

**HOSPITAL PHARMACIES' SURGE CAPACITY FOR DISASTERS AND
PUBLIC HEALTH EMERGENCIES**

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**MSc. (Pharmaceutical Management) Dissertation
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**HOSPITAL PHARMACIES' SURGE CAPACITY FOR DISASTERS AND
PUBLIC HEALTH EMERGENCIES**

By

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**A Dissertation Submitted in (Partial) Fulfillment of the Requirements for the Degree of
Master of Science (Pharmaceutical Management) of
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November, 2013**

CERTIFICATION

The undersigned certify that she has read and hereby recommend for acceptance by Muhimbili University of Health and Allied Sciences a dissertation entitled *Hospital Pharmacies' Surge Capacity for Disaster and Public Health Emergencies* in (Partial) fulfillment of the requirement for the degree of Master of Science, (Pharmaceutical Management) of Muhimbili University of Health and Allied Sciences.

.....

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DEDICATION

To **Dr. Lerise** and family for their unconditional love, prayer and support that has molded me into the woman I am today. May God bless you.

To my husband, **Dr. Godwin Mwisomba** for his continuous love, support, and encouragement throughout this study.

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ABSTRACT

Background : Lessons learnt from worldwide disaster and public health emergencies such as the earthquake in Haiti 2011 and the 2011 flooding in Pakistani have shown that poor surge capacity increases unnecessary morbidity and mortality. Tanzania has of recent experienced a number of disasters and public health emergencies. These include the capsizing of the MV Bukoba in 1996 that killed over 1000 people, the bombing of the United States Embassy in Dar es Salaam in 1998 that killed 11, the influenza outbreak in 2009 and the recent capsizing of MV spice Islander and MV Skagit in 2012 that killed 203 and 144 people respectively. The mortality and morbidity associated with these disasters could have been minimized if the hospital emergency departments where the victims were sent were better prepared to cater for this additional workload in terms of pharmaceutical supplies, medical equipment, and personnel. The surge capacity of Hospitals emergency departments in particular the pharmacy is unknown.

Study Objective: To assess hospital pharmacies' surge capacity for disasters and public health emergencies.

Methodology: A cross sectional survey of tertiary hospitals with emergency departments was conducted. Both qualitative and quantitative data collection methods were applied. Guided in-depth interviews were conducted and data was analyzed using content relation analysis. Review of important documents was also done.

Results: Thirteen out of fifteen of health personnel working in tertiary health facilities could not define the term surge capacity. Only two out of the seven hospitals reported to have adequate pharmaceutical personnel and the average number of pharmacists per pharmaceutical dispensing unit was less than one. Only one of these had a special pharmaceutical dispensing unit within the emergency department. None of the health facilities had a written disaster management plan. The overall perceived role of pharmaceutical personnel in managing disasters is simply as a drug dispenser. Lack of special pharmaceutical dispensing units for emergency departments, lack of training and out of stocks are the main perceived challenges by pharmaceutical personnel when dispensing during disasters.

Conclusion: Currently hospital pharmacies in Dar es salaam have limited surge capacity to cater for natural and manmade disasters. This is due to lack of knowledge, available pharmaceutical personnel, training, and appropriate emergency plans and protocols. In addition to this, there is negative perception of the pharmacists' role in disaster preparedness by pharmaceutical personnel and medical officers, inactive hospital disaster management committees, lack of specialized emergency pharmaceuticals' dispensing units as well as poor management of the scarcely available emergency pharmaceuticals.

Recommendations: Ministry of Health and Social Welfare should formulate a clear plan of action to ensure skilled staff availability by facilitating schools of Pharmacy in the country to enroll more students. They should also revise their curricula accordingly to incorporate basic life saving skills. The Ministry of Health and Social Welfare (MoHSW) should conduct continuous education programs in disaster preparedness for all in service pharmaceutical personnel. The Prime Minister's Office and Ministry of Health and Social Welfare, in collaboration with other stakeholders should prepare a set of regulations to govern the tertiary health facilities, both public and private health facilities in disaster and public health emergencies management.

