

Research Paper

Government institutional emergent issues and gaps in disaster management mechanisms for WASH: a case study of Zambia's Kanyama peri-urban area

Sydney Haanzuki Mulekwa Mudenda ^{*}, Ian Nzali Banda , James Madaliso Tembo and Kelvin Lungu Agabu

Department of Civil and Environmental Engineering, School of Engineering, University of Zambia, Great East Road, Lusaka, Zambia

*Corresponding author. E-mail: sydney.mudenda@gmail.com

 SHM, 0000-0003-3165-3832

ABSTRACT

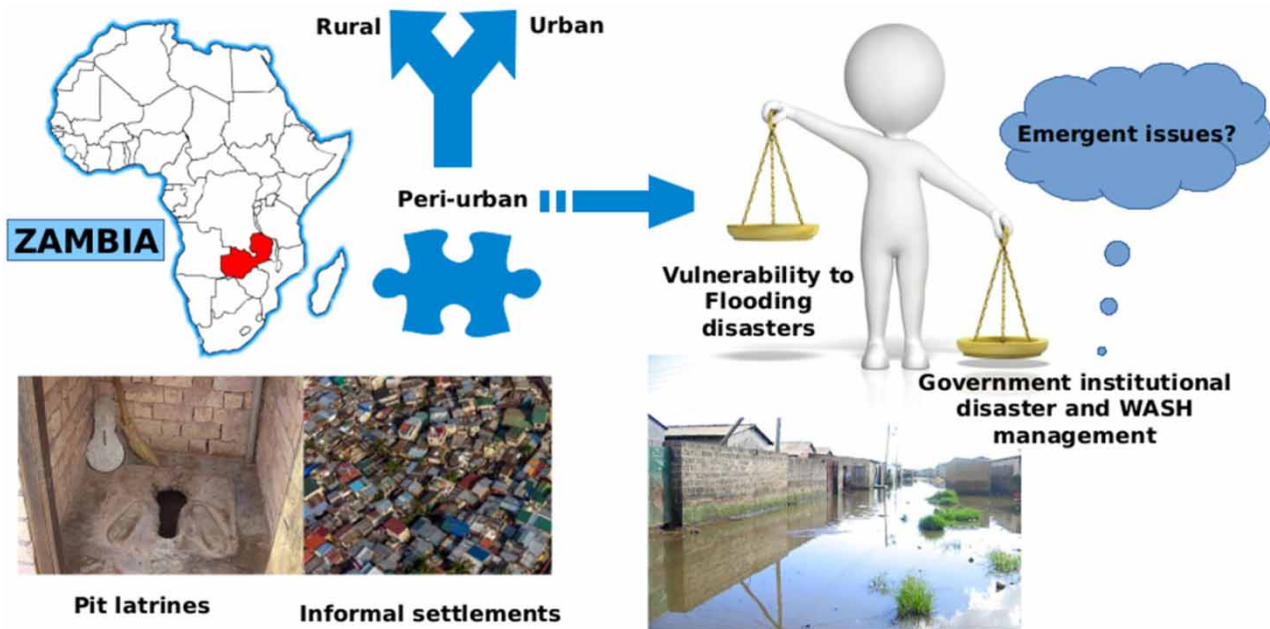
This paper endeavours to characterise emergent issues and gaps in government institutional disaster management mechanisms for water, sanitation, and hygiene (WASH) in peri-urban areas. It is a case of Zambia's Kanyama peri-urban area and focuses on disaster management issues related to prevention, preparedness, and response. To gain an in-depth inductive perspective of emerging issues and inferred gaps, the study used a Straussian Grounded Theory approach by conducting semi-structured interviews with government institutions. Following that, the qualitative data were analysed using open and axial coding. Emergent issues and gaps with regard to mechanisms for emergency sanitation in peri-urban areas have been characterised. The characterised emergent issues and associated gaps include the following: (a) mandate and institutional policy; (b) responsiveness of authorities; (c) community engagement; and (d) stakeholder engagement. Of these emergent issues, mandate and institutional policy is the most outstanding and the critical institutions in the disaster management mechanisms generally are the disaster management and local government authorities. Inadequacies and inefficiencies in the preparedness and response by institutions is highly influenced by the centralisation of preparedness for response. Furthermore, community engagement is cardinal in the effective implementation of preparedness, prevention, and response to disaster management mechanisms in peri-urban WASH by planning authorities.

Key words: disaster, peri-urban, preparedness, prevention, response, sanitation

HIGHLIGHTS

- Characterisation of emergent issues and gaps in government institutional management mechanisms.
- Inadequacies and inefficiencies in preparedness and response by institutions as being influenced by centralisation.
- The importance of community engagement in disaster management mechanisms.
- Interdependencies of institutions when handling disasters.
- The usage of the Grounded Theory when dealing with qualitative data.

GRAPHICAL ABSTRACT



CONCLUSION: The characterised emergent issues include: a) Mandate and Institutional Policy, b) Responsiveness of Authorities, c) Community engagement, and d) Stakeholder engagement.

