



Community Vulnerability to Disasters in Botswana

K. Maripe^{1*} and B. M. P. Setlaleto²

¹Department of Social Work, University of Botswana, Botswana.

²Faculty of Human and Social Sciences, North West University, South Africa.

Authors' contributions

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

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ABSTRACT

Community vulnerability to various hazards and related risks complicates recovery, reconstruction, and adaptation to disaster shocks. Vulnerability results from several factors rooted within the community requiring an accurate analysis of environmental threats. As such, vulnerability and capacity assessments are essential in the analysis and better comprehension of disasters and the related behaviour within the social environment. Hazard and vulnerability assessment diagnose situational crises and the likely effects on people and the environment. A key result from the study on community resilience to disasters in Botswana shows that communities are vulnerable and are constantly under disaster threat. Although there are district disaster management committee, they are only active during emergency response and ignore the pre and post disaster activities. As such, communities, families, and individuals lack fundamental knowledge, skills, and techniques necessary to enhance their resilience to disasters. After reflecting on issues that make individuals / or communities vulnerable, it is crucial that communities develop measures to reduce vulnerabilities across groups in the community. Therefore, this paper seeks to draw the attention of individuals / or communities to disaster related risks and to deliberately prepare for environmental hazards / risks and ensure appropriate mitigation measures.

*Corresponding author: E-mail: maripek@mopipi.ub.bw,

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1. INTRODUCTION

Disasters in Botswana are a challenge for social workers, economists and the environmental scientist. The increase in the frequency of disasters affect developing economies is complicated by human induced hazards and climate change, posing a huge humanitarian challenge. The economists are not only concerned with the distribution of goods and services but also the undisrupted community productive economic capacities with which they can adequately respond to disasters; the environmental scientist seek to ensure a sustainable, productive, and safe physical environment for communities; while social workers ensure that individuals, groups, and communities are functional within their socio-economic environment without disaster disruptions. The reason is that poverty and vulnerability account for 98 percent of those killed and affected by natural disasters in developing countries [1]. In 2001, an estimated 170 million people worldwide were said to have been affected by disasters and it was further predicted that, by 2025, over half of the people living in developing countries would be highly vulnerable to floods and storms [2]. This paper discusses the quantitative findings of the study on community resilience to disasters in Botswana. The intention of the study was to ascertain the extent of preparedness, vulnerability, and the status of community members in relation to disaster risk reduction. The data collection instrument (questionnaire) gave the respondents the opportunity to rate themselves and ascertain their vulnerability to the various hazards which they did. Therefore, the discussion carefully identifies the similarities and the differences amongst and between variables, and the gaps that were identified.

2. METHODOLOGY

This study was conducted in three communities of the South East Administrative District which is prone to floods and drought. It used both the qualitative and quantitative research paradigms (mixed research method) to ascertain the resilience and vulnerability to disasters. The quantitative phase was meant to establish the extent of the problem and its scope, and to describe prevalent resilience characteristics. The sample consisted of a total of 3567 respondents who are residents of the three communities in the

South East Administrative district (Ramotswa, Otse and Mogobane). It constituted 94% of the target 10 percent of the total population from each of the communities represented in the study. In terms of gender representation, males constituted 40% while females were 60% and were the majority in all the age- groups. The crisis, stress, social constructivism and resilience theories and the ecological perspective provided the analytical lens for the interpretation of data. The dependent variables were risk, knowledge, vulnerability, preparedness, response, and community perception and disasters. The researcher used the SPSS to analyse data and compare between and amongst the variables. The quantitative findings apprised critical issues identified by the key informants and participants and that they were vulnerable to a number of hazards.

3. RESULTS AND DISCUSSION

The results are discussed under the appropriate sub-headings to carefully accentuate the effects of the variables on the respondents. As such, the biographical and educational data showed that the overrepresented age groups in the study were those aged 21- 30 years at 43% and 31-40 years at 27%. It also showed that single people constituted 73% and the married 20% and the remaining 7% percentage were in the other two categories (divorced or widowed). The qualification status of the respondents was overrepresented at the junior certificate, BGCSE, and Standard 7 levels at 30%, 25% while a further 22% respectively had a tertiary qualification from certificate to bachelor degree level. In terms of gender, female respondents constituted the majority in all levels, from the lowest to the highest qualification. For example, 50% of those with certificate or diploma and 60% of those with a degree were females.

3.1 Theoretical Bases of the Study

The theoretical lens drawn from the crisis, stress, ecological perspective, social constructivism, and resilience theories show that communities in the South East District have to re-organize to be resilient to disasters. Both the qualitative and quantitative results showed that communities have experience of disasters (which are situational crises). These disasters are floods, drought, windstorms, veld fires and high temperatures. As a result, these communities

have incurred loss of life, injuries, damage to roads and infrastructure and loss of shelter [3]. Due to prevailing low levels of disaster preparedness in communities, it predisposes them to high level of stress and increased vulnerability to disasters. Stress is stimulated by the fear to lose a life or sustain injuries, property damage, and social and economic disruption further accentuated by poverty which a factor of vulnerability. This is worsened by the experience of losses incurred from past disasters from which recovery was quite slow and at times non-existent.

Resilience is only realised and possible when community members and institutions are consciously aware of the inherent dangers associated with crises (disasters) and construct knowledge and actions geared towards reducing the impact of disasters by increasing capacity to cope (social constructivism). It is the contention of the social constructivists that knowledge is sustained by social processes and that knowledge goes with social action [4]. The knowledge about dangers and associated losses should lead to social actions towards reduction of the impact of hazards. The process of stimulating interactions and negotiation in disaster risk reduction is possible with the adoption of the ecological perspective that works with all levels of the community to change the unproductive routines and habits [5]. Their focus is rather on the social processes that are crucial to the generation of resilience knowledge, habits, and routines against disasters. This must be supported by community based disaster risk reduction measures and systems such as; establishing disaster action teams, evacuation

sites and protocols, early warning systems, and conducting public education and awareness campaigns to cultivate appropriate actions and behaviours supported by social constructivism theorists.

