

**Title: Disaster Management and Emergency Response Capability Assessment  
Indexes in Tanzania; Empirical Evidence from Dar es Salaam City**

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## **Abstract**

The disaster management and emergency response capability assessment are put forth in this study to offer broad guidelines for various emergency management organization types. To evaluate the organization's capability, five (policy and Legislations, infrastructure, personnel, technology, inter-agency coordination) elements are proposed from the capability assessment results, and suggestions are made for how the elements' specifics should be. An improved mutual understanding of each agency's perspective, resources, and capabilities for disaster management and emergency response operations turned out to be a significant advantage for this study.

The study applied focus groups, expert consultation, and content analysis to various relevant documents to establish capabilities assessment indexes relevant to disaster management and emergency response capabilities in Tanzania. The application of Delphi method for expert consultations, the weights of indexes were determined using analytic hierarchy process and proportional distribution method. The city's emergency response capabilities were then evaluated using the index system and proved to be significant and will improve the capabilities to both disaster management and emergency response in Tanzania. To improve the capabilities for disaster management and emergency response operation in Tanzania, the study recommends to harmonize disaster management and emergency response regulations and frameworks to align disaster management and emergency response policies with international standards and the actual situation in the ground, to grab the investment opportunities in disaster management and emergency response infrastructure, technology, and personnel development by prioritizing the workable systems and trainings to personnel directly involved in the ground and planning level.

### **Key word**

Capability assessment index, Disaster management, emergency response operations, Dar es Salaam City emergencies

## **1.0 Introduction**

Disaster management and emergency response operations are crucial for ensuring safety of victims in any incidents especially when the incident is sought to affect and threaten lives of people and properties. Both natural and man-made disasters and accidents have the potential to endanger community safety, lives, property and environmental destruction. Consequently, the capabilities for disaster management and emergency response systems become significant.

When the disaster or emergency occurred in the cities, especially the city with various business activities that attract several, the pressure is much higher. Given the high traffic volumes and potential for emergencies in urban areas especially Dar es Salaam city, a business city of Tanzania, a robust disaster and emergency response capabilities is essential.

The city's local governments and other responsible institutions for disaster management and response planning are struggling to keep up with the city's fast growth, that has been primarily driven by the influx of migrants, expansion of economic activities and increasing demand of improved social services.

The majority of people (53%) in the city reside in unplanned settlements, marked with inadequate infrastructure and a shortage of essential services especially clean and safe water supply. These communities struggle with access to clean water, transportation issues, unstable housing, inadequate sanitation facilities, and an inadequate knowledge about search and rescue techniques during emergencies and hygienic practices.

Together with this circumstance, climatic change has negatively impacted the city especially intense rainfall and raise of average temperature impose further hardship and raise the prevalence of diseases. changes in rainfall distribution, exacerbates current vulnerabilities that are highly interlinked with other shocks and stresses such as rapid urbanization, unplanned settlement, uneven distribution of vital infrastructure and water supply systems.

The recent building collapse accident at Kariakoo, that left 30 fatalities and more than 50 injuries, the government of the United Republic of Tanzania has issued directives to

oversee and investigate what transpire and caused the incident and inquire for what has to be done to prevent such incidents in the future. To conduct a comprehensive disaster management and emergency response capabilities analysis and assessment in cities like Dar es Salaam, might assist decision makers on future plans and improvements. This study aims to evaluate current disaster management and emergency response capabilities in Tanzania with focus on Dar es Salaam city, identify gaps, and enhance preparedness and coordination for the same. As Jaksa et al., (2021) study documented that revising and updating assessment indices to ensure they effectively measure relevant capabilities and reflect current best practices have to involve incorporating feedback from stakeholders, updating metrics, and aligning indices with real-world needs.

Taking into account the shortcomings of the earlier assessment models, disasters and emergencies continue to be a major obstacle to sustainable development especially in the developing countries, even though they can be effective in some places and situations. Therefore, in order to significantly lower the likelihood of unfavorable disaster and emergencies impacts, capabilities to utilize disaster management and emergency response resources necessitates a systematic, regular system with a suitable approach and model.

The foremost expected result of conducting an assessment of disaster management and emergency response capabilities is the detailed identification of existing gaps within both governmental and nongovernmental actors in disaster management and emergency response in Tanzania. This process highlights deficiencies in critical areas such as infrastructure, technology, personnel, and coordination mechanisms. It provided an outlook picture of where disaster management and emergency response systems are underperforming, outdated, or lacking, whether it be, poor technological integration, or insufficiently trained personnel. This detailed identification allows stakeholders to recognize the areas that require immediate attention, thereby laying the foundation for targeted improvements in disaster management and emergency response capabilities at both national and community levels.

## **1.2 Rationale of the study**

Conducting an assessment on the disaster management and emergency response capability in major cities like Dar es Salaam city, is essential for several key reasons:

- a) **Safety Enhancement:** A thorough assessment helped ensure that disaster management and emergency response operations can effectively respond to emergencies, reducing the loss of life and property.
- b) **Infrastructure Optimization:** It identified weaknesses or inefficiencies in existing emergency response systems, allowing for targeted improvements in equipment, personnel, and coordination mechanisms.
- c) **Resource Allocation:** The assessment provides significant optimization of the resources by identifying areas where investments in technology, training, or infrastructure are most needed.
- d) **Preparedness for increased traffic:** With growing economic and social activities in the cities, particularly in Dar es Salaam, the assessment that would ensure the emergency response systems can keep pace with rising demand and emerging threats.
- e) **Improved interagency cooperation:** By highlighting disparities across responsible agencies, the results of this study foster collaboration among agencies to create a more cohesive, effective emergency response network.
- f) **Compliance with National and International Standards:** It dig out whether the existing national disaster management and emergency response capabilities align with national and international standards for disaster management and emergency response.
- g) **Disaster and emergency response readiness:** By identifying gaps, this study strengthens the national's ability to respond to large-scale disasters or emergencies, such as floods, earth quakes, bad weather, building collapse, fires, and industrial and traffic and marine and aeronautical accidents.