INTRODUCTION

Water-related diseases, spread through contaminated drinking water and poor sanitation and hygiene, continue to be prevalent in low- and middle-income countries (Mwaba *et al.* 2021; Nyambe & Yamauchi 2021). Poor access to adequate and quality water, sanitation, and hygiene (WASH) facilities has impacted the outbreak of water-related diseases in peri-urban areas, accentuating already existing vulnerabilities, especially in such low income–high population neighbourhoods (Sinyange *et al.* 2018; Nyambe *et al.* 2020; Nyambe & Yamauchi 2021). Despite this, little effort has been made in conceptualising the issues in existing institutional and policy approaches to peri-urban WASH issues related to disaster management strategies for improved prevention, preparedness, and response in such areas. Disaster management administration in Zambia, established by the National Disaster Management Act No. 13 of 2010, takes a multi-sectoral approach among various stakeholders and is coordinated by the Government of the Republic of Zambia (GRZ) through the Disaster Management and Mitigation Unit (DMMU) which falls under the Office of the Vice-President. The organisation is currently governed by the National Disaster Management Policy of 2015 which states how to prepare and respond to disasters within the country.

Prevention, preparedness, and response are critical aspects that disaster management seeks to minimise or eliminate possible losses from risks, provide immediate and appropriate support to disaster survivors and ensure a quick and effective recovery (Carter 2008; Gupta *et al.* 2016; Islam *et al.* 2016). Flooding catastrophes can have a considerable impact on people's livelihoods owing to water-related disease epidemic impacts depending on the type and intensity of the effects of rainfall and climate change (Munzhedzi *et al.* 2016; Schaer & Hanonou 2017). They are particularly severe in locations with on-site sanitation facilities like pit latrines and inadequate solid waste collection systems, which are mostly found in peri-urban areas (Mudenda *et al.* 2022).

The effectiveness of institutional prevention/mitigation, preparedness, response, and recovery disaster management mechanisms have an impact on alleviating the face of a disaster (Sena & Woldemichael 2010; Kouadio *et al.* 2012; Siriwardana *et al.* 2018). It is implied from the literature that municipalities, water and sewerage service providers, non-governmental organisations (NGOs), health institutions, and the community are all stakeholders in disaster management governance. Disaster management governance refers to the way these stakeholders coordinate in the implementation of disaster management at the national, regional, and community levels (Gupta *et al.* 2016; Islam *et al.* 2016; Mudenda *et al.* 2022).

WASH is a public health concern in Zambia (Nyambe *et al.* 2020; Nyambe & Yamauchi 2021). Peri-urban areas are predominant hot spots for water-related disease outbreaks such as cholera and acute diarrhoeal diseases (Mwaba *et al.* 2020; Nyambe *et al.* 2020; Nyambe & Yamauchi 2021) with Kanyama peri-urban in Lusaka being one of the epicentres in recent epidemics (Sinyange *et al.* 2018; Mwaba *et al.* 2020). This study is motivated to establish emergent issues and gaps in existing government institutional policy and action mechanisms related to disaster management in response to alleviating sanitation-related disease outbreaks in peri-urban areas. This will enable policy-makers and government entities such as disaster management authorities, municipalities, water and sanitation service providers, and health institutions concerned with aspects of WASH to make informed decisions before, during, and post a disaster. An inductive methodological approach utilising the Straussian Grounded Theory has been adopted and presented in the following section.

METHODS

This paper aims at not coming up with preconceived hypotheses of emergent issues and gaps in institutional disaster management for WASH in peri-urban areas. Instead, this study takes an inductive approach by adopting a Grounded Theory methodology in characterising these emergent issues and gaps. The Grounded Theory is a qualitative approach that includes a set of systematic procedures for abstracting information from data in order to construct a theory that is based on empirical evidence (Vollstedt & Rezat 2019). In this study, the authors gather and analyse data using a part of the Straussian Grounded Theory. The writers relied on theoretical knowledge to get a degree of familiarity with the field of inquiry before beginning the study using this approach. Preconceptions are unavoidable while taking this technique. This method differs from the Glaserian Grounded Theory which suggests that the researcher should enter the study arena with no specific research questions or difficulties in mind but rather with a wide theoretical foundation that is not revealed right away. However, by utilising the Straussian Grounded Theory, the researchers were able to distinguish between ideas that ‘force’ data and concepts that ‘support the formation’ of new categories, thanks to the utilisation of existing theoretical knowledge based on a good methodological and epistemological foundation.

Following this methodology, the authors followed a structured analytic method of inquiry in characterising emergent issues and institutional gaps in preparedness, prevention, and response disaster management mechanisms for WASH in peri-urban areas. Data collection was conducted by utilising a semi-structured method of inquiry. Participants were selected from identified government institutions. The Grounded Theory method focuses more on the analysis of the narrative type of data collected (Vollstedt & Rezat 2019).

