

Research paper

**FOOD SECURITY AND COPING STRATEGIES OF SELECTED VILLAGES
ALONG RIVER RIMA AFFECTED BY FLOOD IN SOKOTO STATE, NIGERIA.**

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ABSTRACT

The study evaluated the food security and coping strategies of selected villages along River Rima affected by flood in Sokoto State, Nigeria. Eighty respondents were randomly selected across three out of nine local governments affected. Data were collected by the use of interview schedule. Descriptive Statistic, food Security Index and Coping Strategy Index (CSI) were used to analyse data collected. Results revealed that 75.0% of the respondents were below the age of 50 years, about 93% had up to 12 years of formal education, 98% had farming as main occupation and 75% had family size of less than 10 people. In total sample households, the incidence of food security, average food insecurity gap (depth) and square of food insecurity gap (severity) are 59%, 0.33 and 0.007 respectively. Results further revealed that among the coping strategies adopted by households due to flood, relying on less preferred and less expensive foods was the most common adopted while the least adopted by households was skipping whole days without meals. The study concludes that food insecurity in the study area is high and pronounced thus, a special intervention needs to be put in place either by Government or other donor agencies.

Keywords: food security, River Rima, coping strategies, Sokoto, climate change.

INTRODUCTION

Nigeria is one of the food insufficient countries in sub-Saharan Africa (SSA) although, it is arguably better, in terms of food production than the others (1). Food insufficiency and

importation are prevalent in Nigeria, a country having the highest food production in SSA (2). The fact is that food production has consistently increased over the years, yet deficit and importation are on the increase. (2) observed that food production in Nigeria rose from 89.23 million metric tonnes in 1995 to 110.11 million metric tonnes in 2000. Despite the rise in food production, the country is on the brink of severe food insecurity and may not meet the Millennium Development Goals (MDG's) of eliminating hunger by 2015. Poverty and hence food insecurity in Nigeria is concentrated in rural areas, where about 64 percent live below the poverty line compared to 35 percent in urban areas. While a greater proportion of poor households are found in the north than in the south, the highest incidence of poverty is observed in households engaged in agriculture, that is about 90 percent poor households in Nigeria are engaged in agriculture. Agricultural growth, therefore, is important for the eradication of extreme poverty and hunger in Nigeria.

It has been observed that food security is directly or indirectly related to climate change. Any alteration in climatic parameters such as temperature and humidity which govern crops growth will have a direct impact on the quality of food produced. Climate change also undermines current efforts to protect the lives and livelihoods and end the suffering of the over 1 billion food insecure people and will increase the risk of hunger and malnutrition by an unprecedented scale within the next decades (3). Similarly, due to climate change, yields in developing countries could further decrease by 15 percent on average by 2080. Indirect linkages pertains to catastrophic event such as floods and droughts which are projected to multiply as a consequence of climate change leading to huge crop loss and leaving large patches of arable land unfit for cultivation, and hence

62 threatening for food security (4). Further, Climate change and food security are also
63 related because climate change can directly affect a country's ability to feed its people.
64 However, research shows climate change will not equally affect all countries, and will
65 likely have the biggest impact in equatorial regions such as sub-Saharan Africa (5). This
66 means that countries already struggling with food security are likely to struggle still
67 harder in the future.

68 In Nigeria, Sokoto State in particular is highly prone to food insecurity due to a number
69 of factors: climatic, social, economic, erratic weather patterns, low fertile soils and so on.
70 This situation has worsened in recent times due to the climatic change experienced in the
71 world today. In September, 2010, River Rima over flooded due to high volume of rainfall
72 experienced that year. As a result, villages along the River were greatly affected with
73 devastating effect on lives and properties of the inhabitants of those areas and part of the
74 state. Thus, it is critical at this stage to assess the food security situation of the affected
75 area because this is likely to worsen in time to come. Also, knowledge of the coping
76 strategies adopted by households during the crises is important. In view of the above, the
77 study had the following objectives;

- 78 1. Examine the socio-economic characteristics of affected households.
- 79 2. Assess the household food security status of the respondents.
- 80 3. Identify the coping strategies adopted by the respondents as a result of the flood in
81 the study area.