### **1.3 Aims and Objectives**

#### **1.3.3 Main Objective**

To propose the disaster management and emergency response operations capabilities assessment indices in Tanzanian Cities.

#### **1.3.4 Specific Objectives**

1.3.4.1 To assess the existing disaster emergency response capability assessment methods.

1.3.4.2 To identify gaps in human resources, technology, training, and coordination in disaster management and emergency response operations.

1.3.4.3 To recommend disaster management and emergency response capability assessment indices for Tanzania.

## **2 Literature review**

### **2.1 Theoretical literature review**

#### **2.1.1 Dar es Salaam City**

##### **2.1.1.1 Features and Demography**

Dar es Salaam as the Tanzania's commercial hub, its population is predicted to double by 2030 and become a megacity. There are currently between 4.5 and 5 million people living in its metropolitan area, which is divided among five municipalities. It is the Tanzania's main driver of growth and a key component of the nation's goal to become a middle-income. Because of its fast population growth, there is a greater need for improved infrastructure and basic services. It also implies that its capabilities to respond to emergencies and disasters need to be strengthened.

##### **2.1.1.2 Past Disasters and Emergencies**

Three significant emergencies have recently struck Dar es Salaam: the building collapse at Kariakoo that left 30 people dead and numerous others injured, disruption of business activities for 7 days, while the fire that destroyed Karikao Market on 2021 caused displacement of business men and women and loss of capitals.

### **2.2 Empirical literature review**

#### **2.2.1 Existing disaster Emergency Response Capability Assessment Methods**

The following are capability assessments that have been cited as examples of emergency response capability assessment methods and criteria as outlined below. It is sufficing to note that each assessment is unique and depends on the context (e.g., country, organization, community).

##### **2.2.1.1 Disaster Risk Reduction (DRR) Index**

The DRR index evaluates a country's capacity to reduce disaster risks and enhance resilience. It considers things like governance, infrastructure, early warning systems, and community preparedness. Components include risk awareness, risk reduction policies, institutional frameworks, and investment in disaster-resistant infrastructure (M W A Ramli et al 2020).

Further, study by Izumi, T. et al (2019), on disaster risks and innovation, found that increased coproduction with researchers and practitioners, ongoing sharing of innovation

case studies, improved communication and dialogues among stakeholders using effective national and local platforms, an understanding that innovations are not just high-tech products but can also be approaches, and research on the potential of artificial intelligence (AI), communication tools, and innovations related to climate changes and their impact that can improve current strategies and capacities for Disaster risk reduction are all suggested as ways to improve the interfaces between science, technology, and policy making as well as the development and implementation of DRR innovations.

#### **2.2.1.2 Community-Based Disaster Risk Management (CBDRM)**

According to Shaw, R. (ed.) (2012), CBDRM assesses local communities' ability to respond to disasters. It focuses on community participation, knowledge, and skills; Indicators include community risk assessments, early warning dissemination, evacuation plans, and local resource mobilization. That the CBDRM entail the significant of community participation in building and strengthening their capacity to be prepared and respond well to disaster and emergencies when they occur.

#### **2.2.1.3 Hospital Emergency Preparedness Index**

This index evaluates hospitals' readiness to handle emergencies (Anon, 2019) and assesses factors like surge capacity, medical supplies, communication systems, and staff training while components evaluated include emergency response plans, drills, and coordination with other healthcare facilities (PAHO, 2019). That means the well-coordinated health and medical system with other stakeholders is vital for effective response during disasters and emergencies that require involvement of several responders.

#### **2.2.1.4 Business Continuity Maturity Model (BCMM)**

BCMM model was developed by Virtual Corporation, Inc. to assess an organization's ability to maintain essential functions during disruptions. It includes stages like initial awareness, planning, implementation, testing, and continuous improvement (Virtual Corporation, 2020). Virtual Corporation is a leading provider of software and consulting services for business continuity management and organizational resilience. We support government, public, and private entities in all facets of resilience, recovery, and continuity planning. Additionally, we want to promote best practices by creating instruments,

resources, and methods that assist organizations in reducing risk and continuing mission-critical operations in the event of an emergency or disruption.

#### **2.2.1.5 National Incident Management System (NIMS) Compliance**

The NIMS is applicable across functional disciplines and at all jurisdictional levels (FEMA, 2023). Regardless of scale or complexity, NIMS is designed to be applicable to a wide range of possible incidents and hazard scenarios. Boost public-private sector collaboration and coordination in a range of domestic incident management initiatives. NIMS evaluates a country's adherence to standardized incident management practices. Criteria include command structure, resource management, communication protocols, and joint coordination.

While American emergency responders created and maintain NIMS, responders in other countries have recognized its benefits and incorporated it into their local communities. In short, jurisdictions or emergency responders can comply by implementing the Incident Command System. To allow compliance in the future, NIMS still needs to be developed and refined in a few other areas (FEMA, 2024).

As outlined by Alem et al. (2021), it is essential to assess whether current indices meet the present requirements of disaster management or if there is a need for new indices that can offer additional details or address emerging challenges. This involves examining whether current indices are sufficiently comprehensive if they integrate new technological advancements and if they align with updated best practices. The goal is to ensure that the assessment framework remains relevant and effective in guiding disaster management efforts. Because of the dynamic nature of disaster risks and evolving disaster management practices, assessment indices must be continuously evaluated.

#### **2.2.1.6 The Sendai Framework for Disaster Risk Reduction**

A framework for assessing government investment in and ability to mitigate the risks of, prepare for, and respond to natural disasters and other emergencies had to be established in order to perform the analyses. The Hyogo Framework for Action, which was created at the World Conference for Disaster Reduction in 2005. underlined priorities for nations to develop disaster risk reduction policies, including efficient preparedness and response plans between 2005 and 2015 (Jennifer, B. 2014).