Therefore, these institutions and their respondents were sampled using a purposive and snowball mixed-sampling approach which fixates on developing an understanding behind contexts and not the number of responses. Respondents were initially sampled utilising purposive sampling from predetermined relevant representative public institutions based on their preconceived importance to this study’s subject matter as suggested from literature and a preliminary interpersonal interaction. These respondents helped identify further important research participants to include in this study and this defined the snowball sampling conducted during data collection. In the end, the research participants were from government institutions which included respondents from DMMU, Ministry of Health (MoH) (in which Kanyama General Hospital was selected), Zambia National Public Health Institution (ZNPFI), Ministry of Local Government and Rural Development (MLGRD), and Lusaka Water Supply and Sanitation Company (LWSC). However, ZNPFI, MLGRD, and LWSC each had more than one respondent in order to complement one another when answering some of the questions. The institutions were clustered as Disaster Management Authority, Local Government Authority, Health Institution in Peri-urban area, Water Supply and Sanitation Public Service Provider, and Public Health Research Institution respectively (Figure 1). A total of nine (9) respondents were interviewed. The data collection process took about 3 months due to the simultaneous collection and analysis of the data.

Since the study involved interviewing people, ethical clearance was obtained for this study from the Humanities and Social Sciences Research Ethics Committee of the University of Zambia. The peri-urban areas classified in this study include informal settlements with high (a) poverty; (b) vulnerability to water-related disease outbreaks; (c) residential density, and (d) population density. Lusaka, the Capital City of Zambia, was selected for this case study because of being the centre of a predominant number of peri-urban areas (Tembo *et al.* 2019; Nyambe & Yamauchi 2021). The chosen case study area is Kanyama as it is one of the chief epicentre peri-urban areas for water-related disease outbreaks, hence affecting the general sanitation in the area.



Figure 1 | Key government institutions assessed in this study (Source: Author).

Proceeding with this qualitative data collection, the authors performed open coding analysis. In this analysis, the authors read over the data iteratively to develop tentative labels or conceptual aspects for chunks of data that summarised abstract notions based on analytical observations (Figure 2). The authors then intricately analysed these established conceptual aspects to establish inferred cluster labels for interrelated conceptual aspects which describes taking an axial coding approach (Figure 2). These cluster labels were categorised as two types: emergent issues and gaps from these institutions in terms of prevention, preparedness, and response to disaster management mechanisms in relation to peri-urban WASH (Figure 2).

RESULTS AND DISCUSSION

The National Disaster Management Policy of 2015 governs the use of resources pre-disaster, during the disaster, and post-disaster phases. It explicitly states the procedures to follow concerning disasters that include drought, floods, epidemics, and pests, which are the common disasters in Zambia. It acknowledges the need for water and sanitation services during a disaster, but merely mentions the need for these services to be delivered and not how they should be delivered. The outlined procedures for the various disasters are generalised and not specific to a type of settlement. It further states the establishment

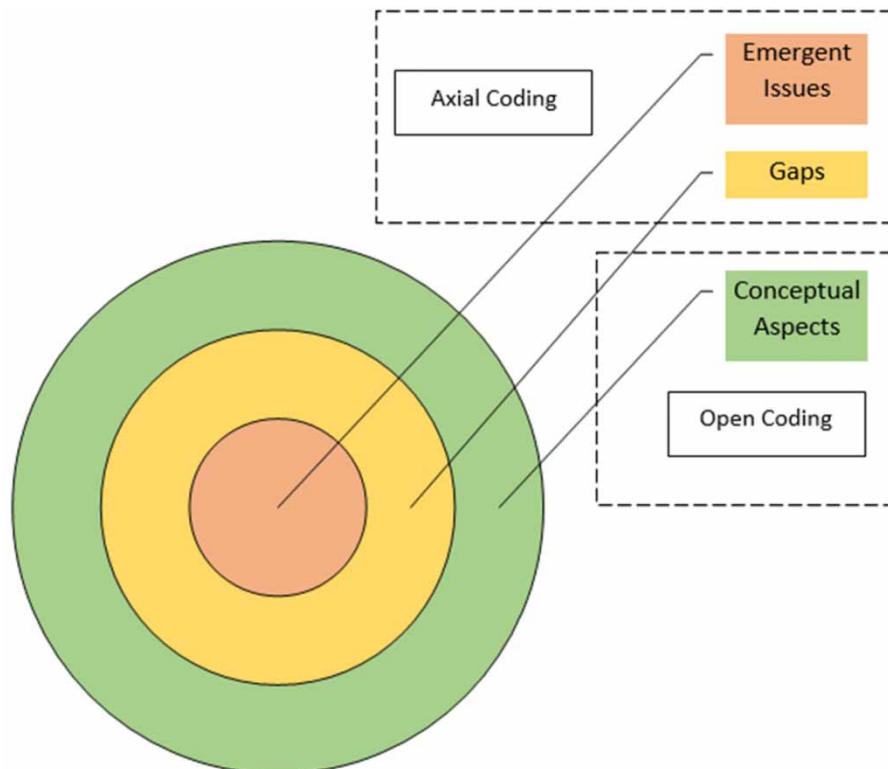


Figure 2 | Grounded theory methodology as applied in this study (Source: Adapted from Vollstedt & Rezat, 2019).

of the committees and councils and states their responsibilities and roles. The different players in disaster management in Zambia include Government ministries and departments, Provincial Disaster Management Committees (PDMCs), District Disaster Management Committees (DDMCs), NGOs, Community-Based Organisations (CBOs) (Disaster Management Operations Manual 2015).

