

Famine Disaster Causes and Management Based on Local Community's Perception in Northern Uganda

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Abstract: This study examined the perception of famine by local people in Lira and Kitgum districts in Northern Uganda in September 2007. The aim was to develop an analytical framework for prediction and management of famine disaster. Two hundred and ninety one respondents were interviewed using questionnaires. The majority defined famine as a state of food insecurity. Chi-square test showed no significant difference in perception of famine in the two districts. The logistic regression model showed that younger and less educated respondents are likely to suffer the consequences of famine. The local people coped with famine by gathering edible wild vegetables, fruits and roots; working for food from other families; planting short-term variety crops and reduction in the number and quantity of meals eaten in a day. We recommend that the government of Uganda should have a clear famine disaster management plan as a preparedness strategy to address the problem.

Key words: Community Perception, Disaster, Drought, Famine, Framework

INTRODUCTION

Disasters arising from human-induced and natural hazards are growing global threats affecting millions of people annually, with devastating impacts on vulnerable communities and high costs are continuously incurred to redevelop the affected areas. Disasters may be localized but could also be large-scale events spanning international borders. Natural disasters can be exacerbated by human activities during response and mitigation ^[22]. Examples of natural disasters of international concern are earthquakes, volcano eruptions, severe droughts, famine, floods, and tsunamis ^[8]. On the other hand, human-induced disasters that prompt international response include nuclear accidents, large-scale oil spills, and terrorist actions such as the embassy bombings in Nairobi and Dar es Salaam in 1998.

In order to protect lives and property, there is a need to build the capacity to predict and manage disasters ^[10]. Disaster risk management strategy that creates awareness and sensitisation of the public should also be developed. The entry points to disaster intervention are preparedness, mitigation, response and recovery ^[22].

Mitigation efforts help to reduce the vulnerability of society to the impact of disasters. Preparedness efforts are focused on responding to a disaster in case

it occurs while response is concerned with activities necessary to address the immediate and short-term effects of a disaster, which focus primarily on actions to save lives, protect property, and to meet basic human needs. Recovery may include reconstruction and return of quality of life to a community after a disaster. With a better understanding of the underlying forces that induce disasters, it is possible to mitigate and possibly eliminate them. The human and institutional capacity to deal with disaster can be enhanced if it can be predicted using computer aided approaches and this applies to famine as well ^[9].

Despite some good understanding of disasters, early warning methods and successes, overall progress over the last decade to build early warning systems that can lead to effective and efficient response has been unsatisfactory ^[22,4]. A systematic computer aided approach to design and develop early warning systems is needed to overcome this problem. Cutter *et al.* ^[6] noted the high priority that organisations, governments and companies world over give to disaster management. As such, there is a need for an effective and reliable predictive computer aided model that can facilitate early detection of a disaster such as famine. In this study the community's perception of famine and the indicators they use to predict a looming famine were assessed in-order to develop a proper risk management strategy.

The general objective was to formulate an analytical framework that can be used to identify and manage famine disaster based on the local community's perception of famine. The specific objectives were to (i) find out the perception of the local community about famine and the coping strategy they use (ii) identify factors related to causes, indicators, response and risk management strategy for famine (iii) relate rainfall data for 1976 to 2006 to incidences of famine as revealed by the local community and (iv) develop an analytical framework for identification of famine disaster and management.

Answers were sought to the following questions: What is the perception of the local people about famine? What are the effects of famine in Lira and Kitgum Districts? How do the local people cope with famine? Is there a relationship between rainfall pattern (1976 - 2006) and famine? What framework can be used to identify and manage famine?

Conceptual Framework: Causes of Famine:

Causes of Famine: Famine may be a result of drought, poverty, armed conflict or other factors (Figure 1) and is often accompanied by malnutrition, starvation, incidences of epidemic diseases, economic stress, hindered development and increased mortality [7,17]. These may cause chaotic situations characterized by social unrest and human suffering.

The chaos caused could be managed if a food shortage crisis is predicted using an appropriate tool which leads to early preparedness to address the problem. The preparedness strategy put in place should ensure availability of enough and accessible food for the affected community.

