

Risk Perception and Disaster Management in the Savannah Region of Ghana

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Abstract

Human vulnerability to hazards is generated from the interaction of the physical and human environment and interventions made to cope with hazards. To intervene with a hazard, the event or its consequences may be prevented or mitigated. The main aim of the study was to show how differences in perception influences adjustments made to cope with floods. Two towns in the savannah region which have been identified as highly vulnerable to flooding due to their history of flooding were selected as case study. The analysis showed that most of the respondents perceived flood risk as natural. Their perception of the causes and impacts of floods varies by gender, ethnicity and spatial location and affects the strategies used to intervene. The study concludes that deeper understanding of how perception and demographic characteristics combine to influence a group's level of vulnerability would be beneficial in establishing more effective interventions to reduce human vulnerability.

Key words: demography, floods, hazard, intervention, mitigation, resilience, risk, vulnerability

1. Introduction

In November 2010, 55 communities in the Central Gonja District located in the savannah region of Ghana were affected by floods, about 700,000 people were displaced, 3,234 houses collapsed, 23,588 acres of farmlands were destroyed at the cost of 116,340.22 US dollars (National Disaster Management Organization 2010(Accra, Ghana)). Buipe, an urban center within the district, was the most affected. Here, twelve thousand, four hundred and eighteen (12,418) people were displaced, 1,196 houses and 81 acres of farms were destroyed at an estimated cost of 48, 410.76 US Dollars. Another area that was also highly affected was a rural settlement, Yapei, where 784 people were displaced and 298 acres of farms were destroyed at an estimated cost of 31, 912.26 US dollars (National Disaster Management Organization, 2010(Accra, Ghana)). Natural hazards significantly affect community development in many parts of the savannah area of Ghana due to the high prevalence of poverty and deepening vulnerability. Researchers have concluded that natural hazards represent potential risks and threats of detrimental interaction between human communities and natural events (Tobin and Montz 1997), and are exceptional environmental episodes that can bring harm to people and may surpass the capabilities of human communities to deal with them (Kates 1971). The event of November 2010 is just one of the many natural disasters that have devastated the area. In the past few decades damaging rainfall and severe floods has occurred frequently in most areas in the savannah most of which has involved the loss of both human and animal lives, properties, and also serious disruption of economic and social activities.

For example, major flood disasters were recorded in 2003, 2007, 2009, and 2010 (National Disaster Management Organization, 2010(Accra, Ghana)). However, the disaster of 2010 was the greatest in recent memory as measured by the extent of mortality, morbidity, and the devastation of physical infrastructure and extreme social and economic dislocation associated with the event. Severe impact of flooding upon a large number of households, recurrent losses of material goods, endangered lives coupled limited resources are issues that affect sustainable human development. The above data indicates that the savannah area is experiencing rising human vulnerability. It could be inferred that losses from disasters are increasing because mitigation measures are not successfully addressing hazard risk faced by the area. This may also imply that the efforts at disaster mitigation may also be contributing to the occurrence and severity of the next disaster. This is because despite increasing mitigation efforts by households, communities and government, the strategies by these parties have failed to reduce human vulnerability to flooding and losses associated with successive flood disasters continue to increase.

Severe rainfall has often led to the overtopping of the natural boundaries of streams thereby putting people and their valuables at risk. While rainfall intensity appears to coincide with major floods in the savannah, one cannot rule out the role of human activities which tends to increase the regularity and intensity of flooding. It is now generally recognized that hazards are more than a force of nature and that attention have to be turned to human activities and interventions in hopes of reducing property and human lost. Porcelli (2001) argued that the recent increase in intensity of floods should be blamed on human interference with nature. To him, natural hazards results from human activities that change the natural course of things. Similarly, Dede-Bamfo (2004) posits that poverty is growing and together, with an increasing population, has forced many people to live, farm and work in hazardous and dangerous locations. In most instances, the poor and resource dependent households are forced to intensify the clearing of forest and vegetation to make ends meet thereby increasing the intensity and occurrence of floods. However, poverty in Ghana has a spatial and gender dimensions.

In sub-Saharan Africa as a whole, poverty situation has seen an increased prevalence over the last decade, with women and children being the most affected (Economic Commission for Africa 2005; Thanh-Dam 2006). Though, over the last one and half decades, poverty trends in Ghana has declined from 51.7 per cent in 1991 to 28.5 per cent in 2005 (Ghana Statistical Service, 2005), the period has also seen evidence of deepening vulnerability and exclusion among some groups, especially, women (Awumbila, 2007). The savannah area of Ghana is noted as one of the poorest areas in Ghana (Feyemi et al., 2003). The region has largely been excluded from the general drop in poverty levels over the years (Harsch, 2008), with women considered as being especially vulnerable to poverty due to gender inequality (UNDP and JICA, 2007). The poverty situation in the savannah region is linked to vulnerability to natural hazards since human vulnerability to natural hazards is generated from the interaction of the physical environment, the human environment, and the interventions made to cope with the hazard. Hazards intervention may involve preventing the event, preventing the consequences, and mitigating the consequences of the event but poverty significantly affects ability to intervene.

