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Evaluating the Causes of Flooding in Six Communities in Awka Anambra State of Nigeria

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Abstract
This study evaluated the causes of flooding in six Communities of Awka including Agulu, Amaenyi, Ezi-Awka, Amikwo, Ifite and Nkwelle. The questionnaire survey method was adopted in which questionnaire was employed in collecting the data from the respondents which was later collated and analyzed. The postulated hypotheses was tested using T-test and the result showed that there is no significant difference in the causes of flooding in the six communities studied in Awka. The study concluded therefore that the causes of flooding in the six communities in Awka are the same; implying that the following factors; inadequate drainage channels, refuse dumps in drainage channels, bad roads and improper planning of the communities in Awka, among others were the causes of flooding in the study area The study thus recommends that there should be massive campaign against improper dumping of refuse in the drainage system as it not only create room for flooding but also encourages flooding in the area, construction of sound drainage system, creating environmental awareness to keep the drainage system from waste dumps, encouraging people to open their drainage system constantly in order to help check and control flooding, avoiding dumping of refuse in drainage system and the intervention of strong governmental forces to ensure that the environmental laws are been adhered to.

1.0 Introduction

1.1. Background of the Study

Floods are naturally occurring weather event that result in overflowing of large amounts of surface water over land that are not always inundated. Flooding is considered to be one of the worst natural disasters in the world and it is responsible for many problems and half of damages on facilities around the globe.

It has become one of the most frequent natural occurrences in the last few decades. Floods have cost damages to societies totaling more than 250 billion dollars and the intensity and frequency of floods are increasing global. It is gradually becoming a common phenomenon around the world, caused by increase in global temperatures that result in torrential rains and rise in sea level that overflowed their banks and flood surrounding coastal lands.

In Nigeria, aside from droughts, floods cause almost 90 percent of damages resulting from natural hazards (Adeleke, 1978). Floods that occur in Nigeria are as a result of extensive rainfall, drainage blockages and dam failures. The effect of floods in Nigeria has been on the increase especially in the last three decades. It has become a life threatening concern to the citizenry and the number of deaths and damages caused by this perennial disaster are alarming. Annually, more than 700,000 hectares of arable land and built up areas are damaged due to flooding in Nigeria. Recorded damages include destruction of schools, houses built with mud brick and other traditional building materials, bridges, markets and washing away of agricultural lands (Adeleke, 1978).

Nigeria recorded her first flood in 1948 in Ibadan, capital of Oyo State. Since then, the menace has spread like wild fire to other states of the federation. More than half of the thirty-six states in Nigeria have been hit by one form of flood or another (Adeleke, 1978) that occurs along the Rivers Niger and Benue. Some of the states that have been badly hit by floods in the country include Kano, Niger, Jigawa, Kaduna, Adamawa, Benue, Kogi and many others in the southern parts of Nigeria. In August 2001, thousands of people were displaced in Kano and Jigawa States as a result of flood that was caused by the overflowing of rivers Challawa and Tiga. Twenty people were reported dead in Kano while 180 others were reported dead in Jigawa State. A record of the total number of people affected by the flood incidence was well above 143,000. Four years later, precisely in August, 2005, the worst floods in forty years occurred in the northern city of Jalingo, the Capital of Taraba state, after a heavy down pour of rain that lasted for eight hours, Over 100 people were killed in the event and thousands of others displaced. Similar incidence occurred in Zamfara state in September 2006, when a torrential rainfall that lasted for 24 hours caused the collapse of a dam located outside the state's capital Gusau. The dam failure led to an influx of water into the nearby Communities washing away hundreds of houses and destroying property worth millions of dollars. The exceptionally heavy rainfall of August 2007 in Nigeria led to more than 46 deaths and displacement of over 2,500 families. The nine states that were seriously affected were Lagos, Ogun, Plateau, Nassarawa, Bauchi, Sokoto, Yobe, Borno and Kebbi. The floods were caused by poor drainage systems, ill-timed discharge of water from dams and the indiscriminate infrastructural development along river banks (Action aid, 2006).