However, as the result of intergovernmental negotiations from July 2014 to March 2015, The Hyogo Framework for Action (HFA) 2005-2015: Building the Resilience of Nations and Communities to Disasters was replaced by the Sendai Framework. The HFA was developed to provide additional momentum to the worldwide efforts under the International Framework for Action for the International Decade for Natural Disaster Reduction (1989), the International Strategy for Disaster Reduction (1999), and the Yokohama Strategy for a Safer World: Guidelines for Natural Disaster Prevention, Preparedness and Mitigation and its Plan of Action (1994) (UNISDR, 2015).

### **2.3 Previous studies on disaster and emergency response capabilities**

Numerous studies have been carried out by several authors with the aim of improving and informing governments, individuals, and other stakeholders on issue related to disaster preparedness and emergency response capacity and operations. This study pinpointed these studies based on their relevance to its aim as follows.

A study on Tanzanian regional hospitals' preparedness and response capabilities for disasters was carried out by Koka et al. (2018). The study focused on all Tanzanian regional hospitals using a descriptive cross-sectional research design. It was discovered that there were not enough medical professionals from all cadres in any of the hospitals to enable efficient disaster response. 92% of hospitals said they had been affected by a disaster in the previous five years, with major auto accidents accounting for 22 (87%), floods for 7 (26%), and infectious disease outbreaks for 6 (22%). Only five hospitals (20%) had a disaster plan, while fifteen hospitals (60%) had a disaster committee. Not a single hospital possessed every element of surge capacity. Only three (12%) had a backup communication system, despite the fact that everyone had electricity and backup generators (Koka P.M et al. 2018). As a result, hospitals that were supposed to offer medical assistance during emergencies are unable to do so.

In addition, Michael P. (2013) evaluated Tanzanian regional hospitals' preparedness and response to disasters and found that disaster and emergency response calls resulted from traffic accidents, floods, bomb explosions, and infection outbreaks. According to the study, hospital readiness was still in its inadequacy. The study's findings point to significant chances to improve regional hospitals' preparedness for emergencies.

Inadequate surge capacity, inadequate personnel, inadequate equipment, inadequate disaster planning, and a lack of backup communication systems are some of the specific gaps.

Further, findings from the study on Fire disaster preparedness and situational analysis in higher learning institutions of Tanzania (Kihila, J. M. 2017), 60% of the firefighting facilities lacked regular maintenance; 50% of them kept some hazardous materials; 70% lacked sufficient water storage for fighting fires; 60% lacked clearly marked fire assembly points; and 90% of the sessions held in the buildings included more than 100 people in one location. Additional findings showed that 81.5% of respondents were unaware of the fire responder's contacts, 95.6% had never taken part in a fire drill, 80.7% had never received any training on firefighting and prevention, and 51% of respondents were unable to operate the installed firefighting facilities. Plans to address the situation are essential, as the overall situation showed that higher education institutions are ill-equipped to handle fire outbreaks. The same was found by Jongo, J.S., et al, (2018) in their study on Fire Safety Preparedness in Building Construction Sites that the fire safety preparedness awareness was low among people and use of firefighting facilities.

In addition, the study by Kachenje, Y., Kihila, J., & Nguluma, H. (2010), found that the majority of the buildings in Dar es Salaam City have a high risk of facing fire accidents as 41% of building occupants are unaware of the available escape routes in the event of a fire or any other accident, 60% of are unable to operate the firefighting facilities installed in the building. while 68% had never been trained on fire safety awareness, and only 29% had received training in their previous five years.

On the other hand, Zhou, S. Y. et al, (2022) in their studies highlighted that disaster and emergency management resources' vital role in disaster and emergency management and determining that capacity for resource allocation and quick response have the greatest effects on the operational capability.

Also, the study by Fan, B et al (2019) investigated the combined effects on collaborative emergency capacity of the leading agency's informational and task attributes of embeddedness and absorptive capacity in China found that the effectiveness of emergency collaborations will be greatly impacted by a leading department with excellent

information accessibility and a well-organized cross-agency network. Collaboration during emergencies is greatly improved by the ability to take in information. The study also highlighted that the irrational distribution of power and resources, the unclear division of responsibilities among departments, the poor design of emergency response centers, and the lack of social and community involvement are affecting capabilities in disaster management and emergency response operations (Xiong (2010)).

Chen, Y.X. and Song, Y., 2014 conducted a study with the focus of creating an index for evaluating emergency response capabilities for organizations involved in disease prevention and control. As the result, they identified seven main indices including communication and collaboration, scientific research and exchange, emergency management system, emergency response team, surveillance and early-warning ability, emergency response capacity, and emergent supply capability.

However, there were no study found specifically dealing with the disaster management and emergency response capability for major cities in Tanzania or any African country. This study is the foundation of improvement of emergency response and addition to the literature in the field of disaster management.

### **Enhancing Impact of assessment Indices**

Evaluating the potential for developing new assessment indices or enhancing existing ones to address identified gaps. This includes considering new metrics or approaches that better capture the complexities of disaster management and emergency response systems (Yabe et al., 2022).

In addition, Holst et al., (2020) in their study supported that for the findings from assessment indices to lead to actionable improvements in disaster management and emergency response practices, effective implementation of recommendations, follow-up actions, and continuous monitoring to track progress and adjust strategies as needed are required. That, by addressing these issues, the effectiveness of disaster management and emergency response can be significantly improved, leading to better preparedness, response, and recovery in the face of disasters (Khan et al., 2022).

The majority of funding that goes toward disaster and emergency preparedness plans is probably going through the budgets of other departments that deal with building codes

and enforcement, education, health management, infrastructure, and agriculture, even though the government have set up specific ministries with departments that oversee disaster-related activities, and in the best cases, the funding for these departments can be found through public government accounts.

