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RESEARCH ARTICLE

Farm Household Food Security Coping Strategies and Severity in Nigeria: Coping Strategy Index Approach

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ABSTRACT

This study investigates the food coping strategies adopted and severity of food shortage crisis of farm households in the northern part of Nigeria. Data were obtained from 244 farmers though the use of structured questionnaire. Data were analyzed using descriptive statistics, coping strategy index and spearman correlation. The result shows average farm holding of farm households to be 2.05 hectares, within the range 0.5 to 6.5 hectares and the annual farm income earning of farm household was observed to be ₦180,914.50k ($1,152), and non-farm income, ₦130,407.10k ($831). The total crop production in grain equivalent was found to be between 412.50kg to 7,915.50kg and an average of 2,147.61kg was observed. About 41% of the total sampled households have experienced food crisis in the last five years that warranted the use of food coping strategies. The farm households that adopted food coping strategies employed strategies ranging from buying from market (88%), eating less preferred food (79%), borrowing money/food (72%), rationing adult meals (55%), sale of livestock (62%), sending children to work for money (17%), even scavenging (14%). The coping strategy index analysis results shows that about 41% of the farm households who used coping strategies had severe food crisis, while income shocks from civil service, trading and carpentry were shown to combat food shortages effectively. The food coping strategies were also found effective in mitigating food crisis. Recommendations were therefore made for sound economic policies geared to addressing economic empowerment for the farmers with attention given to the promotion of non-farm economic activities.

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INTRODUCTION

As a widely prevalent problem especially in the sub-Saharan Africa, household food insecurity or the uncertain availability of culturally appropriate food is a major public concern. Of the estimated 923 million undernourished people in the world, about 200 million of them are in sub-Saharan Africa (FAO, 2009). In Nigeria, among the development problems facing the country, food insecurity ranks topmost. The level of food insecurity has steadily been on the increase since the 1980s and in spite of the Millennium Development Goal target to eradicate extreme poverty and hunger, and halve the incidence of extreme hunger between 1990 and 2015 (FAO, 2006), less than 1 year to the target year, available statistics still shows that this goal is far from being achieved by 2015. Omotesho *et al.* (2010), put the estimate in Nigeria as "more than two-thirds of the Nigerian people are poor, despite living in a country with vast potential wealth".

Food is the foremost basic necessity of life. The importance of food at the household level cannot be overemphasized. In fact, it has been noted that food is of high importance in matters of human wellbeing and economic productivity (Omotesho and Muhammad-Lawal, 2010). Survival is however a basic human instinct and with the prevalent incidence of food insecurity, households that face the dilemma of food shortage do not generally sit back in despair. To combat food shortages, the households engage in various food-acquiring activities or change their eating behavior and these responses are known as food-coping strategies.

Food-coping strategies are defined as the mechanisms employed by households when the means of meeting needs are disrupted by one or a combination of factors, including drought, low income, or high food prices (Ninno *et al*., 2003). Devereux (2001) defines coping strategies as a response to adverse events or shocks. The definition by Snel and Staring (2001), captures the broad notion of coping strategies, namely that "all the strategically selected acts that individuals and households in a poor socio-economic position use to restrict their expense or earn some extra income to enable them to pay for the basic necessities (food, clothing, shelter) and not fall too far below their society's level of welfare". The latter definition implies that coping strategies involves a conscious assessment of alternative plans of action. This does not necessarily mean that their choice of strategies is always successful in achieving their intended objectives. In fact, the coping strategies often have unintended negative effects. However, due to varying degrees of wealth among households, different coping behaviors are adopted by households at different poverty levels. Some coping strategies are common to all households although the extent to which such strategies enable a household to remain afloat depend on the assets at their disposal (Devereux, 2001). Above all, the general tendency is that the lower the household asset status, the more likely the household would engage in erosive responses such as selling off productive assets such as farm implements (Hoddinott, 2004).

Currently, there are fewer studies in Nigeria, especially in the northern part of the country that empirically estimate the extent of household vulnerability and describe household coping strategies employed. This calls for an urgent need to investigate the strategies employed by rural households in order to aid design of appropriate policies and programs that are dedicated to help alleviate food insecurity. This study therefore attempt to investigate the food coping strategies adopted by farm households in the study area to gain empirical estimate of the extent of food shortage severity, the effect of income shocks and impact of strategies on food security status of farm households.