In the case of the study area, Kanyama, the existing policy allows for a Satellite Disaster Management Committee (SDMC) which reports to the Lusaka DDMC and reaches out to the community while working with other stakeholders. Despite this being the case, there is still a need for a policy to strengthen community participatory approaches in interventions aimed at peri-urban livelihood with regards to alleviating flooding disasters and effects related to WASH.

The sampling approaches adopted in this study narrowed down to respondents/players from the following institutions: DMMU, MoH, ZNPHI, MLGRD, and LWSC. It is from these institutions that the study determined the roles and responsibilities of each in connection with disaster management mechanisms to WASH as illustrated in Table 1.

Following the assessment of these institutions, the Disaster Management Authority, Health Institution, and Local Government Authority are the key institutions with responsibilities aligned to the disaster management mechanisms. However, findings from this study indicated that these institutions have close dependencies on each other as illustrated in Figure 3, with the disaster management mechanism of one institution affecting the result of the operation of the other. This is referred to as the domino effect in this study. This further indicates that the failures of the disaster management mechanism by one institution will result in a domino effect gap in another. Results indicated that the Disaster Management Authority and the Local Government Authority are at the centre of these interdependencies and domino effects and thus in turn the most critical institutions whose responsiveness affects other institutions (Figure 3). Domino gaps indicated from conceptualised emergent issues are presented in Figures 4–7.

Four emergent issues and their associated gaps in relation to institutional disaster management of peri-urban areas related to WASH aspects were established as the most suitable to classify the conceptual aspects determined in this study. These are as follows:

(a) Emergent issue 1: mandate and institutional policy

Mandate and institutional policy is an emergent issue (Table 2), with preparedness and response as the predominant institutional gaps in peri-urban disaster management for emergency sanitation aspects (Figure 4 and Table 2). With regards to

Table 1 | Government institutions and their roles in disaster management related to aspects of WASH and water-related disease disasters

Institution	Role	Institutional responsibility disaster management mechanism cluster		
		Prevention	Preparedness	Response
Disaster Management Authority	Institution at the centre of disaster management and coordination of all other institutions	✓	✓	✓
Health Institution	<ul style="list-style-type: none"> • Disease outbreak community environmental risk assessments • Emergency health response and coordination of health services among humanitarian agencies 	✓	✓	✓
Public Health Research Institution	Disease monitoring and early detection of disease outbreaks	✓	✓	–
Local Government Authority	<ul style="list-style-type: none"> • Guidance on Land use and development planning authority • Solid waste management • Protect Public Health • Enforce Hygiene • Public Health emergency response 	✓	✓	✓
Water Supply and Sanitation Public Service Provider	<ul style="list-style-type: none"> • Provision of safe drinking water and wastewater collection • Emergency response in event of water disease-related disaster through provision of safe drinking water using water delivery trucks 	✓	✓	✓

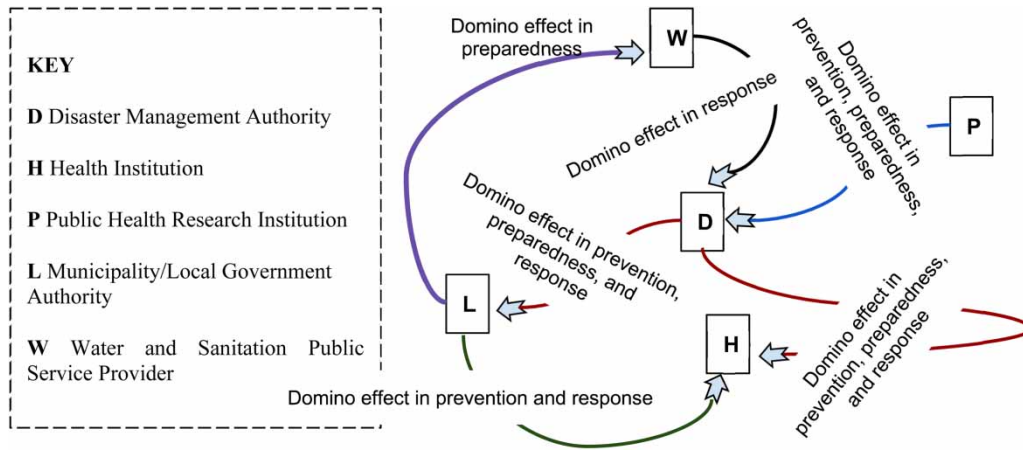


Figure 3 | Interdependencies between institutions in disaster management (Source: Author).

