

**ASSESSMENT OF DISASTER PREPAREDNESS AND RESPONSE IN  
TANZANIAN REGIONAL HOSPITALS.**

**Philip Michael, MD**

**MMed (Emergency Medicine) Dissertation  
Muhimbili University of Health and Allied Sciences  
October, 2013**



**ASSESSMENT OF DISASTER PREPAREDNESS AND RESPONSE IN  
TANZANIAN REGIONAL HOSPITALS.**

**By**

**Philip Michael, MD**

**A Dissertation Submitted in (partial) Fulfillment of the Requirements for the Degree  
of Master of Medicine (Emergency Medicine) of  
Muhimbili University of Health and Allied Sciences**

**Muhimbili University of Health and Allied Sciences  
October, 2013**

## CERTIFICATION

The undersigned certify that they have read and hereby recommend for acceptance by Muhimbili University of Health and Allied Sciences a dissertation entitled, *Assessment of disaster preparedness and response in Tanzanian regional hospitals* in (Partial) fulfillment of the requirements for the degree of Master of Medicine (Emergency Medicine) of Muhimbili University of Health and Allied Sciences.



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**DECLARATION**

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I, **Philip Michael**, declare that this **dissertation** is my own original work and that it has not been presented and will not be presented to any other university for a similar or any other degree award.

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## **LIST OF ABBREVIATIONS**

AMO	Assistant Medical Officer
CCBRT	Centre for Community Based Rehabilitation Tanzania
CDC	Centre for Disease Control
CO	Clinical Officer
CT scan	Computerized Tomography scan
ED	Emergency department
GP	General Practitioner
ICU	Intensive care Unit
MCI	Mass Casualty Incidents
MD	Medical Doctor
Mmed	Masters of medicine
MUHAS	Muhimbili University of Health and Allied Sciences
MSD	Medical stores department
MTA	Motor Traffic Accident
NGO	Non Governmental Organization
RBG	Random Blood Glucose
TANESCO	Tanzania Electricity Supply Company
WHO	World Health Organization

## GLOSSARY

**Clinical Officer.** This is a lower level practitioner of medicine who is qualified to practice medicine. They act as physician assistants and have a 3 years training equivalent to that of a diploma. A clinical officer is not from nursing background and is trained in the medical model as physicians do to provide routine care in general.

**Assistant Medical Officer.** These are clinical officers who have worked in the medical field, taking care of patient for a number of years, and then go for a 2 years training in medicine equivalent to that of an advanced diploma. They are intermediates between the clinical officers and medical doctors (MD).

**Disasters.** These are adverse happenings occurring suddenly and unexpectedly and causing much suffering and loss to many people. They include large motor vehicle accidents, floods, fire, plane crash, infection outbreaks, landslides, explosions and hunger. Disasters normally overwhelm locally available resources to deal with them.

## **ABSTRACT**

### **Background**

A disaster is defined by the World Health Organization as “a serious disruption of the functioning of a community that exceeds the ability of the affected community or society to cope using its own resources.” Healthcare facilities are critical in responding to disasters, but disasters have potential to overwhelm facility and human resources.

### **Aim**

To assess the current state of disaster preparedness and response in Tanzanian regional hospitals.

### **Materials and Methods**

This is a descriptive cross sectional study using a structured questionnaire based on WHO defined essential data.

### **Results**

All 25 regional hospitals in Tanzania were surveyed. Ninety two percent of regional hospitals reported experiencing a disaster in the past five years. The most common disasters were due to large motor vehicle accident (80%) and floods (24%). A majority of the hospitals had a disaster committee (60%), but only 36% had a disaster plan.

Disaster planning, personnel and equipment resources varied greatly among regional hospitals.

### **Conclusions**

Regional hospitals in Tanzania experience disasters secondary to large motor traffic accidents, floods, bomb explosions and infection outbreaks. The survey found hospital preparedness was at an early stage of development. The results of this study suggest important opportunities to better prepare regional hospitals to respond to disasters. Particular gaps include inadequate surge capacity, lack of disaster planning, inadequate personnel, shortage of equipments, and lack of contingency communication systems.

## **INTRODUCTION AND LITERATURE REVIEW**

A disaster is defined as “a serious disruption of the functioning of a community or a society causing widespread human, material, economic or environmental losses that exceed the ability of the affected community or society to cope using its own resources” (1). According to a WHO formula, the risk associated with a disaster is expressed as Hazard x Vulnerability / Level of Preparedness, where *risk* is the probability of harmful consequences, and *vulnerabilities* are the conditions that increase the susceptibility of a community to hazards (2). Hence, the risk conferred on a given population by a given disaster is inversely proportional to the level of preparedness (2).

