



Food and Nutrition Coping Strategies in Flood Prone Areas of Bunyala and Nyando Sub Counties Kenya

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Authors' contributions

This work was carried out in collaboration between both authors. LOO designed the study, performed the statistical analysis, wrote the protocol and wrote the first draft of the manuscript. FN managed the analyses of the study and managed the literature searches. Both authors read and approved the final manuscript.

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ABSTRACT

The nutrition situation in flood affected areas in Kenya is precarious and likely to deteriorate sharply in the coming years. Humanitarian crises exacerbate nutrition risks and poor food consumption practices thereby aggravating malnutrition. There is lack of data on the pre and post floods food and nutrition situation. This study sought to assess Coping strategies by vulnerable groups for sustainable food consumption patterns and nutrition status in flood prone areas of Bunyala and Nyando Sub Counties, Kenya. The study sample comprised of 208 households out of which the vulnerable groups (children 6-59 months and lactating mothers 15-49 years) was derived, key informants interviews and focus group discussions and informed consents from the participants were taken. The study sites were Nyando and Bunyala Sub counties, in western Kenya. The areas were purposively selected given the long history of floods over time, the study started from 4th November to 15th December, 2018. The study adopted a cross sectional descriptive survey and evaluation design. Cluster sampling was used to select the administrative units and households, purposive sampling to select the key informants and simple random sampling to select the vulnerable groups. The data was collected using questionnaires, key informant interview guide, focus group discussions and secondary data. The data was analyzed by SPSS version 16, Nutri-

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survey and ENA soft wares. Chi square statistical test was used to determine the relationship between the food consumption patterns and nutritional status of the vulnerable groups. The results were then presented using tables and graphs. The main findings were that most households continued to stay in flood prone areas despite early warnings and food aid was hardly available. The coping strategies were limited with majority adjusting the frequency of food intake and type of food eaten. The study concluded that the coping strategies were varied and uncoordinated and therefore not sustainable. Thus, there is need to build community resilience through expanding multi-agency social protection programs in flood prone areas to cushion the vulnerable groups against food and nutrition insecurity.

Keywords: Coping strategies; floods; food aid; Vulnerable group; food nutrition.

1. INTRODUCTION

There is a general agreement amongst scientists that the earth is undergoing climate change and that change in rainfall amounts and patterns will lead to both increased drought and floods in localised areas [1] [2]. Despite measures to mitigate floods, the Intergovernmental Panel on Climate Change (IPCC) still predicts future increases in flooding due to escalating storm activity and overall rise in precipitation [3][4]. According to the International Federation of Red Cross (IFRC), WDR of 2014, floods, of all natural disasters, affect the greatest number of people worldwide and have the greatest potential to cause damage [5]. In the past three decades, a significant increase of floods has been observed globally and contributed to over 500,000 mortalities and resulted in financial losses of more than \$500 billion [1].

Floods undermine farm yield and national harvests thus reducing household and national food availability and agricultural income derived from crop sales thus making the populace vulnerable to food insecurity. Floods affected 85% of crop production, food prices by 69% and livestock production by 41% in Bunyala [4]. More than one billion people around the world experience hunger with the vulnerable groups being most affected. Floods lead to widespread displacement of people, loss of life, disruptions to economic activities and destruction of infrastructure which adversely affect food consumption patterns ultimately affecting food and nutrition security [3]. The number of people at risk of hunger as a result of climate change is expected to increase by 20% and the number of malnourished children is projected to go up by 21% more than without climate change by 2050 [6]. Floods are also associated with a number of health problems (water borne diseases) like cholera and diarrhoea. Infection and illness deplete the nutrient stores and this further predisposes

children to malnutrition. The flood related diseases lower the capacity of individuals to utilize food effectively.