82 **METHODOLOGY**

83 Sokoto is a city located in the extreme northwest of Nigeria, near to the confluence of the
84 Sokoto River and the Rima River. It is geographically located between longitude 4°8' and

85 4°45' E and latitude 12°0' and 13°58' N (6). For the purpose of sampling, a list of Local
 86 Government Areas affected by the flood together with their corresponding villages was
 87 obtained from the Ecological Disaster Unit of Ministry of Environment, Sokoto State. A
 88 multi-stage sampling technique was employed. Out of nine (9) Local Governments that
 89 were affected by the flood, three Local Government Areas were selected. For the local
 90 government selected, the first (Gada) had nineteen villages, the second (Goronyo) had
 91 eleven (11) villages and the third (Kware) had seven (7) villages. Accordingly sampling
 92 with proportion was used to select five villages from Gada, three villages from Goronyo
 93 and two villages from Kware. In each village, eight household heads were selected. This
 94 gave a total of (80) eighty respondents. All selections above were done using simple
 95 random sampling technique.

96 Interview schedule was used to collect data and the analytical tools that were used in data
 97 analyses include:

- 98 1. Descriptive Statistic to analyze objectives 1
- 99 2. Food Security Index to analyze objective 2,
- 100 3. Coping Strategy Index (CSI) to analyze objective 3,

101 **3.6 Description of analytical tools**

102 **3.6.1 Food Security Index**

103 Two objective methods of food security measurement have been widely used in most
 104 food security studies (7). First, is to estimate gross household production and purchases
 105 over time, estimate the growth or depletion of food stocks held over that period, and
 106 presume that the food that has come into the households' possession and "disappeared"
 107 has been consumed. The other method is to undertake food consumption recall for

individual members of a household or for the household as a whole and analyze each type of food mentioned for calorie content. In this study, a 7-day recall method was used. The food security line was the recommended daily per capita calorie intake of 2260 kcal. The households' calorie intake was obtained through the households' consumption. From the data the quantity of every food items consumed by the households in the 7 days period was estimated. The quantities were converted to kilogram and the calorie content was estimated by using the nutrient composition table of commonly eaten foods in Nigeria. Per capita calorie intake was calculated by dividing estimated total household calorie intake by the family size.

To get the household's daily per capita calorie intake, the household's per capita calorie intake was divided by seven. Households whose daily per capita calorie intake were up to 2260 kcal were regarded as food secured and those below 2260 kcal were regarded as food insecure households. The food security status is dichotomous (i.e. 1 = food secure households and 0 = food insecure households).

The model as used by (8) is expressed as follows:

$$Z_i = Y_i/R \dots\dots\dots (i)$$

Where;

Z_i = food security status of i^{th} households which take values 1 for food secure households or 0 for food insecure households.

Y_i = daily per capital daily calorie of i^{th} household.

R = recommended per capital daily calorie intake (2260 kcal).

$Z_i = 1$ for Y_i greater than or equal to R

$Z_i = 0$ for Y_i less than R

131 Other indices;

132 Head count method was used to measure food security status of the entire area under
133 study and is expressed as:

$$134 \text{ FII} = (\text{FIH}/\text{TH}) \times 100 \dots\dots\dots 2$$

135 Where;

136 FII = Food Insecurity Index

137 FIH = Number of Food Insecure Households

138 TH = Total Households under study

139 Food Insecurity Gap measures the depth of food insecurity and is expressed as:

$$140 \text{ FIG}_i = (\text{TCR}_i - \text{TCC}_i) / \text{TCR}_i \times 100 / 1 \dots\dots\dots 3$$

141 Where;

142 FIG_i = Food Insecurity Gap of ith food insecure household

143 TCR_i = Total Calorie Requirement for ith food insecure household

144 TCC_i = Total Calorie Consumption by ith food insecure household

145 Hence, the total food insecurity gap is expressed as:

$$146 \text{ TFIG} = \sum \{(\text{TCR}_i - \text{TCC}_i) / \text{TCR}_i\} / \text{FIH} \dots\dots\dots 4$$

147 Squared Food Insecurity Gap, which indicates severity of food insecurity among the food
148 insecure house hold is given as:

$$149 \text{ SFIG} = \sum (\text{FIG}_i)^2 / \text{FIH} \dots\dots\dots 5$$

150 3.6.2 Coping Strategy Index (CSI)