Disaster preparedness and response includes a range of activities to protect communities, property and the environment. Healthcare facilities are critical in responding to disasters both natural and manmade (3). Hospitals are viewed as safe havens where affected individuals may go for shelter, food, water and psychosocial assistance, as well as to obtain information about missing family members or learn of impending dangers related to an incident. Hospitals, however, often experience great difficulty dealing with patients in disasters due to confusion, lack of planning, lack of training in disaster management and lack of practice drills (4,5). Other factors that may hinder effective hospital disaster management include poor communication with emergency medical personnel, media, physicians, nurses, friends and family (6).

Planning is an important component in disaster preparedness; therefore hospitals should have effective plans so that they can sustain uninterrupted medical services following a disaster (7,8). However, disaster planning is often lacking in hospitals or when present, its details may not be known by key stakeholders including doctors staffing the facility (9,10,11).

Even when a disaster plan is in place, the failure to communicate it effectively to staff may render it useless. In addition, while adequately trained and informed staff forms the backbone of disaster surge capacity; regular staff numbers are likely to be insufficient to manage a mass casualty event. Beyond communicating a well-organized disaster plan to existing staff, developing a mechanism to provide additional personnel capacity is crucial (10,12,13).

Surge capacity is defined as the ability of the health care system to quickly expand to accommodate extra number of patients in an emergency (14). It is a marker of the ability to deliver effective emergency care in a disaster situation. Effective surge capacity requires the coordination of multiple resources, including beds, supplies, equipment, physical structure, and staff (15). Staffing is the most important component of surge capacity (16). Adequate numbers of hospital workers affect the number of operational beds and, ultimately, the number of patients that can be cared for during a disaster.

Hospitals should have a stockpile of equipment and supplies for patient care as well as protective equipment for health personnel to ensure uninterrupted services (17). It is important that health care workers' safety is assured during a disaster to enable them to work in understaffed circumstances. In a study including all 50 states in the United States of America, it was revealed that protective equipment for health personnel were lacking in mass casualty situations (6).

Because resources are likely to be overwhelmed during disasters, efficient utilization of available resources is of utmost importance (18,19). One way to achieve this is through triage, which is a process of sorting and prioritizing patients in situations where there are inadequate resources to give immediate and definitive care to all. Triage principles in disasters require a different approach to evaluation and care and may run counter to prior training and ethical instincts, which may be oriented towards delivering the maximum care to every patient (20,21).

According to CDC data regarding mass casualty incidents (MCI) in the USA secondary to a blasts, about a third of the patients will be severely injured (i.e., dead, or requiring surgery or hospitalization), and about two thirds will have minor injuries and can be discharged after treatment at ED. In a fully resourced setting, 50%- 80% of severely injured patients will arrive at the nearest health facility within 90 minutes of the incident (22). This makes it challenging for the healthy facility to accommodate the rapid increase in the flow of patients.

The capacity of a hospital to respond to multiple injured patients depends critically on the number of operating theatres, ICU beds, and X- ray facilities. It is estimated that in a fully-resourced setting, it takes a minimum of 10 minutes to perform an X-ray on a single minor injured patient, limiting patient flow to a maximum of 6 patients per hour (23).

A study done in Australia found that 61%–82% of critically injured patients would not have immediate access to operative care, 34%–70% would have delayed access to an ICU bed, and 42% of the less critically injured would have delayed access to x-ray facilities (24).

These issues have relevance for Africa, and in particular, for Tanzania, which has faced a number of disasters in recent decades, including the sinking of MV Bukoba in 1996 with over 800 casualties; the bombing of American embassy in 1998 in Dar es Salaama with over 100 casualties (25); the Dodoma railway accident in 2002 with over 700 casualties; explosions at Mbagala military base in Dar es salaam in 2008, which killed 26 people, injured hundreds and destroyed over 7000 homes; explosions at Gongo la Mbotto military depot in Dar es salaam killing over 20 people in 2011; and the sinking of MV Spice Islander in 2011, where over 200 people died.

The United Republic of Tanzania is divided into 26 regions; 21 in Tanzania mainland and 5 in Zanzibar (26,27). Public healthcare in Tanzania is a referral-based system starting at the dispensary, moving-through the health center, the district hospital and regional hospitals, and ending at tertiary referral hospitals. In 2011, the Ministry of Health upgraded all regional hospitals into referral hospitals including Amana, Mwananyamala and Temeke, the three municipal hospitals in Dar es salaam (28). Because the country has a large geographical area (945,203 km<sup>2</sup>), limited transportation infrastructure and only four tertiary consultant facilities, mid-level referral facilities, such as district and regional hospitals are a natural target for disaster preparedness initiatives (26,28,29).

