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The 2014 Tokwe-Mukorsi floods: Were the civil protection authorities in Zimbabwe prepared for the disaster?

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Abstract

Flood preparedness involves building capacities that enable minimising losses through effective response and recovery. While there are many preparedness assessments at household and community level, very few have been conducted at institutional level. This study assessed the households' perspectives of the preparedness of civil protection institutions in Zimbabwe during the 2014 Tokwe-Mukorsi flood disaster and identified the capacity building needs of the civil protection institutions. It used a 5-point Likert scale to measure six preparedness indicators: emergency plans, early warning systems, evacuation, resources, disaster knowledge, and relocation camp management. Data came from a cross-sectional survey involving 656 household-heads who were randomly selected among the affected villagers of Tokwe-Mukorsi. The findings revealed various gaps in preparedness both at indicator and at variable level. While some indicators showed incipient levels of development in all their variables, others had a combination of low and developed variables. The preparedness elements that critically need immediate attention include the development of emergency plans, evacuation of populations at risk and the prepositioning of resources. However, it is pertinent to mention that civil protection systems in Zimbabwe need to strengthen most of their preparedness elements. As such, this study recommends strengthening preparedness activities in civil protection systems.

KEYWORDS

civil protection, flood disaster, indicators, preparedness, variables

1 | INTRODUCTION

The term civil protection is widely used around the world describing activities which protect civilians against incidents and disasters (Alexander, 2002). Many countries have different systems of civil protection that are at different stages of development. The level of development partly depends on the hazard profile of each country, resource availability, political will and expertise in disaster risk reduction (DRR) (Alexander, 2015). For example, Zimbabwe has a three-tier system led by the Department of Civil Protection. The system is decentralised to provincial, district, ward and village levels, although the first three are very active. Line ministries, state enterprises, police, army, fire brigade and the national Red Cross Society, among others make up the civil protection

systems (Mavhura, 2016). Civil protection is the sole responsibility of Zimbabwean government. However, the system is far from building resilience to disasters partly because of a strong focus on response with less attention on the processes that enhance resilience and reduce vulnerability (Manyena, Mavhura, Muzenda, & Mabaso, 2013). In the United Kingdom, the police is the lead agency in civil protection system, in Iran, it is the national Red Crescent Society, while in Italy, it is the fire services agency (Alexander, 2015). Although they vary in composition, civil protection institutions focus their activities on minimising disaster impacts on the population (Tim & Florian, 2016). In view of this, the European Union Civil Protection was established to promote swift and effective response to disasters among the civil protection systems of member states (Åhman, Nilsson, Olsson, 2009; Parker, Persson, Widmalm, Parker, & Persson, 2019).

Flood disasters have increased in recent years to become the world's most costly natural hazard (Abdulkareem & Elkadi, 2018; Henstra, Thistlethwaite, Brown, & Scott, 2019; United Nations, 2015). In order to improve their effectiveness in minimising flood losses, civil protection institutions need to learn from past experiences regardless of whether the experiences resulted in positive or negative outcomes (Tim & Florian, 2016). This calls for systematic assessments of their preparedness. Such assessments provide a body of knowledge to reflect on the potential for growth and gaps in activities that need improvement in order to protect citizens. This article contributes to the conceptual discourse on flood disaster preparedness and the ongoing debates and policy discussions aimed at improving civil protection systems. It has two objectives to: (a) assess the households' perspectives of the preparedness of the civil protection institutions in Zimbabwe during the Tokwe-Mukorsi flood disaster and (b) identify the capacity building needs of the civil protection institutions. The article has six sections. After this introduction, Section 2 presents the theoretical consideration of flood disaster preparedness and its measurement, while the third section describes the study site and the data gathering methods. Results appear in Section 4 followed by their discussion in Section 5. The last section gives a conclusion of the study and the related policy implications.