Nyando and Bunyala Sub Counties in Western Kenya have been perennially affected by floods year in and year out. Both Bunyala and Nyando have dark cotton soils which are commonly associated with swamps. There is continued loss of fertile soils and siltation of rivers and water ways leading to frequent flooding. The residents suffer every year due to damage caused by the floods, which intertwined with socio economic constraints, makes the population vulnerable. The floods in Nyando and Bunyala aggravate food and nutrition insecurity. Food is a basic right without which one cannot guarantee life, dignity or the enjoyment of other human rights. The right to sufficient and quality food is a core element of an adequate standard of living [7]. The Nyando and Bunyala residents have a right to basic nutrition and adequate amounts of food in acceptable quality and quantity as stipulated in the Kenyan constitution 2010. There is a great concern that this situation may slow down and reverse the gains made in the attainment of the Vision 2030 goals which aims at better yields of crops and increasing productivity of crops and livestock in Kenya [8], the big four agenda of ensuring food security through making farms as productive as possible and ensuring food resilience within the households and sustainable goals especially goal number two that aims at ending hunger and achieving food security through promoting sustainable agriculture [8], [9].

As extreme weather events intensify, it becomes more critical to understand how vulnerable households are affected by those events and the coping mechanisms they rely on to minimize the effects. The devastating effects of floods will be reduced if the coping and adaptive strategies are enhanced hence the need to investigate the coping capacity and strategies used by

households in order to aid in design of appropriate policies and programs. This is only possible by exploring and obtaining a better understanding of the prevailing coping strategies in flood prone areas. Moreover the coping strategies are time, situation and location specific and therefore it is important to study the area from time to time in order to update the research findings

2. LITERATURE REVIEW

Coping strategies is a response to adverse events or shocks. They are methods used by households to survive when confronted with unanticipated livelihood failure. This may include all strategic actions to restrict expense in order to cater for basic needs by individuals or households [10]. This may include dietary adjustments such as eating less, reducing portion size or eating less preferred foods [31]. It is a means by which household members try to get food items and intervention of relatives, neighbours and social networks for achieving minimum survival of food in a disaster period [7].

Natural disasters (floods) have great impacts on the vulnerable populations and adopting to these impacts have grown from a minor environmental concern to a major challenge for human development [11]. It has been noted that the increasing frequency requires nutrition to be addressed in all phases of response [12]. There is a growing concern on how to manage households affected by disasters like floods from relying on relief to adopting resilience and development. There is need for resilience building and long term development in order to reduce vulnerability of the affected populations in food and nutrition security [14].

Floods induce various types of stresses on livelihoods hence reducing food access and income [15]. Droughts and floods undermine farm yields and the national harvest, reducing household and national food availability and agricultural income derived from crop sales [8]. Poor harvests threaten food security and livelihoods from household to national level [16]. Acute malnutrition increases in the immediate aftermath of an emergency due to the high burden of disease and inadequate diet. It creates a negative impact on stunting, wasting and infant and young child feeding practices [12]. In addition, vulnerable groups are often food insecure and in emergency situations then become even more vulnerable due to lack of

financial support such as insurance and saving, hence they have the least capacity to recover and return to the pre-disaster situation [13]. Some of the coping strategies they opt to adopt are economic diversification like having large families to give the household additional labour or having social systems that can offer budgetary help, passionate support or safe houses in critical moments.

Food aid or food assistance has been invaluable in providing basic nutritional needs to shock affected people saving untold millions of lives of vulnerable groups. It is an essential component of humanitarian response in an emergency. In the short term, food aid may be the only option for protecting the right to food [13]. On the other hand, [4] indicates that the Kano Plains community relies on support from public and private agencies during flood emergencies thereby encouraging them to rely on handouts instead of developing resilience. However, government structures are fragmented and there is lack of clear policies and guidelines on disasters and food assistance in particular [17]. Cross sectoral policies initiatives is always complex and to develop synergy among sectors has been a challenge.