The data analysis showed that the focus has been more on response, to assist individuals during emergencies (disasters) but not building community resilience. The United Nations Hyogo Framework for Action and Disaster Risk Reduction frameworks provide a guide towards the establishment of resilient communities [6]. It is evident from both the qualitative and quantitative data that vulnerability to disaster cuts across all ages, educational levels, mental status, socio-economic status and gender. In terms of vulnerability by gender, 1219 males were vulnerable while 167 were not and 1877 females were vulnerable while 236 said they were not. Furthermore, amongst those who were employed, 774 reported that they were vulnerable while 122 said they were not. Amongst the single (unmarried) 2284 as compared to 283 and 621 compared to 85 said they live under constant fear of loss during disasters. It is quite frantic that disaster threats unless abated will continue to psychologically and physically affect communities. The results show high levels of vulnerability of communities to various hazards (floods, drought, windstorms, wild fires, rains, and climate change) with the possibility of becoming more resilient if social processes are harnessed with relevant knowledge and actions towards resilience. Fig. 1 describes the current vulnerability of communities in terms of readiness to deal with disasters and changing climatic conditions.

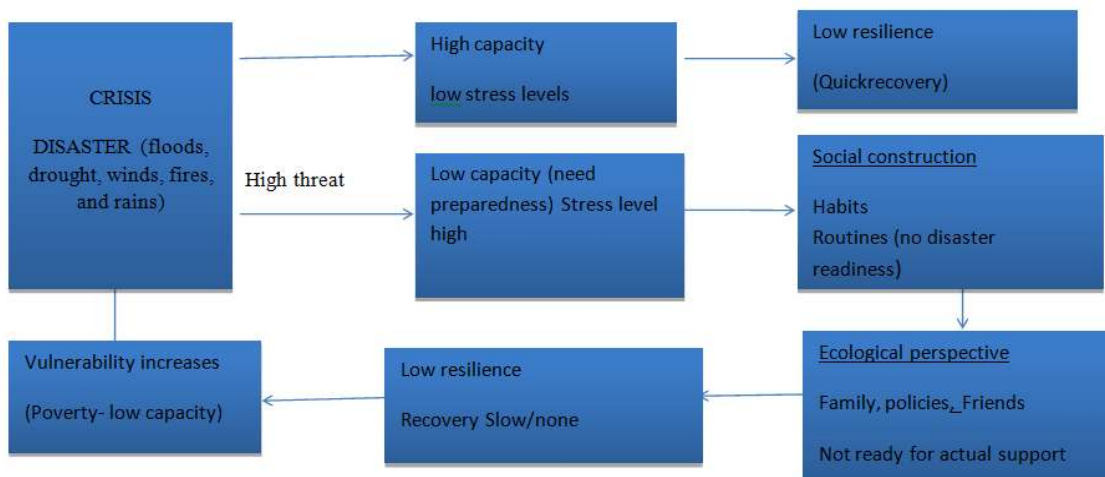


Fig. 1. Model of current state of unpreparedness in communities

3.2 Knowledge of Hazards, Vulnerability, and Risk

The knowledge of hazards, vulnerability, and risk is central to disaster risk reduction and building community resilience measures or strategies in the society. Paton and Johnson [7] assert that “the more people who are involved in community activities that engender a sense of community, efficacy and problem solving, the greater will be their resilience to adversity”. The data shows that 55% of the respondents had some knowledge of hazards, vulnerability and risks while 45% did not. It was established that only a small number of adults are involved in community activities through village development committees and the youth are not included in these committees. As such, they are detached from activities that engender a sense of community, efficacy, and problem solving.

In terms of marital status and knowledge of hazards, vulnerability, and risks, 47% of the total number of single respondents, 37% of the total number of the married, 37% of the total number of divorced persons, and 54% of the total number of widows and widowers had no knowledge of hazards, vulnerability and risks. Furthermore, in terms of gender, the data show that 44% of the total numbers of male respondents and 46% of the total number of females have no information on hazards, vulnerabilities, and risks. This demonstrates that the South East district needs to develop its disaster information dissemination activities to improve the knowledge of disaster related issues in communities. It can engage the Botswana Red Cross Society, other inter-government organizations, community volunteers to carry out the information dissemination campaigns in the district. IFRC [8] states that their national societies are uniquely placed to tap into local knowledge and help communities to identify the dangers, assess their capacities and vulnerabilities, and develop solutions. It is also through the vulnerability and capacity assessment process that the National Red Cross Society could conduct with the communities that will enhance community knowledge of disasters. The prevailing lack of knowledge on disaster and related concepts in the district are a matter of concern and complicates the vulnerability to disasters.

3.3 Sources of Information on Hazards

The respondents obtained the information on hazards, vulnerability, and risks from various

sources. Some received it from the media, schools, workshops, self-reading while others have survived disasters. The leading source of information is the media (15%), schools (14%), and reading (13%), and workshops (4%). This demonstrates that the media, school, and reading could be efficient and effective means of disaster information dissemination in the district. Norris et al. [3] indicated that community resilience must be based on four primary sets of adaptive capacities; economic development, social capital, information and communication, and community competence. Information and communication is one of the crucial tools that help to build knowledge in people on the subject matter which they are expected to address. The lack of such information renders them vulnerable and incompetent to appropriately address such matters. It is apparent that information does not reach people through a single source but through multiple sources and with different effects on target populations.