2 | FLOOD PREPAREDNESS AND ITS MEASUREMENT

Flood preparedness involves developing knowledge and capacities in anticipation of, response to and recovery from hazardous events (Mabuku, Senzanje, Mudhara, Jewitt, & Mulwafu, 2018). When institutions and individuals effectively prepare themselves, lives can be saved and economic losses can be reduced. This calls for constant adjustments in institutional and public behaviour to the context of the imminent floods. The uptake of precautionary measures can enhance the resilience of people and organisations to flood disasters (Schlör, Venghaus, & Hake, 2018). The disaster preparedness field is rapidly growing across the world (Alexander, 2015). Many institutions are shifting their attention from post-disaster responses to a culture of pre-disaster planning with an increasing emphasis on preparedness (Keating et al., 2017; Peters et al., ; Suryani, Shiwaku, Munadi, & Shaw, 2018). One of the reasons behind this shift is the increasing evidence that, in the long run, financial returns from preparedness can offset public expenditure on disaster response and recovery (Tim, Michel, Tabea, & Florian, 2016). Despite this, disaster preparedness remains less politically attractive than response, and raising resources for preparedness is still a challenge (Tim et al., 2016). Consequently, in some countries disaster preparedness is still very low especially at the local level (Alexander, 2015). Yet disasters are essentially local problems that must be managed at the local level, and probably through local civil protection initiatives as witnessed in Switzerland. Many settlements in the mountainous regions of Switzerland are exposed to avalanches, landslides and floods. However, due to protective measures initiated by the local civil protection institutions, these hazards pose limited risk to the people (Maduz, Tim, Florian, & Marco, 2019).

Many flood preparedness studies have been conducted at household and community levels (Atreya et al., 2017; Mabuku et al., 2018). At institutional level, preparedness studies are still scarce especially in the global south. However, many scholars and practitioners have proposed an indicator approach when assessing disaster preparedness. Each indicator is an element derived from observed facts that communicate the level of preparedness. Every indicator has a set of variables (sub-indicators) which represent different dimensions of an element under consideration. Alexander (2015) developed a comprehensive framework of 12 indicators (included in Table 1) whose variables can be contextualised to the particular circumstances of the civil protection system. However, very few studies have tried to operationalise this framework. Farley et al. (2017) employed six parameters (infrastructure, leadership, workforce, emergency plans, supplies, and climate change awareness) to evaluate flood preparedness of public healthcare institutions in Sri Lanka. Similarly, Älgå, Anh, Dang, Saulnier, and Nguyen (2018) assessed the preparedness of health institutions in Vietnam by

TABLE 1 Summary of flood preparedness indicators for institutions

Indicator(s)	Selected variables	References
1. Development of the civil protection system	Degree of articulation of the system; emergency operations centre	Alexander (2015); Farley, Suraweera, Perera, Hess, and Ebi (2017); Parker et al. (2019); Tim et al. (2016); Yadav and Barve (2019)
2. Emergency plans	Availability of written and updated emergency plans; comprehensive/all-hazards planning	Alexander (2015); Farley et al. (2017); Maduz et al. (2019); Rodríguez-Espíndola, Albores, and Brewster, 2018; Yadav and Barve (2019)
3. EWS	Connections to scientific monitoring services that provide timely information on hazardous phenomena (e.g., meteorological, hydrological); ability to warn citizens in advance of impending hazard impacts	Alexander (2015); Rodríguez-Espíndola et al. (2018); Shah et al. (2019); Yadav and Barve (2019)
4. Evacuation and care of citizens	Availability of known evacuation plans, routes and shelters	Alexander (2015); Maduz et al. (2019); Rodríguez-Espíndola et al. (2018); Yadav and Barve (2019)
5. Critical facilities	Linking emergency planning and management to critical facilities such as hospitals; integrating the procedures for safeguarding and maintaining the operation of critical facilities with emergency plans	Alexander (2015); Farley et al. (2017); Rodríguez-Espíndola et al. (2018)
6. Communications	Ability to create and maintain robust, effective communications between services; protocols and standardisation procedures in place	Alexander (2015); Farley et al. (2017); Parker et al. (2019); Rodríguez-Espíndola et al. (2018); Yadav and Barve (2019)
7. Command and control	Ability to command and control operations on site; clarity about who is in charge in the case of emergencies of different kinds and sizes	Alexander (2015); Parker et al. (2019); Shah et al. (2019)
8. Public involvement and information	Involving the public into disaster preparedness including warning and evacuation; adequate links with mass media	Alexander (2015); Farley et al. (2017); Yadav and Barve (2019)
9. Education and training	Adequate professional training of local personnel in emergency planning and management; linking the civil protection system with academic institutions in terms of research, education and training	Alexander (2015); Farley et al. (2017); ; Shah et al. (2019); Yadav and Barve (2019)
10. Post-disaster recovery	Detailed recovery plans and procedures in place	Alexander (2015); Rodríguez-Espíndola et al. (2018)
11. Available resources	Availability of sufficient resources (personnel, equipment, supplies, vehicles, buildings, and facilities) to tackle the sorts of emergencies that are likely to occur in the local area	Alexander (2015); Farley et al. (2017); Maduz et al. (2019); Parker et al. (2019); Rodríguez-Espíndola et al. (2018); Shah et al. (2019); Yadav and Barve (2019)
12. Intangibles	Availability of political and institutional support for civil protection initiatives; establishing adequate accounting procedures and mechanisms to sustain the service	Alexander (2015); Farley et al. (2017); Parker et al. (2019)

considering the amount of emergency resources held by each institution. Recently, Shah et al. (2019) used five pillars to assess the preparedness of the disaster institutions in Pakistan. The pillars include awareness/training, infrastructure/equipment, human and financial resources, and coordination. Table 1 provides a summary of disaster preparedness indicators for institutions along with the relevant references.