In 2010, dam failures as well as opening of flood gates and torrential rains all contributed to flooding in some northern states in Nigeria. Over 2 million people and 5,000 Communities were affected and about 50,000 families were left homeless. In 2011, at least 102 deaths were recorded and 2,000 families were displaced in and around the south-western city of Ibadan as a result of floods from heavy rainfall that collapsed bridges and caused a dam to overflow (Action aid, 2006). In June 2011, the ancient city of Kano experienced extensive rainfall which led to flooding in some parts of the city causing 24 deaths, collapse of houses and displacement of 700 people. The Federal Government of Nigeria has invested millions of naira both on relief and compensation as well as rehabilitation of flooded areas yet the menace is still unabated. These days, flooding events are more rampant in urban cities in Nigeria than in the rural areas. It is fast becoming a serious environmental problem resulting in huge loss of lives, property and priceless arable land. Floods have rendered many people homeless and disrupted a lot of socio-economic activities in urban cities. Various flood plains and land along the Atlantic Ocean coast are affected by flooding yearly in Nigeria (Cross, 2001).

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

1.2 Statement of Problem

Over the years in Anambra, flood has remained a worrisome natural problem which successive governments in the State could not effectively solve. Flood therefore is still a problem in areas like Awka, Oko, Onitsha, Agamelu, Aguleri, Umuleri, and Adani. In most areas of the state, such as Awka, Oko and Onitsha, flooding has posed a major concern to the occupants of properties. The access roads to some of these properties during raining season are usually in their worse states and this deteriorates year after year. It is against this background that this study evaluated the causes of the flooding in Awka, with a view to proffering possible lasting solutions.

2.0 Literature Review

Factors that lead to flooding have been grouped into three main categories: (a) meteorological relating to extensive torrential rainfall, cyclones, storms and tidal surges; (b) hydrological relating to floods caused by increased surface run off as a result of ice and snow melt, land saturation, impermeable surfaces and land erosion; (c) anthropogenic – concerned with human and natural activities such as population growth, urbanization, climate change, land use and degradation.

A lot of researches and papers have been written on the menace of flooding in Nigeria and some of the causal factors identified include high river levels, land inundation from heavy rainfall, poorly built drainages with limited space and blockage of drainages from wastes materials, population growth, urbanization and climate change (Oriola, 2003; Akinbode, 2002 ; Folorunso and Awosika 2009; Ologunorisa, 2004;). These factors are not independent of one another and flooding normally occurs as a result of a combination of one or more of these factors. Growth in population alongside economic and technological advancement have led to an increase in the need for more basic amenities such as shelter, food and the desire for higher standard of living thus encouraging exploitation of the environment . Most of the population explosion witnessed in developing countries is in the urban centers and this is as a result of the shift from rural to urban centers because of the perceived improvement in living conditions in these urban areas .

The unseen consequences of this shift and exploitation are unsustainable use of environmental resources, environmental pollution that lead to changes in the state and course of the natural biosphere, breakdown of most environmental and biological processes that support life and sustain development, variability in climatic conditions, degradation of soil and vegetation as well as conversion of agricultural land, natural vegetation and wetlands to built up environments to contain the ever growing number of industrial and residential estates and buildings on natural drainages.

Deforestation/removal of vegetation have increased the amount of run-off on land surfaces while agricultural activities affect soil compositions, making them very compact, highly impermeable and reduce water infiltration. Flooding and other natural disasters could be future consequences of degradation of the environment and climate change, these factors have intensified the frequency and severity of this natural hazard.

Though studies have shown the extent of damage caused by flooding and some have tried to suggest possible ways of mitigating against it (Ologunorisa, 2004; Folorunsho and Awosika 2009), yet urban flooding is still an annual event in most of Nigerian cities. The reason for this annual trend is because of the ever increasing shift of people from rural areas to urban cities for better livelihood, hence increasing the population of those living in flood vulnerable areas such as flood plains and river beds.