MATERIALS AND METHODS

This study was conducted in four local government areas of Kaduna state, Nigeria namely Giwa, Ikara, Kachia and Zagon-Kataf. Kaduna state is estimated to have a population of about 6,066,562 people (NBS, 2006); and a projected population of 6,527,620 in 2009. The state is located in the northern part of the country between latitude 11^0 32' and 09^0 02' North of the equator and 80^0 50' and 06^0 15' East of the meridian. Agriculture is the main stay of the economy of the people. Food crops that are cultivated and produced by the people include: maize, groundnut, cowpea, guinea corn, millet, rice and cassava, while cash crops include gum arabic, cotton and ginger. The people also rear animals like cattle, goats and sheep.

Multi-stage sampling techniques were used for this study. The first stage involved the random sample of four Local Government Areas in the state and equally two randomly sampled communities within the LGAs making a total of eight (8) villages. A 10% sample size of the farm households in these villages were then randomly sampled for questionnaires administration, making a total of 244 respondents.

Statistical analysis

Descriptive statistic was used to describe the socio-economic characteristics of the respondents as the tools involved the use of measures of central tendency such as mean, mode, percentages and standard deviation. Coping strategy index (CSI) was used to analyze the severity of food crisis with respect to food coping strategies adopted by the farm households, while spearman correlation was use to explain the relationship of income shocks and effect of coping strategies.

Coping strategy index (CSI)

A coping strategy index (CSI) is a food consumption related coping strategy instrument that includes the generic list of coping strategies. The basic idea of using the coping-strategy index tool is to measure the frequency of the coping strategies-how often is the coping strategy used, as well as its severity-what degree of food insecurity does the strategy suggest (Maxwell *et al*., 2003).

Each item was ranked in order of severity and responses weighted so that greater weight is given to more severe measures. Items are then summed and the summed score represents the severity of food insecurity. The values are dimensionless and higher scores imply greater food insecurity.

For the construction of a coping index, twelve strategies or responses to food insecurity were identified on the basis of extensive literature survey and generic list obtained by observation and informal interviews. These are:

1. Buying from market
2. Eating less preferred food (e.g. fish for meat)
3. Borrow money or food from friends/relatives
4. Consumption of seed stock for next year
5. Reduced number of meals for adults
6. Work for food or money
7. Send out children for paid jobs
8. Sale of livestock
9. Gather wild food like hunting/scavenging
10. Sale of assets like land
11. Stealing
12. Migration to cities

The scoring procedure is as shown in Table 1. The more severe coping strategies are allocated higher score while the less severe coping strategies scored lower. For instance migration to city strategy is scored 8 while buying from market is scored 1. Weights were assigned to each Food Coping Strategy (FCS) used in the communities according to the method of Maxwell *et al.* (2003) (See Table1).

The score of each FCS was obtained by multiplying the numeric value presented from the frequency of usage by the weighted number (severity ranking, as indicated in Table 1) of a coping strategy. For example, respondent 1 employed and reported frequency of use of only FCS 1, 4, and 5, and by multiplying frequencies by score weights, the FCS score is calculated as follows:

Table 1: Ranking Procedure of the Food Coping Strategy

Ranking	Severity weight	Severity ranking
Buying from Market	1	2
Eating less preferred food	2	4
Borrowing money/food from friends/ relatives	2	4
Rationing adult meal	3	6
Sale of livestock	3.5	7
Working for money	4	8
Consumption of seed stock	4	8
Sending out children to work for money	4.5	9
Scavenging/Gathering wild food	5	10
Sale of asset like land, house	6	12
Stealing	7	14
Migration to city	8	16

FCS 1: 3 (frequency of usage) × 2 (weight) = 6 (FCS score)
FCS 4: 2 (frequency of usage) × 6 (weight) = 12 (FCS score)
FCS 5: 1 (frequency of usage) × 7 (weight) = 7 (FCS score)

The total FCS score for respondent 1 is therefore 25. This sum is rather referred to as the Coping Strategy Index (CSI) score for each respondent.

The foregone were weighed considering usage of strategy on basis of every day, very often, very rarely and never by 3, 2, 1 and 0 multiples respectively.

RESULTS AND DISCUSSION

The mean age of the respondents as presented in Table 2 is 39.1 years showing a virile and agile average farmers' age with the consequent capability of doing a lot of farm work if given proper incentives. The average farming experience of 22.9 years is also a good indicator as it is expected that with increasing years of farming, farmers gain experience in the art of farming to the advantage of gaining understanding and increasing productivity. The average household size was observed to be 7.5 within the range 1- 27. The household size means the number of people in the house, which includes wives, children and dependents who reside within the family and eat from the "same pot". The total farm and non-farm incomes are also presented in Table 2, as it was observed that the average farm and non-farm income were ₦180,914.50k ($1,152) and ₦130,407.10k ($831) per annum respectively. The range of total farm size the farmer acquires and uses for agricultural production ranges between 0.5 to 6.5 hectares while average total crop production in grain equivalent of the farm household was observed to be 2,147.61kg between the range 412.50kg to 7,915.50k.