Although a series of indicators has been developed to measure preparedness of institutions, the list has been neither exhaustive nor definitive. This has given scholars and disaster practitioners the latitude to use indicators that suit the context of their programmes and studies (Maduz et al., 2019; Rodríguez-Espíndola et al., 2018; Yadav & Barve, 2019). In addition, the selection of indicators remains a subjective activity. Therefore, in order to improve the accuracy of the indicators, this study used a 5-point Likert scale that scaled all the preparedness variables.

3 | MATERIALS AND METHODS

3.1 | Study site

This study's site is the Tokwe-Mukorsi community in Masvingo province, Zimbabwe (Figure 1). Originally, this community was living close to the confluence of Tokwe and Mukorsi rivers, marking the boundaries of three districts: Chivi, Mwenezi, and Masvingo. In 1998, the Government of Zimbabwe started constructing the Tokwe-Mukorsi Dam (Table 2) at the same site. Initially, the dam construction was planned for 4 years stretching from 1998 to 2002, but works stalled in 1999

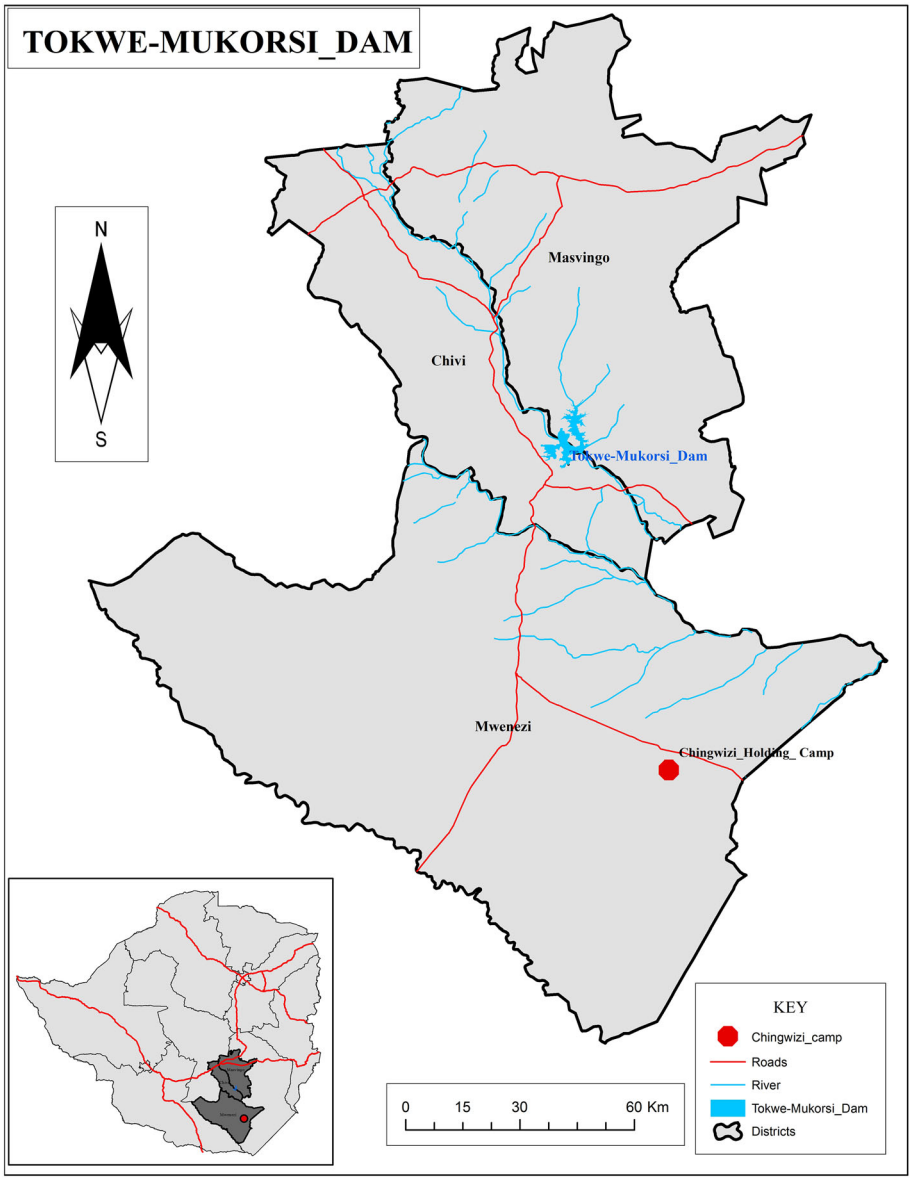

FIGURE 1 Study site—Tokwe-Mukorsi Dam Community, Zimbabwe (Source: Author)

TABLE 2 Facts about Tokwe-Mukorsi Dam (Mavhura, 2020)

Feature(s)	Description
Official name	Tokwe-Mukorsi Dam
Location	Masvingo Province, Zimbabwe
Funders	Government of Zimbabwe
Designers/supervisors	Zimbabwe National Water Authority (Ministry of Environment, Water and Climate)
Main contractor	Salini Impregilo
Sub-contractors	China International Water and Electric Company (for earthworks on saddle dams) Masimba holdings (for some concrete and masonry works) KW blasting (for blasting and grouting)
Main purpose(s)	Irrigation and hydro-power generation
River(s) of location	Tokwe and Mukorsi
Catchment area	7,120 km^2
Capacity	1,802,600 m^3
Flood design	1 in 2,000 years (7,630 m^3/s)
Type of dam	Concrete-faced—rock fill
Height of dam	90.3 m
Depth of water	82.7 m
Spillway	Twin drop-inlets and conduits (total discharge 1,090 m^3/s)
Main dam excavations	1,390,505 m^3
Main dam backfill	2,927,624 m^3
Saddle dam excavations	663,300 m^3
Saddle dam backfill	1,120,000 m^3
Concrete materials	95,000 m^3
Iron materials	4,500 tons
Waterproofing layer	8,542 m
Embankment volume	2,437,000 m^3

due to inadequate funding (Chazireni & Chigonda, 2018). From 2001, the project went through a period of start-stop phases until in December 2016 when all critical works were completed (Mavhura, Collins, & Bongo, 2017; Mavhura, Manyena, & Collins, 2017). However, due to lack of proper planning and inadequate money for compensation, the Tokwe-Mukorsi community could not be resettled before the dam project commenced. Before the project could be completed, heavy rains fell