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LIST OF ACRONYMS AND ABBREVIATIONS

DMD	Disaster Relief Coordination Unit now Disaster Management Department
DOPC	Disaster Operations and Preparedness Sub-Committee
EM-DAT	Emergency Events Database
FEC	Food Emergency Sub-Committee
MSD	Medical Stores Department
MNH	Muhimbili National Hospital
PMO	Prime Minister's Office
QDA	Qualitative Data Analysis
SOP	Standard Operating Procedures
TANDREC	Tanzania Disaster Relief Committee
TANESCO	Tanzania Electric Supply Company
UNISDR	United Nations Disaster Risk Reduction agency
WHO	World Health Organization

DEFINITION OF TERMS

1. **Disaster preparedness** is an aspect that involves putting in place appropriate administrative, legislative, and technical measures to minimize the adverse effects of those affected by disasters. It includes warning systems, training, organization and communication systems, and evacuation plans and resources mobilization. This exercise requires regular systems plan review, modification, update and test.
2. **Disaster** W.H.O does not have one definition of the word disaster, but two. The first one is from the International Strategy for Disaster Reduction (ISDR), which defines disaster as a serious disruption of the functioning of a community or a society causing widespread human, material, economic, or environmental losses, which exceed the ability of the affected community, or society to cope using its own resources. The second definition is by the Centre for Research on the Epidemiology (CRED) that defines a disaster as a situation or event, which overwhelms local capacity, necessitating a request to national or international level for external assistance. A term describing an event that can be defined spatially and geographically, but that demands observation to produce evidence. It implies the interaction of an external stressor with a human community and it carries the implicit concept of non-manageability. The term is used in the entire range of risk-reduction activities, but it is possibly the least appropriate for response
3. **Emergency**- A sudden and usually unforeseen event that calls for immediate measures to mitigate impact
4. **Emergency Department** is a section of an institution that is staffed and equipped to provide rapid and varied emergency care, especially for those who are stricken with sudden and acute illness or who are the victims of severe trauma.
5. **Emergency response plan**- A set of written procedures that guide emergency actions, facilitate recovery efforts and reduce the impact of an emergency event.
6. **Health facility** - building where medicine is practiced

7. **Operational Surge Capacity:** the maximum potential delivery of required resources either through augmentation or modification of resource management and allocation. Components include System (integrity), Space (size, quality), Staff (numbers, skill), and Supplies (volume, quality).
8. **Preparedness** - the state of having been made ready or prepared for use or action.
9. **Procurement** is the process of acquiring supplies including those obtained by purchase, donation, and manufacture.
10. **Public health Emergency** is as an occurrence or imminent threat of an illness or health condition, caused by bio terrorism, epidemic or pandemic disease, or a novel and fatal infectious agent or biological toxin, that poses a substantial risk of a significant number of human fatalities or incidents or permanent or long-term disability.
11. **Surge Capacity** is a the ability to obtain adequate staff, supplies and equipment, structures and systems to provide sufficient care to meet immediate needs of an influx of patients following a large-scale incident or disaster. The term refers to the ability of a health care system to expand rapidly beyond normal services to meet the increased demand for medical care and public health services that would be required to care for patients in the event of a large-scale public health emergency or disasters (Dayton et al, 2008).
12. **Vulnerability** - the extent to which a community, structure, service, or geographical area is likely to be damaged or disrupted by the impact of a particular hazard, on account of their nature, construction, or proximity to a hazard prone area”

CHAPTER ONE

1.0. INTRODUCTION AND LITERATURE REVIEW

1.1 Introduction

A disaster is a serious disruption of the functioning of a society causing wide spread human, material and environmental losses, which exceed the ability of the affected society to cope with using its own resources. The World Health Organization defines natural disaster as an ecological disruption or threat that exceeds the adjustment capacity of the affected community (Lechat, 1979). Such disasters include forest fires, floods, hurricanes, landslides earthquakes etc. While manmade disasters as defined by Guha-Sapir et al (2004), are those resulting from events or situations that are clearly caused by humankind, such as wars, terrorist attacks, chemical/radiation leaks, environmental contamination, technologic catastrophe etc. Whatever the disaster, the health personnel need to be prepared to be able to respond effectively.

1.2 Impact of Disasters

According to the 2011 World Disasters Report, more people died from natural disasters in 2010 than in any other year in the last decade. In comparison to the last decade of the 20th century, disaster deaths rose by 39% from 2000 to 2010. There were three major humanitarian crises in 2010 and 2011 – the earthquake in Haiti, flooding in Pakistan, and the earthquake and tsunami in Japan. These natural disasters were responsible for 297,752 deaths. This exceeds deaths in 2004 (242,010) and 2008 (235,272).