Food coping strategy analyses

The study showed that households employed coping strategies to mitigate food shortages which resulted from insufficient crop production. These strategies are the following: buying from market, eating less preferred food, borrowing money/food from friends/relatives, rationing adult meal, sale of livestock, working for money, consumption of seed stock, sending out children to work for money, scavenging/gathering of wild food. No response was observed for coping strategies like sale of asset like land, stealing, and migration to city.

Frequency of food coping strategy (FCS)

About 41% of the total sample of the survey in the study area used one form of FCS or the other as a mean to combat food shortage, that is, 99 respondents out of the 244 sampled households. The coping strategies that households employ to manage rising food crisis have implications for nutritional status. In the short-term, households have few choices for coping food shortage. As food crisis persist, poor households which are already struggling to afford basic foods can be pushed deeper into poverty. The following FCS were engaged by the respondents in study area

Buying from the market

This is the simplest form of FCS employed by household to combat food shortage. It falls under the first category of the four generic categories of FCS. This strategy is a readily engaged tool when farm household noticed that household food supply from its store is depleted. As presented in Figure 1, 87.88% of the respondents that employed FCS engaged the strategy of buying from market to combat food shortage. It is a simple strategy and does present serious risks to the food production capacity of the farm family in the long run.

Eating less preferred food and rationing adults meals

Among current adjustment strategies for food shortage, adjustment to meals is one of the most common strategies adopted by farm families to cope with food shortage. These adjustments to meals include reducing the number of meals eaten in a day or going a whole day without eating, substituting less preferred and less expensive foods and limiting portions at meal times especially for adults in the family. The adoption of this strategy is even more prevalent among the poorest of the households, as would be expected given the poverty level and vulnerability to shocks and stresses (Rashid 2002). These strategies however have significant consequences in the health and virility of the farm family as is predisposes the family members to nutritional deficiencies and the attendant health risks. Our study shows that 78.78% of the respondents that indicated employing FCS engaged in eating less preferred food while 55.56% ration their meals for children. This is similar to a study conducted in Umbumbulu community in South Africa as 61.4 % of the respondents were found to employ the strategy of eating less expensive food to cope with food shortage from own production (Mjonono *et al.,* 2009). Rashid *et al.* (2006) also in a study of livelihood shocks and coping strategies in Bangladesh households found out that 75.3% of the respondents adopted meal adjustments strategy against coping with food shortage.

Borrowing money/food from friends or relations

The analysis of the household data set confirmed that unsecured borrowing was one of the main coping mechanisms used by households in response to food shortage. The most common source of loans during a shock is relatives and neighbors. Food vendors and provision stores are also the avenues for obtaining food loans. The poorer households borrow from local money lenders *(kudinruwa)* with a high interest as formal micro-finance credit is relatively inaccessible to most of the

Table 2: Socio-economic characteristics of the farmers in the study area

Variable	Mean	Standard Dev.	Minimum	Maximum
Age of Household H. (Years)	39.1	10.765	18	68
Farming Experience (Years)	22.9	11.077	3	35
Household Size	7.5	4.019	1	27
Total Land Size (Ha)	2.05	1.207	0.5	6.5
Number of Farmlands	3.67	1.247	1	7
Total Farm Income (₦)	180,914.50	120021.752	20,000	655,000
Non-Farm Income (₦)	130,407.10	109791.182	15,000	835,000
Total Income (₦)	271,238.88	171496.805	32,000	1,283,000
Crop Production in (grain equiv.(kg)	2,147.61	88.306	412.50	7,915.50

Table 3: Coping strategy index and severity score

Mean of Index	29.05	Severity	Frequency	Percentage
Minimum score	6	Not Severe	58	58.59
Maximum score	62	Severe*	41	41.41
		Group Total	99	100
Standard Deviation	11.83	0.503		

*Using the mean as cut-off mark (Devereux, 2001 & Mjonono *et al.*, 2009). ≥29.05 is severe.