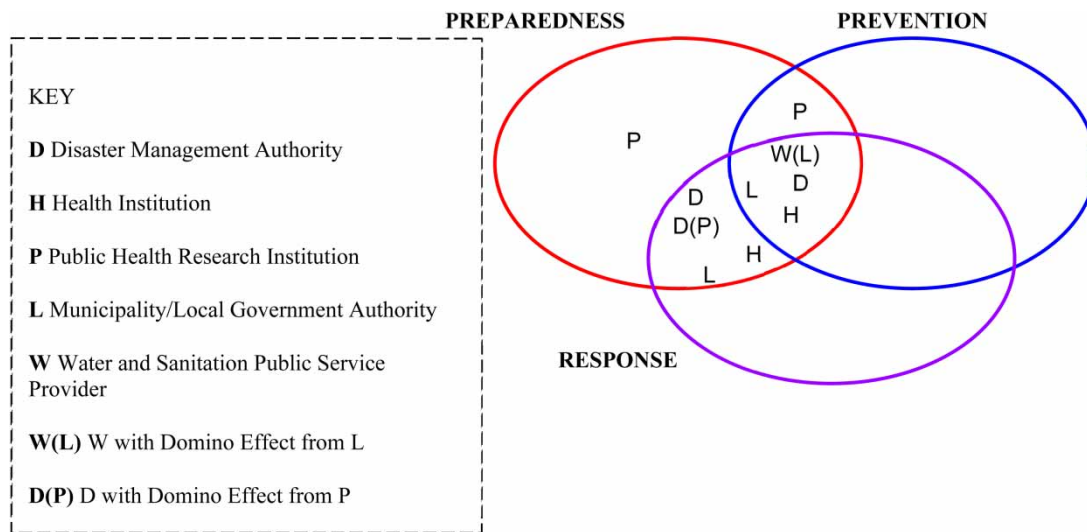


Figure 4 | Prevention, preparedness, and response disaster management mechanism gaps in institutional mandate and policy (Source: Author).

mandate, this is inherent in the sense that there is no specific institution that is mandated to solely deal with emergency sanitation in case of disasters in peri-urban areas. Table 2 illustrates that this conceptual aspect infers a gap in the preparedness of the Disaster Management Authority, Health Institution, and Local Government Authority.

On the contrary, a non-existent disaster management policy specific to WASH aspects in peri-urban has a detrimental effect on all three disaster management mechanisms in all institutions except for the Water Supply and Sanitation Public Service Provider. However, even though the Water Supply and Sanitation Public Services are not directly affected by this conceptual aspect of the discussed emergent issue, they are negatively affected in their preparedness and response to emergency sanitation through the domino effect of failures in the preparedness of the Local Government Authority.

A non-existent policy framework for peri-urban emergency sanitation preparedness measures has equally a detrimental effect on the preparedness of the Disaster Management Authority, Health Institution, and Local Government Authority. This in turn has a negative ripple effect on these institutions' response to a disaster. Furthermore, the failures of these emergency sanitation measures by the Public Health Research Institution have an adverse secondary effect on the preparedness of the Disaster Management Authority which in turn affects this institution's response to a disaster.

Therefore, failure in having such policies and specific mandates weakens the emergency sanitation preparedness and subsequent response to disasters in peri-urban areas.

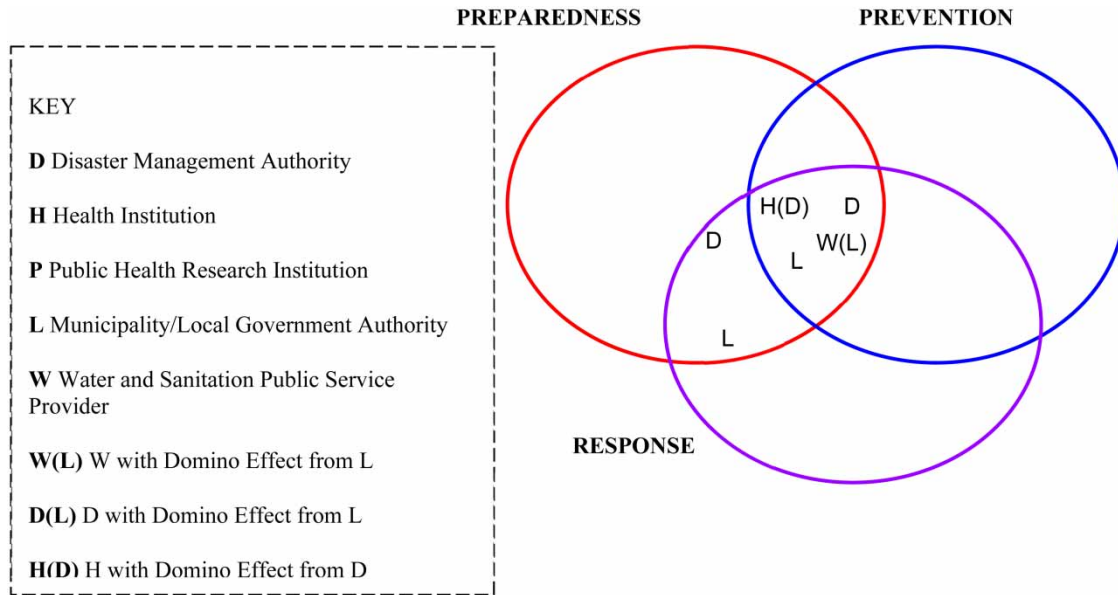


Figure 5 | Prevention, preparedness, and response disaster management mechanism gaps in responsiveness of authorities (Source: Author).