Likewise the worst manmade and public health disasters of the past century, included the United States of America (USA) September 11 terrorist attacks of 2001 which caused 2996 deaths, the Severe Acute Respiratory Syndrome (SARS) outbreak of 2003 that caused 775 deaths and the H1N1 Influenza pandemic of 2009 that caused 294,500 deaths.

Not only do disasters result in increased mortality and morbidity, they also have a huge economic impact as can be seen in Table 1. All combined, natural disasters that the world saw in 2011 have amounted to an economic cost of \$US380 billion, according to a report issued by the United Nations disaster risk reduction agency (UNISDR Report, 2011)

Table 1.1 Economic Toll of Disasters

	Disaster	Year and Location	Death Toll	Total Loss
1	European Heat Wave	2003 /France, Italy, Germany and throughout Europe	70,000	\$13.8 billion
2	Indian Ocean Tsunami	2004 Location: Sri Lanka, Indonesia, Thailand, India, Bangladesh, Myanmar, Maldives and Malaysia	220,000	\$10 billion
3	Hurricane Katrina	2005 / Louisiana, Mississippi USA	1,300	\$125 billion
4	Kashmir Earthquake	2005 : Pakistan, India and Afghanistan	88,000	\$5.2 billion
5	Cyclone Nargis	2008 Location: Myanmar (Burma), Bay of Bengal	140,000	\$4 billion
6	Haiti Earthquake	2010 Location: Haiti	222,570	\$8 billion

Source United States of America - Disaster Statistics (2010)

1.3 History of disasters in Tanzania

Tanzania has also been experiencing a number of disasters that have caused losses of life, destruction of property and environment as seen in table 1.2.

Table 1.2: Disaster Events in Tanzania and Their Effects

Disaster	No. Of Events	Total Killed	Avg. No Killed	Total Affected	Avg. No Affected
Cyclone	1	4	4	2,500	2,500
Drought	12	0	0	12,863,483	1,071,957
Earthquake	8	7	1	3,991	499
Flood	24	531	22	843,046	35,127
Volcano	-	-	-	-	-

Source: Centre for Hazards and Risk Research at Columbia University (2005).

Floods have occurred 15 times since the 80s. They have killed 54 people and affected over 800,271 residents (Matari, 2006). The most recent flooding disaster occurred in Dar es salaam in December 2011 where 23 people died and 4909 were displaced (Aljazeera Online Newspaper 2011).

Apart from floods, public health disease epidemics such as cholera, bubonic plague meningitis and influenza have also been affecting many communities in the country. The most recent outbreak of Cholera was in Morogoro and Tanga region in December 2010 where 4 and 60 people died respectively (Westerhorf, 2010). In 2009, similarly, Tanzania was affected by H1N1/09 influenza pandemic, where 770 people became infected and one person died (Center for Disease Control and Prevention (CDC) cited in Kamuhabwa and Chavda (2009). In July 2002, WHO Global Alert and Response (GAR) reports (2002) showed that there were 90

cases of meningitis with four deaths in Nduta and Karago refugee camps in Kibondo district, Tanzania.

Disasters associated with terrorist attacks have also plagued Tanzania. On August 7, 1998 the United States Embassy of America was bombed, killing 11 people and leaving several injured (Bodansky et al, 1999).

Transportation associated accidents of several forms have been also a major source of disasters in Tanzania. The worst accident occurred in 1996 involving MV Bukoba, which capsized in Lake Victoria, killing over 1000 people and injuring several people with a substantial loss of property. Recently the capsizing of MV Spice Islander and MV Skagit killed 203 people and 144 people respectively (James, 2012). Similarly, railroad accidents have also been a source of a large number of deaths and casualties. The Tanzania Railways Corporation passenger train accident in 2002 June killed 288 people and injured over 370 (Mason, 2002).

In addition, there have been a number of industrial disasters. In June 2002, more than 40 miners died due to inhalation of the accidental release of carbon monoxide fumes produced by a dynamite explosion in a quarry in Mererani Arusha (Nkwame, 2008). Although there were no deaths after explosions due to gas leakages and electrical faults that occurred at the Tipper Refinery in Kigamboni and the Arusha Sun-flag industries respectively, these sites are potential ticking time bombs that could in future be the sites of potentially serious disasters that could cost thousand lives and millions in property damages (Kimati, 2012).