Floods in more than 80 countries have killed almost 3000 people and cause hardships for more than 17 million worldwide since the beginning of 2002 according to the report published by the World Meteorological

Organization (WMO) a specialized organization of United Nations based in Switzerland (United Nations, 2005). WMO estimated the total property damage is more than 30 billion US Dollars with over 8 million square kilometers of the total area affected by floods during the first eight months in 2002. The area affected by flood is almost the size of the United States of America. During August 2002, worst ever recorded floods disasters occurred in central Europe affecting mainly Germany, Czech Republic and Austria. Similarly, the flood events in Nigeria, China, India, Nepal, Bangladesh have affected the region severely.

Flood is a widespread natural risk. During the period of 1997 and average of 66 million people a year suffered flood damages (Few et al, 2006). In 1998 the death toll from floods hit almost 30, 000 (Few et al, 2006). Following are some of the major flood events of the recent past:

2.1 Gaps In Literature

Amongst other areas not covered by the literature reviewed above, it is evident that none of the studies did an evaluation of the causes of flooding in Awka Anambra State of Nigeria but this is indispensable to enhance the structuring of a lasting solution to the problem in the area. This work thus tried to fill this gap considering how long the area has been under this siege of flooding and how badly the environment is been affected.

3.0 Methodology

The research adopted a questionnaire survey method in which questionnaire was employed in collecting the data from the respondents which was later collated and analyzed. The population figure of Awka is giving as 104,193 from the projected population of 2006 census, (National Population Commission, 2006). To get the number of households in the study areas, the national average household size figure of 6 per family as recommended by the 2006 Population and Housing Census was used to divide the 2006 population of the communities in Awka which stand as 104,193. This gave 17,365.5 households for Awka and 22, 155 total percentage response (%) from six village in Awka, the frequency response is 12, 902.

The sample size for the study is 400. This was determined through the Yaro Yamine's formula (2001) which is given as:

$$S = \frac{N}{1 + N(e)^2}$$

Where S = sample size
N = No. of population
e = is the margin of error assumed(0.05)
1 = is the theoretical constant

No of population for Awka = 104,193 Source (NPC, 2006)
Sample size for Awka

$$S = \frac{104,193}{1 + 104,193\ (0.05)^2}$$

$$S = \frac{104,193}{1 + 104,193\ (0.0025)}$$

$$S = \frac{104,193}{261.483}$$

S = 0.398.5 x 100 = 398.5 = Approximate to 400.

Therefore, four hundred copies of questionnaire were distributed to residents in Awka metropolis in order to investigate the causes and environmental effects of flooding in the Awka Communities.

To make for random sampling , the streets within the study area were grouped into six clusters on the basis of the six groups that comprise the thirty-four Communities of the traditional area of Awka. Thus, the six clusters were established. They include: Agulu, Amaenyi, Ezi-Awka, Amikwo , Ifite and Nkwelle.

3.1 Result Presentation

Table 1 below, shows the sample size distribution for the six Communities/Towns studied

Table 1: Sample Size Distribution of Questionnaire

Towns	Number of questionnaires distributed	Number of questionnaire returned	Percentage returned rate (%)
Agulu	67	57	16.0
Amaenyi	67	61	17.1
Ezi-Awka	65	62	17.4
Amikwo	67	56	15.7
Ifite	67	62	17.4
Nkwelle	67	58	16.3
Total	400	356	99.9

Source: Author's Computation from Field work (2012).

Analysis, Discussion on Bio- Data

This section analyzes data on general information that is bio-data, using frequency/percentage table as contained in Table 2 below.