### **3 Materials and methods**

#### **3.1 Area of the study**

This study focused on urban search and rescue operations capabilities at Dar es Salaam City. The city was selected due to the nature of its layout, infrastructure, economic activities, population size and its economic and political significant to Tanzania. Also, the city has experienced various small to large scale emergencies from both man made and natural disasters that can provide ample information to accomplish the goal of this study. Further, most of the Leading Agents in disaster and emergency responders' offices are located in the city and the required information for this study could be accessed within a reasonable time.

#### **3.2 Scope of the study**

This study focused on issues that if well utilized in emergency response operations would have proved the capabilities of emergency responders. The following elements are thought by the authors as the necessity capabilities for effective emergency response operations in urban areas.

##### **3.2.1 Infrastructure**

The study evaluated the physical infrastructure that supports Search and Rescue (SAR) operations among Leading Agencies as indicated in the Tanzania Disaster Management Policy (2014) and the Revised Disaster Management Act, 2022. This includes assessing coordination centers, which serve as command hubs during search and rescue operations, as well as key assets like rescue boats, helicopters, and ambulances services. The analysis determined the availability, condition, and readiness of these assets for rapid deployment in emergencies. It also evaluated whether existing infrastructure meets the needs of growing urban and suburban traffic, identified areas where upgrades or new investments may be required to improve emergency operations effectiveness.

### **3.2.2 Personnel**

The study reviewed the number and qualifications of First responders' personnel among the Leading Agencies. This includes an assessment of the current workforce, focusing on the number of trained personnel, their skill levels, and their ability to respond to complex emergencies. The analysis also examined existing training programs, evaluated whether they provide the necessary competencies in line with agreed standards. Identifying gaps in personnel readiness or training deficiencies allowed for recommendations on improving capacity, enhancing performance during emergency operations.

### **3.2.3 Technology**

The analysis scrutinized the use and integration of modern emergency response technologies, such as integrated communications systems, unmanned aerial vehicles (UAVs), and advanced GPS and radar systems. These technologies are essential for real-time monitoring, location of distressed marine vessels or aircraft, and efficient coordination during search and rescue operations. The analysis determined the level of technological adoption for emergency operations in Tanzania, identified outdated systems or technological gaps that could hinder emergency operations success and propose areas where innovative technology could significantly enhance emergency response capabilities.

### **3.2.4 Coordination**

This element of the analysis assessed the effectiveness of inter-agency coordination mechanisms in emergency operations. It focused on the interoperability of emergency response units between different agencies, ensuring that interagency cooperation and joint responses to emergencies are seamless. The study evaluated the efficiency of response times and communication protocols, pinpointing delays or inefficiencies. This section aimed to highlight areas where enhanced collaboration or better coordination practices could improve emergency response operations and lead to faster, more effective response operations in major cities like Dar es Salam.

### **3.2.5 Legislations and Policy**

This study reviewed the legal frameworks governing emergency response activities in Tanzania. It assessed the adequacy of national laws, plans, and strategies that underpin cooperation between agencies in emergency response operations. This includes

examining how well these legal frameworks align with international standards and frameworks on disaster management and emergency response operations. The analysis explored opportunities for improving legal mechanisms, enhancing interagency cooperation, and ensuring that emergency response activities operate within a cohesive and supportive legislative environment.

### **3.3 Research Design**

This study adopted an in-depth research design that integrates both qualitative and quantitative methodologies to comprehensively address the research objectives and questions. Primary data were collected through questionnaires, focus group discussions, and Delphi technique - structured interviews, while secondary data were collected from critical analysis of various documents, records, and expert consultations. This mixed-method approach was selected to enhance validity and reliability and to offer a more nuanced understanding of the research focus compared to other data collection methods like surveys alone (Taylor et al., 2011).

this study adopts a pragmatist approach. It employs positivism to evaluate differences in capability assessment in relation to disaster management and emergency response and interpretivism to comprehend the effects of various challenges disaster management contexts and the strategies employed to alleviate them. Whether to employ qualitative or quantitative methods depends on the nature of the research questions (Sounders et al., 2012).

#### **3.3.1 Focus group Discussion**

Focus group discussions were used to discuss and evaluating readiness and coordination capabilities. The discussions were organized whereby each group Members were able to present and share their experiences, lesson learned and best practices among others and identifying the gaps and areas for improvement and to be capacitated for emergency response operations. Three focus group discussions were conducted with distinct groups of stakeholders to explore collective perspectives and interactions related to disaster management and emergency response.

#### **3.3.2 Content analysis**

The various documents, articles, magazines, legislation, plans, and books were reviewed and analyzed to match the goal of this study. The purpose of this review is to uncover the

perspectives and conclusions from previous studies related to the subject matter of this study, specifically the distribution of disasters in Tanzania. Under this method, the following issues will also be noted and analyzed.

- i. Available international standards for assessing the capabilities of disaster management and emergency response institutions.
- ii. Reliability of available disaster management and Emergency response system – emergency response team, surveillance and early-warning systems/ability, emergency supply.
- iii. Requirements/provisions issued by the legislation, strategies, plans, and timelines to comply with them.

### **3.3.3 Delphi Technique**

The Delphi technique, also termed as the expert enquiry technique, was used to collect professionals' views on the topic under this study. The problem was forwarded to the selected experts individually (Wang Yukin et al, 2021) and their opinions were collected, summarized, and sorted out. Due to the anonymity of this method, the experts did not meet and talk about the study but only contacted the researcher. After repeated discussion, instruction, and adjustment, the specialists' opinions, collected through interviews, discussions, and questionnaires, were scrutinized and recapped into reliable opinions that were then used as the expected outcomes and answer to the research problem. This method is considered reliable and representative.

#### **3.3.3.1 The benefits of the Delphi technique**

As the experts were contacted and the results were analysed simultaneously at relatively low costs, a quick consensus was reached. The experts shared their opinions individually and provided a wealth of professional information that allowed this study to gather adequate data and information while also filling in the gaps left by information that was difficult to gather using other methods (Faculty of Public Health, 2023).