For famine that is drought induced, preparedness depends a lot on accurate prediction of adverse weather conditions. The main types of drought are: meteorological drought - defined in terms of the degree of dryness in comparison to normal precipitation and the duration of the dry period; hydrological drought experienced when precipitation is reduced or deficient over an extended period of time; socio-economic drought based on the process of supply and demand as seen in many economic goods such as hydroelectric power; agricultural drought characterised by lack of water for plant growth leading to yield reduction that may lead to famine. The cause of drought is influenced by factors such as wind, rain, soil moisture, state of the oceans and human activity including land and water use [25]. The rate at which these factors change at different agricultural crop growth stages such as sowing and flowering should be monitored in order to predict drought that often reduces food production and causes famine. Continuous monitoring of famine indicators is therefore essential because it allows for an

early preparedness, management procedures and recovery plans to be put in place to avoid famine or manage it.

METHODS AND MATERIALS

Study Area: Data were collected in Lira and Kitgum districts in Northern Uganda (Figure 2) in September 2007. The districts belong to the cotton-millet agroecological zone. Kitgum district (32°E and 34°E, 03°N and 04°N) is bordered by Gulu, Pader, and Kotido districts and Sudan. It has an area of 9,634.59 km² with a population of 286,122 according to the 2002 National Housing and Population census [18]. The main economic activity is subsistence agriculture and the major crops grown are millet, maize, sorghum, beans, groundnuts, cassava and simsim [21].

Lira district (2°14'N and 33°42'E) is bordered by Oyam, Apac, Dokolo, Kaberamaido, Amuria, Moroto, Abim and Pader districts. It has an area of 4,405.05 km² with a population of 530,342 persons. The main economic activity is subsistence agriculture and the major crops grown are millet, maize, sorghum, soybeans, beans, groundnuts, cassava and simsim [21].

Data Collection: Moroto and Erute North counties in Lira district and Chua County in Kitgum district were selected using simple random sampling for this study. A total 291 respondents were selected randomly comprising 191 from Lira district and 100 from Kitgum district. After pre-testing the questionnaire for validity and reliability, the respondents were interviewed in September 2007. The questions focused on the local community's perception and causes of famine and drought, and how they coped with them. Persons who had returned to the villages after the war had subsided were interviewed at home while those who were still living in internally displaced people's camps (IDPs) were interviewed at the camps. Appointments for the interview were made with those interviewed at home while those in public places were selected during the encounter with the interviewer. Random selection of respondents ensured that male and female respondents had an equal chance of being interviewed.

Data Processing and Analysis: The questionnaire responses were edited, coded and entered in Stata version 9 to create a data file and then analysed. Chi-square test was performed to show the relationships between perception of famine and sex, age, marital status, education, religion and location (district) of the respondents. Logit model [15] was used to show the influence of sex, age, marital status, education and religion of the respondents on their perception of famine in the area.

The logit model is represented as:

$$\text{Prob (event)} = \frac{\rho^{\beta_0 + (\beta_1 * x_1) + (\beta_2 * x_2) + \dots + (\beta_i * x_i)}}{1 + \rho^{\beta_0 + (\beta_1 * x_1) + (\beta_2 * x_2) + \dots + (\beta_i * x_i)}} \quad (1)$$

where:

Prob (event) = Probability of an event occurring

ρ = the base of natural logarithms, approximately 2.718^[12]

β = the coefficient of the predictor variables.

Thus,

$$z = \beta_0 + (\beta_1 * x_1) + (\beta_2 * x_2) + \dots + (\beta_i * x_i) \quad (2)$$

where:

z= the linear combination of socio-economic factors such as sex, age, marital status, education and religion fitted in the logit model as:

$$\text{Prob(event)} = \beta_0 + (\beta_1 * \text{Sex}) + (\beta_2 * \text{Age}) + (\beta_3 * \text{Marital Status}) + (\beta_4 * \text{Education}) + (\beta_5 * \text{Religion}) \quad (3)$$

The probability of an event not occurring was estimated as:

$$\text{Prob(noevent)} = 1 - \text{P rob(event)} \quad (4)$$

It is assumed in this study that the probability that a respondent will either say famine does or does not occur in the area lies between 0 and 1 regardless of the value of z.

RESULTS AND DISCUSSION

Perception of Famine: The number of valid cases (N values) in Tables 1 to 11 vary because not all the respondents answered all the questions. In addition, the frequency (F) represents the number of cases (i.e. multiple responses) and the percent of cases are more than 100% because of the multiple responses. Chi-square test results are presented in section 4.1 only because data generated by multiple responses where the numbers of cases were more than the number of respondents could not allow the test to be performed.