Civil **unrest** incidences in several areas of the country have been increasing. The recent conflict between Muslims and the police due to the detainment of the religious leader Sheikh Farid Haji in October 2012 is an early warning sign that civil unrest could be a future cause of manmade disasters (Jorgic and Ng'wanakilala, 2012).

Tanzania is bound to see more and more natural and manmade disasters mainly because of, climate change, industrialization, migration, political and religious conflicts. It is therefore imperative, that Tanzania implements strategies and protocols to be able to be effectively prepare for disasters. Especially when one considers that already, over 400,000 people are affected annually by disasters, as seen in Table 1.3.

Table 1.3. Human loss due to disaster in Tanzania 1980 - 2010.

No of events:	73
No of people killed:	6,798
Average killed per year:	219
No of people affected:	12,465,314
Average affected per year:	402,108

Source: Center for Hazards and Risk Research at Columbia University (2010)

Disaster Management

Disaster management is the managerial function aimed at creating the framework within which communities reduce vulnerability to hazards and cope with disasters in a way that preserves life and property. The concept includes all the activities and measures put in place to minimize the effects and impacts of the disaster. This covers physical, economic, and social effects of the disaster to a given population and may take so many aspects and angles depending on the locality and the community concerned, including surge capacity.

1.4 Disaster Management Structures in Tanzania

In 1987, the Government established disaster relief coordinating unit under Parliamentary & Political Affairs Department. In 1990, the Disaster Relief Coordination Act 9 was enacted and it established committees (TANDREC) at national level down to the District level with a full Department of Disaster Relief Coordination being established within the Prime Minister's

Office (PMO). From this act The National Disaster Management Policy 2004 was developed. The policy outlines and stipulates the levels of disaster management structures within the country and provides the national operational guidelines for disaster management.

According to the policy, Disaster management structure is at five levels namely; national, regional, district, ward and village level.

1.4.1 National Disaster Management Committees

There are two structures at national level; the Tanzania Disaster Relief Committee (TANDREC) and the Disaster Management Department (DMD) for overseeing and coordinating overall relief operations at national level

TANDREC is made up of Permanent Secretaries from Government Ministries or any other agencies determined by the Prime Minister as having a key role in disaster preparedness and response. The Permanent Secretary in the PMO chairs the Committee. TANDREC Sub-Committees include the Disaster Operations and Preparedness Sub-Committee (DOPC) and the Food Emergency Sub-Committee (FEC).

DOPC is composed of experts from TANDREC line Ministries, including Ministries of Health, Works, Agriculture & Food Security, Home Affairs, Defense & National Service, and Communication & Transport. The main function of DOPC is to provide technical information to TANDREC on matters related to disaster mitigation, preparedness, and response in relation to their technical specialization and mandate. The FEC is made up of members from the Disaster Management Department (DMD), Ministry of Agriculture & Food Security, FAO, the World Food Program, Non-Government Organizations (NGOs) and any organization interested in emergency food distribution. Their major function is to perform need assessment and beneficiaries targeting as well as relief supplies distribution through organizations such as The Tanzania Social Action Fund (TASAF) (Costella, Machume and Manjolo, 2009).

For effective implementation of its activities, TANDREC established The National Disaster Management Committee (NADMAC), the Regional Disaster Management Committee (REDMAC), and District Disaster Management Committee (DIDMAC). The main function of these committees is to coordinate, guide, direct, approve and control disaster management activities at respective levels, as follows;

1.4.2. Regional Disaster Management Committee

The Regional Disaster Management Committee is formed by members of the Regional Administrative Secretariat, Civil organizations (Non Governmental Organizations (NGOs) and Faith Based Organizations (FBOs), Business Community representatives, Leaders of Religious Organizations and Prominent Persons in the Region. The Regional Commissioner (RC) is the chairperson of the Committee and Regional Administrative Secretary (RAS) is the Secretary. The function of this committee is to prepare plans and procedures for disaster management programs in their respective locations. They take operational control in the event of a disaster or emergency to ensure that support is provided to the affected houses and to establish a fund for disaster management. They also mobilize needed financial and material resources for disaster management and establish civil groups for disaster operations.