151 The CSI gives a quantitative score for each household and is a cumulative measure of the
152 level of coping (9). The extent of use of the CSI was expressed using a five-point scale
153 with the scoring order 4, 3, 2, 1 and 0 for every day, 3-6 times a week, 1-2 times a week,

less than 1 time a week and never used respectively. The formula used to obtain the CSI score was adapted from (10) as follows:

$$CSI = N_4 X_4 + N_3 X_3 + N_2 X_2 + N_1 X_1 + N_0 X_0$$

Where:

CSI = Coping strategies use index

N_4 = Number of households using a particular coping strategy everyday

N_3 = Number of households using a particular coping strategy 3-6 times a week

N_2 = Number of households using a particular coping strategy 1-2 times a week

N_1 = Number of households using a particular coping strategy less than 1 time a week

N_0 = Number of households not using any of the coping strategies.

X_4 = scoring order for everyday

X_3 = scoring order for 3-6times a week

X_2 = scoring order for 1-2 times a week

X_1 = scoring order for less than 1time a week

X_0 = scoring order for not using any

The CSI was used in rank order to reflect the relative position of each of the coping strategy in terms of their use.

RESULTS AND DISCUSSION

Socio-economic characteristics of the respondents

Table 1 shows that 29 and 25% of the respondents fall within the age range of 31-40 and 41-50 years respectively. This indicates that majority (54%) of the respondents fall within the active productive age. This is an indication of a brighter future for agriculture because majority of the respondent are in their prime age, possessing the energy and labour for

177 agricultural development. Also, the age category is an indication that the respondents are
178 more likely to accept innovations and improved technology which could enhance
179 agricultural development and food security. In addition, all (100%) respondents were
180 married and majority (98%) of them had farming as their main occupation, while about
181 3% were engaged in fishing (Table 1). This implies that the predominant occupation in
182 the study area is agriculture.

183 Using the highest years of formal education obtained, Table 1 shows that about 25
184 percent of the respondents had no formal education at all, 45.0 percent had 1-6years,
185 while only a minority (7.5%) had above 12 years of formal education. This finding
186 indicates that majority (75%) of the victims of the flood were relatively literate because it
187 is expected that they will be able to read and write. Similarly from Table 1, majority
188 (68%) of the respondents had family size of between 6-10 people and 13% had between
189 11-15 people. This is true of most localities in northern Nigeria as most of the men are
190 polygamous. (8) also stressed that household size could have implications for labour
191 supply for farm work and also food security but that the contrary is also possible
192 especially when there are many children dependents and elderly people in the family.

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201 **Table 1: Socio-economic characteristics of the respondents in the study area.**

Characteristics	Frequency	Percentage
Age		
<30	17	21.30
31-40	23	28.70
41-50	20	25.00
51-60	12	15.00
>60	08	10.00
Marital status		
Single	-	-
Married	80	100.00
Main Occupation		
Farming	78	97.50
Fishing	02	02.50
Formal Education(Years)		
None	20	25.00
1-6	36	45.00
7-12	18	22.50
>12	06	07.50
Family size		
1-5	5	6.25
6-10	55	68.75
11-15	10	12.50
16-20	9	11.25
>20	1	1.25

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203 **4.5 Food Insecurity Profile among Households in the Study Area.**

204 Adequacy of food consumption is the ultimate index of food security. This adequacy is
 205 directly reflected in the adequacy of food nutrient intake. This is because the calorie
 206 consumed in a region is a reflection of the food security situation of an area. Furthermore,
 207 knowing the number of calories missing from the diets of undernourished people helps
 208 run out the picture of food deprivation in an area (11). It can be observed from the
 209 findings in Table 2 that the average calorie intake was found to be 1514.2 kcal per capita
 210 per day. This is far below the FAO minimum recommended intake of 2260kcal per capita
 211 per day and could indicate food insecurity problem in the area. For further analysis, three
 212 food insecurity measures (incidence, depth and severity) were used to assess the degree

of food insecurity among sampled households using the household male adult equivalent per capita calorie intake as presented in Table 2. On the average the head count ratio was 0.59 implying that 59% of the households in the study area were food insecure based on the household adult male equivalent per capita daily calorie intake. Therefore, the incidence of food insecurity can be said to be high in the study area as more than half of the population are food insecure. In terms of level of food insecurity (indicated by depth and severity), the results showed that for the depth, daily calorie intake increases of about 33% are required to fill the food insecurity gap by households to meet the minimum Recommended Daily Allowance (RDA). The severity observed was surprisingly low (0.007) and is contrary to expectation. With the present global food crises due to effect of climate change and increase in fuel prices in the country which has resulted to high cost of food stuffs, the situation of food insecurity in the area is expected to worsen.