3.4 Type of Disaster Information Shared

The findings showed that the type of information on disasters that the community acquired was on disaster risks at 16%, prevention (14%), preparedness (9%), hazards (8%), and vulnerability (7%). There are no significant differences between age groups, gender, and marital status of respondents in terms of the disaster related knowledge acquired. However, there was a slight difference for the employed because there were many who obtained knowledge on prevention rather than disaster risks but for other categories, the trend is the same. This might indicate that the information released to the respondents was limited to disaster risks and prevention only. It is important that disaster information is comprehensively packaged to address all the facets of the disaster cycle and ensures its appropriateness for all age groups, social status, and educational levels.

3.5 Disaster Threat and Respondent's Perception

The study showed that 85% (3034) of the respondents considered themselves under threat of disasters in the South East District. The threat to disaster cuts across the respondents' marital status, age, education, gender, and employment. They are threatened more by drought (39%), floods (37%), and rains (9%). Other hazards like wild fires and windstorms appear to constitute a lesser threat to communities (4%). In terms of

age, it appears that the pattern and order of threat is drought, floods, and rains for the 21-30 and 31-40 year age groups which changes to floods, droughts, and rains for the 41-50 age-groups.

As for the 51 and above age group, the pattern changes to drought, floods, and then windstorms instead of rains. The ranking pattern is quite crucial and gives an indication of the type of knowledge and risk reduction measures that would be suitable for each age-group. It indicates that interventions and programmes devised to address the threats have to be specific to the capacity building needs of age groups as well as being hazard specific. Although the groups are vulnerable, their perception of what is threatening varies in pattern and it confirms the uniqueness of community members.

The marital status of the respondents shows a pattern similar to that pertaining to age groups. Single people and the married are susceptible to drought, floods, and rains while the divorced feel unprotected against floods, drought, and rains; and the widows / widowers are vulnerable to drought, floods, and windstorms (a pattern similar to those aged 51 and above). There is no gender difference in terms of disaster danger perception; the order is drought, floods, and rains. Paton & Johnson [7] argue that diversity in the manner in which perceived risk is distributed throughout a community adds further complexity to the communication process and provides material upon which social amplification processes can operate. This process can both reduce communication effectiveness and lessen credibility of emergency management. It is fundamental that this diversity is taken into account by those who work with communities on disaster risk reduction to avoid communication complexities.

The study showed that communities in the South East District are endangered more by drought, floods, rains, and windstorms. The perceived danger appears to be quite high and a basis for stress in the community even before the advent of any hazard. Existing agitations in the community constrain their functional ability to cope with or recover quickly from daily life demands, and increase their vulnerability to disasters. The stress theory states that the already existing strains complicate effective response and recovery from disasters. Stress results from the characteristics of the stressor, appraisal of the stressor, the response to or

effects of the stressor, and the various conditions that influence the relations between the stressor, stress appraisal, and stress response [3].

In this case, the disaster with its unexpected demands puts individuals and communities under undue pressure to respond in a timely manner. The individual or community appraisal of the stressor is dependent on the available capacity to mediate the demands generated by the disaster. The greater the capacity individuals have to mediate the crisis, the less the problem but the fewer the resources, the greater the strain, hence the potential for stress. Neale et al. [9] argue that the assistance of relatives and friends during times of stress can help people achieve successful problem-focussed or emotion-focused coping. Social support has two aspects: the structural and the functional; the structural refers to a person's network of social relationships, marital status, and number of friends while the functional is concerned more with the quality of a person's relationship. Therefore, the lack of structural support (person's network of social relationships) has been linked to death among the elderly population, more specially men.

3.6 Respondents' Vulnerability Perception

The results showed that 87% (3096) of the respondents considered themselves vulnerable to disasters. IFRC [10] define human vulnerability as the relative lack of capacity of a person or social group to anticipate, cope with, resist, and recover from the impact of a hazard. Vulnerability has two components: exposure to hazard (drought, floods, and rains) and difficulty in coping with and recovering from them (due to lack of resources). The vulnerability to hazards (drought, floods, rains and windstorms) in the South East District cuts across age-groups, marital status, educational level, and employment status of the respondents. Forty-three percent (43%) anticipate loss of shelter, 22% injuries, and 14% increased levels of poverty, and 6% loss of livelihood. Five percent (5%) fear they might drown. According to stress diathesis theory, stress will emanate from the level of exposure interacting with pre-existing vulnerabilities of the individual or community (3: 128). Although the respondents are aware of their vulnerability and fears, they have not determined and defined mediating measures to address their deficiencies.

The respondents consider themselves to be without adequate resources to cope with, respond, and recover from the impact of disasters. Norris et al. [3] argues that stressors are adverse circumstances' that threaten the well-being or functioning of the individual, organization, neighbourhood, community or society. The specific stressors that affect post disaster communities are injury to self or family members, life threat, property damage, displacement, and financial loss. This confirms what respondents expressed as their fears and the consequences that resulted from past disasters. Their vulnerability is a consequence of weak social support systems, inadequate economic ability, and weak political support to reduce risks, unfavourable technological systems, and degraded environments [11]. Those who considered themselves safe from disasters could not identify the capacities that give them the impetus to perceive themselves thus. It is crucial that communities identify capacities that guarantee resilience against hazards and risks in their environment.

3.7 Economic /Employment Status of Respondents

The results showed that 35% of the respondents were employed as officials by government, others were in the private sector, and some were farmers while 63% were unemployed. In terms of marital status and employment, from a total of 2539 singles, 69% (1759) were unemployed; for the 713 married respondents, 48% (340) were unemployed; 40% (23) of the 58 divorced respondents were unemployed; and 66% (90) of the 137 widows / widowers were unemployed. The issue of unemployment is a challenge for the communities at all stages of life and it contributes considerably to vulnerability to disaster. Depending on the type of unemployment (seasonal or chronic), the unemployed are tempted to turn to drugs, petty crime, and anti-social behaviours. Botswana Government [12] annual poverty monitoring report shows that unemployment is highest in the 20-24 and 25-29 age groups, especially amongst the female population.