1.4.3 District Disaster Management Committee

The District Management Committee (DMT) forms the Committee (Heads of Departments at the District level) but it also includes members of civic organizations (NGOs & FBOs) and any other Key persons. The District Commissioner is the Chairman and District Executive Director is the Secretary of the Committee. The function of this committee is similar to regional committee but at the district level

1.5 The Disaster Management Department (DMD)

The DMD has two sections, the coordination and Operations Section and The Planning and Research Section. The DMD primary function is coordination of disaster management activities in the country. It seeks to ensure that in times of disaster, appropriate response systems, procedures, and resources are in place to assist those afflicted. The Department has the responsibility to coordinate disaster preparedness efforts and activities in order to minimize the adverse effects of hazards through effective precautionary measures and to ensure timely appropriate and efficient organization and delivery of emergency assistance.

1.6. The Ministry of Health and Social Welfare

The Ministry of Health and Social Welfare has a special section called the Health Emergency Preparedness and Response Section. This section is under an assistant Director. Its function is to develop, prepare and formulates health sector guidelines, protocols, and standards on emergency and disaster preparedness and response in the country. To coordinate and direct health sector emergency response activities in the country and provides technical advice to the Chief Medical Officer on matters pertaining to emergency and disaster management. It coordinates mechanisms on issues of containment of major epidemics in the country. It mobilizes resources such as human, materials, financial, pharmaceuticals, medical supplies and equipment and deploying them during response to major emergencies.

It also identifies collaborators including United Nation (UN) Agencies, International Organizations, and NGOs that will provide health related support for effective management of a disaster condition in the country by:

- i. Identifying training needs on health related emergencies and disaster management for health personnel and other stakeholders;
- ii. Building capacity of the National Health Emergency Rapid Response Committee at Zonal and Regional levels.

- iii. Provides medical equipment and supplies for disaster relief management
- iv. Conducts health related Vulnerability Assessment and Hazard Mapping of disaster prone areas in collaboration with other sectors;
- v. Evaluates health related emergencies and disaster activities through health sector simulation exercises.

1.7. The Tanzania Red Cross Society

This international non-governmental organization collaborates with the Ministry of Health and Social Welfare (MOHSW) in disaster response as first responders.

The National Red Cross Society has the mandate by an Act of Parliament to play specific voluntary humanitarian roles in disasters and emergencies as an auxiliary to public authorities. Its International network and National wide grass-root branches, membership and trained volunteers are a valuable source of skilled labor and essential medical supplies in disaster management.

1.8. Pharmaceutical Management and Disaster Preparedness

The recent worldwide terrorist attacks that occurred even in Tanzania, have heightened awareness that more incidence involving weapons of mass destruction may occur globally.

In event that a terrorist attack is carried out using weapons of mass destruction, the possibility exist that , hospital emergency departments may be flooded with a large number of casualties exposed to nuclear, biological or chemical agents (NBCs). Hospital pharmacies would then be required to provide antidotes, prophylaxis, antitoxins, and other pharmaceuticals in large amounts at almost instantaneous notice. This is in disregard that the routine activities of the hospital pharmacy, particularly when it comes into providing care to in and out chronic disease patients will have to continue.

Not only do hospitals pharmacies have to have some of these pharmaceuticals standby in stock, but they also have to have the capability to procure, supply, distribute, and dispense these pharmaceuticals quickly and in time to avert mass casualties. The need for this is reflected in the results of a survey done by Perderson et al in 2003, on Pharmacists' opinions regarding level of involvement in emergency preparedness and response, which indicated that pharmacists should have a high level of involvement in emergency preparedness and response activities.

In particular, we look at the lessons learned from the pharmacist's role after the Haiti earthquake and Hurricane Katrina which highlighted the importance of pharmaceutical surge capacity built protocols and training, skills in evacuation and triage (Ferris, 2010; Hogue et al 2009). The lesson learnt from these natural disaster events clearly suggest that the pharmacist's historical duties viewed as just keepers of drugs has shifted.

For example respondents to a survey done by Perderson et al (2003) on Pharmacists' opinions regarding level of involvement in emergency preparedness and response indicated that pharmacists should have a high level of involvement in emergency preparedness and response activities. Pharmacists should not only maintain their traditional pharmacy practice activities such as medication preparation and dispensing, but also need to acquire newer skills such as abilities to perform disease surveillance, vaccine administration, basic life support, and mobilization in order to enhance pharmacists' preparedness and response to disasters.

One of the most critical components of Pharmacy disaster preparedness is surge capacity. This is the ability to effectively manage a sudden, unexpected increase in patient volume that would otherwise severely challenge or exceed the current capacity of the healthcare system (Hicky et al, 2004). Its key components, which are referred to as the "4 S's" of 'staff,' "stuff," "structure," and "systems" where staff refers to personnel, stuff consists of supplies and equipment, structure refers to facilities, and systems include integrated management policies and processes.