## **PROBLEM STATEMENT**

Tanzania has witnessed a number of disasters in the past 15 years which claimed the lives of its citizens, leaving some with permanent disabilities, and caused disruption of infrastructure and settlement. The health system plays an essential role in the management of disaster. The capacity and capability of the Tanzanian health care infrastructure to manage disasters is unknown.

## **RATIONALE**

This study provides data and analysis to guide the development of disaster preparedness and response strategies. It also intended to establish a baseline against which future progress regarding the impact of disaster preparedness interventions and projects can be measured.

It will serve to inform decision makers, through the provision of quantitative data, as they undertake strategic planning and budgeting of staff, resources and capacity building interventions dedicated to disaster management capabilities and assets.

We also hope that this study will help identify disaster preparedness gaps in regional hospitals that have recently been upgraded to referral hospitals. This will help the Ministry of Health and other stakeholders in developing effective disaster preparedness plans.

Preparedness mitigates the effects of the disasters and is likely to be much more cost effective than the provision of care after a disaster has occurred (30).



## **AIMS AND OBJECTIVES**

### **Broad Objective**

To assess the current state of disaster preparedness and response in Tanzanian regional hospitals.

### **Specific Objectives**

1. To assess staff disaster surge capacity in regional hospitals
2. To assess the availability of essential equipment and supplies for disasters in regional hospitals
3. To assess the level of safety and security in regional hospitals during disasters
4. To assess disaster triage capacity in regional hospitals
5. To assess communication infrastructure available for use during disasters.

## **STUDY METHODS**

### **Study design**

Descriptive cross sectional study

### **Study setting**

Regional hospitals in the Tanzania mainland

### **Study subjects**

The heads of acute intake areas, matrons, and medical officers in-charge in all regional hospitals in Tanzania mainland.

### **Sampling design**

Comprehensive study involving all regional hospitals in Tanzania mainland.

### **Sample size**

The sample size includes all 25 regional hospitals in Tanzania mainland, including several hospitals that have recently been upgraded to regional hospitals

### **Data collection**

A structured questionnaire based on WHO-defined essential data was used for data collection. Direct observation and onsite interviews were conducted by a total of six investigators. This study was part of a larger project called the Tanzania Emergency Care Capacity Site Survey (TECCSS). The other two branches evaluate equipment availability and disease burden at district and regional hospitals. Prior to data collection, training of all the data collectors was conducted and data collection started in May 2012.

## **Data analysis**

All data was imported into SAS Version 9.3 from Excel. SAS Proc Freq was used to check for any outliers, questionable data entry, and clean data. Further programming was done to create any variables required to complete analysis based on objectives.

1. Proc Freq was used to obtain freq distribution [N (%)] of equipment and supplies for all hospitals.
2. Proc Freq was also used to get freq distribution [N(%) ] of safety & security variables
3. Proc Freq was used to obtain freq distribution [N (%)] of triage variables.
4. Communications, Proc Freq was used to obtain [N (%)] for variables associated with communications.

Computation of average and mean was done on dataset spreadsheet using Excel formula.

## **ETHICAL CONSIDERATIONS**

Permission to conduct this study was obtained from the MUHAS ethical board and the Ministry of Health of Tanzania. There was no risk to patients or interview subjects as data collected did not include patient identifiers and was reported only in aggregate form.

## RESULTS

All 25 regional hospitals in Tanzania were surveyed. Two hospitals, CCBRT and Lugalo, have since been designated as regional hospitals, but did not meet regional hospital criteria at the time of data collection, and were therefore not surveyed. Personnel interviewed included hospital doctors in charge (52%), matrons (36%) and heads of casualty (16%).

**Table 1: Disaster experience and planning in Tanzanian regional hospitals.**

	<b>YES</b>
	<b>N (%)</b>
Experience of disaster past 5 years	23(92.0)
Disaster programme	10(41.2)
Disaster committee	15(60.0)
Disaster plan	9(36.0)
Disaster simulation	11(44.0)
Simulation plan	5(22.7)

Ninety two percent of regional hospitals reported experiencing a disaster in the past five years. The most common type of disasters were due to large motor traffic accidents, (80%) followed by floods (24%). Three hospitals (12%) had experienced multiple casualty events resulting from bomb explosions in the past five years.

A majority of hospitals had a disaster committee (60%), but only 36% had a disaster plan. Forty four percent of hospitals had conducted a disaster drill in the last year and only 20% had a plan to conduct a disaster drill in the following year.