### **3.4 Targeted Population**

The targeted population for this study encompasses a diverse group of individuals and organizations involved in disaster management and emergency response across Tanzania. The population includes:

### **3.4.1 Government Officials**

This group comprises individuals working in key governmental departments and agencies responsible for disaster management and emergency response, such as the Prime Minister's Office, the Department for Disaster Management, and regional emergency response units. Their details on policy implementation, legislative compliance, and coordination efforts are critical for assessing the effectiveness of disaster management systems.

### **3.4.2 Non-governmental Organizations (NGOs)**

NGOs play a vital role in disaster management by providing emergency relief, recovery support, and capacity-building initiatives. The targeted NGOs include those with a focus on disaster relief, humanitarian aid, and community resilience.

## **4 Findings and discussions**

### **4.1 Assessment indices for disaster management and emergency response capabilities in Tanzania**

#### **4.1.1 Features to Develop Disaster Management and Emergency Response Capability Assessment Indices in Tanzania**

These features were developed based on the authors' understanding and perspective on disaster management and emergency response systems. It is believed that the existing standards, both national and international, were developed to enhance the significance of the intended models and indexes.

##### **4.1.1.1 Adherence to International Standards**

Ensuring that disaster management practices align with internationally agreed standards, such as the Sendai Framework and ISO 22301, is crucial for assessing effectiveness. The integration of these standards into national strategies and practices helps in benchmarking performance and identifying areas for improvement.

##### **4.1.1.2 Resource Utilization**

Effective resource management is a key indicator of capability. Assessment indices should evaluate how resources are allocated and used during disaster response, including funding, personnel, equipment, and infrastructure. Reliable transport infrastructure is

essential for the timely deployment of resources and personnel during emergencies. This study emphasizes that effective disaster and emergency response depends on having well-maintained and accessible transport networks. Challenges in transport infrastructure can delay response times and hinder the overall effectiveness of disaster management and emergency response efforts as summarized in table 1.

**Table 1: Features for the Disaster Management and Emergency Response**

**Assessment Indices**

<b>Features</b>	<b>Components and descriptions</b>	<b>Indicator</b>	<b>Frequency</b>
Adherence to International Standards	Evaluate alignment with international standards like the Sendai Framework and ISO 22301.	Compliance Rate (%)	
Resource Planning, Allocation and Utilization	<b>Inventory Management:</b> Tracking and managing of resources such as medical supplies, food, and shelter materials that are available in various stake holders of disaster management and emergency response.	Resource Allocation Efficiency (%)	
	<b>Budget Utilization:</b> Evaluate how well funds are allocated from the budget and how much is spent on preparedness and response efforts in the event of a disaster.		
Organizational Management Capability	<b>Contingency Planning:</b> Assess the availability, comprehensiveness and adaptability of contingency plans.	Plan Comprehensiveness Rating (1-5)	Annual
	<b>Training and Drills:</b> Assess how frequently and successfully responders receive training programs and collaborative emergency drills exercises.	Number of training and drills per year.	Annual
	<b>Coordination and Communication:</b> Evaluate how well different agencies and stakeholders are coordinated and communicate with one another.	Functional integrated framework and network system	Semi annual
Resource Support Capability	<b>Logistics and Supply Chain:</b> Measure the efficiency of logistics and supply chain management in delivering aid to affected areas. This is based on inventory management and coordination among players	Rate of aid distribution	Annual

	<b>Infrastructure Resilience:</b> Assess the resilience of vital infrastructure, including communication networks, bridges, and highways.	Response time	biannual
Information Processing Capability	<b>Data Collection and Analysis:</b> Assess the ability to collect, analyse, and disseminate information during a disaster; and evaluate the effectiveness of performance measurement and feedback mechanisms.	Feedback Implementation Rate (%)	biannual
	<b>Early Warning Systems:</b> Measure the efficiency of early warning systems in predicting and disseminating disaster risks and emergencies.	Reporting and response time	biannual
Timeliness and Efficiency	<b>Response Time:</b> Measure the time taken to respond to a disaster from the moment it is reported.	Incident impact – number of injuries, death and property saved vs damage costs	biannual
	<b>Recovery Time:</b> Evaluate the time taken to restore normalcy in affected areas.	Depending on the nature and magnitude of the disaster or emergency, number of people affected and environmental destruction.	
Interagency Cooperation	<b>Public Awareness:</b> Evaluate the effectiveness of public awareness campaigns on disaster preparedness.	Number of awareness campaigns and number of people reached	Annual
	<b>Monitoring and Evaluation frameworks:</b> it is significant to enhance engagement and involvement of key players and the Department responsible for Performance Monitoring and Evaluation under the PMO in the establishment of an effective Monitoring and Evaluation frameworks for disaster management and emergency response.	Reports	

	<b>Public-Private Partnerships:</b> Measure the effectiveness of partnerships with private sector entities in disaster response efforts.	Integrated disaster and emergency response plans	
Community Engagement and Resilience	<b>Public Awareness:</b> Evaluate the effectiveness of public awareness campaigns on disaster preparedness.	Number of awareness campaigns and number of people reached	biannual
	<b>Community Participation:</b> Measure the level of community involvement in disaster preparedness and response activities.		

**Source:** This study

#### 4.1.1.3 Frequency and Quality of Drills and Exercises

Regular combined drills and mock exercises are essential for maintaining readiness. The frequency of these exercises and the quality of their execution can serve as important indicators of preparedness and coordination.

The strength and adaptability of contingency plans are vital for effective disaster response. Assessment indices should examine the comprehensiveness of these plans and their ability to address various disaster scenarios.

Hence, establishing assessment indices for disaster management and emergency response capabilities involves evaluating practices against international standards, measuring resource utilization, assessing the frequency and quality of drills, and evaluating performance and contingency planning. The data collected from various institutions provides valuable information about these aspects, demonstrating the need for ongoing improvements and alignment with global best practices to enhance disaster management and response capabilities in Tanzania.