Seventy four percent of the respondents said that their areas experienced famine. In Lira district, nearly 60% of the respondents said that famine is attributed to lack of food while less than 5% linked famine to environmental hazards such as insufficient rainfall that hinders crop production and food availability (Table 1). In Kitgum district, about half of the respondents said famine is a condition in which food is scarce whereas less than 6% said that famine results from environmental hazards noted above. Chi-square test showed that there was no significant relationship between the respondents' perception of famine and their district of origin ($X^2 = 0.1475$, $df = 3$; $p \leq 0.05$).

In addition, there was no significant relationship between perception of famine and sex, age, marital status, education and religion in both districts (Table 2).

Results of the logistic regression showing the relationship between existence of famine and sex, age, marital status, education and religion in both districts are presented in Table 3. Sex and marital status have positive coefficients while age, education and religion have negative coefficients implying that as age advances and educational level increases there is a reduction in the number of those who are likely to experience famine.

Indicators of Famine: Nearly 60% of the respondents said that poor agricultural crop yields indicated an approaching famine (Table 4). Other indicators of the effects of famine are poor health (65.05%), insufficient rainfall (50.52%), deaths (31.83%), increased incidences of theft (10.03%), divorce and domestic violence (6.92%). The latter three indicators are social ills that may not necessarily be attributed to famine alone.

Famine Coping Strategy: The major famine coping strategy mentioned by nearly 84% of the respondents was gathering of wild vegetables, fruits and roots (Table 5). Some respondents said they worked for others in exchange for food (61.97%) or to get money (47.89%) to buy food during famine. Migration to where there is food (13.03%) and urban centers

(11.97%) were reported as coping strategies although these are hard to believe because local people tend to travel to such places to look for food rather than migrate. Less than 10% said they were involved in business and this is because many of the respondents were resource poor. Again, this is not an activity that is practised only during famine.

Agricultural Crops that Households Depend on During Famine: Of the crops that households depend on during famine, cultivated vegetables (91.29%) was the most common food followed by wild leaves, fruits and roots (74.91%), sorghum (70.03%) and cassava (68.65%). Fewer people said they depended on beans (20.56%) and millet (10.80%) as major food stuffs because such foods are not usually available during famine and yet they are major staple foods in the two districts. The major crops that the households did not depend on during famine were simsim, groundnuts and peas.

Assistance to Local People Provided During Famine: In both districts, the respondents said food stuff (93.72%) and medicine (46.37%) were supplied during famine. Other non-food items such as utensils, garden tools and commodities such as salt, cooking oil were also given during famine.

Sources of Assistance during Famine: The majority (72%) said they got assistance from various organizations ranging from United Nations bodies such as World Food Program and NGOs like World Vision. About 40% of the respondents said that government assisted the hungry while less than 10% indicated that relatives supported them during famine.

Effects of Famine: The effects of famine on the local community are given in Table 6. The major ones mentioned by the respondents were ill health (83.99%), malnutrition (72.60%), poverty (65.48%) and lack of socialization (30.96%).

Local Community's Expectation of Government Support during Famine: Eighty percent of the respondents said that government gave inadequate food stuff during famine. The type of government support that the local community expected from government during famine included relief food, tools such as household utensils, farm tools, medicine and early maturing seed varieties. Less than 28% indicated that they expect government to provide them with loans (27.46%) to do petty business such as selling sugar, salt and posho during famine.

Indicators of Drought: The indicators of drought reported were dry wind (92.53%), prolonged heat (77.22%), irregular rain (76.51%) and drying and loss of leaves (62.63%).

The effect of drought that directly contributed to famine that were mentioned included poor harvest (91.23%), lack of water (86.32%), plants and grass drying up (70.53%) in addition to poor animal health/animal grades (74.03%) and death of livestock (37.19%) (F=1114 and N=285; %ages calculated from multiple responses).

The pattern of rainfall between 1976 and 2006 in relation to famine in Lira and Kitgum districts showed that the annual rainfall decreased in 1979, 1980, 1986, 1990, 2004 in Lira district and 1979, 1980, 2000, 2004 in Kitgum district (Figure 3). The respondents in the two districts mentioned that there was famine in the area in 1980 (6.64%), 1994 (6.64%), 1997 (11.81%), 2003 (11.07%), 2004 (4.43%) and 2005 (5.54%). Annual rainfall data for the years 1986 - 1991 for Kitgum district was missing. In many respects therefore, it was possible to link decrease in rainfall to occurrence of famine in the two districts.

Famine Disaster Causes and Management Framework: A Framework that can be used to detect, respond and manage famine disaster is shown in Figure 4. This framework is an improvement of Cutler's^[5] and Jeremy's^[11] and includes the risk management strategy.