Two prominent towns in the savannah area that are mostly affected by floods are Buipe and Yapei in the Central Gonja District (See Figure 1). Buipe is the district capital and an urban centre with a population of about 8,347 people. Yapei on the other hand is a rural settlement with a population of about 4,044 people. The two areas have a population growth rate of over 3.1 per cent which is higher than the national growth rate of 2.8 per cent (Ghana Statistical Service, 2000). Buipe and Yapei are located along the Black and White Volta Rivers respectively. Rainfall in the area is unevenly distributed and mainly occurs from May to October. The mean annual rainfall ranges between 1,000 and 1,500 millimetres (Ghana Meteorological Agency, 2010). Highest rainfall amount in a single month is often recoded in the month of August which also has the greatest number of rainy days as well as very high intensity of rainfall of about 300 millimeters per hour (Ghana Meteorological Agency, 2010).

2. Research Objectives

One would expect that people who have long experience with flooding would develop methods to mitigate their impacts. Therefore if flood victims continue to suffer heavy losses, then explanations should be pursued. The various flood disasters and the devastating annual floods in the Central Gonja District indicate that hazards are more than a force of nature. Although flood events can become actual disasters for many reasons, some related to the physical characteristics of the flood (rain intensity, duration, size, etc), in the savannah region of Ghana the vulnerability of human groups that are exposed to the flooding risk is significant.

Without a doubt both the level of risk (the probability of occurrence of flooding and likelihood of damage) and conditions that contribute to social vulnerability (a wide range of social, economic, and political factors within society) are implicated in the impact of disasters in the area. However, differential perception of flood risk and differential access to resources to mitigate hazard risks are profound.

Unfortunately, increasing flooding impact in the Central Gonja District is quickly attributed by the Ghanaian authorities to excessive rainfall and the spilling of the Bagre Dam (in neighbouring Burkina Faso) thereby increasing riparian tension between the two countries. To intervene, the Ghanaian authorities have resulted to issuing of flood warnings and the distribution of relief items as the methods of mitigating the hazard. This approach minimizes the fact that demographic characteristics and human perception of flood risk has a relationship with the type and effectiveness of intervention made to reduce the impact of floods. Local perceptions, mitigation strategies and flood experiences in both communities have been largely ignored and have not been adequately researched into. This article was based on the premise that property and human loss can be reduced or eliminated through effective intervention. Therefore, the article explores the relationship between demographic characteristics, local perception of flood risk, and mitigation strategies. We also examine the spatial differences in perception of flood risk.

3. Methodology

Processes and influences that determine levels of vulnerability to hazards have macro (national and international) and micro (community and household) dimensions. In this study, we undertook a micro-level analysis of human vulnerability to examine and understand how perception of flood hazards influences household interventions. Both primary and secondary data were collected and analyzed qualitatively and quantitatively. We carried out fieldwork in Buipe and Yapei for a period of 13 months. The fieldwork simultaneously involved document analysis, interviewing of respondents, focus group discussions and the distribution of questionnaires. The units of analysis used were households and communities. A household is defined as a person or group of persons who live together, share the same living arrangements, and consider themselves a single unit (Ghana Statistical Services, 2005). Households by our definition need not be related by blood or marriage, but simply cohabit. The term family is not synonymous with household in this context, even though family members who live in different households often involve one another in decisions concerning production and consumption. Community is defined as a group of households that interact frequently and have common interests, needs, and shared sense of identity (Friedman, 1996 and Morris-Oswald, 2007).

Due to the size of the population and limits to our time and resources sampling was used in selecting part of the population to represent the whole. To allow all units in the population an equal chance of being selected, the probability sampling technique was used. The multi stage cluster sampling was used for the selection of the sample units. In the first stage, communities were selected through simple random technique. At Buipe the communities included Buipe Bridge, Yipala, Goroase and Worontu. Using the fish bowl method, numbers were written on pieces of papers, numbered one to four, each number represented a community. Buipe Bridge was randomly chosen. At Yapei, the communities included Daresalam, Quarters, Old Yapei and Madina Line. The fish bowl method was again used in the selection of the neighbourhood. Old Yapei was randomly chosen.