Table 2: Percentage Response on General Information

S/N	ISSUES RAISED	FREQUENCY					PERCENTAGE				
1.	Gender	Male		Female			Male			Female	
	Agulu	35		22			61.4			38.6	
	Amaenyi	32		29			52.5			47.5	
	Ezi-Awka	28		34			45.2			54.9	
	Amikwo	29		27			51.8			48.2	
	Ifite	28		34			45.2			54.8	
	Nkwelle	26		32			44.8			55.2	
2.	Age	15-20	25-30	35-40	45-50	50/Above	15-20	25-30	35-40	45-50	50/Above
	Agulu	6	30	16	5	-	10.5	52.6	28.1	8.8	-
	Amaenyi	15	31	12	3	-	24.6	50.8	19.7	4.9	-
	Ezi-Awka	10	27	20	4	1	16.1	43.5	32.3	6.5	1.6
	Amikwo	5	29	15	6	1	8.5	51.8	26.8	10.7	1.8
	Ifite	11	28	19	4	-	17.7	45.2	30.6	6.5	-
	Nkwelle	16	31	9	2	-	27.6	53.4	15.5	3.4	-
3.	Occupation	Civil Servant	Student	Trader			Civil Servant	Student	Trader		
	Agulu	16	19	21			28.6	33.9	37.5		
	Amaenyi	8	18	35			13.1	29.5	57.4		
	Ezi-Awka	14	28	19			23.0	46.0	31.1		
	Amikwo	15	18	26			25.4	30.5	44.1		
	Ifite	29	22	10			47.5	36.1	16.4		
	Nkwelle	14	18	26			24.1	31.0	44.8		

4.	Level of Education	Fslc	Waec/Neco	Hnd/Degree	No formal Edu. NFF	Fslc	Waec/Neco	Hnd/Degree	No formal Edu. NFF
	Agulu	12	23	23	-	20.7	39.7	39.7	-
	Amaenyi	7	36	9	9	11.5	59.0	14.8	14.8
	Ezi-Awka	4	31	24	3	6.5	50	38.7	4.8
	Amikwo	4	24	28	2	6.9	41.4	48.3	3.4
	Ifite	6	12	42	2	9.7	19.4	67.7	3.2
	Nkwelle	7	32	20	-	11.9	54.2	33.9	-
5.	Duration of stay	Less than one year	1-5 years	6-10 years	Above 10 years	Less than one year	1-5 years	6-10 years	Above 10 years
	Agulu	1	2	17	37	1.8	3.5	29.8	64.9
	Amaenyi	9	25	18	9	14.6	41.0	29.5	14.6
	Ezi-Awka	2	22	10	17	3.3	36.1	32.8	27.9
	Amikwo	12	22	16	9	20.3	37.3	27.1	15.3
	Ifite	6	23	20	13	9.7	37.1	32.3	21
	Nkwelle	1	20	19	19	1.7	33.9	32.3	32.2
6.	Flooding Experience	YES		NO		YES		NO	
	Agulu	35		22		61.4		38.6	
	Amaenyi	47		14		77.0		23.0	
	Ezi-Awka	60		2		96.8		31.2	
	Amikwo	34		25		57.6		42.4	
	Ifite	30		30		49.2		49.2	
	Nkwelle	39		20		66.1		33.9	
7.	Flooding Period	Rainy Season		Dry Season		Rainy Season		Dry Season	
	Agulu	39		-		100		-	
	Amaenyi	51		1		98.1		1.9	
	Ezi-Awka	62		-		100		-	
	Amikwo	57		2		96.6		3.4	
	Ifite	54		2		96.4		3.6	
	Nkwelle	54		4		92.0		6.8	

Source: Author's computation from Field work (2012)

From Table 2, we observed that the percentage of male and female in the study area varies. In Agulu Awka the percentage of male is higher than female with 61.4% as against 38.6% of female in the area, in Amaenyi the percentage of male is also higher than female with 52.2% against 47.5% female. Then in Ezi-Awka the percentage of female is more than that of male with 54.9% as against 45.2 male, coming to Amikwo the percentage of male is higher than female with 51.8% as against 48.2% while in Ifite Awka the percentage of female is higher than male with 54.8% against 45.2% male and at Nwelle the female percentage is also higher with 55.2% against 44.8% male.

Table 2 shows the age distributions of the respondents in the selected Communities in Awka. From the table it was observed that majority of the residents fall within the active age group.

The Table 2 showed that in Agulu Awka the residents fall within the ages of 15yrs to 40yrs accounting for more than 80% of the population. In Amaenyi Awka, Ezi Awka and Amikwo the age bracket varies from between 15 to 30 and 15 to 40 respectively. While in Ifite and Nkwelle Awka, majority of the respondent falls within 30 to 35 accounting for 65% of the population. It shows information on the occupation of the respondents. It was observed from the table that many people in Awka were student and civil servant due to the location of many higher institutions in the area.