Table 4: Coping Strategy Index Correlation for Income Sources

Additional income sources	Spearman's correlation-CS index
Coping Strategy Index	1
Level of severity	0.867**
Civil service level of commitment	0.000
Civil service income	-0.693
Trading level of commitment	0.517
Trading income	-0.540
Artisan income	0.249
Carpentry income	-0.600
Commercial M/C level of commitment	0.665*
Commercial M/C income	0.189
Milling level of commitment	0.000
Outside income say from children	-0.907*

**Significant at P<0.01 (2-tailed); *Significant at P<0.05 level (2-tailed)

Table 5: Coping strategy index correlation for food coping strategies

Food coping strategies (FCS)	Spearman's correlation-CS index
Coping Strategy Index	1
Level of severity	0.867**
Buying from Market	-0.163
Eating less preferred food	0.623**
Borrowing money/food from friends/ relatives	0.311**
Rationing adult meal	0.625**
Sale of livestock	0.499**
Working for money	0.079
Consume seed stock	0.356**
Send out children to work for money	0.296**
Scavenge/Gather wild food	0.486**

**Significant at P<0.01 (2-tailed); *Significant at P<0.05 level (2-tailed)

respondents in the study area. The idea of borrowing by households during a period of food crisis is essentially for food purchases. From the result as presented in Figure 1, 71.72% of the respondents who adopted coping strategies to food crisis employ the borrowing of money or food from relatives, friends, food vendor and local money lenders. Other studies by Mjonono *et al.* (2009) and Rashid *et al.* (2006) have also indicated similar results as 52.8% and 63.8% respectively being results observed in their studies in South Africa and Bangladesh as figures for borrowing food and money FCS employed.

Sale of livestock and consumption of seed stock

Due to varying degrees of wealth among households, different coping behaviors are adopted by households at different poverty levels. However, some coping strategies are common to all households although the extent to which such strategies enable a household to remain afloat depend on the assets at their disposal (Devereux, 2001). Above all, the general tendency is that the lower the household asset status, the more likely the household would engage in erosive responses such as selling off productive assets such as farm implements (Hoddinott, 2004). One of such responses of disposing off of productive assets is destocking of livestock. This is to be noted that it is not the same thing as selling, for instance, male livestock as a source of farm income by farm households. This is more like selling female, productive livestock to cope with food shortage. From the result as presented in Figure 1, 61.62% of the respondents employed the sale of livestock against coping with food shortage. This is not without the effect on the farmers' current and future productive livelihood as this shows an increasing commitment of resources to meeting subsistence needs. The result however further presents that just about 12% of the respondents are involved in the consumption of seed stock for the following year. This means that these farm families will literally have no seed to plant for the coming year except to probably borrow seeds or money to purchase seed for next production. A vicious cycle of poverty may ensure if no intervention come to the aid of these farm households as this is indicative of high degree of food insecurity.

Working for money, sending out children to work and scavenging

Amongst the strategies that entails altering the household structure is going to work for money and sending out children to work for paid jobs. Here, food crisis has persisted and the family goes out to take a drastic action to save the situation. Going out to scavenge food either in the wild or gathering food around falls under the category of household-structure altering. Watts (1983), suggests that, "households do not respond arbitrarily to a food crisis for which they are in some sense conceptually prepared; rather they do so serially, with respect to the intensity of what one might call famine signals." At this level, the food crisis has deepened and future production commitment is less the concern compared to meeting the immediate family needs. Figure

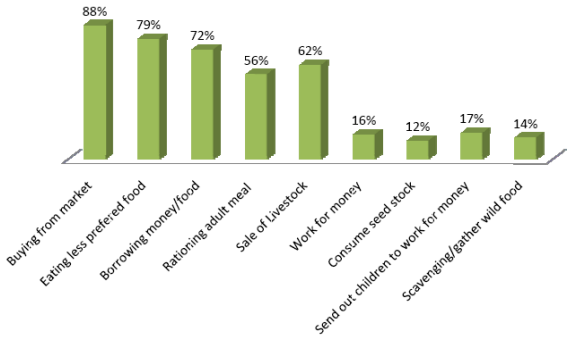

Fig. 1: Distribution of respondents' use of Food Coping Strategies (FCS)

1 presents that 16.2% of the household sampled shows that labour was sold for money in the family while 17.2% of the households sent children out to work for paid jobs. If labour sale was at the time that the farm household is also involved in production activities, which is very likely, then the farm household production will be limited in no small measure. The family commitment to its own food production will be affected thereby predisposing it more to food insecurity.

It to be noted also that 14.14% of the respondents adopted scavenging as a means of coping with food shortage, while no response were observed for sale of assets like land, stealing and migration to cities.