The framework is divided into four parts: famine causes, indicators, responses and risk management strategy. Famine causes include factors that stimulate famine occurrence; indicators which alert in case of a looming famine, responses are measures taken by households in case of famine and risk management are actions to deal with famine.

The framework incorporates exogenous factors like rain failure, flood and response measures like gathering wild fruits, and wage labour suggested in the work of Cutler^[5] and Jeremy^[11]. Rain fall is a prime factor in the development of the WRSI model and is one of the main factors causing famine^[24]. Endogenous factors like household size are included because large families cannot adequately feed themselves during famine.

Discussion:

Perception of Famine: Famine is a common phenomenon in areas that are prone to drought and environmental stress both of which hinder production of food crops and livestock rearing. The way local people perceive a situation and explain a problem is important because perception is related to attitude which in turn determines whether or not a community can take action to address the problem. In this study

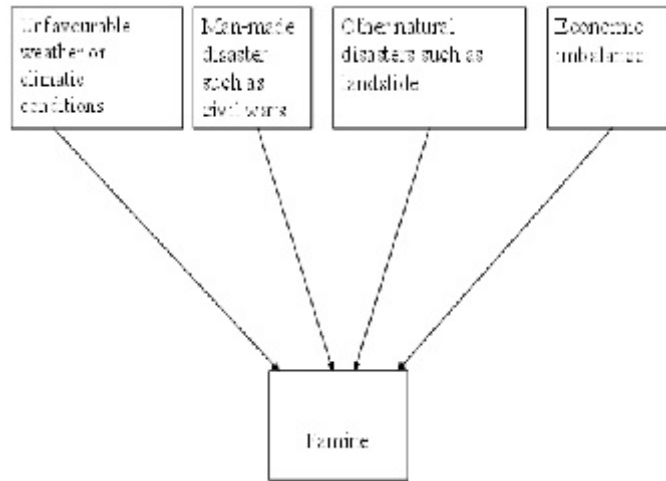


Fig. 1: Conceptual framework showing causes of famine.

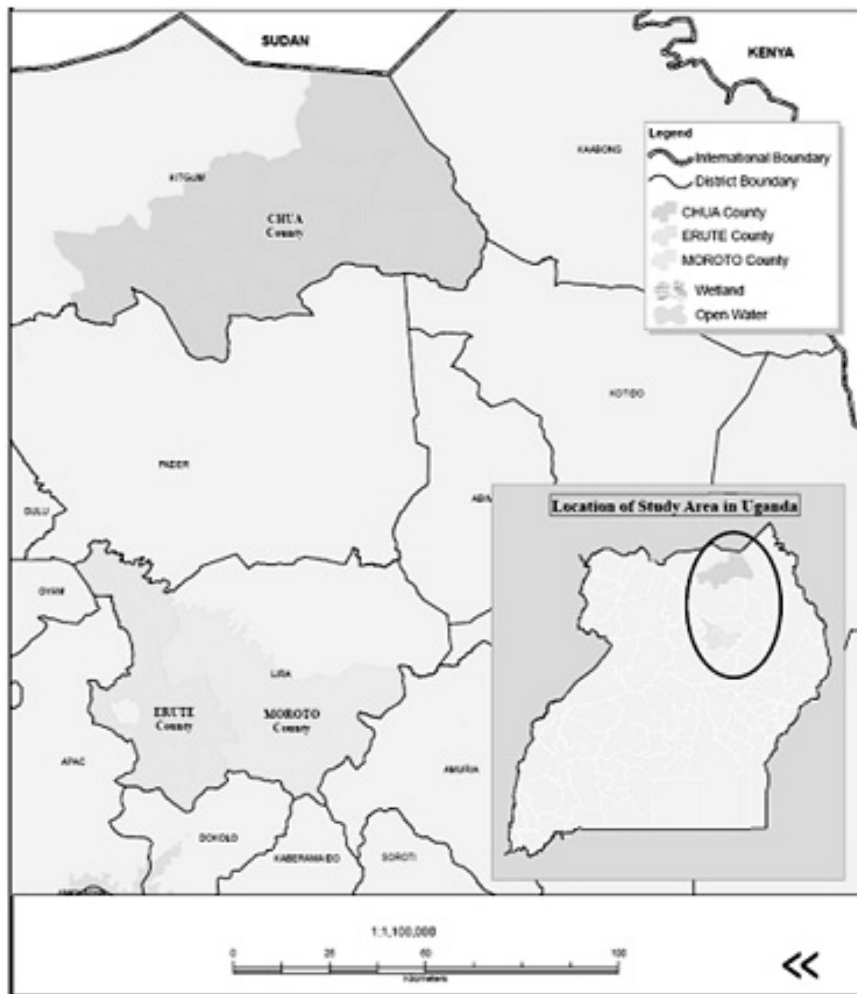


Fig. 2: Location of the study area.