The Table 2 showed that civil servant and student accounted for more than 90% of the population in all the six selected Communities. The implications of this is that majority of the people in Awka are enlightened enough to should know the importance of keeping the environment free for easy passage of water during rainy

season.

The table also disclosed the level of education of the respondents from the six selected Communities in Awka. From the table, the educational background started from those that had first school leaving certificate to higher degree were ascertained. The level of education from the six selected Communities varies. In Agulu Awka, those that had formal education account for 20.7%, West African School Certificate stand at 39.7% of the respondent, while higher education account for 39.7%. For Amaenyi and Ezi-Awka, first school certificate holder's account for 11.5%, 35.0% and 14.8% while those that have no formal education stands at 14.8% respectively. Ifite and Nkwelle Awka shows that majority of the respondents were educated. The implication of the above result is that many of the respondents were educated and therefore should have knowledge of the causes, effect and solutions to flooding in the area. It shows how long the respondents have been in Awka. Again from table 4.2, it shows that many of the respondents have lived in Awka for more than 6 years while those that have lived for more than 10 years had the highest population. In Agulu Awka, many of the respondent of t have lived there for more than 10 years accounting for 64.9% of the responses, while in Amaenyi people have lived for more than 29.5. For Ezi-Awka, Amikwo, Ifite and Nwelle, majority of the respondent have lived there for more than 10 years accounting for 14.6%, 27.8%, 15.0%, 21% and 32% respectively. The implications of the above findings is that majority of the respondent have had one experience of flooding or the other and have witnessed rain fall in Awka and therefore can be able to give useful information on the experiences had from flooding.

Table 2 presented the experiences which the respondents have from flooding in Awka during rainy season. The table showed that people have witness one form of flooding in the selected area to other.

The table also showed that majority of the respondent especially in Ezi-Awka, Amikwo, Amaenyi and Agulu Awka have had the experiences of flooding within the period of their stay in the study area. The highest percentage of the experience was seen in Ezi-Awka accounting for 96.8% of the respondent. At Amaenyi and Nkwelle Awka it was observed that 77.0% of the response from Amaenyi and 66.1% of the respondents from Nkwelle Awka have experienced flooding in their area. While Ifite Awka and Amikwo showed slight difference from the result of the experience. At Ifite Awka the respondents showed that 57.6% of the respondents have witnessed flooding in their area and 49.2 testified from Amikwo-awka to have had flooding experience. The table discusses the responses on the flooding period. This particular table discusses the period which flooding due occur in Awka. From the responses, it was observed that flooding in Awka usually occur during rainy season.

From the table, majority of the respondents testified that flooding in Awka usually occur during rainy season. The implication is that rainy season is a season of constant rain fall and where there is no adequate provision of flood control measures like in Awka, flooding are bound to occur.

The occurrences of flooding in Awka were also ascertained from the respondents in the six selected Communities in Awka. From their responses, flooding in the study area usually occur during rainy season. The table shows that more than 90% of the respondents were of the opinion that flooding in Awka always occur during rainy season and it occurs constantly in the area. They attributed the occurrence to many factors which would be discussed in the next table. The occurrence is sequential during rainy season especially during the peak of the rainy season.

Frequency/ Percentage on Causes of Flooding

This section treats the analysis of frequency / percentage on the causes of flooding. The information is presented in Table 3.

Table 3: Percentage Response on Causes of Flooding in Awka.