There were 562 (73%) unemployed standard 7 holders out of a total of 766; for the junior certificate holders 695 (68%) were unemployed from a total of 1030; for the BGSCE holders 590 (68%) from a total of 865 were unemployed; and for the 760 with tertiary education (certificate, diploma, and degree holders) 344 (45%) were

unemployed (the only group below 50%). It shows that employment correlates with education of the respondents. The higher the qualification the less likelihood there is of being unemployed. The age groups that were overrepresented in the unemployed bracket were the 21-30 and 31-40 groups, besides the 51 and above age group which is in the retirement age bracket. It was estimated in 2003 by the Central Statistics Office that the South East District unemployment rate was 13.8% in 2003 with a contribution to total unemployment by 2.5% (12: 6). The Botswana Core Welfare Indicator Survey (BCWIS) of 2009/10 reveal that unemployment is high amongst adolescents 15-19 years at 41% as compared to 18% at national level. Furthermore, it attests that it is highest among young people 20-24 years at 34% and females at 21% [13]. In terms of sector employment, government accounted for 12%, private companies for 13 %, and NGO's for 2%.

3.8 Disaster Related Personal Experience by Respondents

Disaster risk management necessitates assessment of respondents' disaster experiences as this is essential for resilience intervention. It was found that 78% of the respondents had not had personal experience of disasters while 21% had survived an episode. The percentage of those who had experienced disaster is low compared to those who have not done so and this may account for the reactive approach in the community. Amongst the 21 % that survived disasters, 9% of them survived floods, 6% drought, and 4% heavy rains. A majority of survivors of past disasters included the elderly in the 51 & above age bracket and their challenges were not documented for inclusion in future disaster interventions. Rosenkoetter, Covan, Cobb, Bunting, and Weinrich [14] assert that disasters can be particularly serious for elderly victims in unsafe neighbourhoods or with inadequate transportation systems and limited personal support. It is crucial to document people experiences of past disasters for incorporation into assessment of needs, being able to drawing information from the lessons learned, and the design of appropriate measures.

The normal individual reaction to any danger is to seek assistance from families and relatives. The respondents also confirmed a similar pattern when dealing with disasters. It was discovered that 6% asked for help from relatives while 4%

reported to the police, 3% to social workers and friends, and 2% to the kgosi (Chief). Hawkins and Maurer [15] consider families as construing the bonding social capital (referring to relationships amongst members of a network who are similar in some form) and the police, the social workers, and traditional leaders as the linking social capital (referring to the extent to which individuals build relationships with institutions and individuals who have relative power over them). The three components of social capital (social capital, bonding social capital, and linking social capital) are quite crucial to strengthening the community resilience to disasters. The results further demonstrate that in the south east district, disaster emergency assistance is expected and sought from families before the police, social workers, and /or traditional leaders could be approached. The respondents further reported that when they were overwhelmed, their call for help was answered by family members and later they contacted the police and others. Tobin and Whitehead [16] argue that those with personal resources or strong kin support networks move away from dependence on assistance programmes and re-establish themselves using these other resources. The kinship support networks in south east district communities must be assessed as a vital capacity against disasters and an important resilience resource.

3.9 Ability of Respondents' to Differentiate Between Hazard and Disaster

Community resilience to disaster requires knowledgeable community members to identify the hazards, project both the possibility and probability of a disaster occurring, and be able to distinguish a hazard from a disaster. The data shows that 51% of the respondents were unable to differentiate between the two. Although these are technical concepts that ordinary members of the community may not be familiar with, there is need for communities to undergo basic disaster training to enable them to appreciate disaster terminology. Furthermore, it was discovered that 53% of respondents were unable to explain the terms to a child. This identifies the extent to which knowledge and information on disasters has been disseminated to communities as well as the level of community consciousness in this regard.

The exploration of disaster concepts with the community is essential as is the reticulation of

water in a locality. It determines the preparedness level of communities to prevailing hazards and risks. Paton and Johnson [7] argue that effective messages require the identification of individual and community vulnerability factors, definition of relationships between them and hazard effects, and then adaptation of relevant information to each group. Disaster information needs to be translated and presented in a way that accommodates the preconceptions of each group and corrects any errors, consistent with the beliefs, needs, and goals of DRR for each group. Groups in the same environment are not homogeneous but vary in characteristics, needs, assimilation of information, and interests. All these have to be incorporated into any programme that intends to provide information on hazards and risks.

3.10 Community Response Knowledge to Various Hazards

The respondents have evidently shown that their communities are vulnerable to drought, floods, heavy rains, and windstorms. In addition, the respondents categorically indicated that they are incapacitated in responding to the following hazards; floods, windstorms, torrential rains, overflowing dams, wild land fires, drought, climate change, and earthquakes. Maripe [11] stated that, in 2006, Ramotswa floods damaged roads and railway lines, killed four people, and flooded the homes of those living along the Ngotwane River. Despite the flood experience in 2006, the study established that 66% of the respondents lack flood and related response knowledge. Rosenkoetter et al. [14] state that if the people do not know how to prepare, if they are unable or do not know they should prepare, then, by definition, they are at risk. Therefore, communities in the district ought to be given accurate information on the hazards and related risks prone to which their locality is prone and then they should be trained to deal with them.

The study further established that 65% of respondents are unprepared for windstorms and have not defined appropriate response actions. Vulnerability to windstorms cuts across age, marital, gender, and employment status of respondents. All these variables (age, marital status, gender, and employment) are supposed to give some people added impetus against hazards more than others but for the South East District, the opposite is the case. All respondents, regardless of their status, are vulnerable to natural hazards and unable to cushion

themselves against the impact. The respondents have not devised measures to deal with the hazard and minimise its disastrous effects.