Past food security policies have had limited success in addressing Kenya's food and nutrition insecurity due to several reasons. Chief among these are inadequate budgetary allocations, unstable macro-economic conditions, limited involvement of the private sector, inadequate sectorial coordination, lack of monitoring and evaluation systems, limited stakeholder participation and lack of a clear food and nutrition strategy. The early warning systems primarily focus on agricultural production and do not address the effects of food and nutrition insecurity [18]. Only about two-thirds of the Kenyan population can be said to be food secure. This is similar to a study done in Iran that identified the weak operations, inappropriate and unfair distribution of food aid. Food storage equipment, food provision and distribution were very poor [13].

Food insecure people suffer from extreme poverty chronically and are largely left to their own devices with no access to some of the safety net provisions available to those suffering from acute food shortages in drought and flood prone areas. Preparedness and response capacity for floods is usually low unless a severe crisis is imminent. The coping strategies differ

within and between households. The Sphere Project done by WHO in 2004 recommended the use of new technologies to be utilized putting local production systems and cultural practices into practice [19]. It further recommended capacity building initiatives including cash for work or food for work to enable families build up their assets. In the Kisumu County Integrated Development Plan, stakeholders recommend a strategic food reserve that will include critical food stuffs in the form of physical stock and cash and that will ensure that Nyando Sub County has sufficient food stocks for handling emergencies.

A study conducted by [20] in India on vulnerability and coping with disasters explored the effectiveness of some of the coping strategies the vulnerable groups have adopted. The study found out that some of the strategies included receiving cash transfers, relief, selling livestock and borrowing. Furthermore, the study revealed that the strategies taken by the vulnerable groups depended on the shock of the disaster. Although the study looked at the coping strategies of vulnerable groups, the study was not clear on which vulnerable group they were looking at and therefore, this study seeks to develop on this study finding by determining the coping strategies from the vulnerable groups specifically lactating mothers and children aged 6-59 months.

A study in Ghana on coping strategies of households in flood prone areas found out the the community opted to temporary vacate their homes during flooding, transferring some of their properties to neighbours and building flood steps. However, the study noted that the strategies varied from one community to the next. It is noted that the study focused on mechanisms for avoidance of floods therefore, conclusions on the coping strategies of the vulnerable groups cannot be drawn from the study. Furthermore, the nutrition and food consumption strategies taken by the households is not addressed by the study.

In a study done in Malawi by [21] on theory and practice of vulnerability in flood prone areas of Chikwakwa. The study focused on vulnerability in terms of preparedness for the disaster by looking at the evacuation process and how well the people are prepared for disaster. The study did not highlight the coping mechanisms with the disaster and therefore it did not shed the light on the food consumption and nutrition status which this study aims to address.

In a study in Uganda on the coping strategies for landslides and floods in Mt. Elgon, the study found out that the coping strategies of the community was practising good farming activities and getting assistance from the government. It revealed that the strategies had reduced the negative effect of the disasters. However, the vulnerable groups were not the center of interest in that study while this study sought to determine the coping mechanisms of the vulnerable groups in the study areas.

A food security and nutrition strategy paper developed by the Government of Kenya states that access to efficient food markets in both rural and urban areas will be ensured by supporting investment in infrastructure to facilitate movement of food products from surplus to deficit areas and to reduce the cost of transport. The paper recommends a multi-sectorial approach that integrates the economy, agriculture and other related sectors. There was limited literature on the implementation of these recommendations. In regards to the coping strategies, many studies have also looked at the coping strategies of the households found in the flood prone areas. However, in these studies the strategies were more focused on how the individuals avoid floods rather than the activities they were involved in during the floods. This study therefore sought to find out the coping strategies by vulnerable groups for sustainable food consumption patterns and nutrition status in flood prone areas of Bunyala and Nyando Sub Counties.