over the dam catchment for two consecutive weeks in February 2014, causing the volume of water in the reservoir to increase from $40 \times 10^6 m^3$ to $350 \times 10^6 m^3$ and dam levels to rise from 15.8 to 61.56 m. As a result, about 6,393 households (about 32,000 people) living within the dam basin were inundated and needed evacuation. The dam partially collapsed and induced further flooding downstream that put at risk lives of about 40,000 people (Mukwashi, 2017). The evacuated people were latter resettled in Masangula, Chisase, and Chingwizi in Mwenezi district.

3.2 | Methodology

Empirical data came from a questionnaire survey that was carried out between February and June 2019. Then, 656 of the 6,393 displaced households were randomly surveyed in Chingwizi, Chisase, and Masangula resettlement areas. The cross-sectional survey targeted household heads. In cases where the family head was absent, an adult member of the family knowledgeable with the events surrounding Tokwe-Mukorsi floods responded to the survey. The questionnaire had a leading statement that directed respondents to the 2014 flood event. The survey focused on six indicators that were subjectively selected from the literature based on their relevance to Zimbabwean context (Table 3). The respondents were able to comment on the indicators and variables shown in Table 3 because the activities and operations of civil protection institutions in Zimbabwe are a common knowledge among the citizens (Mavhura, 2016). This is partly because (a) the civil protection systems is decentralised to provincial, district, ward and village levels, (b) citizens in the country expect government to assume a sole responsibility of their protection, and (c) the households expected compensation from government prior to dam construction that induced the disaster (Mavhura et al., 2017, b). These three factors qualified the respondents to make an informed assessment using the indicators and variables employed in the survey.

To ensure that the indicators were appropriate to Zimbabwe, five members of the national civil protection committee participated in the selection. The rationale of selecting context-specific indicators as opposed to generic ones was because the later tend to mask important context-specific preparedness variables. A 5-point Likert scale (added at the bottom of each question) enhanced the precision of the indicators and variables: 1 = Incipient or absent; 2 = Poorly developed; 3 = Improving but not fully instituted; 4 = Satisfactory; and 5 = Excellent. The scale reflected different stages of development of the civil protection systems per variable, as perceived by the household respondents. Afterward, descriptive statistics were used to analyse the study findings.