**Table 2: Common types of disasters at Tanzanian regional hospitals.**

<b>Type of disaster</b>	<b>YES</b>
	<b>N (%)</b>
MTA	20(80.0)
Plane crash	3(12.0)
Infection outbreak	5(20.0)
Fire	2(8.0)
Floods	6(24.0)
Explosions	3(12.0)
Hunger	0(0.0)
Conflict	2(8.0)
Landslide	1(4.0)

Table 3 reports available staff by facility. The category of ‘Doctors’ includes medical specialists (MMed), medical officers (MD), assistant medical officers (AMO) and clinical officers (CO). The category ‘Nurses’ includes nurse officers, registered nurses, enrolled nurses and nurse attendants. The category ‘Others’ includes pharmacy and laboratory staff.

**Table 3: Available staff on site at Tanzanian regional hospitals.**

	<b>Region</b>	<b>Population</b>	<b>Doctors</b>	<b>Nurses</b>	<b>Others</b>	<b>Total Staff</b>
1	Mwanza	2942148	27	254	9	290
2	Tabora	2,539,708	20	191	7	218
3	Mbeya	2070046	14	90	12	116
4	Kagera	2033888	25	165	6	196
5	Dodoma	2000000	44	322	11	377
6	Morogoro	2000000	46	80	9	135
7	Kinondoni	2000000	55	305	11	371
8	Shinyanga	2,000,000	25	270	8	303
9	Kigoma	1,971,333	26	158	3	187
10	Arusha	1,700,000	35	320	11	366
11	Tanga	1642015	67	291	7	365
12	Kilimanjaro	1,630,819	50	252	14	316
13	Ilala	1500000	64	251	22	337
14	Mtwara	1,500,000	16	179	7	202
15	Iringa	1495333	35	304	11	350
16	Ruvuma	1,400,000	29	358	11	398
17	Mara	1368602	21	225	5	251
18	Singida	1,300,000	27	214	5	246
19	Rukwa	1141743	17	139	7	163
20	Manyara	1040461	15	97	6	118
21	Temeke	1000000	82	273	24	379
22	Lindi	984,000	21	147	12	180
23	Coast	889154	29	207	5	241
24	Kilombero	516988	24	176	5	205
25	Njombe	420348	15	122	3	140

Each region contains only one regional hospital to serve its population. The average regional population is 1,563,463, and average staff per regional hospital is 257. Ruvuma regional hospital had the highest number of total staff at 398, and the lowest was Manyara with 118 total staff.

The breakdown of staff is described in table 4. The median number of all doctors per hospital was 27 with a range from 14 to 82. Forty five percent of these were AMO, 25% were CO, 23.3% were MD and 8.6% were specialists. The median number of all nurses per hospital was 214 with a range from 80 to 358. Thirty eight percent of these were nurse attendants, 33.5% were enrolled nurses, 26.8% were registered nurses and 1.4 % were nurse officers.

**Table 4: Type of personnel at Tanzanian regional hospital**

<b>Type of staff</b>	<b>Number</b>	<b>Median per hospital (Range)</b>
TOTAL DOCTORS		
Surgeons	19	0 (0-3)
Obstetrician and gynaecologists	26	1 (0-2)
Pediatricians	14	0 (0-2)
Physicians	16	0 (0-2)
General practitioners	192	4 (1-25)
Assistant Medical Officers	352	12 (5-37)
Clinical officers	211	7 (1-19)
TOTAL NURSES		
Nurse officer	77	2 (0-13)
Registered nurses	1445	54 (21-112)
Enrolled nurses	1807	76 (9-160)
Nurse attendants	2061	90(18-133)
OTHER PERSONNEL		
Pharmacists	32	1(0-4)
Pharmacy assistant	32	2 (0-6)
Lab technologist	24	0 (0-3)
Lab technician	114	3 (1-15)



**Table 5: Available of elements of surge capacity**

Surge capacity component	<b>YES</b>
	<b>N (%)</b>
Temporary morgue	2 (8.3)
Area for patient overflow	4 (16.7)
Additional sites for patient overflow	4 (16.7)
Stockpiling space	5(20.0)
Prioritize services	8 (34.8)
Pull staff from other hosp	12(48.0)
Contingency agreement for supplies	17(70.8)
Contingency triage area	20(83.3)

No hospitals had all components of surge capacity. Eighty four percent of the hospitals had fewer than 50% of the surge capacity components. Forty eight percent of Tanzanian regional hospitals can pull staff from other hospitals to help during a disaster. The majority of the hospitals (70.8%) had a contingency agreement with private suppliers for provision of equipments and supplies in disaster situation.

All the regional hospitals had electricity and a backup generator. Eighty four percent of them have storage tanks and 44 % have an ICU. All hospitals have at least one X-ray machine and ultrasound machine, and none have a CT scan. The average number of inpatient beds was 311.