History has shown us that when we prepare adequately for disasters, its effects could be mitigated by a great margin as compared to a country or county with no proper preparedness (Achiando, 2012). Pharmacies have to stock adequate emergency pharmaceuticals to last them long enough until the national supplies become available or may put in plan specially prepared procedures and protocols for emergency procurement of pharmaceuticals from known private wholesalers or neighboring private health facilities to cater for disaster victims while waiting for national supplies in disaster events.

The Public Procurement Act of 2011 states that emergency procurement may be made in the event that there is compelling urgency that creates threat to life, health, welfare or safety of the public by reason of major natural disaster, epidemic, riot, war, fire or such other reasons of similar nature. A situation whereby, without the urgent procurement, the continued functioning of the Government or organization would suffer irreparable loss, the preservation or protection of irreplaceable public property, or the health or safety of public will be threatened.

To avoid panic and confusion during disasters, emergency procurement has to be done under previously prepared plans and protocols, making the process more effective and easy by avoiding chaos. This includes setting aside a budget for emergency procurement and selection of well-trained and experienced procurement personnel.

A study done by Hsu et al in 2006 in Maryland metropolitan region revealed that, even collectively, regional hospitals have limited supplies of antibiotics for prophylaxis and treatment of hospital staff, their families, as well as the community thus may not be able to provide surge in pharmaceutical supplies. This led them to conclude that in relation to pharmaceutical stock, regional hospitals are underprepared for Chemical, Biological, Radiological, Nuclear, and high- yield Explosives (CBRNE) attacks.

Results from a hospital all-risk emergency preparedness study done in Ghana showed that national hospitals' respective abilities to handle large scale Road Traffic Accidents (RTA's) were compromised by the lack of competent medical and allied health personnel as well as adequate supplies, which resulted into, surge demands. This is because they did not possess general emergency preparedness programs (Norman et al, 2012).

In short, hospital disaster preparedness can maximally be effective only and only if all key medical services departments including the pharmacy are a well organized, have the right protocols, are well equipped, and are functioning under adequate surge capacity.

1.9 PROBLEM STATEMENT

Tanzania to date has been a country with a limited number of casualties resulting from disasters. However, the recent events have increased awareness about the limits of the response capabilities of Tanzanian emergency departments to meet the challenge of disasters management. Lessons learnt from H1N1/09 influenza outbreak in Tanzania, highlighted that there were gaps in the knowledge of healthcare providers on the prevention and treatment of infection in Tanzania. These findings are key indicators that more efforts are required in terms for strengthening of healthcare systems in case of public health emergency disaster such as a flu epidemic (Kamuhabwa and Chavda 2009).

It is clear, in the event of any of these pending disasters, hospital emergency departments including the pharmacy would need to have surge capacities to cater for the victims to minimize unnecessary loss of life. We need to assess if hospitals pharmacies **are** currently prepared to deal with an overwhelming sudden influx injured victims or infected individuals. We also need to know if our pharmacies have the protocols and the capacity to mobilize large stocks emergency pharmaceuticals at the drop of a hat as well as deal with disaster victims at the same time without compromising routine activities that cater for in and out patients. It is

important for countries with limited disaster management experience like Tanzania to evaluate their capabilities before a full-blown disaster occurs.

1.10. RATIONALE

Tanzania should not wait for a disaster to happen. It should learn from developed countries experience in disaster management by introducing disaster management plans and protocols with the aim of preserving life and property.

The observations from September 11 event in New York City showed that morbidity and mortality can be well limited in the event of a terrorist attack through rapid and appropriate response. Hence, a shortage of pharmaceuticals or medical supplies during a disaster event would surely contribute to increased morbidity and mortality. In the event this occurs in Tanzania, the valuables gains painstakingly acquired through the years in terms of national health status would be eroded in an instance, as hospital operations may be brought to a standstill when critical supplies are inadequate to meet the increased needs or supply channels are disrupted.

It is therefore important that Tanzania emergency departments including pharmacy develop hospital specific plans for pharmaceutical stockpiling and an increased surge capacity in case of disasters. However, for this to be effective, a study to assess the current pharmacy surge capacity for disaster preparedness of tertiary hospitals is urgently required.