TABLE 3 Flood preparedness survey items

Indicator	Variables
Emergency plans	(a) Written emergency plans were in place in the dam basin
	(b) Written emergency plans were based on what was likely to happen to the dam
	(c) Written emergency plans were known by the displaced villagers
	(d) Written emergency plans were updated, tested by tabletop or field exercises
EWS	(a) Civil protection institutions were connected to meteorological and hydrological monitoring agencies
	(b) Civil protection institutions were capable of interpreting and acting upon predictive information.
	(c) Civil protection issued flood alerts before the flood disaster.
Evacuation	(a) Evacuation plans and procedures were adequately dealt with in the emergency plans
	(b) Displaced villagers were aware of the need to evacuate and the procedures involved
	(c) Evacuation routes and shelters were designated or signposted
	(d) Evacuation shelters were supplied with food and non-food items (NFIs) or arrangements were in place to supply them when they were needed
Resources	Comment on the availability of the following resources at the time of the flood disaster:
	(a) Human
	(b) Finance (including cash transfers)
	(c) Equipment, vehicles, fuel
	(d) Food and NFIs
DRR knowledge	(a) The civil protection authorities were monitoring flood risk prior to the disaster
	(b) Search and rescue operations were effective
	(c) The civil protection staff received sufficient education and training in DRR
	(d) The civil protection system had good links with academic institutions in terms of research, education and training
	(e) Civil protection staff were trained to an adequate professional standard
Relocation camp management	(a) The civil protection authorities were in charge of the relocation camp
	(b) There was clarity about who was in charge of the emergencies
	(c) Volunteers were fully integrated into civil protection structures
	(d) Volunteers were trained and adequately equipped to manage the camps

Abbreviations: DRR, disaster risk reduction; EWS, early warning systems.

4 | RESULTS

This study assessed the households' perspectives of the preparedness of civil protection institutions in Zimbabwe and identified the capacity building needs of the civil protection institutions. Using a scale of 1–5, Table 4 gives a point-by-point level of households' perspectives of the preparedness of the civil protection system. Subsequent themes: emergency plans, early warning system (EWS), evacuation, resources, DRR knowledge, and relocation camp management further explain the perceived preparedness levels and capacity building needs of the system.

The mean values of the six preparedness indicators ranged from 1.2 (incipient or absent) to 3.3 (improving but not fully instituted) (Figure 2). This shows that the civil protection system is perceived as performing better in relocation camp management, development of DRR knowledge and EWS than in emergency plans, evacuation and resource availability. The last three aspects need immediate attention. However, the mean value of each indicator masked the relative importance of each variable, which constituted a function of the specific disaster management needs at the institutional level. Therefore, further analyses of the individual variables revealed other capacity building needs of the civil protection system. These are presented in the sections to follow.

4.1 | Emergency plans

All the four variables for emergency plans scored very low (mean 1.2) as the majority of the respondents felt that they not aware of the plans. This shows that emergency plans are seriously under-developed in the Zimbabwean civil protection systems. Written emergency plans are