Table 1: Local people's perception of famine in Lira (n=181) and Kitgum (n=99) districts

Perception	% response
Lira district	
Lack of food	61.33
Shortage of food	18.23
Lack of resources to acquire food items	15.92
What results from environmental hazards	04.42
Total	100.00
Kitgum district	
Lack of food	48.48
Lack of resources to acquire food items	28.29
Shortage of food	17.17
What results from environmental hazards	06.06
Total	100.00

Table 2: Chi-square relationship between sex, age, marital status, education and religion

Dependent Variable	Socio Economic Variable	X ²	df	P and significance
Perception of famine	Sex	2.5062	3	0.474 ns
	Age	5.1913	9	0.817 ns
	Marital Status	4.1618	9	0.900 ns
	Education	13.0100	12	0.368 ns
	Religion	6.2090	6	0.400 ns

ns= not significant at $P \leq 0.05$

Table 3: Logit analysis of the influence of socio-economic factors on famine

Dependent Variable	Socio Economic characteristics	Coefficient of β	P level
Existence of famine	Sex	0.2587226	0.521
	Age	-0.2546455	0.210
	Marital Status	0.3199232	0.276
	Education	-0.0104576	0.961
	Religion	-0.3194088	0.675
	Constant	1.5338880	0.252

Table 4: Indicators of famine (F=1058 and N=289; %ages are multiple responses)

Indicator	% cases
Poor health	65.05
Poor yield	58.82
Insufficient rainfall	50.52
Rise in food price	46.71
Poverty	46.02
Wars and instability	37.36

Table 4: Continue

Deaths	31.83
Movement from place to place	12.80
Rise in theft cases	10.03
Divorce and domestic violence	06.92

Table 5: Coping strategy during famine (F=1076 and N=284; %ages are multiple responses)

Strategy	% cases
Looking for wild vegetables, fruits and roots	83.80
Exchange of labour for food	61.97
Casual labouring to get money	47.89
Getting food from neighbours and relatives in urban centres	41.20
Buy food	35.56
Planting short term variety crops in swamps	30.99
Reduction in the number and quantity of meals a day	26.76
Wait for donations	17.96
Migrate to where there is food	13.03
Migrate to urban centers	11.97
Engage in business	07.75

Table 6: Effects of famine (F= 1078 and N=281; %ages are multiple responses)

Effect	% cases
Ill health	83.99
Malnutrition	72.60
Poverty	65.48
Conflicts	55.16
Deaths	54.09
Lack of Socialization	30.96
Weak farming labour force	21.35

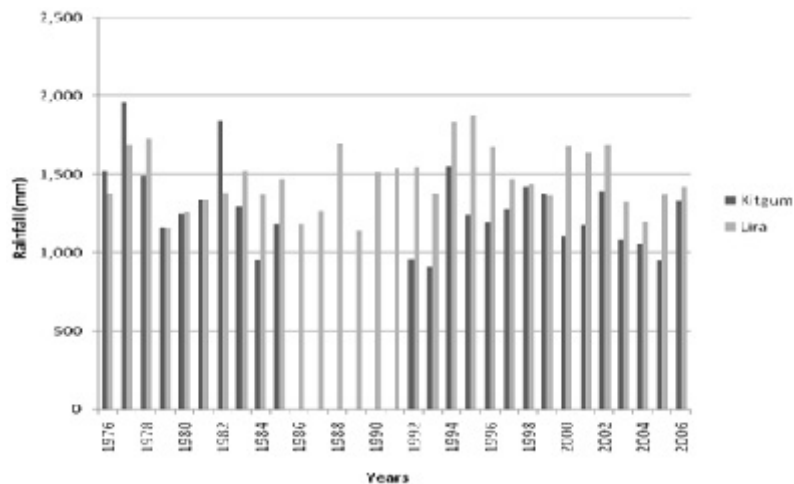


Fig. 3: Rainfall pattern for Lira and Kitgum districts (1976-2006).