The second stage of the multistage cluster sampling involved the selection of households from the selected neighbourhoods. The total number of households in Buipe was 1264 (Ghana Statistical Service, 2000). Twelve per cent of the total number of households was chosen as the sample size. The total sample size for Buipe Bridge was 152. At Yapei, the total number of households was 542 (Ghana Population and Housing Census, 2000). Twelve per cent of the total households were chosen as the sample size. The total sample size was 65. The procedure for selecting households was systematic. In both communities, the sampling fraction was obtained by dividing the sample size by the total number of households. The sampling fraction was one-eighth for both communities. To ensure validity of inferences as well as avoiding bias, the starting point for the selection of units was selected randomly. At Buipe the random number chosen was 5. At Yapei 3 was chosen. In the study area, some of the houses were compound houses that contained more than one household. Where there were more than one household in a house only one head of household was interviewed. This was based on the assumption that all members in the household shared the same socio-demographic characteristics, perception, flood experience and coping strategies. Both primary and secondary sources of data were used for the research. Primary data collections instruments used for the research were focus group discussion, questionnaires and interviews.

Secondary data collection instruments used for the research includes documents, archives, journals, newspapers and also reports from National Disaster Management Organisation (NADMO), and Central Gonja District Assembly. Reports from National Disaster Management Organization were used to get data on available flood statistics. Rainfall figures were obtained from the Ghana Meteorological Agency. Questionnaires were used for heads of households. The questionnaires were divided into sections which included socio-demographic characteristics of respondents, flood experiences, perception of flood risk and coping strategies. Focus group discussions (FGD) were used for community elders. Discussants were both women and men of different ethnic groups who had stayed in the community for more than 30 years. Focus group discussions were used to provide more information on flooding. The discussions were used to generate data on changes in the occurrence of flooding, community perception of floods and coping strategies. Four different discussions were carried out. The discussions were carried on the 14th of October, 2011 but at different times for both men and women. The focus group at Buipe constituted 15 people (7 men and 8 women). The discussions lasted for about 138 minutes (65 minutes for men and 73 minutes for women). In Yapei the focus group constituted 14 people (7 men and 7 women). The discussions lasted for 135 minutes in Yapei (65 minutes for women and 70 minutes for men). Data gathered from the field were edited. Statistical Package and Service Solution was used for coding and analyzing data.

4. Results and Discussions

Risk perception refers to the intuitive risk judgment of individuals and social groups in the context of limited and uncertain information (Slovic 1987). Individuals of a community may assess the risk of being flooded very differently, because they do not have the same information about the probability of flood hazard events in their region, about flood mitigation measures and their effectiveness, and they perhaps have a different historical background regarding the experience of living in a floodplain and of being flooded (Frank and Volker 2005). Risk perception is also affected by several other factors such as age (Greening L. Et al, 1996; Millstein and Halpern-Felsher, 2002), social structure (Heimer, 1988; Rogers, 1985), the possibility of a large-scale disaster (Von Winterfeldt, John, and Borcherdig, 1981), personal belief (Dake 1991; Fishbein and Stasson 1990), and trust (Slovic 1990, 1993). Preparedness and early warning are ways which can contribute to flood risk mitigation and these strategies are closely linked to risk perception.

People's perception of flood risk determines their coping strategies. Kates (1976) found out that people who had experience with floods were more likely to expect that they would reappear, and consequently they act protectively. However, a study by Gardner and Stern (1996) showed that majority of inhabitants living in areas where floods or other disasters are frequent are prone toward an underestimation of danger. Measures taken to reduce disaster impact include structural and non-structural measures. Non-structural mitigation measures could refer to awareness, knowledge development methods and operating practices, including participatory mechanisms and the provision of information, which can reduce risk with related impacts. For example, some of this may include monitoring the movement of the river to know when floods would occur, flood warnings from government agencies, friends and relatives, sale of assets, relocation and assistance from friends, relatives, government and non-governmental agencies. On the other hand, structural mitigation could include physical construction to reduce possible impacts of hazards. This may include construction of hazard-resistant and protective structures and infrastructure.

Meanwhile, some studies point out differing perspectives on hazards and distinct coping strategies among men and women (Cutter 1995; Enarson and Morrow 1998; Stehlik et al, 2000). This article examines how gender and ethnicity influences flood risk perception and coping strategies. It also compares risk perception between urban and rural communities.

4.1 Gender, Perception, and Mitigation Strategies

The analysis shows that 65.1 per cent of respondents sampled at the urban center were males and 34.9 per cent were females. At the rural settlement, 83.08 per cent of respondents were males and 16.92 per cent were females. This shows that in both study areas there were more households headed by men than women. This could be as a result of the Ghanaian traditional system which recognizes the man as the head of the household. This could also be a sampling error. However, it should be noted that the urban center has more female headed households compared to the rural settlement.