1.11 .RESEARCH QUESTIONS

1. Are there hospital disaster committees? What is their composition? What are its unctions?
2. What are the types, stock levels, and dosage forms of emergency pharmaceuticals stored at pharmacies in tertiary hospitals?
3. What protocols are in place for fast procurement distribution and dispensing of pharmaceuticals in the event of a disaster?
4. Are there procedures to increase the pharmaceutical personnel surge capacity in the event of a disaster?

OBJECTIVES

1.12 BROAD OBJECTIVE

To assess hospital pharmacies' surge capacity for disasters and public health emergencies.

1.13 SPECIFIC OBJECTIVES:

1. To determine the existence of hospitals' disaster management committees, their composition and functions.
2. To determine the existence of emergency stocks of pharmaceuticals and their composition.
3. To determine the existence of individual hospitals protocols for procurement and distribution of emergency pharmaceuticals in disaster events.
4. To assess the emergency pharmaceutical personnel's preparedness and capacity to serve in disaster management.
5. To determine the perceived role of pharmacists in disaster management

CHAPTER TWO

2.0. MATERIALS AND METHODS

2.1 Study Sites

The study was conducted in Dar es Salaam region that is administratively divided into three districts, namely Kinondoni, Ilala and Temke. Ten sites were visited as seen in table 2.1

Table 2.1 Profile of Study sites.

NO	Name of Site	Type of Office	Location	Ownership
1	Prime Minister's Office	Government Office	Ilala	Government
2	Ministry of Health and social Welfare	Government Office	Ilala	Government
3	Tanzania Red Cross Society.	Non-Governmental Organization.	Kinondoni	NGO
4	Muhimbili National Hospital	Health Facility	National Hospital	Public
5	Amana	Health Facility	Ilala District	Public
6	Temeke	Health Facility	Temeke District	Public
7	Mwananyamala	Health Facility	Kinondoni District	Public
8	Aga Khan Hospital	Health Facility	Ilala District	Private
9	Mikocheni Hospital	Health Facility	Kinondoni District	Private
10	Hindu Mandal Hospital	Health Facility	Ilala District	Private

1. One District hospital and one private hospital, which were purposively selected from among health facilities with an active emergency department from each of the three districts. Muhimbili National Hospital was included since it is the national hospital and the main referral hospital for emergency services.

2. Ministry of Health and Social Welfare being one of the ministries involved at national level disaster planning.

3. The Prime Minister's Office (PMO).

4. The Red Cross Society of Tanzania.

2.2 Study Design

The study was cross-sectional which employed guided qualitative in-depth interviews.

2.3 Study Population:

The study population included chief pharmacists and pharmaceutical personnel serving at the emergency departments. Medical officers in charge or medical officers working within the emergency departments were also interviewed to determine if they were satisfied with the role and contribution by pharmaceutical personnel in disasters and public health emergencies. Disaster Planning officials from the Prime Minister's office and Ministry of Health and Social Welfare (MOSHW).

2.4 Sample Size

Sample size of this study was nineteen (19). At least one pharmaceutical personnel, as well as medical officer from each of the 8 selected health facilities and at least one government official from each of the selected government offices.

2.5 Sampling technique

A purposive sampling of all district hospitals in Dar es salaam was done from government health facilities. These included Mwananyamala, Amana and Temeke hospitals. Muhimbili national hospital was included since it the main referral hospital for emergency services.

One private hospital from each district was purposely selected from all private hospitals with emergency departments.

Convenient sampling of personnel was done from all selected health facilities, disaster-planning officials from the Prime Minister's office, Ministry of Health, and Social Welfare (MOSHW) as well as Red Cross personnel who take part in disaster management. Fifteen interviews were done.

2.6 Data Collection Procedure

Data was collected through guided in-depth interviews of participants from seven health facilities, two government officials' from Prime Minister's Office and Ministry of Health and Social Welfare, and an official from Tanzania Red Cross Society. Data was collected over a period of three months.

During the in-depth interview, tape recorder and notes taking were used. The investigator also maintained an assessment journal. After each interview the information obtained were transcribed and translated immediately to obtain meaningful information.

Review of documents on stocks and dosage forms of emergency pharmaceuticals available was also done.

2.7 Study Period

The study was conducted from April to June 2013.

2.8 Data Analysis

The data collected through the guided in-depth interviews included interview summaries, field notes, and tapes recordings. Transcription of the data collected was done within 48 hours after data collection to avoid forgetting of information obtained.