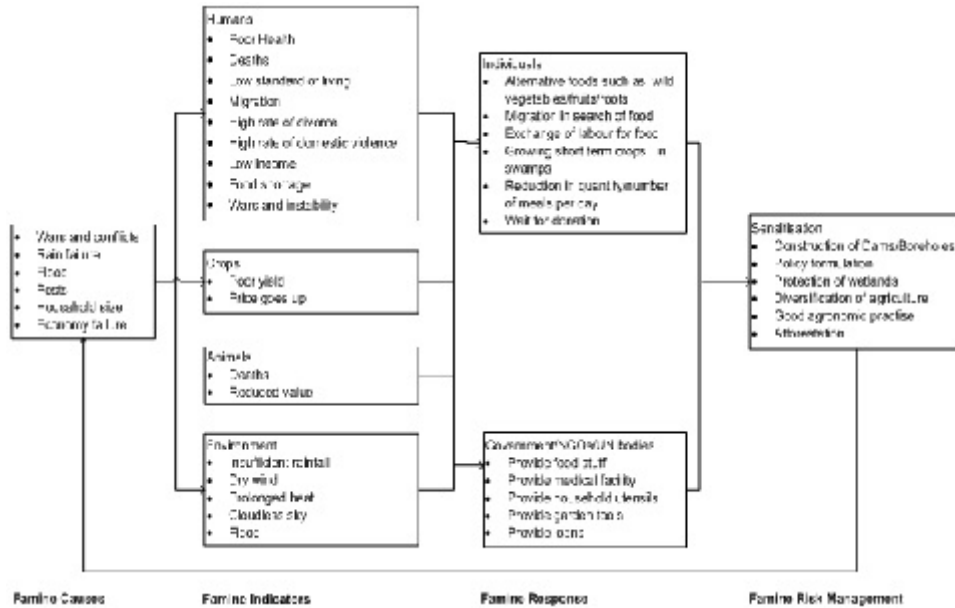


Fig. 4: Famine detection and management analytical framework developed from survey data.

we examined the local perception of famine as a disaster in northern Uganda and found that in both Lira and Kitgum districts, the local perception and definition of famine was similar. The local communities from the two districts perceive famine as a disaster that is linked to various causes the majority of which are environmental in nature. It was noted that in the two districts, decline in rainfall, the amount received and the time when it comes affected food production thus resulting in famine. Although this is a plausible explanation, famine results from a combination of several factors. According to UNDP [19], technical and political failures such as lack of information to guide farmers in planning their agricultural activities and misguided policies also contribute to famine. Famine is also linked to food scarcity and the respondents in this study indicated that famine always results from food insecurity. We also sought the relationship between the demographic and socio-economic characteristics of the respondents and their understanding of famine. The logistic regression model showed that age and education influenced the local perception of famine with the older and more educated being more knowledgeable about the causes and consequences of famine. On this basis it can be said that any intervention aimed at addressing the problem of famine in northern Uganda should target these categories of people because of their experience and they can have significant inputs in the planning and management of famine as a disaster. Factors such as religion could not help to explain perception and knowledge of famine by the local community because religious belief is often

not linked to environmental stress and other causes of famine. In addition, the local communities have a tendency of assisting each other during famine irrespective of their religions.

Indicators of Famine: For successful detection of famine disaster at an early stage, the local community have a formidable challenge to use their experience in the history of famine in providing the indicators that can be used to detect famine. The different indicators of famine and the durations show the intensity of famine. In this study, the indicators of famine such as poor health and insufficient rainfall mentioned in both Lira and Kitgum districts should be monitored by the government and the local community in order to put in place an early preparedness strategy to save lives and property. Poor health during famine results from not having enough to feed the local community causing malnutrition which further results into lack of labour force needed for food production. Poor crop yield and insufficient rainfall may be attributed to unfavourable climatic conditions which affect production of agricultural crops. We can also attribute poor yield to lack of proper agronomic practices such as crop rotation. In such circumstances agricultural extension agents should provide proper advice to farmers on how to get increase crop yields. In addition, rise in food price and poverty as a result of economic imbalances that cause structural distortion heightens the intensity of famine disaster [3] while wars and instability distract the peasant farmers from attending to their gardens thus leading to poor yields and famine.

The findings of this study is consistent with those of other researchers about the causes of famine that may be grouped into unfavourable weather or climatic conditions; man-made disasters such as civil wars; other natural disasters such as earthquake, landslide and fires and economic imbalances ^[2].