3. RESEARCH METHODS AND MATERIALS

The study sites, Bunyala and Nyando Sub Counties were purposively selected because of their flooding history over the years. The study population consisted of vulnerable groups (children 6-59 months) and (lactating mothers aged 15-49 years) sampled from 208 households in Bunyala and Nyando Sub Counties, Kenya. The study used cross section descriptive survey design and evaluation research designs. The study adopted a multi stage random sampling with both probability and non-probability strategies 215 households were sampled in the proportionate ratio of 1:4 for Budalang'i and Nyando Sub Counties as per [32]. The participants for Key informants and Focus Group Discussions were selected using purposive sampling. The study used questionnaires, Focus Group Discussions guide, Key Informant

Interview guide and observation checklists as tools for data collection Descriptive analysis was done by use of means, modes, standard deviations, frequencies and percentages while inferential statistics was done by use of Chi Square test. The qualitative data collected from FGD and KII was transcribed, coded and categorized to come up with Emerging themes and integrated into the form of narrative. The results from the questionnaires, FGD and KII were then triangulated to form a basis for Discussion.

4. RESULTS AND DISCUSSIONS

The findings indicate that 58% were not living in their usual residence and only 42 reported that the study area was their usual residence. Significantly notable 97% had not received any food Aid in the last three months preceding the study and hence the study population adopted their own coping mechanisms. The mechanisms included reducing number of meals (95%), skipping entire day meals (18%), and restricting consumption of meals to children (87%). Other coping strategies were purchasing food on credit (88%), consuming wild foods (18%) and sending household members to eat elsewhere (46%), The study population from the focus group discussions and key informants had developed

some little level of resilience since floods was a recurrent phenomenon.

4.1 Duration of Stay at the Residence

The study investigated whether the respondents were at their usual residence. The duration of stay is important as it informs on the capacity of households to endure, adapt, adjust to and mitigate flood threats to reduce vulnerability.

The result obtained revealed that 88 (42%) of the study participants were residing in their usual residence of which 17 (41%) were in Bunyala and 71(43%) were in Nyando sub County. A cross-tabulation between households in vulnerable groups was conducted Chi-square test at 5% level of significance. The p-value=0.903 which is greater than the threshold $p < 0.05$ showed that there is no statistically significant difference in duration of usual residence for households in vulnerable groups ($X^2(1) = 0.015$; $p = 0.903$).

The Key informants explained that due to cultural beliefs and traditions some members of the community did not move from their usual residence. Others said the socio –economic status determined the migration of those who moved. The other major determinant was their property (land, livestock, and houses).