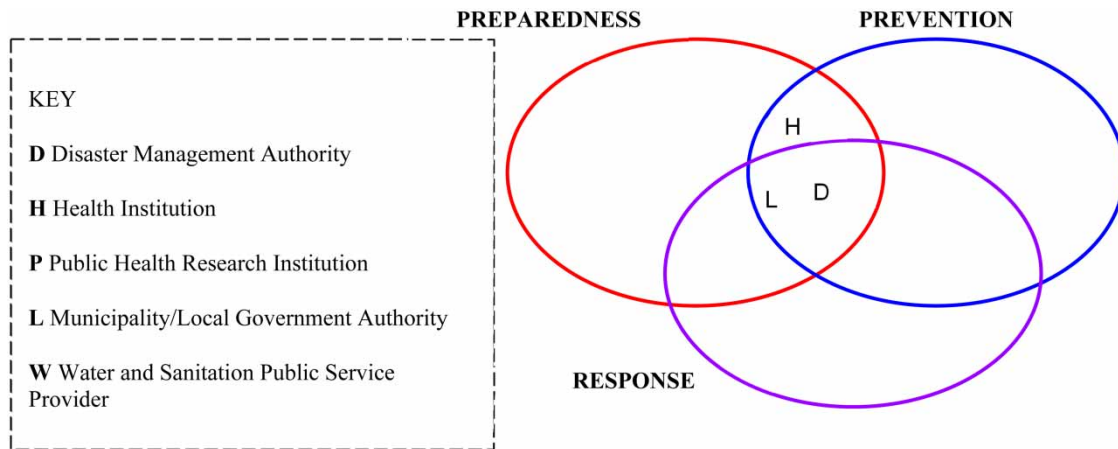


Figure 6 | Prevention, preparedness, and response disaster management mechanism gaps in institutional community engagement (Source: Author).

(b) Emergent issue 2: responsiveness of authorities

Responsiveness of authorities (Table 3) is a primary concern of the Disaster Management and Local Government Authorities. This is twofold, inferred by these institutional disaster management gaps and their secondary effects on the Water Supply and Sanitation Public Service Provider and Health Institution. Furthermore, it was observed that the Local Government Authority compounds the effects of failures in the responsiveness of the Disaster Management Authority to its already existing gaps with regard to this emergent issue, as depicted in Figure 5.

Taking surge capacity and cascading approaches to disaster management for WASH aspects in peri-urban areas, indicate there is a lack of a structured approach adopted by the Disaster Management Authority and Local Government Authority. These explain inadequacies in the preparedness for response aligned to disaster management peri-urban area water-related disease outbreaks. Cascading in this context refers to waiting until an emergency response is needed or lacking preparedness for response to emergency sanitation in the event of a disaster. On the other hand, these institutions lack strategic preparedness for response with regard to the extra technical and financial capacity needed in the event of a disaster. Thus, both

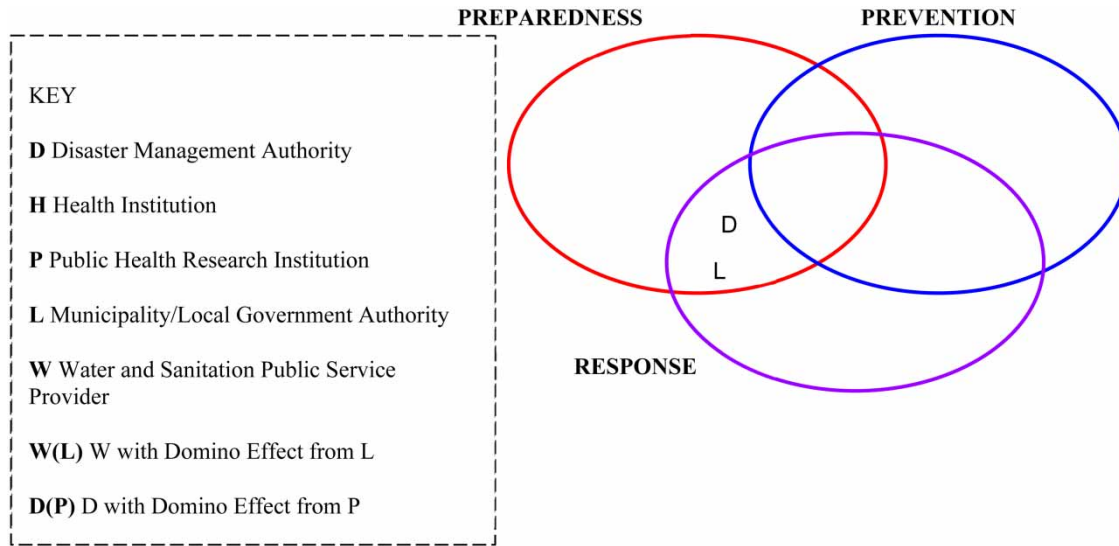


Figure 7 | Prevention, preparedness, and response disaster management mechanism gaps in institutional stakeholder engagement (Source: Author).

