal education was 4.2%. This finding is in line with Ayoola (2015) that Qur'anic education is very important in Islamic community. Result on Table 1 also revealed that equal number of respondents (36.7%) belongs to cooperative society and governmental organizations, 10.8% belong to private organization while 15.8% of the respondents are not member of any organization. Membership of an organization gives the respondents easy access to funds and other benefits from their members, government and non-governmental organization. This result agreed with the finding of Pretty and Buck (2002) that most farmers achieve their activities through collective work and cooperation among themselves and this gives opportunity to those who are members of the organization to gain direct access to fund and support.

Table 1: Distribution of respondents based on their socio-economic characteristics

Variable	Frequency (N = 120)	Percentage (%)
Age		
Below 20	7	5.8
21 – 30	35	29.2
31 – 40	38	31.7
41 – 50	34	28.3
51 and Above	6	5.0
Religion		
Christianity	1	0.8
Islam	119	99.2
Sex		
Male	105	87.5
Female	15	12.5
Marital Status		
Single	18	15.0
Married	101	84.2
Widowed	1	0.8
Household Size		
1 – 5	43	35.8
6 – 10	46	38.3
11 – 15	29	24.2
16 – 20	1	0.8
21 – 25	1	0.8
Education Level		
Non-Formal	5	4.2
Qur'anic	64	53.3
Primary	18	15.0
Secondary	27	22.5
Tertiary	6	5.0
Membership in Organization		
Nil	19	15.8
Cooperative society	44	36.7
Governmental Organization	44	36.7
Private organization	13	10.8

Distribution of the Livelihood Activities of Respondents

The distribution of the respondents according to the livelihood activities was presented on Table 2. According to the table, farming (93.30%) was the major occupation that the respondents' were involved in, most of the respondents were also involved with one income generating activity or the other such as selling of cooked food/snacks (20.80%), gathering, processing and selling of non-timber products (11.60%), rearing of livestock's (43.30%) and trading (6.60%). This helps the farmers especially during the off season to generate more income and make the ends meet. Agricultural production has remained a significant and important component of human population, due to its strategic role of providing food for the entire human race. This system has however, had severe repercussions on land resources as continuous tillage of the land easily loosens

the soil and results in soil erosion and large-scale environmental degradation (Nyong, 2005). Only 2.50% and 1.70% of the respondents are Civil servants and Artisan respectively.

Table 2 Distribution of respondents based on livelihood activities

Variables	Frequency (N = 120)	Percentage (%)
Primary occupation		
Farming	112	93.30
Trading	8	6.60
Other income generating Activities		
Nil	24	20.00
Selling cooked food/snacks	25	20.80
Rearing of livestock	52	43.30
Gathering/selling of Non timber	14	11.60
Civil servant	3	2.50
Artisan	2	1.70

Distribution of Respondents Based on Their Perspectives on the Causes of Flood

Table 3 showed the response of the respondents on the causes of flood and these include erosion (96.7%), deforestation and overgrazing had equal responses of 95.00%. Poor drainage, heavy rainfall and dam breakage also had equal percentage of 99.20%. The percentage attributed to strong wind and thunderstorm as causes of flood by the respondents are 63.30% and 23.30% respectively. However, 76.70% and 36.70% of the respondents stated that thunderstorm and strong wind are not causes of flood.

Table 3 Distribution of Respondents Based on Cause of Flood

Cause of Flood	*Yes	*No
Soil Erosion	116 (96.70)	4 (3.30)
Deforestation	114 (95.00)	6 (5.00)
Overgrazing	114 (95.00)	6 (5.00)
Poor Drainage	119 (99.20)	1 (.80)
Heavy rainfall	119(99.20)	1 (.80)
Dam breakage	119 (99.20)	1 (.80)
Strong wind	76 (63.30)	44 (36.70)
Thunderstorm	26 (23.30)	92 (76.70)

* Multiple responses

Figures in parenthesis are percentages

Distribution of Respondents Based on their Perspectives on the Effects of Flood

Flood disasters in Nigeria afford good insights into the extent of flood menace and flood related problems in Nigeria. Table 4 revealed the response of the respondents on the effects of flood which include loss of life (96.7%), loss of property (95%), loss of land for farming (95%), loss of soil nutrient (99.2%), loss of land for industrial activities (99.2%) and poor road network (92%). Nott (2006) correctly pointed out that a flood event is not considered to be a natural hazard unless there is a threat to human life and/or property. Douben (2006) emphasized that the most vulnerable landscapes for floods

are low-lying parts of flood plains, low-lying coasts and deltas, small basins subject to flash floods. The implication of this is that when people are informed about the causes and effect of flood it will reduce the increased levels of physical, emotional and psychological health problems suffered by flood-affected people (The Nation, 2011).