S/N	ISSUES RAISED	FREQUENCY					PERCENTAGE				
1.	**Inadequate drainage system**	S.A	A	NO	D	S.D	S.A	A	NO	D	S.D
	Agulu	39	16	3	-	23	67.2	27.6	5.2	-	
	Amaenyi	55	4	1	-	51	91.7	6.7	1.6	-	
	Ezi-Awka	47	14	-	1	33	75.8	22.6	-	1.6	
	Amikwo	52	6	1	-	48	88.1	10.2	1.7	-	
	Ifite	49	11	1	-	38	80.3	18.0	1.6	-	
	Nkwelle	36	15	5	3	21	61.0	25.4	8.5	5.1	
2.	**Refuse dump in gutters**	**S.A**	**A**	**NO**	**D**	**S.D**	**S.A**	**A**	**NO**	**D**	**S.D**
	Agulu	27	26	2	1	1	47.4	45.6	3.5	1.8	1.8
	Amaenyi	55	4	-	1	-	91.7	6.7	-	1.6	-
	Ezi-Awka	31	29	-	2	-	50	46.8	-	3.2	-
	Amikwo	45	13	1	-	-	76.3	22.0	1.7	-	-
	Ifite	39	17	2	3	1	62.9	27.4	3.2	4.8	1.6
	Nkwelle	38	16	1	3	1	64.4	27.1	1.7	5.1	1.7
3.	**Bad roads**	**S.A**	**A**	**NO**	**D**	**S.D**	**S.A**	**A**	**NO**	**D**	**S.D**
	Agulu	16	26	13	1	1	28.1	45.6	22.8	1.8	1.8
	Amaenyi	42	16	-	2	-	70	26.7	-	3.3	-
	Ezi-Awka	35	16	3	7	1	56.5	25.8	4.8	11.3	1.6
	Amikwo	18	17	11	10	1	31.6	29.8	19.3	17.5	1.8
	Ifite	19	23	8	11	1	30.6	37.1	13.0	17.7	1.6
	Nkwelle	19	24	2	12	2	32.2	40.7	3.4	20.3	3.4
4.	**Improper planning of the environment**	**S.A**	**A**	**NO**	**D**	**S.D**	**S.A**	**A**	**NO**	**D**	**S.D**
	Agulu	22	17	9	8	1	38.6	29.9	15.8	14.0	1.8
	Amaenyi	47	10	2	2	-	77.0	16.4	3.3	3.3	-
	Ezi-Awka	20	31	4	5	2	32.3	50	6.5	8.1	3.2
	Amikwo	47	11	1	-	-	79.7	18.6	1.7	-	-
	Ifite	39	15	5	1	2	62.9	24.2	8.1	1.6	3.2
	Nkwelle	22	26	2	9	-	37.3	44.1	3.4	15.3	-

Source: Author's computation from Field work (2012)

Table 3 shows the causes of flooding in Awka in the six selected Communities. From their responses, it was observed that the cause of flooding varies differently in the six aforementioned Communities.

From the table, majority of the respondents strongly agreed that inadequate provision of drainage system in the study area causes flooding in the area. The percentage of respondents that strongly agreed to inadequate provision of drainage system as a cause of flooding in Awka accounts for more than 90%. Table 3 also showed that some people were of the opinion that lack of drainage system does not cause flooding in the area, these group accounts for only 4% of the population. The implications of this is that lack of adequate provision of drainage system causes flooding in the study area and therefore should be taken note of for prevention for future occurrence.

From the responses, majority testified that dumping of refuse in the gutter in Awka leads to flooding in the area. The percentage of the responses was measured to give more than 80%. It was observed that majority of the people living at Amaenyi, Ezi-Awka, Amikwo, Nkwelle dump their refuse in gutter as a means of disposing of the wastes and this causes flooding in the area during rainy season. The implications of the above result is that refuse block free movement of water during rainy season and these water must find their ways thereby overflowing to the street, causing flooding to the environment.

Responses on whether bad road increases the incidence of flooding in the study area were ascertained. From the responses, Amaenyi residents were of the opinion that bad road also causes flooding in Awka with 70% response.

Responses from Ezi-Awka also show that bad road causes flooding in the area accounting for 56.5% of the population. From the table also, many were of the opinion that bad road does not cause flooding and this

percentage account for 20% of the respondent. The observation is bad road could cause flooding in the study area looking at places in Awka that have good road like Ichide, Umuzocha.

The Table 3 shows the responses on the impact of planning on the environment in Awka. From the table, it was noticed that improper planning is one of the causes of flooding in the study area.