Although Botswana is predominately a dry country, it does receive average to above average rainfall that at times culminates in flooding in some districts, including the south east [11]. The south east is one of the districts that have been affected by heavy rains in 2006 and in subsequent years. As such, communities should have been trained either by the district disaster management committee or the national disaster management office, and prepared to deal with torrential rains and other hazards. Instead the study established that 62% are not knowledgeable on what actions are appropriate to manage torrential rains. In terms of age, only those aged 20 years and below were knowledgeable on what actions would be appropriate to respond to heavy rains. The lack of torrential rains response knowledge cannot be mediated or altered by marital status, gender, and employment criteria of respondents. There is need to build the capacity of families in disaster risk management to strengthen knowledge and reduce vulnerable to heavy rains.

An overflowing dam is a consequence of heavy rains in the dam catchment area that fills the dam beyond its capacity. The Taung River in the South East District that flows into the Gaborone dam is supplied by the water overflowing from the Nnywane dam in Otse, the Mogobane dam, and tributaries form Kanye. The River does flow at times with high volumes of water beyond its capacity and it erodes the fields and cattle posts along the banks. As such, 70% of respondents indicated that they and their children are susceptible to drowning in the overflowing dams. The expressed pattern of vulnerability to overflowing dams appears to be similar to that concerning other hazards. It cuts across age, marital status, employment, and gender [11].

Wild land fires are a serious threat to communities in the south east which has limited cattle grazing land [17,18]. The fires have destroyed communal grass and vegetation that is used for cattle free zone grazing even during the dry periods. The data shows that 65% of the respondents are vulnerable to wild land fires and they do not have (or they are not aware of) government defined measures to deal with the fires. Although the age-vulnerability pattern has slightly changed for the age group 20 years and below, 41-50 years and 51 & above age-groups

who had some response knowledge to fires, 21-30 and 31-40 years age-groups lacked knowledge. Marital status, gender, and employment show high vulnerability compared to those who considered themselves to have knowledge. Wild land fires are a serious challenge for Botswana communities (including those in the South East District) and it is critical that each district has a well-structured community based system to combat the fires [17].

Drought is considered by the respondents to be a dominant and life threatening hazard in the South East District (as it is in the country in general). Maripe [18] has indicated that drought is a persistent climate related challenge for communities in Botswana. The data authenticated the fact that 70% of the respondents are vulnerable to drought in the south east [19,20]. Like other hazards, there are no differences in terms of vulnerability to drought according to age, marital status, gender, and employment variables. The respondents have identified their vulnerability to drought and they have to explore capacities and /or resources at their disposal to reduce this vulnerability to drought.

According to [21] climate change refers to any change in climate over time, whether due to natural variability or as a result of human activity. It is a relatively new concept for the respondents and 80% of them stated that they are vulnerable to changing climatic conditions. All the age-groups, marital status, gender, and employment are without knowledge on appropriate measures to reduce vulnerability to changing climatic conditions. Climate change has been found to contribute to the irregular rains, severe periodic droughts, and increasing temperatures (heat waves). It has been established that the frequency pattern of drought and rainfall in Botswana has drastically changed over the years and confirmed by the national policy on disasters [22]. Maripe [18] stated that weather related disasters have increased as have the number of people affected, in particular those dependent on rain-fed agriculture. It is necessary that robust disaster risk reduction plans provide protective and preventive measures ensuring rapid, efficient, and effective measures to save lives and livelihoods [21].

Earthquakes are not common hazards in Botswana and its districts except for some tremors that were experienced in the early 80s.

In this study, only 8% of the respondents attested to having earthquake response knowledge while 92% were without knowledge. The vulnerability trend applies to all age groups, marital status, genders, and employment status of the respondents. Some might argue that it is not necessary to adopt protective measures against seismic hazards because the country is not prone to them and is outside the earthquake belt. It is crucial to acknowledge that, in a global village, people are no longer restricted to a locality as they travel and study abroad where earthquakes might be common experiences. It is better to prepare them than to let them remain vulnerable without appropriate attitudes and behaviours for survival in earthquake territories. The Federal Emergency Management Agency [23] states that earthquake cause buildings and bridges to collapse and power lines to fall and result in fires, explosion, and landslides. They also cause huge ocean waves termed tsunamis.

The evidence shows that communities lack knowledge, skills, and techniques on planning and responding to disaster related hazards and risks. It indicates that community development initiatives have not incorporated disaster risk reduction in all their activities in the community. Paton and Johnson [7] are of the view that hazard mitigation strategies should be linked to community development activities and the supplementation of community development activities with specific hazard education and reduction initiatives. Community members are not to be viewed only as victims of disasters, but responders during emergencies and pioneers of the reconstruction process after the event. Victoria [24] argues that capacity building and public awareness activities should enable communities to increase participation and, eventually, to sustain (even on their own) the community based disaster mitigation activities.

3.11 Sources of Knowledge Sharing / Information Dissemination

It has been established, through both qualitative and quantitative data, that information is shared through various media with consumers in the modern world, for example, television, radio, print media, families and friends, and schools. The respondents indicated that they obtained hazards related information through reading (23%), from television and /or radio (16%), through other unnamed sources (10%), from workshops (7%), and from the print media (2%). As such, those

who lack information on hazards and related risks have not had access to the necessary information. They have identified appropriate ways to gain knowledge on disasters: 50% want education and/ or awareness campaigns, 18% prefer public and / kgotla meetings, 16% want disaster training, and 7% information dissemination (brochures / pamphlets).

It was further established that 59% of respondents were of the view that government should lead the process of disseminating information on disasters while 15% cited tribal leaders, 12% communities, 5% the district commissioner, and 3% the council secretary. The council secretary and the district commissioner cannot be divorced from government, they are chief executives in the local government districts, and so the call is for the government and communities to act. Paton and Johnson [7] asserted that participation in identifying shared problems and developing and implementing solutions facilitates the development of problem-focused coping, a sense of community, and commitment to action. This is an ingredient needed by communities in the south east to build their resilience against disasters.