Since studies have shown that poverty in Ghana has a feminine face, it could be inferred that female headed households are disadvantaged in their quest to access economic resources to mitigate hazards. This finding supports conclusions from other hazards research that gender differences can determine disparities in the impact of a hazardous event. It has been documented that women suffer disproportionately in earthquake events (Wisner, 1999), floods (Zoleta-Nantes, 2002), and droughts (Twigg and Bharrat, 1998).

A study by Songsore and McGranahan (1998) that examined the gender dimension of local environmental management, relating it to household wealth and the environmental hazards women face revealed that environmental hazards impose greater burdens on women more than men. Peacock, Morrow, and Gladwin (1997) also interviewed several hundred people in Dade County, Florida in the USA about the impacts they experienced from Hurricane Andrew and how they were recovering. In this work, the researchers found that many of the recovery programs were based on a nuclear family model with a male-headed household. The traditional head of household policy disadvantaged many poor women, especially single mothers, from accessing aid such as vouchers for temporary public housing. The study concluded that the recovery rate was slower for women than men. Again, Pelling (1999) in a study of the socio-demographic characteristics of coastal neighbourhoods in Georgetown, Guyana determined that majority of the households in a squatter settlements were headed by a woman and thus, were more vulnerable than the average household. Taken together, these studies help us understand how male-dominated societies systematically disadvantage women (and their children and the elderly they care for) and increase their vulnerability to environmental changes.

In table 1 below, most of the respondents from the urban center (66.5 per cent) ranked floods as a serious threat to their household than food shortage, crime, road accidents and diseases. Out of this percentage, 45.4 per cent are males and 21.1 per cent are females. The respondents who ranked floods as the greatest threat may be those who were frequently flooded. They may also be located closer to the Volta River. From the sample, 33.5 per cent rated diseases as serious problems that threaten their livelihoods. Among these people, 19.7 per cent were males and 13.8 per cent were females. Those who chose diseases as the major threat are likely not to be physically located closer to the Volta River. These were also the people for whom floods were not an annual occurrence but were seriously affected by the 2010 floods disaster. In the rural settlement, 98.4 per cent of the sample saw floods as the most serious threat. Out of this percentage, 81.5 per cent were males and 16.9 per cent were females. Only 1.5 per cent of the sample ranked diseases as the most serious threat to households. This person was also affected by floods in 2010 but feel disease pose serious problem to him than floods. More respondents feel threatened by floods in the rural settlement as compared to the urban center. This may be because of the frequency of occurrence of floods in the rural community and differences in mitigation measures.

In the urban center, out of 66.5 per cent of the sample who perceived floods as very risky 42.1 per cent of them uses structural measures to mitigate flood impacts. Of this number, 32.2 per cent were males and 9.9 per cent were females. Most males adopted structural measures such as rebuilding their houses with cement blocks. Majority of the females sampled agreed that cement houses are very good to withstand flood impacts but lamented on the lack of economic resources to enable them adopt such measures. Other structural measures often adopted by male respondents included creating channels for storm water to pass and filling their compounds with gravel. The only structural measure adopted by females is creating of channels for storm water around their houses. The remaining percentages of the sample in the urban center adopt non-structural measures to mitigate flood impacts. From the sample, 32.9 per cent of males use non structural measures. Some of the respondents rely on their traditional knowledge to monitor the movement of the river and predict floods. This is done through the use of stones. In a Focus group discussion carried out Htu said "I put stone at the edge of the river in the morning, and then I monitor it. When the river over flows the stone then I know that the water is moving towards me then I take quick action." However, 25 per cent of the females in the urban center do not take any remedial measures. Most of them rely on assistance from government and non-governmental agencies, friends and relatives to mitigate floods. Most of the respondents vacate their homes during floods. This finding supports a study by Nyakundi et al. (2010) that showed that during extreme flood events, affected families vacated their homes and moved to camps or were accommodated by relatives and friends.

In the rural settlement, even though most of the respondents saw floods as the most serious threat to their households most of them did not use structural measures. Only 16.9 per cent of males in the sample adopt structural measures before floods.

The structural measures include creating of gutters, filling their compounds with gravel and rebuilding of their houses with mud. None of the respondents rebuilt their houses with cement blocks even though they agreed cement houses were much able to withstand flood impacts than mud houses. A study by Nethengwe (2007) concluded that housing quality index was an important indicator of flood vulnerability. In this study, households in a grass-thatched house were found to be more vulnerable to floods than households in a stone house (Nethengwe, 2007:126-130). During floods relocation becomes the best choice for the flood victims. This supports a study by Nyakundi et al. (2010) that showed that during extreme flood events affected families vacated their homes and moved to camps or were accommodated by relatives and friends. Most of the females sampled mitigated the impact of flood events by relocating during the event. They also sell off some their assets to restart lives. The type of mitigation measures adopted by women in the area differs from that of men. Most of the men in the sample who adopt non-structural measures also relocate during floods while those who do not relocate stay in the houses and walk on floating woods during flood events. Some also sell off some of their assets to recover.