TABLE 4 Flood preparedness levels

Indicator/variables	Preparedness level (n = 656 [%]) 1	2	3	4	5	Mean value
1. Emergency plans						
(a) Written emergency plans were in place in the dam basin	519 (79.1)	131 (20)	6 (0.9)			1.2
(b) Written emergency plans were based on what was likely to happen to the dam	498 (75.9)	152 (23.2)	6 (0.9)			1.3
(c) Written emergency plans were known by the displaced villagers	523 (79.7)	127 (19.4)	6 (0.9)			1.2
(d) Written emergency plans were updated, tested by tabletop or field exercises	555 (84.6)	95 14.5)	6 (0.9)			1.2
2. EWS						
(a) Civil protection institutions were connected to meteorological and hydrological monitoring agencies	10 (1.5)	21 (3.2)	21 (3.2)	398 (60.7)	206 31.4)	4.2
(b) Civil protection institutions were capable of interpreting and acting upon predictive information		29 (4.42)	56 (8.5)	256 (39)	315 (48)	4.3
(c) Civil protection issued flood alerts before the flood disaster	451 (68.8)	106 (16.2)	99 (15.1)			2.5
3. Evacuation						
(a) Evacuation plans and procedures were adequately dealt with in the emergency plans	509 (77.6)	141 (21.5)	6 (0.9)			1.2
(b) Displaced villagers were aware of the need to evacuate and the procedures involved	219 (33.4)	201 (30.6)	100 (15.2)	80 12.2)	56 (8.5)	2.3
(c) Evacuation routes and shelters were designated or signposted	513 (78.2)	113 (17.2)	19 (2.9)	11 (1.7)		1.5
(d) Evacuation shelters were supplied with food and NFIs or arrangements were in place to supply them when they were needed	274 (41.8)	157 (23.9)	99 (15.1)	75 (11.4)	51 (7.8)	2.2
4. Resources						
Comment on the availability of the following resources at the time of the flood disaster						
(a) Human	8 (1.2)	101 (15.4)	219 (33.4)	317 (48.3)	11 (1.7)	3.3
(b) Finance (including cash transfers)	418 (63.7)	180 (27.4)	58 (8.8)			1.5
(c) Equipment, vehicles, fuel	266 (40.5)	218 (33.2)	50 (7.6)	86 (13.1)	36 (5.5)	2.8
(d) Food and NFIs.	259 (39.5)	299 (45.6)	98 (14.9)			1.8
5. DRR knowledge						
(a) The civil protection authorities were monitoring flood risk prior to the disaster	34 (5.2)	305 (146.5)	216 (32.9)	88 (13.4	13 (2)	3.3
(b) Search and rescue operations were effective	19 (2.9)	18 (2.7)	293 (44.7)	261 (39.8)	65 (9.9)	3.5
(c) The civil protection staff received sufficient education and training in DRR	11 (1.7)	87 (13.3)	302 (46)	223 (34)	33 (5)	3.3
(d) The civil protection system had good links with academic institutions in terms of research, education and training	27 (4.1)	31 (4.7)	207 (31.6)	294 (44.8)	97 (14.8)	3.6
(e) Civil protection staff were trained to an adequate professional standard	50 (7.6)	86 (13.1)	292 (44.5)	199 (30.3)	29 (4.4)	3.1

(Continues)

TABLE 4 (Continued)

Indicator/variables	Preparedness level (n = 656 [%]) 1	2	3	4	5	Mean value
6. Relocation camp management						
(a) The civil protection authorities were in charge of the relocation camp		8 (1.2)	166 (25.3)	307 (46.8)	175 (26.7)	4.0
(b) There was clarity about who was in charge of the emergencies	6 (0.9)	21 (3.2)	114 (17.4)	244 (37.2)	271 (41.3)	4.1
(c) Volunteers were fully integrated into civil protection structures	238 (36.3)	256 (39)	78 (11.9)	75 (11.4)	9 (1.4)	2.1
(d) Volunteers were trained and adequately equipped to manage the camps	345 (52.6)	187 (28.5)	88 (13.4)	33 (5)	3 (0.5)	1.7

Abbreviations: DRR, disaster risk reduction; EWS, early warning systems; NFIs, non-food items.

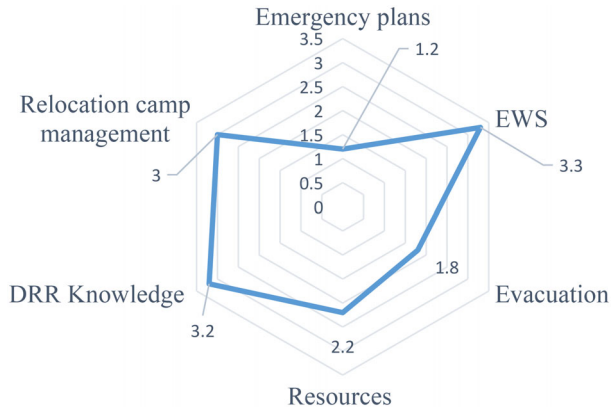

FIGURE 2 Mean values of flood preparedness indicators

either at incipient level of development or totally absent. If they are at incipient level, the plans are unlikely to have been tested either by tabletop or field exercises.

4.2 | Early warning systems

The EWS was perceived as the best-developed aspect of all the preparedness indicators. This is because the civil protection system is well connected to meteorological and hydrological agencies that are capable of interpreting and acting upon predictive information. However, no flood warnings were issued prior to the flood disaster (mean score: 1.5). Hence, the civil protection needs to work on issuing early warning messages.

4.3 | Evacuation

Evacuation is another aspect perceived to be in need of capacity building in Zimbabwe. The evacuation plans and procedures are not adequately dealt within the emergency plans. As a result, the evacuation routes and shelters were not designated in the dam basin and most of the respondents reported that they were not aware of them.