Coping strategy index (CSI) and severity

Given that the CSI monitoring tool is a comparative tool, rather than absolute measure of food insecurity, the CSI score alone has no meaning (Maxwell *et al.*, 2003). However it establishes a baseline within sampled comparative measure from which changes in food security among households can be monitored over time (Maxwell *et al.*, 2003). Comparing CSI scores and averages gives a good picture of overall household food security and establishes baseline for monitoring trends and the impact of interventions (Devereux, 2001). The analysis presented in Table 3 uses the mean CSI score to compare the relative food insecurity severity between households defined by one or more household characteristics, in this case the use of FCS. Table 3 shows the severity of food crisis and otherwise of households who employed food coping strategies. The range of the CSI is between 6 and 62, while the mean score is given as 29.05. Further analysis in comparison with the mean score reveals that about 41.41% of the respondents who adopted various forms of coping strategies had severe food crisis, a situation that calls for concern.

Correlation of income shocks with CSI

Spearman's correlation showed that respondents' committed to commercial motorcycling and trading activities, are strongly and positively correlated to CSI score, though only commitment level to commercial motorcycling was found to be significant at 5% level (See Table 4). This may be interpreted as, the more a farmer abandons farming activities to be committed to commercial motorcycling, the more coping strategies he employs to combat food insecurity. Commercial motorcycling seems to be the survival strategy of low poor farmers, as a quick source of income to meet family food needs. The income sourced from this is weakly but positively correlated to SCI score but the level of commitment to this temporal vocation can be said to affect adequate commitment to production activities and consequently food insecurity ensures. Farmers who spend more time sourcing income from commercial motorcycling have less time for agricultural production activities. It is also indicative that farmers' amount of time spend in this trade does not tend to equate the amount of income they get from it. Another vocation offering better income level could therefore be advocated judging by this result.

Income from civil service and outside sources, (e.g. remittances from children and/or relatives) were however found to be negatively and very strongly correlated to the CSI score, meaning these income sources have proven to succor food shortage experiences (Table 4). Both income sources showed high correlation with the CSI score, indicating that farmers who are civil servants are highly more likely to be food secured as the correlation coefficient indicates (-0.693). The correlation coefficient of income from outside sources even shows a higher negative correlation (-0.907) found to be significant at 1% level. The implication of this result is that any form of aid given to farmers as assistance or remittance to increase the financial capacity goes a long way to lessen CSI score and invariably their food insecurity status.

The table also shows that income sourced from trading activities was found to be negatively and strongly correlated to the SCI score. This also indicates that traders' income level causes them to be relatively food secured, with less CSI score, though the relationship is not significant at both 1 and 5 percent levels of significance. The enormous amount of time spent in trading may be the reason why this result is so indicated. Another reason could actually be that the level of trading the farmers undertake might not be so sophisticated to attract high income significant enough to affect their food security level. All the same trading farmers are likely to be more food secured as indicated by the result presented.

Income sourced from carpentry has a correlation coefficient of -0.600, though not found to be significant at either 1 or 5% levels. The implication of this is also that income from this vocation buffers household from food insecurity. Same can be said for income sourced from artisanship like shoe cobbling, barbing, handicraft as well as bricklaying. Income sourced here however shows a weak correlation with the CSI score (0.249).

Correlation of food coping strategies with CSI

Spearman's correlation showed that food shortage coping strategies were significantly correlated to the cumulative CSI scores of households (See Table 5). The strong and positive correlation of most of the food coping strategies to the cumulating CSI implies households continued to apply the coping strategies despite using their income and consumption of food from their own production and these strategies are effective in countering food shortages. The survey indicated that as CSI scores increased, households relied more often on the food coping strategies showing high level of food insecurity.

Households with low CSI scores applied these food coping strategies less frequently than households with high CSI scores.

All of the coping strategies employed except two which are, buying from market and working for money, were found to be significantly correlated to the CSI score. The negative, weak but insignificant correlation coefficient of buying from the market (-0.163) is indicative of less food insecurity measure of this strategy. This is indicated as not significant and the measure negatively correlated to the CSI score.

Conclusion and recommendations

This research result is indicative that most of the coping strategies employed by household were effective in mitigating the food insecurity situation, the most popular being buying from the market, eating less preferred food and borrowing money/food from friends and relative. The coping strategies employed were mostly not detrimental to livelihoods and future food security and this is an indication of resilience buffered by non-farm income sources like civil service and trading. The coping strategies employed by households were reversible, i.e. they were not mostly detrimental to livelihoods and future food security situation of the households. However, some of the copping strategies were not reversible, meaning that they were detrimental to the livelihoods and future food security situation of the households. It is therefore recommended that sound economic policies geared to addressing economic empowerment for the farmers in the study area are imperative. Attention should also be given to the promotion of non-farm activities, particularly those that are associated with the smallholder agricultural sector. A strategy that pays attention to the strengthening of farm/non-farm linkages is likely to yield better results in terms of employment and income generation.

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