Table 2 | Emergent issue 1: mandate and institutional policy

Emergent issue	Conceptual aspects	Institutional gap in peri-urban disaster management for WASH aspects in peri-urban areas				Water Supply and Sanitation Public Service Provider
		Disaster Management Authority	Health Institution	Public Health Research Institution	Local Government Authority	
Mandate and Institutional Policy	No mandate specific to emergency sanitation for an event of a disaster in peri-urban areas	Preparedness and Response	Preparedness and Response	None	Preparedness and Response	None
	Non-existent policy framework for peri-urban emergency sanitation preparedness measures	Preparedness with a ripple effect to response	Preparedness with a ripple effect to response	Preparedness with a domino effect to Disaster Management Authority	Preparedness with a ripple effect to response	None
	Non-existent disaster management policy specific to WASH aspects in peri-urban areas	Prevention, Preparedness and Response		Preparedness and Prevention	Prevention, Preparedness and Response, with a domino effect to Water Supply and Sanitation Public Service Provider	None

cascading and surge capacity mechanisms are explained as reactive approaches and therefore, reliance on such approaches imply these institutions must wait for the need to act or respond to emergency sanitation. The Water and Sanitation Public Service Provider has an emergency response plan. However, this on its own is rendered weak due to the interdependency of the responsiveness of the Local Government Authority. These concerns accrue from issues related to policy and guidelines, especially with gaps regarding systematic response following technical assessments.

(c) Emergent issue 3: community engagement

Table 3 | Emergent issue 2: responsiveness of authorities

Emergent issue	Conceptual aspects	Institutional gap in peri-urban disaster management for WASH aspects in peri-urban areas				
		Disaster Management Authority	Health Institution	Public Health Research Institution	Local Government Authority	Water Supply and Sanitation Public Service Provider
Responsiveness of Authorities	Take a surge capacity 'reactive' approach to disaster management for Water, Sanitation and Hygiene (WASH) aspects in peri-urban areas	Preparedness and Response with a domino effect to Health Institution	None	None	Preparedness and Response, with a domino effect to Disaster Management Authority	None
	Take a cascading effect 'reactive' approach to disaster management for Water, Sanitation and Hygiene (WASH) aspects in peri-urban areas	Prevention, Preparedness and Response with a domino effect to Health Institution	None	None	Prevention, Preparedness and Response with a domino effect to Disaster Management Authority and Water Supply and Sanitation Public Service Provider	None

Table 4 | Emergent issue 3: community engagement

Emergent issue	Conceptual aspects	Institutional gap in peri-urban disaster management for WASH aspects in peri-urban areas				
		Disaster Management Authority	Health Institution	Public Health Research Institution	Local Government Authority	Water Supply and Sanitation Public Service Provider
Community Engagement	Inadequate community participation in disaster management	Preparedness, Prevention and Response	Preparedness and Prevention	None	Preparedness and Prevention with a ripple effect to Response	None
	Inadequate community participation, in peri-urban areas, to prevent epidemic disasters related to poor WASH	Preparedness, Prevention and Response	Preparedness and Prevention	None	Preparedness and Prevention with a ripple effect to Response	None

Community members are given very little a participatory role by Disaster Management Authority, Local Government Authority and Health institution with their focus on sensitisation and providing chlorine and providing relief for instance. This induces weaknesses in especially preparedness and prevention (Figure 6).

Therefore, as illustrated in Table 4, community engagement is an emergent issue that is further substantiated by less community engagement by these institutions in emergency sanitation response in the event of a disaster. Little effort is made in disaster management governance to be community participatory driven. This characterises the inadequacies in community engagement.

(d) Emergent issue 4: stakeholder engagement

Stakeholder engagement is an emergent issue (Table 5) with centralisation of stakeholder engagement for disaster management the most notable conceptual aspect dependent on the interdependency between the Disaster Management Authority and other institutions. Findings from this study present that all disasters are coordinated under the Disaster Management Mitigation Unit (DMMU) and follow existing acts of parliament and procedures and predominantly relying on multi-sectoral high-level national epidemic meetings. However, these approaches fail to be more strategically specific to meeting the

Table 5 | Emergent issue 4: stakeholder engagement

Emergent issue	Conceptual aspects	Institutional gap in peri-urban disaster management for WASH aspects in peri-urban areas				
		Disaster Management Authority	Health Institution	Public Health Research Institution	Local Government Authority	Water Supply and Sanitation Public Service Provider
Stakeholder Engagement	Centralisation of stakeholder engagement for disaster management with the Disaster Management Authority as the hub	Domino effects in prevention, preparedness, and response in all stakeholders except the Public Health Research Institution	None	None	None	None
	Take a surge capacity approach ('reactive') for peri-urban sanitation	Preparedness and response	None	None	Preparedness and response	None
	Take a cascading effect approach ('reactive') for peri-urban sanitation	Prevention, preparedness and response with a domino effect in all stakeholders except the Public Health Research Institution	None	None	Prevention, preparedness and response	None