**Table 6: Availability of infrastructure at Tanzanian regional hospitals.**

Infrastructure component	Number of hospitals where available (percent of total)	
Electricity	25 (100%)	
Backup Generator	25 (100)	
Storage tanks	21 (91.3)	
Inventory	21(91.3)	
Blood bank/refrigerator	23(92.0)	
ICU	11(44.0)	
	Total number	Median per facility (range)
Mortuary capacity	371	12 (2-50)
ICU beds	64	0 (0-14)
Hospital Beds:	7783	350 (86-450)
Ambulances	36	1 (0-3)
Units of blood	445	20 (3-50)
Stretchers	75	3 (1-14)
Wheelchairs	100	3 (2-10)
X-ray	31	1 (0-4)
Ultra sound	24	1 (0-3)
ECG	12	0 (0-3)
CT scan	0	
Working extinguishers	237	11.9

**Table 7. Safety and security at Tanzanian regional hospitals.**

Safety and security component	<b>YES</b>
	<b>Y (%)</b>
Fence	22(88.0)
Guards	20(80.0)
Specific entry	24(96.0)
Control entry	21(84.0)
Specific exit	20(80.0)
Decontamination area	0(0.0)
Extinguishers	24(96.0)
Sand buckets	4(17.4)
Fire alarm	2(8.0)

Eighty eight percent of hospitals were fenced, 96% had a specific entry to the hospital. Eighty four percent of the surveyed hospitals reported entry control of people to the hospital. None of the hospitals, however, had a decontamination area and only 8% had a fire alarm system.

**Table 8: Triage capacity at Tanzanian regional hospital.**

Triage capacity component	<b>YES</b>
	<b>Y (%)</b>
Regular triage	15(60.0)
Triage CO	4(16.0)
Triage AMO	4(16.7)
Triage MD	1(4.2)
Triage attendants	11(45.8)
Triage enrolled nurse	12(50.0)
Triage RN	5(20.8)
Triage training	8(33.3)
Triage guidelines	4(16.7)
Triage forms	3(12.5)
Triage area	10(41.7)

Triage is performed in 60% of the regional hospitals, mostly by enrolled nurses (50%) and nurse attendants (45%). Only 33.3% of those involved in triage had received training in triage. There were triage guidelines in only 4 hospitals (16.7%).

**Table 9: Communication components available for disaster events at Tanzanian regional hospitals.**

Communication component	YES
	Y (%)
Landline	9(36.0)
Mobile	24(96.0)
Notice board	0(0.0)
Siren	4(16.0)
Command centre	10(40.0)
Staff contacts	21(84.4)
Spokesperson(Liaison)	18(72.0)
Conference area	7(28.0)
Back up communication	3(12.0)

Almost all the hospitals (96%) rely on mobile cell phone communication during disaster and 84.4% have updated staff contacts. The medical officer in charge acts as hospital liaison in 18 of the hospitals (72%). Only 12% had a backup communication system.

## **DISCUSSION**

Ninety two percent of regional hospitals reported experiencing a disaster in the past five years. This demonstrates the importance of preparedness to ensure that the health sector itself is resilient to the effects of these emergencies and disasters.

Eighty percent of regional hospitals in Tanzania reported experiencing disasters due to large motor vehicle accidents. Floods (24%), bomb explosions (12%) and infectious outbreaks (12%) also contributed the substantially to the disaster burden.

The identified gaps in disaster preparedness crossed a wide variety of system components, suggesting that disaster mitigation will likely require a multi-disciplinary approach, involving not only the health sector but also other sectors for improvement of infrastructure for human settlement, transportation and law enforcement.

An “all hazards” approach to disaster preparedness should be emphasised where general and flexible arrangements are made which can be adapted to any type of disaster (2). Such an approach should describe generic roles and responsibilities, coordination, information and resource management. Under these general arrangements, disaster specific planning for MTA, floods, explosions, and infectious outbreak would be appropriate given the regional disaster burden.

Hospital beds and staff are already routinely saturated to care for the sickest patients in Tanzania (31). Therefore, there is no additional staff to mobilize during a disaster. Only 50% of hospitals reported being able to pull in staff from other facilities in a disaster. A number of actions can be taken to manage a catastrophic surge. These include discharging stable ED and inpatients, cancelling elective surgeries, opening alternate care areas, and calling in standby or off-duty staff, but all of these approaches require careful pre-event planning.

Tanzania has a pronounced shortage of medical practitioners. Available practitioners may work in many hospitals, including government hospitals and private hospitals. Therefore, they may not be readily available to respond to disasters in their primary facilities. Similar findings were observed in a study done in Cape-town South Africa (12).