#### 4.1.1.4 Feedback Mechanisms

The ability to measure and evaluate the implementation and performance of disaster management plans is critical. Assessment indices should include metrics for evaluating compliance, effectiveness, and areas for improvement based on feedback from performance reviews and audits.

However, this study found that there is no clear implementation of the evaluation of capability systems as it was found carried internally within each organization,

supplemented by external audits or assessments when major accident or failure to respond properly to disasters. The Auditor General's Office conduct general auditing on different issues including the compliance of various legislations though its focus is on resources utilization (UTR, 2024). The frequency of internal evaluations varies but is typically conducted on a biannual or annual basis. The Fire and Rescue Force stated, *“Our evaluations involve both internal assessments and reviews to ensure that our response capabilities remain strong and effective.”*

#### **4.2 Existing Assessment Indices in Tanzania**

The existing disaster management and emergency response framework in Tanzania has been primarily assessed using key documents such as the National Disaster Management Strategy (2022-2027), the National Emergency Response Plan, the United Republic of Tanzania IMF report of April 2023, and the Risk Information for Sustainable Development report (2019).

Additionally, the Disaster Risk Management Index (DRMI) developed by the World Bank and the Earthquake and Megacities Initiative (EMI) for Dar es Salaam provides important benchmarks for assessing disaster risks and management capabilities. These references serve as foundational tools for assessing disaster scenarios, understanding challenges, and guiding improvements in disaster management strategies.

Also, an assessment index system was developed by Wang, H. et al. (2022) to evaluate China's emergency response capability. Their evaluation system takes into account the entire life cycle of emergency management and concentrates on four main areas: emergency response and rescue, which assesses the ability to act quickly and effectively in an emergency; monitoring and early warning, which evaluates the effectiveness of monitoring systems and early warning mechanisms; and prevention and emergency preparedness, which assesses the steps taken to prevent emergencies and improve preparedness.

Furthermore, another study by Wang, Y et al (2023) examined the degree of maturity of the general public's emergency preparedness. Within the five dimensions of emergency consciousness and attitude, emergency knowledge and skill, physical condition, emergency information, and communication capability, the index system comprised

twelve evaluation criteria. These evaluations are essential for improving public disaster and emergency responders' operations and for fortifying the emergency response system.

To establish effective assessment indices for disaster management and emergency response capabilities, it is essential to evaluate current practices against international standards and determine how resources and performance are measured. Based on the data collected from the DMU Prime Minister's Office (PMO), DARMART, Fire and Rescue Force, TAMISEMI, and private emergency response companies like the Red Cross, the following discussion provides information into the assessment indices and practices employed in Tanzania.

This study revealed that there are several initiatives in Tanzania that could be directly related to emergency response capability assessment. The Prime Minister's Office Disaster Management Department and other stakeholders worked together to create the Tanzania Emergency Preparedness and Response Plan (TEPRP) that sets rules for how the government and its departments should respond to all types of emergencies and disasters and make sure they follow the rules for disaster management and emergency response. It outlines the authority, purpose, scope, situation assessment, concept of operations, organization, and responsibilities among key players in disaster management and emergency response in Tanzania. However, the plan is still a draft document for more than 10 years.

Though, Tanzania Bureau of Standards (TBS) is responsible for standardization in Tanzania, Reichman, N. (1992), Hutter, B. (1997) and the Organization for Economic Co-operation and Development report released in 2000 insisted that it is ideal to collaborate with the responsible institutions in establishing various standards, legislation, policies, and strategies to enhance ownership and compliance levels and reduce the risk of policy failure.

Also in 2016, the World Health Organization conducted the health sector evaluation study that assesses the disaster preparedness and emergency response capacities of referral and regional hospital in Tanzania (WHO, 2017). The evaluation focused on hospital readiness and capacity assessment that covered equipment availability, patients load and general preparedness in case of emergencies that require massive services like outbreak of

pandemics, big accident with big casualties. These assessments played a critical role in improving Tanzania's capability to respond efficiently to disasters and emergencies.

In addition, to ensure that assessment indices are used regularly and systematically to evaluate disaster management capabilities. This involves integrating assessments into routine practices and ensuring consistent application across various levels of disaster management (Saja et al., 2021). The implementation and usage of the assessment indices need to be planned on a regular basis. The study finding from focus group discussion and interview revealed that quarterly and annual assessment can yield to improvement of various disaster management and emergency response initiatives in place. This tendency will improve proactive strategies rather than reaction and then blame each other for the consequences of the events.

Moreover, evaluating the effectiveness of current assessment indices is a critical first step in understanding their impact on disaster management capabilities. This evaluation involves a thorough analysis of how well these indices measure key aspects of disaster preparedness and response. According to Flanagan et al. (2011), the evaluation should focus on identifying strengths, weaknesses, and any existing gaps that might hinder the overall effectiveness of disaster and emergency response management efforts. Understanding these limitations allows for targeted improvements, ensuring that the indices provide accurate and actionable insights into disaster management capabilities.

### **4.3 Proposed Disaster management and Emergency response capability indices for Tanzania**

Based on the findings of this study, the following indices are proposed for assessing disaster management and response capabilities in major cities in Tanzania. These indices, if well utilized, will improve the way the responsible institutions for disaster management and emergency response are planning for and handling disasters and emergencies in the cities like Dar es Salaam.

#### **4.3.1 Disaster management and Emergency response capability Indicators Assessment Tool**

The purpose of this tool is to evaluate how regularly assessment indices are used to measure disaster management capabilities. This tool, indicated in Appendix 1, is proposed to be used to assess compliance with available legislation, directives, strategies, and plans.

This tool will assist members of the Capability Assessment Committees in assessing the capabilities of disaster and emergency response institutions in carrying out their critical duties as per their establishment legislations.

In addition, as previously found by this study in the previous chapter, the capability assessment is an essential part of the general assessment of district, regional, and emergency response institutions (public and private) comprehensive disaster and emergency response plans and disaster management. These plans need to be examined every three years or in any specified period, prescribed in the regulations, to ensure compliance with established legislations for disaster management and emergency response operations that require real-time preparations (drills and exercises) when they occur (URT, 2022).