Table 4: Distribution of respondents based on effects of flood

Causes of Flood	*Yes	*No
Loss of life	116 (96.70)	4 (3.30)
Loss of property	114 (95.00)	6 (5.00)
Loss of farm land	114 (95.00)	6 (5.00)
Loss of soil nutrient	119 (99.20)	1 (0.80)
Loss of industrial activities	119 (99.20)	1 (0.80)
Poor road network	92 (76.70)	28 (23.30)

* Multiple responses
Figures in parenthesis are percentages

Distribution of the Respondents Based on Flood Control Programme

The rural dwellers were more exposed to natural disasters such as flood because they tend to live in marginal areas. The distribution of the respondents based on flood control programme was presented on Table 5. The table showed that majority (95.80%) of the respondents were able to control flood in their locality, 14.20% of the respondents were involved in flood control programme, such that 2.50% of the respondents were involved in International Lending and Development Assistance Programme (ILDAP), 12.50% of the respondents were involved in Kwankwasiyya Ring Drainage (KRD) programme while few (3.30%) of the respondents were involved in Economic Development Policies Programme (EDPP). The implication is that when people are informed about the importance of these flood control programmes it will help prevent the causes and effect of flood; it will also assist the rural dwellers take the necessary precautions to avoid flood and live in safety because ignorance can never be a defense (Agbonkhese *et al*., 2013).This in line with the findings of Kolawole, (2011) that the flood control programmes has helped the farmers a lot to be able to control flood in their locality. However, 85.80% of the respondents do not involve in flood control programme. The percentage of respondents that are not involved in KRD and EDPP are more, 97.50% and 96.70% respectively. This revealed that there is low level of awareness of flood control programmes in the study area.

Table 5: Distribution of respondents based on flood control programme

Programme	*Yes	*No
Control of flood in your locality	115 (95.80)	5 (4.20)
Flood control programme	17 (14.20)	103 (85.80)
KRD programme	3 (2.50)	117 (97.5)
EDPP programme	4 (3.30)	116 (96.70)
ILDAP Programme	3 (2.50)	117 (97.50)

* Multiple responses
Figures in parentheses are percentages

Test of Hypotheses

Correlation Between Respondents' Age and Livelihood Activities

The relationship between age and livelihood activities was presented on Table 6. The table showed the significant relationship between age (r = 0.227, p = 0.013) and livelihood activities. This revealed that age is significant to livelihood activities. Therefore, the null hypothesis which stated that there is no significant relationship between age and livelihood activities is hereby rejected. This implied that when people are young, they have strength and vigour to diversify into various income generating activities to improve their standard of living. This agreed with the findings of Ayooso (2012).

Table 6: Correlation between Respondents' age and livelihood activities

Variable	r	p	Remark
Age	0.227	0.013	S

Chi-square Analysis of Respondent's Socio-economic Characteristics and Livelihood Activities

Among other selected socio-economic characteristics, the Chi-square result on Table 7 revealed that only sex (χ^2= 26.286, p= 0.000) was significant to livelihood activities. This implied that sex is of great value in the community hence the community is gender sensitive. That is, the women in the community were not active economically and this could be linked to the practice of purdah. This in accordance with the findings of Sultana et al. (2009) that the essence of purdah is to restrict women's participation in various aspects of life whether in education, employment or even access to information.

Table 7: Chi-square analysis of respondent's socio-economic characteristics and livelihood activities.

Variable	χ^2	df	P	Remark
Religion	8.3000	6	0.217	NS
Sex	26.286	6	0.002	S
Marital Status	16.130	12	0.185	NS
Monthly income	16.230	30	0.981	NS

Chi-square Analysis on Causes of Flood and Livelihood Activities

The Chi-square analysis on causes of flood and livelihood activities of the respondents was presented on Table 8. The result revealed that deforestation (χ^2 = 22.444, p = 0.000), Overgrazing (χ^2 = 28.459, p = 0.000), poor drainage (χ^2 = 120.000, p = 0.000), and heavy rainfall (χ^2 = 120.000, p = 0.000) were significant to livelihood activities. This showed that the livelihood activities of the respondents that increases deforestation, overgrazing and poor drainage will increase flood in the study area. This hazard (flood) has increased the vulnerability of the community thereby setting back their economic, social and livelihood activities. It is however paramount for the people in the study area to be aware of these significant variables that causes flood. The implication is that when people are aware

of the causes of flood they will take the necessary precautions so as to avert the causes of flood on their livelihood activities (Alabi, 2006).

Table 8: Chi-square Analysis on causes of flood and Farming activities.

Variable	χ^2	df	P-value	Remark
Soil erosion	2.789	2	.248	NS
Deforestation	22.444	2	.002	S
Overgrazing	28.459	2	.004	S
Poor drainage	120.000	2	.001	S
Heavy rainfall	120.000	2	.001	S

Conclusion and Recommendation

Floods are essentially natural events that bring about negative economic and social consequences on livelihood activities, thereby increasing the level of poverty and food insecurity. It can be concluded from the study that mean age of the respondents was 35.7 years. The community is homogenous in terms of religion (Islamic community). Farming is the main occupation with more men engaged in farming and other livelihood activities which were rearing of livestock, selling of cooked food, gathering/selling of non- timber forest products and trading. Overgrazing, Poor drainage, deforestation and heavy rainfall were identified as the main causes of flood while the effects of flood include loss of life, loss of property, loss of land for farming, loss of nutrient, loss of land for industrial activities and poor road network. Age, sex, deforestation, overgrazing, poor drainage and heavy rainfall were significant to livelihood activities.

Based on the findings, the following recommendations are made:

i. The livelihood activities of the respondents that increases deforestation, overgrazing, poor drainage from heavy rainfall should be discouraged so as to prevent flood. Also, farmers should be encouraged on agro forestry practices to prevent the adverse effects of flood on rural livelihood activities.
ii. There is low level of awareness of flood control programmes in the study area, therefore training on flood control programmes are recommended to create awareness. Also more people should be encouraged to participate in the existing programme of flood control.
iii. The government should provide adequate infrastructure such as good drainage system and more programmes that will help the rural dwellers to control flood in their locality.

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