People's opinion on whether improper planning of the environment could cause flooding was ascertained. From table 4.3 above, the respondents showed that improper planning of an area like Awka is one of the causes of flooding in the area. This can be seen from different responses of the respondent.

Majority of the respondents responded positively by strongly agreeing that improper planning of Awka is one of the causes of flooding problem in Awka. In Agulu Awka, 68.5% of the respondents strongly agreed to that,.and at Amaenyi, 93.4% strongly agreed. Ezi-Awka, Amikwo, Ifite and Nkwelle Awka respondents strongly agreed that improper planning of the environment is a cause of flooding in the area. These gave the percentage of their responses as 83.3%, 98.3%, 87.1%, and 81.4% respectively.

Statistical Analysis testing the Hypotheses

This section discusses the statistical analysis of the data. As stated in chapter three, due to the nature of the data generated from the six communities, the independent samples T- test was used to test the five hypotheses postulated. The analysis was done using SPSS version 16.0. Also the decision rule for using SPSS in testing the hypothesis is:

- Reject null hypothesis if p-value is greater than 0.05 i.e $\mu \geq 0.05$ concluded and accept the alternative hypotheses.
- When P-value is lesser or equal to 0.05 i.e $\mu \leq 0.05$, we accept the null hypotheses.

Hypothesis

Ho: There is no significant difference between the causes of flooding in Awka Communities.

Hypotheses 1 was tested using the T-test . This compared the various causes of flooding in the six communities in Awka. The result is shown in table 4.9 (a) (b) and (c)

Table 4: T-Test of Causes of Flooding

(a) Paired Samples Statistics

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	Agree Causes	3.1550E2	4	33.98529	16.99265
	Disagree Causes	77.5000	4	94.81385	47.40693

Source: Author's Computation from field work (2012)

(b) Paired Samples Correlations

		N	Correlation	Sig.
Pair 1	Agree Causes & Disagree Causes	4	.424	.576

Source: Author's Computation from field work (2012)

(c) Paired Samples Test

		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
Pair 1	Agree Causes - Disagree Causes	238.00000	86.10459	43.05229	100.98839	375.01161	5.528	3	.012

Source: Author's Computation from field work (2012)

Decision Rule

Reject the null hypothesis if the p – value is greater than or equal to 0.05, otherwise accept it.

The interpretation of the work:

The overall responses of the respondents were checked, and it was found that the p – value was 0.012 which is less than 0.05. This means that we accept the null hypothesis and conclude that there is no significant difference in the causes of flooding in the six communities studied in Awka.

4.0 Summary of Findings

From the result of the statistical analysis, it was found that there is no significant difference in the causes of flooding in the six communities studied in Awka. Some of the identified causative factors include; inadequate drainage channels, refuse dumps in drainage channels, bad roads and improper planning of the communities in Awka ,were the causes of flooding.

4.1 Conclusion and Recommendation

From the above findings, it was concluded that the causes of flooding in the six communities in Awka are the same; implying that the following factors; inadequate drainage channels, refuse dumps in drainage channels, bad roads and improper planning of the communities in Awka, among others were the causes of flooding in the study area. This is as a result of similarity in location and conditions which includes mainly geology and topography of the area and some human induced conditions like deteriorated infrastructure within these communities.

Sequel to these, the study recommends that:

1. There is need for massive campaign against improper dumping of refuse in the drainage system as it not only create room for flooding but also encourages flooding in the area Blocking of the drainage system with any form of waste could lead to flooding in an area and therefore should be discouraged.
2. That sorting of waste before disposal could effectively reduce the effect of flooding in Awka
3. Construction of sound drainage system is highly needed in controlling and checking flooding in Awka.
4. There is need for creating environmental awareness to keep the drainage systems from waste dumps as this could help in providing lasting solution to environmental problems of flooding in Awka.
5. People should be encouraged to open the drainage system within their area constantly in order to help check and control flooding in that area.
6. Dumping of refuse in drainage systems should be prohibited.
7. The intervention of strong governmental forces to ensure that the environmental laws are been adhered to.

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