Apart from the-several events that might transpire over a span of time (be it three years or any), these exercises and drills will provide a chance to the capability assessment committee. The committee is proposed to comprise at least senior officials from the Prime Minister's Office, the Fire and Rescue Force, the Police Force, the Ministry of Local Government, two officials from selected private responders like the Red Cross and Red Crescents, and the Regional Administrative Secretary of the particular region that is assessed.

Further, the assessment tool consists of three (3) rating categories: deficient, requirements enhancement, and an acceptable rating that requires no further action. The components that are marked as requiring improvement or enhancement are basically submissions for enhancing a specific facet of a specific function. A rating that indicates a weakness in a particular area of assignment or in the function as a whole need to be adjusted in compliance with the established legislation and procedure requirements. This stipulates that the shortfall needs to be amended within a certain period of time set by the procedures or an action plan needs to be established to correct the deficiency identified.

The components that would not be assessed during the preceding assessments, will be assessed prior to the succeeding scheduled assessments. The assessment coordinators, emergency response operations commanders, and officers responsible for local disaster and emergency response management at the district/municipal levels will sign the

evaluation report to attest to their agreement with the ratings before it is submitted to the higher levels – Regional, Ministerial Disaster Management and Emergency Response Committee. The chairperson of the assessment committee will receive the signed evaluation reports and submit them to higher authorities for further action.

It is ideal to point out that this tool was tested at three municipalities and in the fire and rescue forces offices at Ilala, Temeke and Kinondoni and proved to be ideal as the tool that can be used to analyse the capability at once by assuming that the current status of disaster management and emergency response systems change or remain the same and the government structure has not changed or changed.

Respondents were asked to evaluate the National Emergency Response Plan and note its comprehensiveness in offering solutions for disaster management challenges. Though the plan outlined operational procedures and guidelines for carrying out coordinated, efficient, and effective disaster management initiatives. out of 200 respondents, 98 (49%) thought the plan is inadequate, 89 (44%) thought it is mediocre, and 13 (6.5%) thought it is satisfactory. The findings show that the plan and associated tactics fall short in offering answers in disaster management and emergency scenarios.

#### **4.3.2 Resource Planning, Allocation and Utilization**

The aim of this index is to assess how resources (funding, personnel, equipment) are allocated and used for disaster management and emergency response operations.

In addition, it was found that there is no specified mechanism set to guide the departments responsible for disaster management and emergency response operations. The data from the group discussion study indicates that a well-designed budget allocation mechanism aids departments in securing sufficient funds for disaster management and emergency response operations.

The budget for the financial year 2023–2024 was also broken down by sector, but the disaster risk management budget wasn't made clear. This is because disaster risks could affect all sectors if they aren't properly identified and dealt with (Mennen M.G. (Ed) 2013). Knowing that there was no international or national standard way of doing it, this budget

allocation was done. The goal is to maximize safety within a restricted budget, while acknowledging that certain risks are unavoidable.

The table 2 below indicates the allocation of the budget for the financial year 2023/2024, with 12.3% going to military and security projects and 31% going to general public services. The budget also allocated 24% to economic development, 3.5% to water, housing, and community development, and 3.4% to public safety. However, there was no budget specifically planned to deal with and manage the national risks identified in the national risk assessment; rather, it was left to the ministries and local government to decide.

In this way, the study suggests that the way budgets are allocated for managing disaster risks and emergency response operations could be one way to measure how well Tanzania can handle disasters and emergencies. Tanzania's GDP for the 2023/2024 financial year will be used to allocate the budget for disaster risk management. We will allocate 1% of GDP to address the top ten national disaster risks from the previous section, and then devise a plan to distribute this money among the risks and hazards.

**Table 2: Tanzanian Government Budget by Sector Allocation in the Financial year 2023/2024**

<b>Sector</b>	<b>Billion shillings</b>	<b>Percent (%)</b>
General Public Services	11,788.3	26.6
Defence, Public order and Safety	4,688.3	10.6
Economic Development	9,470.1	21.3
Education	5,979.6	13.5
Health	2,463.7	5.6
Water, Housing and Community Development	1,346.7	3
Social Development	2,345.4	5.3
<b>Total Sector</b>	<b>38,082.1</b>	
<b>Debt Service (Principal Repayment)</b>	<b>6,306.0</b>	14.2
<b>Grand Total</b>	<b>44,388.1</b>	<b>100</b>

**Source: Ministry of Finance Tanzania Financial Year 2023/2024**

### 4.3.3 Emergency Response Time

The table 3 indicates the agreed emergency response time for emergencies in various localities (UK, 2021). It was found that though incidents like fire and road accidents are happening within reasonable distance from Fire and Rescue and Police Stations, the response times recorded were beyond the predetermined time as indicated in the table 3.

**Table 1: Emergency Response Time**

Risk Category	First Appliance	Second Appliance	Third Appliance
<b>Special Risk</b>	<b>Pre-determined attendance</b>		
A	5 minutes	5 minutes	8 minutes
B	5 minutes	8 minutes	
C	8-10 minutes		
D	20 minutes		

\***A Risk** (City centres and large industrial areas), **B Risk** (Built up areas such as large towns), **C Risk** (Suburbs and housing estates), **D Risk** (Mainly rural areas)

The report of Kariakoo market fire incident that happened in 2022, indicated that the average response time for each fire appliances attended that incident was 35 minutes. Among the challenge identified for late response was inadequate infrastructure that was attributed by poor urban planning and land use (UNISDR, 2019). Dar es Salaam Road networks, market places and city centre structures are not conducive for emergency responders especially during high time.