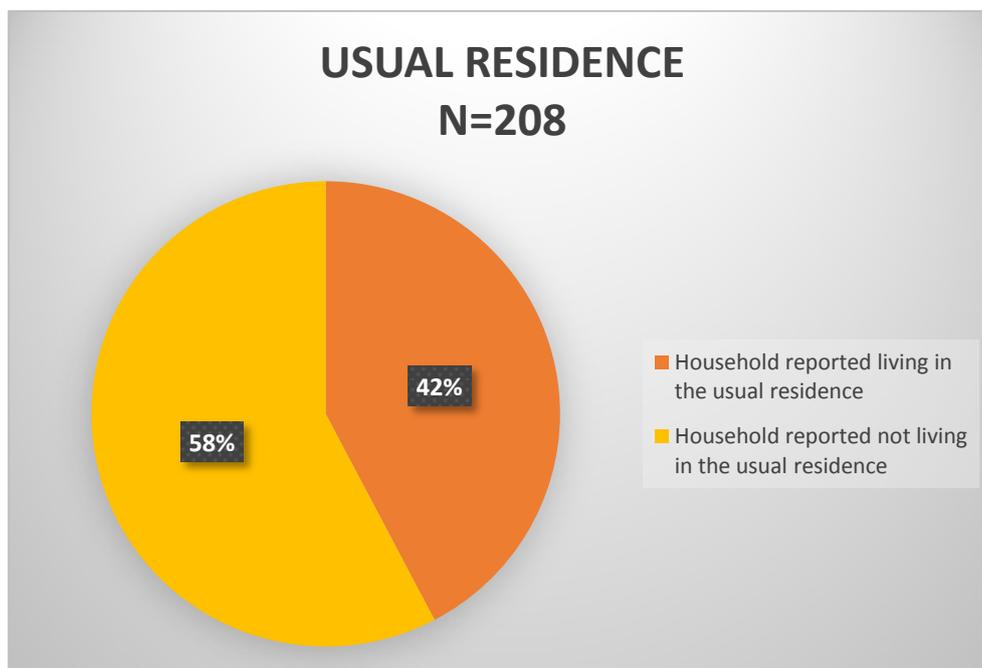


Fig. 1. Duration of stay at the residence

This result was much lower than the study done by [22] that revealed that residents of Kano plains did not move to evacuation centers despite the early warning systems and indicated that 67% and 83% of the respondents in Nyando and Bunyala had been living in their usual residence for more than 10 years. As explained by [23] in a study done in Nyando, revealed that the community most preferred option was temporary relocation based on the perception that the impacts of floods was short lived [23]. From observation the respondents in Bunyala and Nyando appear to normalize the risk associated with floods and to them it was just an occurrence that will come and go. A Participant in the FGD stated:

“Flooding is normal, I was born and found floods and yet am still alive, I earn my living through fishing so you don’t expect me to move”

This finding was in line with a study conducted by [24] which discovered that affected families in areas inclined to flooding usually vacate their homes and move to camps or homes of friends and relatives.

In a study done in Akurassa, Srilanka to determine why people live in flood prone areas, revealed that some of the reasons was that the current place of residence had been inherited through generation and hence there was a strong connection. 80% of the respondents in the study expressed views of sense of place. The findings were consistent with a study in Ghana that showed the main reactive strategies used in times of flooding were seeking for refuge in flood-free settlements and transferring valuables to

friends and relatives. Thus, the idea was to protect lives and properties, then, think of recovery strategies afterwards.

Earlier research established that the more one is exposed to something the more familiar it gets, and the more one tends to develop a tolerance for it. The results indicate that the residents of Bunyala and Nyando were aware of the flood risk but at the same time make little effort to prepare. The community bond provides a form of social security. Therefore there is a need for continued sensitization on disaster risk reduction measures.

4.2 Food Aid Utilization

All citizens of Kenya have the right to receive relief assistance as a fundamental human principle [17].

The Fig. 2 shows that only 3% of the total households had received food aid while 97% indicated they had not received the food aid. Only 7% of the 167 household’s interviewed in Nyando had received food aid while none of the 41 households in Bunyala had received any food aid.

A cross-tabulation between households in vulnerable groups who received food aid was conducted to determine statistically significance difference on food aid. This was done using a Chi-square test at 5% level of significance. The p-value=0.218 which is greater than the threshold $p < 0.05$ showed that there is no statistically significant difference for households in vulnerable groups who received food aid ($X^2 = 1.517$; $p = 0.218$).