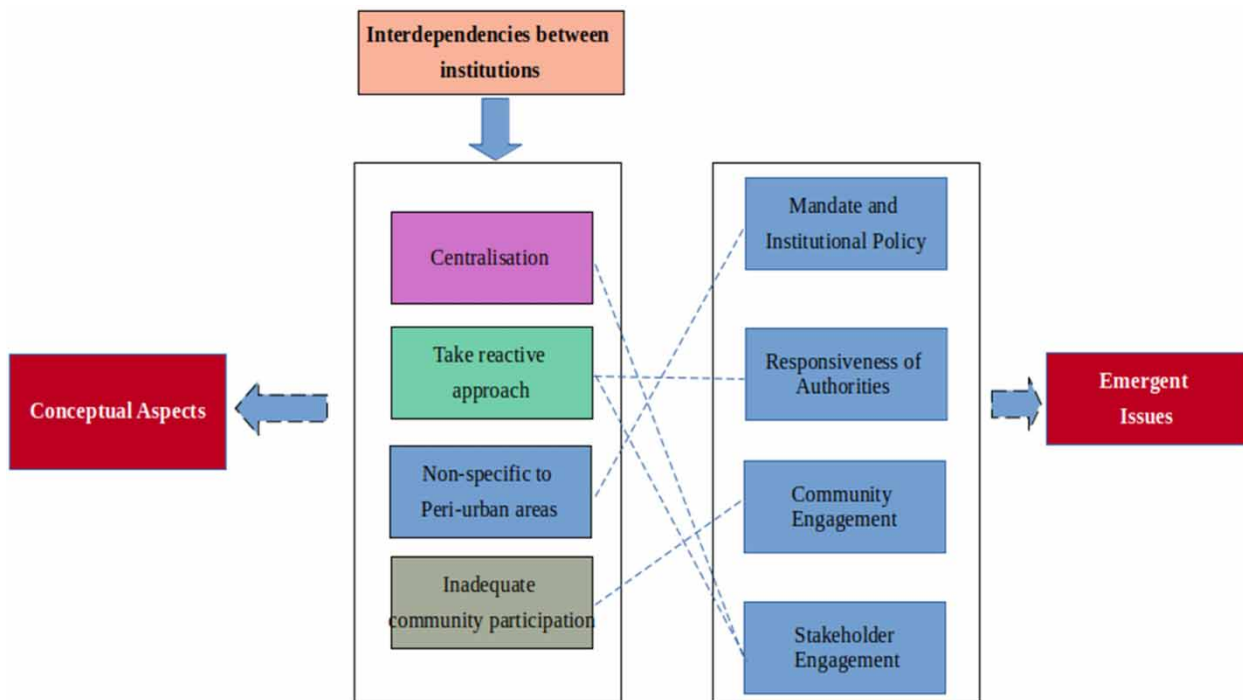


Figure 8 | Established emergent issues characterised based on the determined conceptual aspects (Source: Author).

challenges and barriers in stakeholder engagement of peri-urban areas. Peri-urban areas are hot spots for poor WASH and water-related disease outbreaks. This implies that more intricate and intensified approaches must be taken in stakeholder engagement in such areas. The failures fundamental to centralisation are characterised by the secondary (domino) negative effects felt by all the other institutions except for the Public Health Research Institution (Figure 7). This is because the Public Health Research Institution's relationship with the Disaster Management Authority is mainly dependent on the former in enhancing prevention planning and preparedness for the response action mechanism of the latter. Furthermore, Health institutions do not directly engage stakeholders as established by the findings of this study, and this further explains the weakness of stakeholder engagement in events where there is a need for time sensitive actions to be undertaken.

Table 5 further illustrates other inadequacies in existing multi-sectoral collaboration approaches by each institution in stakeholder engagement. Similarly, to the discussed emergent issue on the responsiveness of authorities, institutions are weighed down by taking surge capacity and cascading effect action approaches. Most notably, domino effects with regards to taking a cascading effect approach are felt in all other institutions. This is because of the centralisation concerns presented in the earlier section.

The results indicated that the inadequacies and inefficiencies in the preparedness and response by institutions related to the established emergent issues in this study are highly influenced by centralisation of preparedness for response (planning to respond). Results also indicate that community engagement by the planning authorities (Disaster Management and Local Government Authority) affect their effectiveness in the implementation of preparedness, prevention, and response disaster management mechanisms in peri-urban WASH. Reviewing the *Disaster Management Operations Manual (2015)* for Zambia, there are no specific action strategies for peri-urban areas taking care of the problems highlighted in this study.

CONCLUSIONS

In this study, conceptual aspects were characterised for each type of institution. The authors clustered related conceptual aspects into established emergent issue categories (Figure 8). These emergent issues were discussed based on institutional gaps in the preparedness, prevention, and response mechanisms in managing the effects of flooding disasters in peri-urban areas. Each emergent issue associated with the conceptual aspect was used to discuss these inadequacies. It was revealed that inadequacies and inefficiencies in the preparedness and response by institutions related to established emergent issues in this study are highly influenced by centralisation of preparedness for response. The authors also determined the effects of interdependencies between institutions with regard to these conceptual aspects.

In conclusion, the findings revealed that deficiencies and inefficiencies in institutional readiness and reaction in peri-urban areas as they relate to the study's identified emerging concerns are heavily impacted by: (a) centralisation of preparedness for response; (b) effort in aligning disaster management to be community participatory driven; and (c) how specialised disaster management action strategies are to peri-urban areas flooding disasters.

DATA AVAILABILITY STATEMENT

All relevant data are available from an online repository or repositories (<https://drive.google.com/drive/folders/1ORDS67jJWK7kayHaF85HRtOmja0HYpMd?usp=sharing>).

CONFLICT OF INTEREST

The authors declare there is no conflict.

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