4.4 | Resources

One of the major challenge facing civil protection systems in Zimbabwe is limited resources. The survey respondents reported inadequate financial and material resources including food and NFIs. However, the human resource variable is slightly improved (mean score: 3.3).

4.5 | DRR knowledge

The DRR knowledge in civil protection matters is perceived as satisfactory. The civil protection system monitors flood risk through the hydrological and the meteorological agencies. It also has good links with academic institutions in terms of research, education and training. The search and rescue operations conducted by the police sub-aqua unit received a satisfactory score (mean score: 3.5), while its staff's education and training needs are improving.

4.6 | Relocation camp management

In terms of camp management and coordination, the civil protection system is satisfactorily performing such tasks. However, there is need to train, adequately equip and integrate volunteers into the civil protection systems.

5 | DISCUSSION

This study assessed the households' perspectives of the flood preparedness of civil protection institutions in

Zimbabwe and identified the capacity building needs of such institutions. It used a scale of 1–5 to measure six broad preparedness indicators and their variables. The findings revealed that, in general, the civil protection system is performing satisfactorily in the management of relocation camps, development of DRR knowledge and EWS. However, some variables of these broad indicators need great improvements, while the development of emergency plans, evacuation systems and prepositioning of resources are still at incipient level or non-existent at all. This shows that the measurement of flood preparedness need to go beyond the broad indicators to include a series of sub-indicators. This is because the broad indicators tend to mask the relative importance of some variables that constitute the specific disaster preparedness. This observation is consistent with disaster literature involving indicators. For example, when Mavhura, Collins, and Bongo, 2017 and Mavhura, Manyena, and Collins (2017) used this approach to measure social vulnerability to floods, they found that generic indicators failed to account for the differentiation of social vulnerability at the local level.

This study has provided a good example of measuring flood preparedness of civil protection systems. This is vital for policy and decision makers involved in building capacities that enhance disaster preparedness. In the face of increasing disaster costs, many disciplines including health and mining are prioritising disaster preparedness (Älgå et al., 2018; Kalanlar, 2018; Maunganidze, Ncube, & Sibanda, 2013). At work places, many organisations recognise that disaster preparedness is a cost-effective way to fight occupational injuries (Mavhura, 2019). One of the key preparedness indicators used in this study is the existence of an emergency plan, which is written, tested through drills or simulations, and updated frequently. Emergency plans have been the basis for rapid response in Chinese emergency systems (Lixin, Lingling, Dong, Junxue, & Zhanwu, 2011). However, caution should be exercised when dealing with this element because the best test of any plan rests with its implementation during a disaster. Furthermore, the frequency at which emergency plans should be reviewed remains a subjective decision. At times, this depends on the hazard profile of each area, resource availability and lessons learnt from past disasters (Rosi et al., 2015). Therefore, the existence of an emergency plan cannot guarantee full safety of individuals and organisations (Peterson & Perry, 1999).

EWS are also an integral component of flood preparedness. Global frameworks including the Hyogo Framework for Action and the Sendai Framework for DRR emphasise on the development of EWS (UNISDR, 2015; United Nations, 2005). The provision of early warnings to populations at risk can significantly minimise loss of life and socio-economic impacts (Maini, Clarke, Blanchard, & Murray, 2017; Natho & Thieken, 2018). For example, the Pacific tsunami warning systems in Indonesia and the Caribbean region have significantly reduced disaster losses through the provision of detailed and accurate tsunami and flood models (Kaklauskas et al., 2014; Sardina et al., 2019). In Zimbabwe, results of this study show satisfactory capacity for predicting and forecasting flood risks, but there is a huge gap in issuing the flood alerts. A warning alert from a trusted institution can motivate vulnerable people to take preventive and mitigation measures. However, for this to happen, the alerts need to state clearly the dos and don'ts including where to go during the crisis. All the people at risk need access to such alerts. This calls for multiple communication channels (Peters et al.,). The EWS can ride on increasing evolution of technology involving smart phones that are penetrating poor areas (Atreya et al., 2017). Using smart phone, many people can subscribe to social media, which is increasingly becoming a reliable means of communication during disasters. Apart from reaching a wider audience in a short time, social media allows analysis of information as the disaster unfolds (Luna & Pennock, 2018). Where social media is not accessible, flood warning boards and sirens installed in river basins can also improve flood warnings (Noorhashirin, Faiza, Farhan, & Juni, 2016).