Majority of those sampled in the urban center perceived incidence of floods as a natural occurrence which could not be controlled. From the sample in table 2 below, 53.3 per cent of the sample perceive causes of flood occurrences as natural and did not believe humans could exacerbate flood impact. However, 11.8 per cent of those sampled agreed that floods occur naturally but human agency can exacerbate the impact of flood. Those who accepted human agency as capable of either attenuating or amplifying the impact of floods were between the ages of 18 and 40 years and have had some form of education. Some human modification systems given as responsible for floods included the settlement pattern in the community and lack of drainage systems. All females sampled attributed flood occurrence to nature without acknowledging the role of human agency in either amplifying or attenuating the impact of floods. Several researchers have come to a similar conclusion that gender has an effect on how people perceive risk (Flynn et al., 1994; Rogers 1985; Slovic 1997). The perception of the causes of floods influences how respondents prepare for flood events. Information obtained from the survey indicates 88.2 per cent of respondents use non-structural measures to mitigate flood impacts. Out of the number, 53.3 per cent were males and 34.9 per cent were females. Most men sell off their assets to recover from floods. Unlike the males, females in the sample do not own valuable assets to sell in order to mitigate floods but rely on assistance from government, non-governmental agencies, friends and relatives. From the sample, 11.8 per cent use structural measures to mitigate flood impacts. These are those who believe humans have a role in exacerbating flood impacts. These people often rebuild their houses with cement and create channels for storm water.

In the rural settlement, all respondent saw the causes of floods as natural and did not believe humans could exacerbate flood impacts. None of the sampled respondents in the rural community acknowledged the role of human agency in amplifying or attenuating the impact of floods. This finding supports conclusions from a similar study in western Kenya where majority of rural residents' perceived floods to be inevitable and fairly unpredictable (Nyakundi et al., 2010). Such perceptions often limit the scope for action and response thereby increasing human vulnerability. Furthermore, because most respondents in the rural center attribute flood occurrence to nature only 4.6 per cent of the males use structural measures to mitigate the consequences of floods. Structural measures used included using of sticks to support their buildings, filling their compounds with gravels and creating of channels for storm water to flow through. As a result of the perception of the causes of flood, 78.5 per cent of males and all females prefer to relocate during floods and also sell off their assets after floods to restart their lives. Studies have also shown that such flood risk perception could also be related to disaster experience (Burn, 1999; Weinstein et al., 2000).

In both study areas, males turned to dominate activities used to mitigate flood impacts. This finding supports studies by Nyakundi et al. (2010) in Kenya where women were reported to have considerably lower levels of preparedness compared to their male counterparts. Also a similar study cited in Nyakundi et al. (2010) shows similar findings by Murphy et al. (2005:83-109) in Ontario, Canada in which men appeared to dominate in both outdoor and indoor preparedness.

4.2 Gender and Business Continuity after Floods

The survey sample at Buipe constituted 99 (65.1%) males and 53 (34.9%) females. The table below shows gender and access to various assets in Buipe. It is important to note that most males in the community own larger and valuable livestock than that of the females. This is because majority of the males own cattle, sheep and goats while most of the females own fowls.

The situation in the community follows the general pattern where men own large livestock and particularly, work animals, while women own smaller livestock and yard animals (Doss et al., 2008). Again more males have access to formal education than the females in the community. From the Focus Group Discussion conducted, this has been attributed to the religion, socio-cultural practice and the value system of the people which tend to marginalize the full development of females. This supports the research by Fagan (2006) which states that academic expectations, level of education attained, school attendance, and academic performance are all positively affected by religious practice.

Majority of the male respondents at Buipe are employed in the agriculture and fishing sectors with most of the females in the petty trading sector. From the survey sample, out of the 99 males sampled, 46 were in the fishing sector, 35 in the agriculture sector, 2 were in the transportation sector, 12 in the education service sector and 4 in the construction sector. Majority of the male respondents in the sample survey lost their businesses. This can be attributed to the fact that most of them are employed in the informal sector which is vulnerable to floods. After the 2010 floods in Buipe, Only 3 respondents in the agriculture sector and those in the construction, transportation and education sector did not have their farms destroyed by floods. This was because their farms were little farther away from the river. However, respondents in the transportation and construction complained of reduction in the number of customers as compared to times where floods had not occurred. Respondents in the fishing sector lost all their fishing nets, boats. Also the rivers were over flowing so fishing activities could not be continued. Respondents in the agriculture sector had their lands covered by water and lost all their farm produce. As at the time data was collected majority of the male (66) respondents had been able to continue with their business. Only a few (12) of the female respondents had also been able to continue with their businesses. This is shown in table 4.1.2