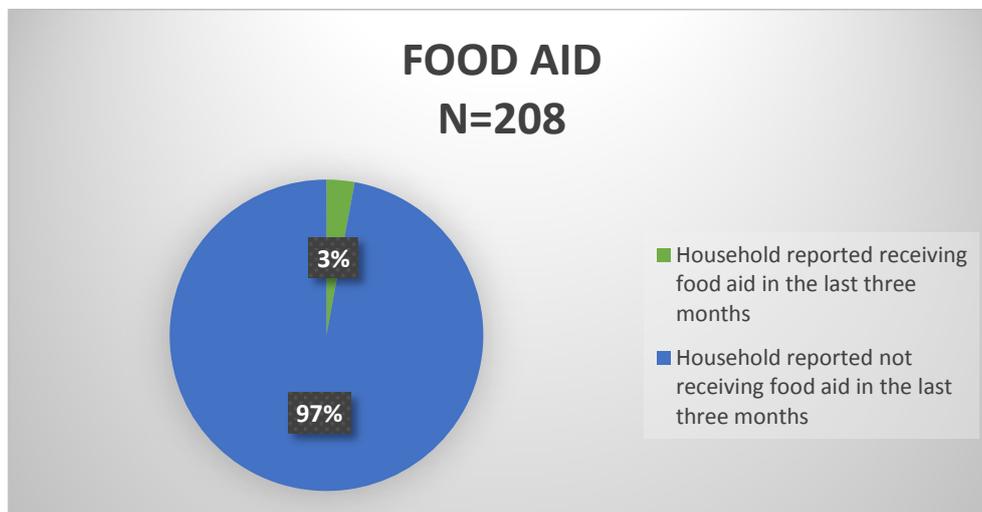


Fig. 1. Food aid utilization

The study results contradict the information from KII that organizations working in both Bunyala and Nyando Sub Counties offered food supplements, agricultural inputs, reconstructed irrigation schemes and conducted water treatment. Hence they may not offer relief directly but have activities that would ensure food and nutrition security, When probed on what the county and national government does to assist they prioritizes as follows, provision of relief food. Health services and storage of food stocks.

However, from the FGD it emerged that there was relief food but it was not effective in that most needy household were excluded. However, there could have been the possibility of under reporting to portray the need for increased inclusion of perceived needy household by the community. [33] In her study stated that Bunyala received more relief than Nyando since the population affected by floods in Bunyala is greater than the one of Kano plains. A study done in the study area of Nyando had indicated that 66% received food relief [25].This echoes a similar study disclosed that only a few victims in the Pru District of Ghana received relief items from external sources after a flooding event. The distribution of relief items was done in an ad hoc manner hence offering little capacity for the affected households to contain future disasters.

In the study in Bera, Malaysia also reported that 73% had received food aid from the Government, 16% from religious organizations and 29% from families [26].

There is evidence that the coordination of food aid is lacking and hence the contradicting statements

from the key stakeholders. It was observed that the disaster management committees were only active during the emergency period and played a passive role in the other phases of disaster management cycle. Thus the continuity to vulnerability to disasters with yearly persistent calls for aid from Government and donors [27].

4.3 Coping Strategies

The study sought to find out which are the most common strategies used by the two sub counties of Bunyala and Nyando to mitigate or respond to flood disaster in the context of food consumption patterns and nutrition status of vulnerable groups.

The results revealed that there was statistically significant difference in the following variables; for reduction in the number of meals, Skipped meals for the entire day, for reduction in size of meals, for purchased food on credit, For consume wild foods Swapped consumption to less preferred.

Those who its only in restricting consumption of food by adults to allow more for children only, Send household members to eat elsewhere and For those who abandoned children that had a p-value which is greater than the threshold $p < 0.05$.

The key components include; reduction in the number of meals per day with 92.7% and 97% for Bunyala and Nyando respectively, reduction in the size of meals with 95.1% for Bunyala and 95.2 for Nyando. 97.4% of Bunyala indicated that they restrict consumption of food of adults to allow more for children only with 86.2% from

Table 1. Household coping strategies in the last month before the survey

Adaptation within the household			
Reduction in the number of meals per day	35 (85)	162 (97)	197 (95)
Skipped meals for an entire day	12 (29)	26 (16)	38 (18)
Reduction in size of meals	33 (80)	157 (94)	190 (91)
Restrict consumption of food by adults to allow more for children only	33 (80)	148 (89)	181 (87)
Coping mechanisms			
Purchased food on credit	29 (71)	154 (92)	183 (88)
Consume wild foods	7 (17)	2 (1)	9 (4)
Send household members to eat elsewhere	19 (46)	97 (58)	116 (46)
Coping strategies			
Swapped consumption to less preferred or cheaper foods	34 (83)	164 (98)	198 (95)
Sell household goods or farm implements to purchase food	25 (61)	127 (76)	152 (73)
Abandonment of children	1 (2)	3 (2)	4 (2)
Consume immature crop	19 (46)	62 (37)	81 (39)
Migrated out of the area due to floods	3 (7)	22 (13)	25 (12)

N=208

Nyando saying the same while 85.4% of Bunyala and 89.9% purchase food on credit. Furthermore, 97.6% of those in Bunyala indicated that swapped consumption to less preferred or cheaper foods while 99.4% of Nyando did the same. Of those that said they opted to sale household goods or farm implements to purchase food 80.5% of those in Bunyala took this option while 72.6% of Nyando did the same. 56.1% of those in Bunyala were sending household members to eat elsewhere while 58.9% of Nyando used the same strategy. In addition Bunyala residence adopted other strategies like consumed wild foods (48.8%) and Consume immature crop (40.5%) while 97.6% and 60.7% of those in Nyando opted for wild foods and immature crops respectively.