3.12 District / Community Disaster Policies, Legislation, and Programmes

District or community disaster policies and programmes are fundamental for developing resilience to disasters. It is crucial to identify disaster related policies, legislation, and programmes available in the district and assess whether they are aligned to the DRR and UNHFA frameworks. It was found that the district only relied on the national policy on disaster of 1996 which has not incorporated risk reduction. The disaster risk reduction concept is relatively foreign to communities mainly because it was introduced after the 2004 tsunami experience in Asia, India, and Africa. UNISDR [6] states that efforts to reduce disaster risk must be systematically integrated into policies, plans, and programmes for sustainable development, and poverty reduction, and supported through bilateral, regional, and international cooperation, including partnerships. The district has not contextualised the disaster risk management into its policies and / or plans. Results showed that 70% of the respondents also do not know the disaster risk reduction concepts and related processes.

Furthermore, all age, marital status, gender, and employment groups were equally without knowledge on DRR. The reasons given by respondents in the South East District for the lack of knowledge vary; 28% simply said they do not have DRR knowledge; 4% lacked information; and 1% had no interest in DRR. Disaster Risk Reduction (DRR) is a framework designed by UNISDR (United Nations International Strategy for Disaster Reduction) for governments to promote sustainable development committed to risk identification, analysis, and reduction [25,19].

The respondents disclosed that they obtained information through reading (11%), the media (10%), primary and secondary schools (4%), workshops (3%), and district disaster committee (1%). It is evident that many respondents received more disaster information through reading and the media than any other sources. These sources pass information to a wide audience and can be strengthened for effective and efficient information sharing. The data indicates that the district disaster committee has not efficiently and effectively disseminated disaster information to communities. This also shows that a committee system approach to disasters is more reactive than proactive and needs to be re-organized. It is only active during the emergency phase and its visibility wanes immediately thereafter [19].

3.13 Knowledge Related to Hyogo Framework for Action (HFA)

The United Nations Hyogo Framework for Action was developed by the United Nations at a conference on disasters held in Hyogo, Japan in 2005 after the catastrophic tsunami in 2004. Data shows that 93% of respondents in the South East District are not aware of the UNHFA and its objectives. In terms of age groups and marital status, limited numbers in the age groups 21-30 and 31- 40 years had some knowledge on the framework. It is apparent that only 2% of the respondents had applied the framework and it is not well understood by communities. The HFA is a 10 year framework adopted in 2005 to ensure that disaster risk reduction is a national and local priority with a strong institutional basis for implementation, identification, assessment, and monitoring disaster risks and enhancement of early warning, and the use of knowledge, innovation, and education to build a culture of safety and resilience at all levels [6,6]. Although the framework is ending in 2015, the results

showed that the south east district communities are not aware of it and have not begun to implement its recommendations. The framework promotes community participation in disaster risk reduction through the adoption of specific policies, the promotion of networks, strategic management of volunteer resources, attribution of roles and responsibilities, and the delegation and provision of necessary authority and resources [6]. It was further established that the framework has not been customized to suit the South East District disaster policy needs and challenges.

3.14 Community Preparedness and Disaster Risk Reduction

The level of preparedness to deal with disaster in the district / community is unsatisfactory and worrisome. The communities of the South East District do not have disaster action teams, action team protocols, district / community disaster policies, district disaster preparedness plan, district / community disaster strategy, a district / community response plan, a district / community disaster zones, a district disaster early warning system, a district / community disaster evacuation plan, a disaster /community disaster profile, and relevant committees. These systems are important to establish functional disaster risk reduction measures that efficiently and effectively discharge appropriate services to the communities. The existence of functional disaster systems that actively engage community members on disaster matters is a necessity for the district.

3.14.1 District action teams

Disaster actions teams are critical in community based disaster risk mitigation and they play a major role in education and awareness programmes. Action teams can be established in different ways to undertake various tasks and assignments. Disaster action teams refer to groups of people assigned to undertake a task in the community (first aid provision, erecting shelters, and early warning systems) [26]. Victoria [24] argues that community groups in disaster management are essential in sustaining the risk reduction process for the community to meet aims and targets. They play various roles to keep community members informed and ready to act in the event of any hazard. Seventy percent (70%) of the respondents confirmed that they have neither district nor community action teams.

3.14.2 Disaster policy and preparedness plan

In terms of disaster policy, 78% indicated that they do not have a community / district disaster policy that derives from the national policy on disasters. A disaster policy is an important document that states the intentions of the district about disasters and the related setbacks and what should be expected from the district by community members [6]. A policy serves several purposes (one of which is to avoid duplication of effort) and facilitates the coordination of risk reduction related efforts. The district disaster policy will define the roles and responsibilities of the community, volunteers, and delegate authority and resources. The district and communities do not have disaster preparedness plans that would guide actions towards protecting community members. A disaster preparedness plan is an important document that defines roles and responsibilities that different stakeholders should perform before, during, and after disasters. It is defined as a framework that outlines activities that are essential to the development of a preparedness strategy [27,11]. It was confirmed by 79% of the respondents that they do not have a disaster preparedness plan for the district and its communities.

3.14.3 Disaster early warning systems

The district does not have early warning systems that would process and forward disaster related information to community members in a language that they understand. UNISDR [6] indicates that early warning systems should be people centred, timely and understandable to those at risk, and take into account demographic, gender, cultural and livelihood characteristics of the target audience, and guidance on how to act upon warning [28]. Data designates that 74% of the respondents have attested to the non-existence of early warning systems in the district. Early warning systems are instrumental in alerting vulnerable members to take appropriate action to mitigate or escape from danger. Hellmuth et al. [29] state that an early warning system provides forecasts of risks, detects and monitors hazards, and puts out warnings when necessary, paving the way for a coordinated response.