The AMO and CO form the largest group of medical practitioners. Medical specialists and registrars are mainly found in big cities like Dar es salaam, Mwanza, Arusha and Mbeya. As the government strives to increase university enrollment for doctors, short course programmes for both AMO and CO in emergency preparedness will be invaluable.

For a hospital to be capable of taking care of the maximum number of patients in disasters, it should be able to expand its operations for both pediatrics and adults to about 500/ million population. For example, the Israeli army estimates that hospitals should be able to expand their operations by 20% (32). For Tanzania, this would require an expansion of the capacity to treat approximately an additional 22,000 patients.

Regional hospitals in Tanzania have one X-ray machine on average, and therefore their capacity to handle casualties requiring diagnostic radiography is limited to about six patients an hour (23). ICU beds are available in only 44% of the hospitals, and so analysis of the capacity to treat critically ill patients must account for the equipment and personnel required for transfer of patients to facilities with ICU beds. Additionally, other equipment such as ultrasounds and wheelchairs are also limited.

The basic principle in disaster situations where resources are limited is to do the maximum good for the most casualties with the least amount of resources. Triage is therefore a crucial component in disaster management. More than half of the hospitals reported to have triage system in place during disasters, but only a third of hospitals reported that the providers involved in triage had received training, and only 4% of facilities had an explicit triage protocol.

During a disaster event, the convergence of people to a hospital may pose an increased stress to the already overextended hospital staff. Providers may be pulled from clinical care to attend to families, political leaders, media, and the unwounded (4). Control of people in and around a hospital is therefore crucial. Safety and security for staff is also necessary to enable them to take care of patients. Most regional hospitals are fenced with a specific entry making it possible to control entry into the hospital compounds. However, the majority of the hospitals did not have a fire alarm system or a decontamination area.

Communication was found to rely mainly on mobile cell phones and landline telephones. Disasters are likely to overwhelm communication networks within the facility and outside. It is therefore important to have a backup communication system or facility-specific plan such as radios and runners.

#### **LIMITATIONS:**

There was some variation in data acquisition from site to site, as interviews were conducted with different cadres of providers. We believe that this has limited impact as all interview subjects were lead administrators.

Some of our results are based on reported rather than observed data and this may limit accuracy.

Our results were gathered during a brief visit and may not reflect conditions year round. We think this effect is limited as we reported facility characteristics without high seasonal variation.



## **CONCLUSIONS AND RECOMMENDATIONS**

Regional hospitals in Tanzania experience disasters secondary to large MTA, floods, explosions and infection outbreaks. Our survey suggests that hospital disaster preparedness is at an early stage of development in Tanzania and we identify important opportunities to better prepare regional hospitals to respond to disasters.

### **Recommendations**

#### **Planning**

Health facilities should have a disaster plan that is familiar to all staff, with easily accessible documentation, and regular staff training.

#### **Provider preparedness and surge capacity**

Doctor and nurses should undergo dedicated short course training in disaster preparedness and triage.

Identification of alternative staff that can be activated in the case of disasters , for example medical students and volunteers.

#### **Equipments and supplies**

Given the lack of ICU facilities in many hospitals, a plan for networking hospitals to transfer patients to the nearest ICU should be developed.

#### **Disaster training exercises**

A formal program should be developed to engage all staff members on a regular basis.

#### **Safety and security**

Improve fire outbreak control measures, such as fire alarm systems.

Construct and equip decontamination areas.

**Communication**

Create explicit contingency plans for communication failures and expand available communication modes.

**Overall**

A national centralized approach to disaster preparedness should be developed in coordination with national societies such as Emergency Medicine Association of Tanzania (EMAT).

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## APPENDICES

### A) Questioner

This questioner is divided into 9 categories.

1. General information
2. Command and Control
3. Communication
4. Safety and security
5. Triage
6. Surge capacity
7. Human resources
8. Logistics and supplies
9. Post disaster recovery

#### 1. General information

- 1.1 Name of the region.....
- 1.2 Name of district.....
- 1.3 What is your title?
  - a) Hospital in charge
  - b) Matron
  - c) Head of casualty/head of emergence department
- 1.5 Region/ district population .....
- 1.6 Total Bed capacity.....
- 1.7 Number of beds in Intensive care Unit.....
- 1.8. Mortuary number of dead bodies that can be accommodated (in refrigerator).....
  - 1.9Average outpatients seen per day.....
- 1.10 Average admissions per day.....
- 1.11 Is there electricity in the hospital?
  - a) Yes
  - b) No

1.12 What is the source of electricity?

- a) generator
- b) TANESCO
- c) Solar
- d) Other, specify.....