Table 2: Summary Statistics of Food Security Indices for the Study Area

Food Security Indices	Mean Value
Per capita daily Calorie availability	1514.20kcal
Food Insecurity Incidence	58.75%
Depth	0.33
Severity	0.007

Coping strategies of the respondents

Households actively try to protect their livelihood, adopting several action and mechanism when faced with shock and stress that affect their livelihood or livelihood outcomes one of which is food security which is an important aspect (12). The prevailing strategies for dealing with food insufficiencies in households are presented in Table 3

231 using rank scores. The result from the Table shows that “eating less preferred and less
 232 expensive food” was the most prevalent coping strategy among households during
 233 periods of food insufficiency which ranked first with a score of 280. This is similar to
 234 findings of several authors (7, 9, 13, 14, 15) and implies that the first thing that comes to
 235 mind in a household in the event of insufficient food is to consider the purchase of food
 236 that is less expensive and usually less preferred relative to what should have been
 237 consumed if food is sufficiently available. However, the essence of eating food is not
 238 only to quench hunger but also to derive satisfaction from the foods being consumed.
 239 Hence, if one is compelled by necessities to eat foods which are not preferred, that
 240 satisfaction might not be attained. Also, consuming cheap foods means consuming less
 241 meat and fewer dairy products, smaller amounts of oils and fats, and fewer fruits and
 242 vegetables. These foods are usually the most expensive, but they are also the most
 243 concentrated sources of many nutrients. Thus, the poor in developing countries usually
 244 suffer disproportionately from malnutrition in part because diverse, nutritionally well-
 245 balanced diets are unaffordable (16).
 246 The second strategy adopted by households was “limit meal consumed by adults”. This
 247 allows children to have relatively enough food to eat but could results to reduction in the
 248 health and productivity of the adults in the households on whom the responsibility of
 249 providing food for the family is bestowed (17, 18, 19). These might further aggravate the
 250 food insecurity situation as the ability to work and earn income is hampered. The third
 251 strategy adopted was “borrow food or borrow money to buy food”. This is similar to
 252 finding of (15) and (20). Although adoption of this strategy might results in satisfying the

present food need, it might also results in future food insecurity as it can lead to permanent indebtedness.

Other strategies adopted in descending order were ‘limit portions at meal times’, ‘purchase food on credit’, reduce number of meal eaten in a day’, ‘ration little money available to members to buy street food’, rely on help from relative or friends outside household’, and the least adopted was ‘skipping whole day without eating.

Table 3: Coping strategies of Adopted by Households

S/ N	Strategy	Every day (4)	3-6 times a week (3)	1-2 times a week (2)	<1 times week (1)	Never (0)	Total score	Rank
1	Rely on less preferred and less expensive food?	58	10	8	2	2	280	1
2	Borrow food or borrow money to buy food?	11	45	15	1	8	210	3
3	Purchase food on credit?	6	39	20	6	9	187	5
4	Rely on help from relatives or friend outside household?	4	6	11	12	47	68	8
5	Limit portions at meal time?	10	29	28	8	5	191	4
6	Ration little money available to members to buy street food?	3	9	11	8	49	69	7
7	Limit meal consumed by adult	29	19	16	13	3	218	2
8	Reduce number of meal eaten in a day	16	21	16	24	2	183	6
9	Skip whole day without eating?	2	4	7	10	58	44	9

CONCLUSION AND RECOMMENDATION

Based on the findings of the study, it could be concluded that households in the study area are food insecure and they actively adopt various strategies to improve their situation. Government should improve on the maintenance of Goronyo dam in order to identify any problem which might lead to flood so as to prevent future occurrence of flood along river Rima. Victims and other individuals living in places liable to flood are

267 advised to vacate those areas so that they will not be affected by possible future
268 occurrence of the flood.

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