Famine Coping Strategy: Famine coping strategies as ways of dealing with famine disaster problem depend on the ability of the local community to get alternative means of managing disaster. Coping strategies such as gathering edible wild vegetables, fruits and roots that are practiced in the two districts, necessitate conservation of the habitats where they are found. This requires putting into place and operationalising conservation policies that protect indigenous plants and natural habitats. Other coping strategies like working for others in exchange for food and migration might cause secondary impacts like exposure to new diseases as a result of low body resistance due to poor diet ^[1] and disruption of the set-up of the local community since homes have to be abandoned. Coping strategy like planting short-term variety crops such as cowpeas in wetlands implies that policies should be put in place by government to protect the wetlands and water catchments during famine. Wetland should serve as places for the local people to grow crops without degrading it. This may in the long run result into effects like insufficient rainfall and global warming. The strategy of depending on donors and relatives for assistance may not be sustainable as insecurity and lack of funds may disrupt such assistance. It was reported in Malawi that people died because of lack of financial support from the International Monetary Fund (IMF) to support famine victims ^[15].

Crops that Households Depend on During Famine: Dependence on agricultural crops constitutes the most significant survival means against poverty and famine in the rural areas. This study has shown that the local people in Lira and Kitgum districts depend of similar kinds of agricultural crops such as vegetables fruits and carbohydrates except beans that can be brought or bought from other areas that are not affected by famine. The survival on these crops is linked to their availability in other areas not affected by famine and the capacity to bring and sell them in the local market. Overall, the production of these agricultural crops during famine is too inadequate to feed those affected by famine.

The crops that the households do not depend on during famine such as simsim are high value crops that need good agronomic practices such as weeding in time and favourable climatic conditions such as sufficient rain ^[13]. The yields are often low when there

is insufficient rainfall. In conclusion, the affected local people depend mainly on vegetables and carbohydrates during famine and this may lead to malnutrition.

Assistance Provided During Famine: We found that local people depended on agricultural crops and crop failure often resulted in absolute poverty. Because of the poverty inflicted by famine, basic commodities such as household utensils, salt, soap and cooking oil should be provided by government as the local community would not afford them. Although provision of external assistance is a good measure to address the famine problem, there is a need to develop a more long-term and sustainable strategy for coping with famine. External assistance should only be considered as a short-term intervention.

Source of Assistance During Famine: Famine attracts the attention of International and Non-Governmental Organizations. These organizations always provide humanitarian assistance such as food stuff and medicine to the affected people as has been the case in northern Uganda. The continuation of such assistance, however, is sometimes constrained by relocation of operation of the organizations. In Lira and Kitgum districts, most of the assistance given to the local people during famine comes from the United Nations World Food Program and NGOs such as World Vision. Reliance on foreign bodies to provide donations during famine indicates the inability of government to provide assistance to the affected population at the time of need. This could be due to lack of resources or poor planning to deal with disasters. Reliance on external assistance indicates that government should put in place an early preparedness strategy to deal with famine. This does not constitute replacement of external assistance, instead it underscores the importance of government working together with aid agencies to address famine in affected areas and populations.

Effects of Famine: Low agricultural production is a major challenge to food security in northern Uganda sometimes resulting into famine ^[20]. Famine affects the socio-economic and nutritional status of families and often slows down economic growth of an area. Some of the effects of famine like poverty results mainly from lack of surplus food that can be sold to meet other basic needs such as clothing while conflicts are a result of misuse of the little available food. Many families usually come together in times of good harvest and surplus food to attend different kinds of ceremonies and this is disrupted during famine causing lack of socialization. In addition, ill health and malnutrition can weaken farm labour force. The poor

and socially disadvantaged of the local community are most affected by famine because they are least equipped with the strategies to cope with the impact.

We found that in both districts the effects of famine can be minimized if adequate measures are put in place early enough. This would require an integrated approach that includes health, nutrition, agriculture, conflict resolution and environment conservation. These sectors need to work together to plan and prepare the community to meet the challenges of famine. The preparedness requires that government should be in a position to provide relief foods, farm tools, short-term seeds, medicine and household utensils.

Local Community's Expectation of Government Support during Famine: In spite of the support given to the local community during famine, the majority of the respondents reported that the support they get such as provision of relief food during famine is not enough. Local people expect to be supplied with items such as food, medicine, short-term seeds that take short time to mature to provide food and credits to reduce poverty and allow families to acquire basic commodities including household utensils. These are necessary to enable households continue with their normal socio-economic and cultural activities such as eating the desired meals. It is evident that the local community knows what they expect during famine but they do nothing to plan for them therefore increasing their dependence outside their households during famine.