A study done in Nyando affirms that the most common coping mechanisms were selling property to earn income 78.2, while 88.2 show that they migrate to safer places. As a coping mechanism, there were two main coping mechanisms by the responded, namely eating wild food and reducing the amount of food consumed per day. Findings by [4] on a study on loss and damage from flooding in Budalangi, revealed that the most common coping strategies adopted by households included seeking support from organizations, temporary relocation, reduction of expenditure on household necessities, engagement in extra income-generating activities, sale of property, reliance on social networks, and modification of food consumption. Households mostly modified food consumption patterns by having fewer meals per day, eating cheaper foods, having smaller portions, and by reducing food intake of adults to be able to feed young children adequately.

Similarly, in a survey of 220 residents conducted in a flood prone region in Ghana, on coping strategies after a flood hazard [28] noted some of the strategies that respondents implemented included: roofing of thatch houses for money, fishing, weeding the farms of other individuals in return for food, trading and selling in nearby townships, obtaining loans from social contacts, selling of livestock, premature harvesting of crops, weaving and basketry, dependence on food from previous crop seasons, and resettlement in other towns (geographical diversification). Another study done in Nigeria on the effects of floods revealed that 90% skipped meals, 31.5% borrowed and 80.7% reduced portion size [29]. The study findings were consistent with these results. The study

population skipped meals either voluntary or forced because the household did not have any income. They borrowed to sustain the household.

For the two sub counties, abandonment of children was the least mechanism reported a strategy to improve food consumption pattern. Out of the twelve mechanisms, consuming wild foods was the most significant strategy in coping up with flood with a chi square of 16.85 and p-value of 0.001 Previous literature reported that the coping strategies used by the respondents varied by their places of residence. The implication is that, the strategies used within each community depended on the nature of land and available resources. This confirms the arguments that due to variations in resources and vulnerability to flooding, adaptation requires place-specific strategies. The study affirms the results of a similar study done in Ghana which revealed that during flooding the market becomes the main source of access to food and hence the study population resulted to sell assets, burn charcoal and fell trees to be able to buy food [27].

From observation the researcher was able to observe other coping mechanisms like drying food either on high grounds like the road or on stones and the early warning systems that were in the study sites of Bunyala and Nyando Sub Counties. The researcher observed that there were early warning systems in place and this was confirmed by the key informants and in the focus group discussions. In Nyando a key informant said *"we are warned and told to move to safe higher grounds, where is the higher ground, Kano is a low plain land"* In Bunyala a respondent said, *we are aware of the early warning systems but this is our way of life, we only move when it's inevitable"* A report submitted by Transparency International [17] Kenya stated that the lack of action on early warning has devastating consequences for those affected, high malnutrition rates and graver impacts on livelihood.

A study done in Bangladesh indicated that most of the strategies are self-devised and only provide temporary means of survival in times of food shortages at household level caused by destruction of farmland and disruption of prices as discussed in the literature review [30] It was also discovered that collateral requirements and high interest rates prevented many flood victims from borrowing money from banks and credit unions to recover from their losses. This reflects

on other studies in which poor households affected by flooding sometimes borrowed money and food from close associates instead of going for formal loans [24].

government. The study further revealed that the losses reported by people living in these areas included loss of crops and damaged houses.