Most of the males in the sample survey were able to continue with their business as a result of the assets owned in which case females are at a disadvantage. From table above, males had a better access to the key assets than the females and so enabled them to continue with their businesses. However research has shown that flood victims usually go through a lot of stress in order to recover from the impacts of hazards. Most of the male respondents even though are able to continue with their business but complain of going through a lot of stress. It is important to note that most business owners do not have insurance cover but are able to continue through their access to key asset in the community. At Buipe, majority of those in the fishing and agric sector depend on the sale of livestock in order to continue with their business. Again, others who do not own livestock rely on savings and loans in order to continue with their businesses. Most fishermen rely on the sale of livestock in order to continue with their business. Also a few of the farmers depend on assistance from friends, relatives, and National Disaster Management Organisation (NADMO) in order to acquire seeds and fertilizers to continue with their businesses.

At Buipe, out of the 53 females in the survey sample, 50 of the females in the sample are employed in the petty trading sector with only two in the agriculture sector and only one being in the education sector. This supports arguments by some researchers that more women than men work in the informal sector and in small enterprises. These sectors are often the worst hit and least able to recover from the effects of disasters, due to lack of capital and limited access to credit and information, among other obstacles (Nelson *et al.*, 2002). From the study, 48 females lost their businesses during the 2010 floods. Most of the females as at the time of data collection had not recovered from the impact of the flood to continue with their business. Those who had been able to continue with their businesses relied on loans. However, loans are usually petty and not enough to continue with their businesses. From the sample survey, only twelve of those who lost their businesses were able to continue after the floods.

At Yapei which is a rural area, males constituted 83.08% (54) of the sample and females constituted 16.92% (11). The table below shows gender and access to various assets in Yapei. Again, majority of the males have a better access to the five assets than the females. Again, males in the community own larger and valuable livestock than that of the females. This is because majority of the males own cattle, sheep and goats while most of the females own fowls. At Yapei, 20 of the male respondents are employed in the fishing sector, 30 of the male respondents are in the agriculture sector with only 4 in the construction sector. After the 2010 floods only those in the construction sector were able to continue with their businesses. At Yapei, none of the respondents is employed in the education sector and the transportation sector. All those in the fishing and agriculture sector had their businesses destroyed by floods. Females in the sample are engage in petty trading.

All females sampled had their businesses destroyed during the 2010 floods. At Yapei, there are no financial institutions and as a result most of them do not rely on either savings or loans to continue with their businesses. From the findings at Yapei, respondents take a longer time to recover from the consequences of a flood event. Only 22 of the total numbers of males were able to continue with their businesses after floods. These people largely depended on the sale of livestock owned and lands in order to continue with their businesses. Those in the fishing sector relied on their lands and livestock in order to continue with their businesses while those in the agriculture sector had to sell off their livestock in order to be able to continue with their businesses. None of the females recovered after a year from the flood impacts. Majority of the respondents are able to continue with their businesses than those at Yapei because of the differences in access to key assets. Respondents at Buipe had a better access to key assets especially financial capital which helped them to continue with their businesses. However, those at Yapei they had to rely on their physical and natural capital in order to be able to continue with their businesses.

4.3 Ethnicity, Perception, and Mitigation Strategies

Factors such as culture, religion, social setting, values and morals, ethnicity and family structure could have an influence on risk perception. Information obtained from the survey indicates different ethnic groups have different ways they perceive flood risk. The flood risk perception of the native ethnic groups (Gonjas) who constituted 32.2 per cent of the sampled respondents were found to be significantly different from that of the migrants who represented 67.8 per cent of the sampled respondents in the urban center. In the rural settlement, the sample was made up of 80 per cent natives, 20 per cent migrants. In table 3 below, most of the residents of the urban center (66.4 per cent) agreed that floods were a serious threat to their household. Out of this number, 13.8 per cent were natives while 52.6 per cent were migrants. A total of 33.5 per cent ranked diseases as the most serious threat to their household. Of this number, 18.4 per cent were natives while 15.1 per cent were migrants.