Although EWS can minimise flood impacts, they are not enough in protecting people. Early action is also needed (Chinh, Bubeck, Dung, & Kreibich, 2016). The early action can include evacuation and relocation of people from unsafe locations. These two are some of the non-structural measures that can significantly reduce flood mortalities and property damage (Noorhashirin et al., 2016). Other early actions include the preparation of evacuation routes and shelters; training and equipping volunteers; and the prepositioning of food and NFIs in strategic shelters (Davidson et al., 2018; Jiang, Li, & Cutter, 2019). The setting up of trained local voluntary disaster management teams has the advantage of riding on local social capital, indigenous knowledge and experience when preparing for floods (Nakamura, Umeki, & Kato, 2017). However, many preparedness activities are poorly developed in most developing countries partly due to inadequate resources (Jahre, Pazirandeh, & Wassenhove, 2016). For example, Mabaso and Manyena (2015) reported that insufficient resources were severely limiting effective contingency planning in southern Africa. While there could be outright shortage of financial and material resources in some countries, in others, it is a matter of failure to prioritise preparedness (Alexander, 2015). Interestingly, some of the activities can be achieved by using locally available materials. On a

different note, Rodríguez-Espíndola et al. (2018) observed that having many resources does not guarantee effective preparedness and response. Instead, it is a matter of having the right resources at the right time, clear standard operating procedures and effective coordination during the crisis.

This study has three main limitations. First, it relied on opinions of household heads who had been displaced by the floods. Some of the respondents may have over- or under-rated the preparedness variables due to the negative impacts they suffered from the floods. Hence, an observational study would have been useful in triangulating the results. Second, the study did not measure all the flood preparedness indicators as reported in the literature. Maybe, the indicators that were left out could have revealed a different picture of the level of preparedness of the civil protection system. Third, people from the civil protection systems subjectively selected the indicators. This selection might have been influenced by what they thought would give credit to the system. Nevertheless, this study has empirically demonstrated the assessment of households' perspectives of the flood preparedness of institutions.

6 | CONCLUSIONS AND POLICY IMPLICATIONS

The study assessed the households' perspectives of the flood preparedness of civil protection institutions in Zimbabwe and identified the capacity building needs of the civil protection institutions in Zimbabwe. It used six context-specific indicators that were measured at variable level. The findings revealed different gaps in preparedness at both indicator and variable levels. While some indicators showed incipient levels of development across all their variables, others had a combination of low and developed variables.

The measurement of the variables on a Likert scale enhanced the accuracy of the indicators. This approach also revealed some important areas that needed capacity building. Such areas include development of tested and updated emergency plans; evacuation procedures, routes and shelters; and prepositioning of resources (funds including cash transfers, vehicles, equipment, food, and NFIs). This shows that the assessment of flood preparedness need to go beyond the broad indicators to include a series of variables. This is because the broad indicators tend to mask the relative importance of some variables that constitute the specific flood preparedness. Variables in need of further strengthening include issuing flood alerts, training and equipping volunteers. The alerts need to be issued whenever there is evidence that certain people are at risk. At the same time, resources should be invested in civil protection systems. Where resources are scarce for structural measures, non-structural strategies that are less expensive can enhance flood preparedness. However, it is pertinent to mention that the civil protection system in Zimbabwe needs to strengthen most of its preparedness elements.

In view of the above findings, this study makes four policy recommendations. First, the civil protection authorities should invest in disaster preparedness in the same way they put resources for disaster response. This means that the thrust of their activities should be on proactive rather than reactive measures. Doing so has many benefits: it enhances disaster resilience, saves life and property, and provides long-term financial returns that can offset public expenditure on disaster response and recovery. Second, communities at risk should be engaged when developing, testing and simulating emergency plans. This can be the starting point in preparing for disasters as it may trigger the development of evacuation procedures, routes, relocation shelters and the prepositioning of resources. Third, the civil protection organisation should strengthen its capacity for evacuation. Although this can be costly in terms of time, money and other resources, evacuation remains a risk-averse decision that minimises fatalities. Strengthening the capacity for evacuation will also improve other weaknesses of the civil protection institution. This is because preparing for evacuation will include other processes of warning the people at risk, determining evacuation routes and establishing safe havens. Finally, early warnings are needed whenever a group of people is faced with a hazard. Such warnings can have benefits that exceed their costs: they can save life and property, enhance community resilience, strengthen disaster knowledge and engage other institutions across sectors. In fact, there is no reason to invest in DRR knowledge, meteorological and hydrological monitoring services if no warning would be given to at risk communities.

CONFLICT OF INTEREST

The author declares no conflict of interest.

DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available from the corresponding author upon request.

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