3.14.4 Disaster profiling

It was established that the South East District has not profiled prevalent disasters other than the national hazard and risks analysis conducted

in 2008 by the national disaster management office. Eighty percent (82%) of the respondents confirmed the non-existence of district and / or community disaster profiling. Disaster profiling serves several purposes in the district / community, and particularly guides the design of appropriate strategies and contingency plans. Neither district nor its communities have a disaster strategy to deal with impending hazard and related risks. It was confirmed further by 83% of the respondents that the district has not zoned high, medium, and low risk areas. The profiling of hazard is useful in designing evacuation plans and identifying routes and safe sites for the district.

In addition, 74% of the respondents alluded to the fact that they do not have a district evacuation plan, procedures, and codes in the district. During disasters, evacuation is carried out haphazardly and is dependent on the courtesy of the police. Kent [27] states that the response mechanisms should be familiar to potential beneficiaries or to those with the responsibility of implementing such measures. An evacuation plan is an important document for the district and / or communities in disaster response [30,31]. It provides those who evacuate others with the protocols to observe and the routes to follow as well as information needed by the evacuees at the site.

3.15 Committees and Community Actions during Disasters

The district has committees formed by community members to contribute to the welfare of their community or district. The community member identified only two main committees which are: district development committee and / or village development committee and the district health committee and / or village health committee. The respondents did not endorse the presence of a district disaster committee or village disaster committee. The qualitative data showed that there is a district disaster management committee that responded to disasters in the past. It appears in the quantitative data that the activities and visibility of the district disaster committee are insignificant and unknown to the respondents. It further reflects that its visibility and contact with the community is low and irregular.

In terms of who the community would call during disasters, the respondents indicated that they call the police, the social worker, the tribal leader,

relatives and friends, and then the district commissioner. According to the policy, the district commissioner is the coordinator of disaster response actions at the district level and the respondents rank him last in the list [22]. The respondents may not be aware that the police and the social worker are members of the district disaster management committee. It also indicates that the communities need intensive education and awareness on capacities available in the district and those which could be solicited elsewhere. The data also shows that 68% of respondents call the police during a disaster because they believe they are efficient in the provision of assistance while 30% said they call them for lack of an alternative. As such, the 30% would not call the police if they had an efficient and effective disaster response alternative.

3.16 Areas of High and Medium Risk and Vulnerability to Disasters

The respondents identified the wards they considered to be vulnerable to disasters as: Taung, Ramotswa, Goo- Siga, Tswapong, Rivers, Ikageleng, Lesetlhana, Mogobane, Masimo, Badukane, Bokaa, and Borotsi. Amongst these, they picked five [5] areas they presumed to be of high risk, and these are: Taung, Ramotswa, Goo-Siga, Lesetlhana, and Tswapong. IFRC [10] define risk as “the expected or anticipated losses (lives lost, people injured, property damaged, and economic activities or livelihoods disrupted) from the impact of a given hazard on a given element at risk over a period of time.” The respondents were unable to identify the low disaster risk areas in their communities. Results indicate that the wards are affected by different, insignificant, and infrequent hazards. The respondents identified the kinds of hazards prevalent in the wards as floods, crime, drought, rains, fires, and windstorms which are insignificant.

3.17 The Role of Social Workers in Disaster Risk Reduction

Social work is a professional activity of helping individuals, groups, or communities enhance or restore their capacity for social functioning and creating societal conditions favourable to that goal [32,33]. The study showed that social workers and their assistants constituted 1% of the total respondents and 8 had a certificate, 8 a diploma, and 6 a bachelors' degree in social work. Some were trained at the University of Botswana, 1 at the University of Namibia, and 3

at universities overseas. These social workers are employed in the Ministry of Local Government and Rural Development, by the Social and Community Development Department. They work with individuals, groups, and communities and some of their clients in the community are the poor and destitute who are vulnerable to disasters. The social workers reported that disasters do not constitute part of their day to day work in the agency [34]. This is a reactive position about disasters which are viewed as tragic events that must be attended to in a relevant manner when they occur. According to [35] social workers skills in communication, networking, stress management, and therapeutic listening are vital in both immediate and long-term responses to disasters. They must draw from these skills and engage communities in identifying hazards, vulnerabilities, and capacities that communities and individuals could use to withstand shocks. Results showed that 14 social workers perform disaster related work sometimes, 4 do it regularly, 2 on sporadically times, and 4 not at all.

The evidence indicates that social workers do not construe disaster risk reduction as part of their professional activity. Harding [36] argues that social work is predicated on the values of social justice and elimination of all forms of oppression, discrimination, and inequality that characterize human-made disasters. As such, social workers must not distance themselves from natural disaster risk management in order to safeguard their clients against social injustice, discrimination, and inequalities. These are factors that promote vulnerability to disasters that may result from policies and practices that marginalize the poor members of the community. IFRC [10] identified seven factors that affect human vulnerability to disasters and these are: poverty, increased population density, rapid urbanization, changes in ways of life, environmental degradation, lack of awareness and information, and war and civil strife. Some of these factors are what social workers grapple with on a day-to-day basis and they would be in a better position to prevent at-risk populations from falling victims to disaster.

The kinds of disasters social worker have dealt with have been identified by the respondents as: drought, heavy rains, and domestic fires, floods, and windstorms. This also confirms that drought is a more frequent hazard than others that threaten the lives of the already poor and destitute in the South East District. Harding [36]

argues that disasters cause human suffering especially among vulnerable groups, disproportionately women, children, older people, and the poor. It is probable that the rains, floods, and drought will further erode the remaining capacity of vulnerable groups, if social workers will not take risk reduction measures seriously [10]. In Botswana, drought accounts for the loss of livestock and income, and also food insecurity for communities involved in subsistence farming.