1.13 Is there a backup generator in case of power cuts/ ration?

- a) Yes
- b) No

1.14 What is the source of water in the hospital?

- a) Water authority (eg DAWASCO in Dar)
- b) Wells
- c) Rain
- d) Others...specify.....

1.15 Are there storage tanks in case of water cuts/ shortage?

- a) Yes
- b) No

1.16 What is the maximum water storage capacity in the department (Liters)?

- a) < 500
- b) 501- 1000
- c) 1001- 2000
- d) 2001-5000
- e) 5001-10,000
- f) >10,000

1.17 Has the district/ region experienced a disaster in the past 5 years?

- a) Yes
- b) No.



1.18. What type of disaster was it?

- a) MTA
- b) plane crash
- b) Biological/ Infection
- c) Fire
- d) Floods
- e) Explosions
- f) Hunger
- g) conflicts
- h) Other..specify.....

1.19 To what major hazards; natural, technological, social or conflicts that may cause disaster is your district/region exposed?

- a)MTA
- b)Biological/ Infection
- c) Fire
- d) Floods
- e) Explosions
- f) Hunger
- g) conflicts
- h) plane crash
- i) Others..specify.....

1.20 What is the Common means of transport of casualties to hospital?

- a) Private car
- b) Tricycle (Bajaji)
- c) Bicycle
- d) Ambulance
- e) Foot
- f) Helicopter
- g) Others.....Specify.....

1.21 Who bring/ accompany the patient to hospital in mass casualty events?

- a) Relative
- b) Police
- c) Neighbor
- d) Good Samaritan
- e) Fire department
- f) NGO, eg Red Cross
- g) Don't know

1.22. Are there current health sector disaster preparedness & response Programmes/projects being conducted

- a) Yes
- b) No

## **2. Command and Control**

2.1 Is there a designated command centre in the hospital i.e. a specific location prepared to convene and coordinate hospital-wide emergency response activities and equipped with effective means of communication?

- a) Yes
- b) No

2.2 Is there a disaster committee in the hospital?

- a) Yes
- b) No

2.3 Is there a person in the hospital assigned/ responsible to coordinate disaster activities?

- a) Yes
- b) No

2.4 Is there a disaster plan?

- a) Yes
- b) No

2.5 Is it accessible to other staff?

- a) Yes
- b) No

2.6 Are NGOs involved in emergency preparedness & response?

- a) Yes
- b) No

If yes, in what capacity?.....

2.7 Are NGOs members represented in disaster preparedness & response committee?

- a) Yes
- b) No

### **3. Communication**

3.1 How do you communicate with staff in case of a disaster?

- a) Landline call
- b) Mobile call
- b) Internet/email
- c) Notice board
- d) Other... Specify.....

3.2 Is there an updated staff contacts list?

- a) Yes
- b) No

3.3 Is there a public information spokesperson in the hospital?

- a) Yes
- b) No

3.4 Is there a designated area for press conference?

- a) Yes,
- b) No

3.5 Is there back-up communication systems (e.g. satellite phones, pagers, two-way radios,)?

- a) Yes
- b) No

#### **4. Safety and security**

4.1 Is the hospital fenced?

- a) Yes
- b) No

4.2. How many guards/ are there?.....

4.3 Is there a specific entry to the hospital?

- a) Yes

4.4 Can entry of people into the hospital be controlled?

- a) Yes
- b) No

4.5 I there a specific exit from the hospital?

- a) Yes
- b) No

4.6 Are there fire extinguishers in the hospital? ( If no go to question 4.8)

- a) Yes
- b) No

4.7 If yes how many are working ?.....

4.8Are there "sand buckets" is the hospital ( alternative for fire extinguisher) ?

- a) Yes
- b) No

4.9. Is there fire alarm system in the hospital?

- a) Yes
- b) No

4.10 Is there an area for radioactive, biological and chemical decontamination and isolation?

- a) Yes
- b) No

## **5. Triage**

5.1 Do you normally triage patients in this hospital?.

a) Yes

b) No

5.2 Who does the triage?

a) C.O

b) AMO

c) MD

d) Nurse Attendant

e )Enrolled nurse

f) Registered nurse

g) Other..... (specify)

5.3. Have they received any training in triage?

a) Yes

b) No

5.4 Triage guidelines?

a)Yes

b)No

5.5 Triage forms?

a) Yes

b) No

5.6 Is there a triage area?

a) Yes

b) No

5.6 Contingency triage area for receipt and triage of mass casualties?

a)Yes

b) No

## **6. Surge Capacity**

6.1 Is there a designated care areas for patient overflow (e.g. auditorium, lobby).

a) Yes,

b) No

6.2 Has the hospital identified additional sites that may be converted to patient care units (e.g. schools, community centers).