Indicators and Effects of Drought: Drought results from a deficiency in precipitation that causes a prolonged dry spell which may reduce agricultural crop yields. Crop yields have a direct bearing on the extent of famine^[14]. In this study, indicators of drought such as dry wind and prolonged excessive heat lead to increase in evapotranspiration that result in insufficient amount of water for plant growth which affect crop yield. These indicators should be used by government to plan to mitigate the effect of drought. Furthermore, drought influences famine disaster by limiting land preparation and delaying cultivation activities.

The pattern of rainfall for thirty one years (1976 -2006) in Lira district shows that the average annual rainfall ranged between 1142 - 1873 mm while in Kitgum it varied from 910 to 1846 mm in 1979, 1980, 1986, 1990, 2004. In Lira district the rainfall was below 1257 mm in 1979, 1980, 2000, 2004. Lanina rains were experienced in some of the years that resulted into drought. However, El-Nino was also experience in 2007. Data for the years 1986 - 1991 were not available for Kitgum district due to insurgency.

In 1979, 1994, 1999 and 2005, the rainfall was below annual expected averages (less than 1371 mm per annum) and drought and famine were experienced^[23]. The drought contributed to lack of food, water and inadequate pasture for animals. The local communities from both districts reported that drought is experienced in the area and it is one of the indicators of famine. They perceived drought in terms of insufficient rain fall as observed by Wilhite^[25] and is manifested in the prolonged dry spell with a lot of dry wind. Drought is experienced in November to January and June thus coinciding with the dry spells. Since the drought periods and the indicators of drought are well defined for those areas, the local people need to be aware of the need to preserve food reserve for the seasons through sensitization.

Famine Detection and Management Analytical Framework: The framework developed addresses each of the entry points to a disaster such as famine^[21]. We have stipulated the main areas such as famine indicators that should be used to check the development of famine up to its management. It is envisaged that the causes of famine can be used to put in place mitigation measures like conflict resolution to stop famine disaster. Famine indicators on the other hand can be used to put in place preparedness plans to cope with famine disaster in addition to response from individuals and governments to expedite response in case of famine disaster. Finally, risk management is essential for long-term reduction and management of famine.

Conclusions and Recommendations:

Conclusions: The way local people perceived famine were similar in Lira and Kitgum districts. Famine was defined as a state of food insecurity by the respondents. The coping strategies that the local community have developed to contain famine are: gathering edible wild vegetables, fruits and roots; exchange of labour and migration; planting short-term variety crops such as cowpeas in swamps; reduction in the number and quantity of meals a day and depending on donors such as World Food Program and relatives as source of food.

Famine is caused by both exogenous and endogenous factors while its indicators can be shown in human health and standard of living, crop production and price index, animal health and value, and factors like climatic conditions. In both districts, the assistance given to the local people as a response during famine comes from the United Nations World Food Program and NGOs such as World Vision. Risk management through sensitization is essential for long-term reduction and management of famine.

In the years that rainfall was below annual expected averages, drought and famine were experienced. The local communities from both districts reported that drought is experienced in the area and it is one of the indicators of famine.

Recommendations:

Recommendations for Management of Famine:

(i) Policy makers in Uganda should enforce food security measures like storage of surplus food during good harvest, diversification and modernization of agriculture as well as introduction of drought resistant crops.

(ii) Government of Uganda should put in place a clear famine disaster management plan as a preparedness strategy. This should be extended to all other disasters like earthquake, disease epidemics and others.

(iii) Government through the Ministry of Agriculture Animal Industries and Fisheries should put in place a strategy that can be adopted to mitigate the risks of drought by construction of dams and boreholes which would server as a place to get water for both human, crops and livestock consumption.

(iv) Agricultural extension agents should sensitize local farmers on good agronomic practices which will boost agricultural production.

(v) Sensitization of the public about disasters is important and should be carried out routinely by Ministry of Disaster Preparedness so as to keep the public aware of what to do in-case a disaster strikes.

Recommendations for Future Research on Famine:

(i) Further research should be carried out to define quantified predictive measures of famine disaster.

(ii) Research in the design of a multi agent model of famine disaster response would serve to show how fast interventions to famine disaster can be made

(iii) Bigger sample size should be used for study in future to get a more representative view of the respondents since during the study the people in the area were scattered due to insurgency and they were just beginning to return home.

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