Social workers have played diverse roles in disaster response in the past. They have assessed damages, provided shelter, conducted search and rescue, provided relief, and counselling. However, these roles are limited to the emergency phase only not other phases of the disaster cycle (preparedness, mitigation, and prevention). Sweifach, Laporte, and Linzer [37] stated that social workers are among the crucial allied professionals providing care in the aftermath of disasters in Israel. In the South East District, social workers were involved more in damage assessment and counselling than in other areas of response during floods and fires. In Barbados, social workers who were involved in disaster recovery efforts, provision of needs assessment, overseeing temporary shelters, and setting up a food distribution centre and administration of trust funds showed deficiencies in their work because they were untrained in the disaster field though they played an important role [2]. It identifies the crucial nature of social work intervention in disaster risk reduction and measures intended to promote community resilience to disasters. The respondents were of the view that social workers should undertake the following roles:

- Education and awareness.
- Damage assessment.
- Relief provision during response.

The respondent social workers attested to the fact that they possess adequate disaster related knowledge to effectively discharge their roles and responsibilities. In terms of rating the adequacy of knowledge, 5 found it to be excellent, 6 said it was the best, 6 said it was good, 5 said it was fair, and 4 said it was poor. The majority are confident about the professional knowledge they attained at the universities to address disaster related challenges. Rock and Corbin [2] stated that social work must be committed to helping vulnerable persons including those affected disasters. The heart of the social work profession in helping the marginalized and vulnerable

members of the community to deal with social hardships and challenges of the physical environment requires efficient and effective helpers in disaster risk reduction.

Social workers, with their understanding of economics, sociology, and psychology, should be instrumental in building the resilience of communities to disaster. They need to be appropriately trained to mainstream disaster risk reduction and resilience in their daily work activities. Rock and Corbin [2] have argued that the training of social workers in Barbados has not kept pace with the new requirements in the disaster risk reduction field. These left many traumatized survivors of disasters with emotional injuries and wounds without any relevant treatment because the assistance provided by social workers was focussed on food, clothing, and tents rather than the emotional losses and other long term needs. It is crucial that social workers are not excluded in matters pertaining to community resilience to disasters by development practitioners.

3.18 Community Recommended Actions for DRR Programme

The respondents were of the view that community members must participate in the design of disaster preparedness plan, development of early warning systems, and establishment of action teams; monitoring hazards and risks; and conducting community disaster drills. IFRC [38] states that community based disaster programmes are meant to help communities cope better with the hazardous environment that provides them with a life sustaining income but at the same time a threat to their livelihoods. The respondents indicated that they prefer the community based disaster approaches that should include the following aspects for the benefit of the district [39]. They asserted that community members must be involved in:

- Conducting community education and awareness programmes.
- Form community action teams.
- Carrying out community disaster training of volunteers.
- Stockpiling resources in the community.

In terms of responding to disaster, the respondents suggested that communities should be trained and involved in the search and rescue of victims, warning others of danger, and

evacuating the stranded during disasters. Although others are of the view that community members should not play any significant role in disaster response, the majority are in support of community based interventions. Schoch-Spana [40,10] argues that in disasters, families, friends, co-workers, neighbours, and strangers who happen to be in the area often conduct search and rescue activities and provide medical aid before police, fire, and other official arrive. This gives a true picture of community action in disaster intervention before help comes from others.

After disasters, the respondents' stated that communities must be involved in rehabilitation and reconstruction work in their locality to strengthen the recovery process [41,42]. They want a community disaster strategy that defines specific steps and resources for action before, during, and after an emergency. Currently, the district does not have a disaster strategy that guides efforts towards reconstruction and recovery. Paton & Johnson [7] argue that a focus on actively dealing with salient issues helps foster individual and collective efficacy. In this case, it is important for communities to actively engage in salient issues that would foster the individual and collective efficacy necessary to build their resilience to disasters, that is, the binding, bonding, and linking of social capital.

3.19 The Role of the Kgosi / Chief/ Tribal Leader in DRR

Although the Chief and tribal leaders play crucial roles in the community, their role in disaster risk reduction is not well defined as well as in the national policy on disaster. It is assumed that the role of the traditional leadership is known by the community. The Botswana Government [22] states that "the overall responsibility for disaster management rests with traditional leaders and organized groups identified by each district disaster management committee..." The policy defines the roles of the district commissioner and holds the office more accountable than that of traditional leaders and communities. In the policy, communities are only perceived as victims to disaster and without capacity to deal with them though their awareness and involvement are crucial to building self-reliance and sustainability. The respondents have identified three roles that tribal leaders, in particular the Chief (*Kgosi*), must undertake in DRR, these are:

- Counseling.
- Coordination.

- Passive actor.

4. CONCLUSION

It is evident that the Ramotswa, Otse, and Mogobane communities are vulnerable to the following hazards: drought, floods, windstorms, and fires and they have not defined effective and efficient preparedness and response systems. Although some respondents are aware of the common hazards, they do not have adequate knowledge and skills to respond to and protect themselves from the hazards. It indicates the need for systematized educational and awareness campaigns in the communities. The reactive approach to disasters adopted by communities needs to change to a more proactive system. Responding to disasters as and when they occur and then returning to the unpreparedness mode increase the vulnerability to other hazards. The reactive approach has been quite costly in terms of damages, injuries, loss of livelihood, and deaths suffered in these communities. Yet they have not adopted the proactive DRR approach that would save lives and costs for communities.

Although disasters can be prevented by adopting appropriate community measures, the delays in undertaking these measures may complicate efforts to respond to future disasters. Communities must therefore, be mobilized by social workers and community leaders to drive the resilience agenda against disasters. Although some respondents are of the view that chiefs should play a passive role, others are adamant that the chief should take the lead in the process and even provide counselling and coordination of disaster activities in their communities. As such, with proper disaster risk management systems in place and training, the communities will build their resilience to disasters. Disaster risk reduction is a multifaceted approach which requires the deliberate involvement of different stakeholders for the successful attainment of desired ends. Tribal leaders, the business community, church leaders, government, and households should have defined roles and responsibilities in all phases of the disaster cycle. The roles and responsibilities must state actions to be undertaken before, during, and after disasters by each actor in the system.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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