In a study done in Pakistan on the coping strategies, the study found out that coping strategies included borrowing from informal sector, asset disposal and grants from the

Through FGDs they said they were not aware of any policies but from KIIs there were many players distributing food aid and social protection programs. The National food and nutrition security policy is to protect vulnerable

Table 2. Key findings on coping strategies and coping mechanisms from key informants

Thematic areas	Key/common findings on coping mechanisms and strategies
Coping strategies in place	<ul style="list-style-type: none"> ▪ Moving people to higher grounds ▪ Tree planting
Assistance offered in times of Emergency	<ul style="list-style-type: none"> ▪ Relief food ▪ Provision of temporary shelter ▪ Cash and food for work programmes
What can be done to mitigate flood emergencies	<ul style="list-style-type: none"> ▪ Construction of dykes and dams ▪ Desilting ▪ Sensitization and awareness
What sustainable interventions that can be applied to ensure food and nutrition security	<ul style="list-style-type: none"> ▪ Upscale fish farming ▪ Have granaries ▪ Early warning systems ▪ Markets for fresh produce and kitchen gardens
Level of preparedness	<ul style="list-style-type: none"> ▪ One person said they were highly prepared ▪ Four persons – said level of preparedness was high ▪ Nine persons said the level of preparedness was low ▪ Five persons said level of preparedness was very low
Policies /guidelines in place	<ul style="list-style-type: none"> ▪ No clear guidelines and policies ▪ Only one organization had a policy

Table 3. Key findings from FGD on coping mechanisms and strategies

Thematic area	Main findings
Effects of floods on food and nutrition security	<ul style="list-style-type: none"> ▪ Destruction of crops and livestock ▪ Destruction of property-source of livelihood ▪ Poor infrastructure ▪ Disease outbreak ▪ Increased food prices
Assistance offered in emergencies	<ul style="list-style-type: none"> ▪ Food donations ▪ Supply of water treatment chemicals ▪ Water containers ▪ Agricultural inputs ▪ Medication ▪ Temporary housing ▪ Counselling
Coping strategies in place	<ul style="list-style-type: none"> ▪ Relocation ▪ Planting early maturing crops ▪ Planting flood tolerant crops like arrow roots ▪ Adjusting consumption patterns
Proposed mitigation measures	<ul style="list-style-type: none"> ▪ Introduction of flood tolerant crops ▪ Construction of dams ▪ Strengthen disaster management committees ▪ Build bigger dykes ▪ Upscale social protection programs

populations using innovative and cost effective safety nets and emergency relief programs linked to long term development however from the coping strategies assessed there is still a major gap the sustainability of food and nutrition in times of emergency is still a challenge.

Taking into consideration the magnitude and frequency of stresses and shocks is changing and approaches such as social protection, disaster risk reduction and climate change adaptation will be needed to bolster local resilience and bolster people's experience. The study results indicated weak coping mechanisms and limited coordination among stake holders. There is need for a multi sectorial approach in order to adequately respond to emergencies that have a direct impact on food and nutrition security which is embedded in the sustainable development goals and Kenya's Vision 2030.

5. CONCLUSION

The findings indicate that 58% were not living in their usual residence and only 42% reported that the study area was their usual residence. Significantly notable 97% had not received any food aid in the last three months preceding the study and hence the study population adopted their own coping mechanisms. The mechanisms included reducing number of meals (95%), skipping entire day meals 18%, and restricting consumption of meals to children 87%. Other coping strategies were purchasing food on credit 88%, consuming wild foods (18%) and sending household members to eat elsewhere 46%, The study population from the FGD and key informants had developed some little level of resilience since floods was a recurrent phenomenon.

The study population definitely have coping strategies and each household has different coping capacity which includes skipping meals, consumption of less preferred foods, reduction of meals and eating wild fruits. There are also strategies by the Government and non-governmental organizations like availing of relief food and early warning systems but from the FGD and KII there seems to be no synergy among the key stakeholders. There was a gap between information collected and data users.

The coping strategies are varied and uncoordinated and therefore not sustainable. Thus, there is a need to build community resilience through expanding multi-agency social protection programs in flood prone areas to cushion the vulnerable groups against food and nutrition insecurity.

CONSENT

As per international standard or university standard, Participants' written consent has been collected and preserved by the authors.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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