a) Yes

b) No

6.3 Is there a plan to prioritize/cancel nonessential services (e.g. elective surgery) when necessary.

a) Yes

b) No

6.4 Is there a designated area for use as a temporary morgue.?

a) Yes

b) No

6.5 Is there a plan to call in staff from other hospitals to help in disaster?

a) Yes

b) No

## **7. Human resource and training**

7.1. Have you conducted a disaster simulation exercises in the past 12 months?

a) Yes

b) No

7.2 Was it

a) small group

b) multi departmental

7.3 Who participated in the simulation exercises?

- a) Enrolled nurses
- b) C.O.
- c) AMO
- d) MD
- e) registered nurse,
- f) Registered nurses
- g) attendants
- h) administrator
- h) others .....(specify)

7.4 Where the following involved

- a) police
- b) fire
- c) private insurance companies
- d) military
- e) NGO

7.5. Are you planning to conduct disaster simulation exercises in the next 12 months?

- a)Yes
- b) No

7.6. Have the staff received training in

- 8.4.1 Basic life support            Yes / No
- 8.4.2 Primary trauma care        Yes/ No
- 8.4.3 Disaster preparedness       Yes/ No
- 8.4.4 Public health emergency    Yes/ No

7.7. Number of staff in the hospital

- 7.7.1 Surgeons.....
- 7.7.2 Gynecologists.....
- 7.7.3 Pediatricians.....
- 7.7.4 Physicians.....
- 7.7.5 General Practitioner (MD).....
- 7.7.6 Assistant medical officers (AMO).....
- 7.7.7 Clinical Officer.....
- 7.7.8 Nurse Officer.....
- 7.7.9 Registered nurse.....
- 7.7.10 Enrolled nurse.....
- 7.7.11 Attendants .....
- 7.7.12 Pharmacists (Bpharm).....
- 7.7.13 Pharmacy assistants (diploma).....
- 7.7.14 Laboratory technologist (Bachelor).....
- 7.7.15 Laboratory technician (diploma).....

**8. Logistics, equipments and supplies**

- 8.1 How many working ambulances are there?.....
- 8.2 How far is the nearest referral facility in km?.....
- 8.3 How long on average does it take to get there by ambulance?.....
- 8.4 In case of disaster do you go on site to bring patients to the hospital?
  - a) Yes
  - b) No
- 8.5 Is there an updated inventory of all equipment, supplies and pharmaceuticals;
  - a) Yes
  - b) No
- 8.6 Where do you get your equipments, supplies and pharmaceuticals?
  - a) MSD
  - b) NGO



- c) Private suppliers
- d) Others..specify

8.7 How far in km is the nearest MSD?.....

8.8 Has the hospital established contingency agreements (e.g. memoranda of understanding, mutual aid agreements) with vendors to ensure the procurement and prompt delivery of equipment, supplies and other resources in times of shortage?

- a) Yes
- b) No

8.9 Has the hospital identified physical space within the hospital for the storage and stockpiling of additional supplies?

- a) Yes
- b) No

8.10 Is there a blood bank in the hospital?

- a) Yes
- b) No

8.11 How many units of blood are there?.....

8.12 How many of the following are there?

8.12.1 Stretchers.....

8.12.2 Wheelchairs.....

8.13. How many of the following equipments are available in the ICU?

8.13.1 Cardiac monitors.....

8.13.2 Ventilators.....

8.13.3 Laryngoscopes.....

8.13.4 Defibrillators.....

8.13.5. Central lines.....

8.13.6 R.B.G machine .....

8.14 How many of the following diagnostic facilities are there? (in working condition)

8.14.1. X-Ray machine.....

8.14.2 Ultra sound machines.....

8.14.3 ECG machines.....

8.14.4 CT scan.....

**9. Post disaster recovery**

9.1 Does the hospital have methods for capturing lessons learned following disaster responses?

- a) Yes
- b) No

9.2 Describe the methods

.....

9.3. Is there a post-disaster recovery assistance programme like counseling and support services?

- a) Yes
- b) No

9.4 Do the hospital show recognition of the services provided by staff, volunteers, external personnel and donors during disaster response and recovery

- a) Yes b) No

**B) Consent form**

My name is ..... from Muhimbili  
University of Health and allied sciences.

I am conducting a study on disaster preparedness in regional hospitals as part of fulfillment of the masters of medicine degree programme. The information obtained will provide descriptive statistics necessary for the key stakeholders to improve the capacity of the hospitals in responding to disasters.

There is no risk/ danger for you or the hospital in participating in the assessment.

Do you have any question?

Thanks in advance for your cooperation.

Sign of participant .....

Date .....