#### **4.4 Impact of indices on Practice**

The impact of assessment indices on disaster management practices is a crucial measure of their utility. According to Wood et al. (2021), there is a need to measure the effectiveness of these indices by their capacity to enhance preparedness, response, and recovery efforts. This includes evaluating whether the indices have influenced policy changes, resource allocation, and the overall strategic approach to disaster management. An impactful index should lead to tangible improvements in how disasters are managed, ensuring that lessons learned from past events are integrated into future strategies. The Royal Commission into National Natural Disaster Arrangements came to the conclusion that a national approach to capability planning was required, as well as that a systematic process should be in place to periodically assess capability and capacity requirements (Bennett, Binskin, and Macintosh (2020).

## **5 Conclusion and Recommendation**

### **5.1 Conclusion**

The capabilities assessment indexes for disaster management and emergency response operation in Tanzania, provided a comprehensive overview of the country's readiness to respond to disaster and emergencies. The findings and recommendations from this study sought to enhance resilient, coordinated, and efficient of both disasters and emergencies framework among the actors. The determined indices are feasible and reliable, and they

can be used to assess management and response capabilities in institutions responsible for disaster management and emergency response in Tanzania.

Based on the findings from both quantitative and qualitative analyses conducted in this study and the relationship with the literature review made in this study, several capability assessment indices have been developed for disaster management and emergency response in Tanzania. These indices are designed to provide a comprehensive framework for evaluating and improving disaster management practices in the country.

Table 4 below summarise the developed indices, that are structured to enhance disaster preparedness, response, and recovery efforts. Each index builds upon existing standards, practices, and the identified gaps in current methodologies. It is believed that if the government and responsible institutions for disaster management and emergency response, in collaboration with other stakeholders in the private sector, effectively utilize these resources, the public will benefit from improved services, reduced impacts of disasters and other emergencies such as fires, road accidents, building collapse, threat of terrorism, proliferation of unplanned settlements, power failure, strong winds, and pest infestation.

**Table 4: Developed Assessment Indices Chart**

<b>Assessment Index</b>	<b>Description</b>	<b>Metric</b>	<b>Frequency</b>	<b>Current Status</b>
<b>Current Use of Assessment Indices</b>	Evaluate how regularly assessment indices are used to measure disaster management capabilities.	Frequency of Use (%)	Semi-annual Review	2.84 (Current Perception)
<b>Adherence to International Standards</b>	Evaluate alignment with international standards like the Sendai Framework and ISO 22301.	Compliance Rate (%)	Annual Review	To be assessed
<b>Resource Utilization</b>	Assess how resources (funding, personnel, equipment) are allocated and used during disaster response.	Resource Allocation Efficiency (%)	Quarterly Review	assessed

<b>Frequency and Quality of Drills</b>	Measure the frequency and quality of combined drills and mock exercises.	Number of Drills per Year, Drill Quality Rating (1-5)	Bi-annual Review	To be assessed
<b>Performance Measurement and Feedback</b>	Evaluate the effectiveness of performance measurement and feedback mechanisms.	Feedback Implementation Rate (%)	Annual Review	To be assessed
<b>Contingency Planning</b>	Assess the comprehensiveness and adaptability of contingency plans.	Plan Comprehensiveness Rating (1-5)	Annual Review	To be assessed

Developing and implementing assessment indices, Tanzania can better evaluate and enhance its disaster management and emergency response capabilities. Regular use, effective metrics, and actionable data from these indices are crucial for improving preparedness, response, and recovery efforts in the face of disasters.

## **5.2 Recommendations**

### **5.2.1 Capability Building Roadmap**

The key outcome of this study is the development of a comprehensive capability-building roadmap aimed at enhancing disaster management and emergency response capabilities among responsible actors. This roadmap focuses on specific actions to address identified deficiencies in technology, personnel, and coordination. It proposes capacity-building initiatives such as upgrading emergency response equipment, introducing advanced technology like satellite communications, improving personnel training programs, and developing joint operational protocols. This roadmap is recommended to act as a strategic guide for governments, organizations, and other stakeholders to systematically enhance disaster management and emergency response capabilities, focusing on the most pressing needs to ensure a robust and efficient response to emergencies in major cities like Dar es Salaam.

### **5.2.2 Improved Coordination**

This study led to actionable recommendations for improving disaster management and emergency response coordination. proposed frequent interorganizational exercises, streamlining communication protocols, and fostering stronger partnerships between actors to ensure seamless, unified responses to emergencies. Improved coordination

between actors will not only reduce response times but also enable more effective rescues during inter-organizational emergencies operations, enhancing the overall safety of the community.

### **5.2.3 Policy Recommendations**

Policy recommendations aimed at harmonizing disaster management and emergency response regulations and frameworks in Tanzania. this involves the alignment of disaster management and emergency response policies with international standards set by United Nations agencies and their conferences on disaster risk management. These recommendations need to focus on creating unified legal frameworks, improving inter organizational cooperation, and establishing shared guidelines for disaster management and emergency response operations. Harmonizing policies among the actors will reduce legal and procedural barriers, ensuring that disaster management and emergency response operations are consistent, efficient, and legally sound, fostering a more integrated approach to community safety.

### **5.2.4 Investment Opportunities**

Finally, this study highlighted specific investment opportunities in disaster management and emergency response infrastructure, technology, and personnel development. By identifying areas with the most significant deficiencies, the findings will guide governments and its departments, and private organizations toward key areas that require funding and improvements. This includes the purchase of modern disaster management and emergency response vessels, the construction of new emergency response coordination centers, the implementation of cutting-edge technology, or the expansion of specialized training programs for disaster management and emergency response personnel. Prioritizing these investment needs ensures that resources are directed where they will have the most significant impact, facilitating the modernization and strengthening of disaster management and emergency response capabilities throughout in Tanzania and other nations.

## **6. Proposed future studies**

The authors propose studies on the capacity diagnosis with major emphasis on disaster risk governance, understanding risk, investing in disaster and climate risk resilience and their impact on gender perspectives and psychosocial needs, and assessment of the

suburban areas' disaster preparedness and response capacities and capabilities; and initiative to empower vulnerable communities to understand and mitigate their own risks through local knowledge and participation.

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