Some of the structural measures used by households included building of houses with cement, raising the elevation of the foundation, creating channels for storm water, and filling their compounds with gravels. The type of mitigation measure undertaken differed by ethnicity. Most migrants created channels for storm water and filled their compound with gravels while very few built their houses with cement blocks. This contrast with structural measures undertaken by the natives which included raising of the elevation of the foundation of housing and heavy reliance on cement blocks for building their houses. From the sample survey, 19.7 per cent of the natives and 38.2 per cent of migrants use non-structural measures to mitigate flood impacts. The non-structural measures used by natives include relocating during floods and relying on assistance from friends, relatives, government and non-governmental agencies. The non-structural measures used to mitigate flood impacts by the migrants include using stones to monitor the movement of floods, monitoring of the river in the morning and evening, farming earlier, packing of assets before the flood, and relocating during floods. Some also depend on assistance from friends, relatives, governmental and non-governmental organisation.

In the rural community, 78.5 per cent of natives and 20 per cent of migrants saw floods as the most serious threat to their livelihoods. Only 1.5 per cent of the sample said disease was the most serious threat to them. In terms of mitigation, 16.9 per cent of the natives use structural measures such as filling their compound with gravels while 63.1 per cent natives and 20 per cent non-natives use non-structural measures. The non-structural measures include relocation, sale of assets and reliance on social network. As stated earlier ethnicity influences how people perceive flood occurrence. In the urban center, 28.9 per cent of the natives and 59.2 per cent of migrants in table 4 below perceive flood occurrences as natural while 3.3 per cent of the natives and 8.6 per cent of migrants acknowledged human agency in the exacerbation of flood impacts.

However, in the rural settlement all respondents perceive flood occurrence as natural. In the urban center, 3.3 per cent of natives and 8.6 per cent of migrants use structural measures to mitigate flood impacts. From the sample, 28.9 per cent of natives and 59.2 per cent of non-migrants use non structural measures to mitigate flood impacts. In the rural settlement, 75.4 per cent of the natives use non-structural measures while all the migrants use non-structural measures to mitigate flood occurrence. Only 4.6 per cent of the sample use structural measures to mitigate floods. From the finding at the urban centre, more than half (29 per cent) of the natives recovered from the flood impacts in less than a year. However, only 25 per cent of the migrants recovered from the floods in less than a year. At the rural area, 31 per cent of the natives and 3 per cent of the migrants recovered from the flood impacts in less than a year.

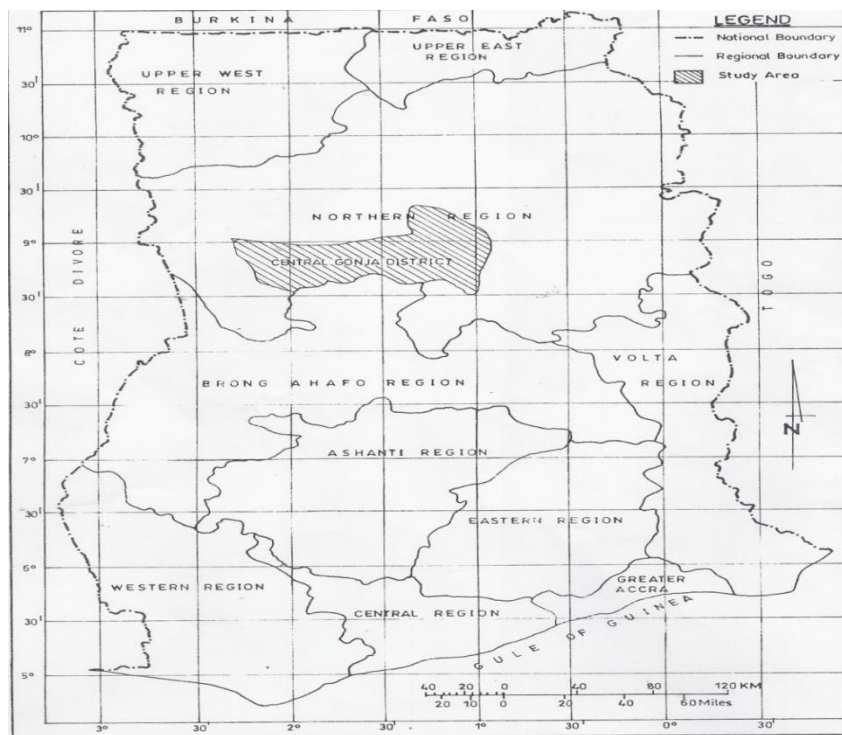
Majority of those who take longer periods to recover from floods are the migrants in both study areas. However respondents at the urban settlement recover faster than those at the rural settlement. Residents at Yapei are more vulnerable to floods than those at Buipe. This could be because of the differences in perception and mitigation strategies used towards floods.

Conclusions

The analysis has shown that people’s perception of flood risk affects their ability to prepare for floods. However, perception of flood risk is affected by factors such as gender, ethnicity, previous experience, and spatial location. In effect perception affects level of preparedness and human vulnerability to floods. The findings from this study supports conclusions from some hazards researchers that characteristics of natural events are not sufficient to explain human vulnerability to environmental hazards (see works by Susman et al., 1983, Blaikie et al., 1994, Wisner, 1999, etc). For sustainable hazard mitigation, equal attention needs to be paid to demographic characteristics that influence perception and coping strategies. This is because demographic characteristics and perception affect ability to anticipate, resist and recover from the impacts of floods. As put by some writers’ interventions to strengthen capacities to cope is also a positive step towards the empowerment of communities rather than the reinforcement of dependency associated with flood relief efforts (Blaikie et al. 1994). Strengthening the coping capacities and also changing the perception towards flood risk of the local people will help devise strategies that will help them to anticipate, resist and recover from floods.

Tables and figures

Figure 1: Central Gonja District



Source: Survey Department of Ghana 1994

Table 1: Gender, Perception of Dangers Posed by Floods and Mitigation Strategies

Gender	Buipe		Mitigation Strategies		Yapei		Mitigation strategies	
	Risky (%)	Not Risky (%)	Structural (%)	Non-Structural (%)	Risky (%)	Not Risky (%)	Structural (%)	Non- Structural (%)
Male	45.4	19.7	32.2	32.9	81.5	1.5	16.9	66.2
Female	21.1	13.8	9.9	25	16.9	0	0	16.9
Total	66.5	33.5	42.1	57.9	98.4	1.5	16.9	83.1

Source: Authors Fieldwork, 2012

Table 2: Gender, Perception of Causes of Floods and Mitigation Strategies

Gender	Buipe		Mitigation strategies		Yapei		Mitigation strategies	
	Natural (%)	Not Natural (%)	Structural (%)	Non-Structural (%)	Natural (%)	Not Natural (%)	Structural (%)	Non-structural (%)
Male	53.3	11.8	11.8	53.3	83.1	0	4.6	78.5
Female	34.9	0	0	34.9	16.9	0	0	16.9
Total	88.2	11.8	11.8	88.2	100	0	4.6	95.4

Source: Authors Fieldwork, 2011

Table 4.1.1 Gender and access to assets in Buipe

Gender	Assets					
	Education	Savings	Loans	Livestock	Social Network	Land
Male	41	57	44	43	28	50
Female	7	15	27	23	10	13

Source: Field Survey, 2011

Table 4.1.2 Gender and Rate of Recovery at Buipe

Gender	Counts and percentages				Total	
	Less than a year		More than a year			
	Counts	%	Counts	%	Counts	%
Male	66	67	33	33	99	100
Female	12	23	41	77	53	100

Source: Field survey, 2011

Table 4.1.3 Gender and access to assets in Yapei

Gender	Assets					
	Education	Savings	Loans	Livestock	Social Network	Land
Male	9	5	4	39	11	29
Female	0	2	0	6	2	3

Source: Field survey, 2011

Table 4.1.4 Gender and Rate of Recovery at Yapei

Gender	Counts and percentages				Total	
	Less than a year		More than a year			
	Counts	%	Counts	%	Counts	%
Male	22	41	32	59	54	100
Females	0	0	11	100	11	100

Source: Field survey, 2011

Table 3: Ethnicity, Perception of Dangers Posed by Floods and Mitigation Strategies

Gender	Buipe		Mitigation Strategies		Yapei		Mitigation strategies	
	Risky (%)	Not Risky (%)	Structural (%)	Non-Structural (%)	Risky (%)	Not Risky (%)	Structural (%)	Non-Structural (%)
Natives	13.8	18.4	12.5	19.7	78.5	1.5	16.9	63.1
Migrants	52.6	15.1	29.6	38.2	20	0	0	20%
Total	66.4	33.5	42.1	57.9	98.5	1.5	16.9	83.1

Source: Author's Fieldwork

Table 4: Ethnicity, Perception of Causes of Floods and Mitigation Strategies

Gender	Buipe		Mitigation strategies		Yapei		Mitigation strategies	
	Natural (%)	Not Natural (%)	Structural (%)	Non-Structural (%)	Natural (%)	Not Natural (%)	Structural (%)	Non-structural (%)
Natives	28.9	3.3	3.3	28.9	80	0	4.6	75.4
Migrants	59.2	8.6	8.6	59.2	20	0	0	20
Total	88.1	11.9	11.9	88.1	100	0	4.6	95.4

Source: Field Survey, 2011

Ethnicity and Rate of Recovery at Buipe and Yapei

Gender	Counts and percentages			
	Less than a year		More than a year	
	Buipe	Yapei	Buipe	Yapei
Natives	23%	31%	9%	49%
Migrants	25%	3%	43%	17%

Source: Authors Fieldwork, 2011

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