Study variables that were considered for the purpose of this study were:

- ? Demographic data of the pharmaceutical health workers and medical officers who were part of the study.
- ? The existence and composition of emergency stocks of pharmaceuticals.
- ? Knowledge in disaster and public health emergency preparedness and management.
- ? Awareness and experience in managing disaster victims.

- ? Existence and composition of hospital disaster management committees and their function.
- ? The perceived role of pharmaceutical personnel in management of disasters and public health emergencies.
- ? Challenges perceived by the pharmaceutical personnel when dispensing emergency pharmaceuticals.

Data analysis was done manually by coding and analyzing themes. Themes were identified and categorized using content relation analysis, which shows relation between themes and codes. Themes were then identified and ranked in order of frequency.

2.9 Instrument Pre-test

The tool for data collection was Pre-tested in one of the selected health facilities, which was Mwananyamala. Pre-testing was necessary to assess the applicability of the tool if they provided the depth, range, and quality of information required and the likely response rate. Necessary deletions and additions were made on the final tool to obtain the required information. Data collected during pilot test was included in the final report since there were little changes in the final tool.

2.10 Data Validity

To ensure the validity of the data, participants were assured of the aim of the study and their anonymity. The in-depth interviews were held in places where respondents felt comfortable, and the conversations were recorded by using a digital audio recorder. Interviews were transcribed by the investigator within 48 hours of each session. Transcripts were read and re-read several times to familiarize the investigator with the contents before analysis.

2.11 Ethical Consideration

Ethical clearance was sought and obtained from the research and publication committee of Muhimbili University of Health and Allied Sciences (MUHAS) prior to the study. Permission to collect data was sought from the administrators of each health facility and respective ministry as well as government offices involved in the study. Informed consent was sought and obtained from the participants. Participants were informed about the objectives of the study and that their participation was voluntary. Participants were informed that they were free to decline and they were assured that the information provided would be treated with utmost confidentiality.

CHAPTER THREE

3.0 RESULTS

3.1 Demographic profile of the respondents

3.1.1 The Gender distribution of the participants

Majority (11) of the participants were males, who constituted 73 percent as seen in the figure 3.1 below.

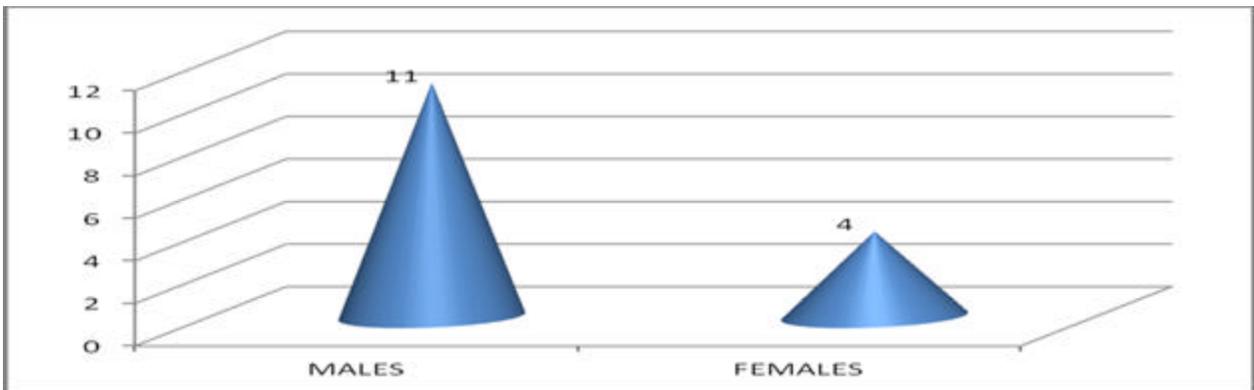


Figure 3.1 Gender Distribution of the Participants

3.1.2 Age distribution of the Participants

The age of participants was grouped in four different ranges, and their distribution is as shown in table 3.1 below.

AGE	RANGE	NUMBER	PERCENTAGE
	Below 30	5	33
	30 – 39	4	27
	40 – 49	4	27
	50 and above	2	13
TOTAL		15	100

Table 3.1 Age Distribution of the Participant

3.1.3 Distribution of Participants by Professional Cadres

The majority of the interviewed personnel were pharmacists 50%, followed by medical doctors 30% as depicted in figure 3.2

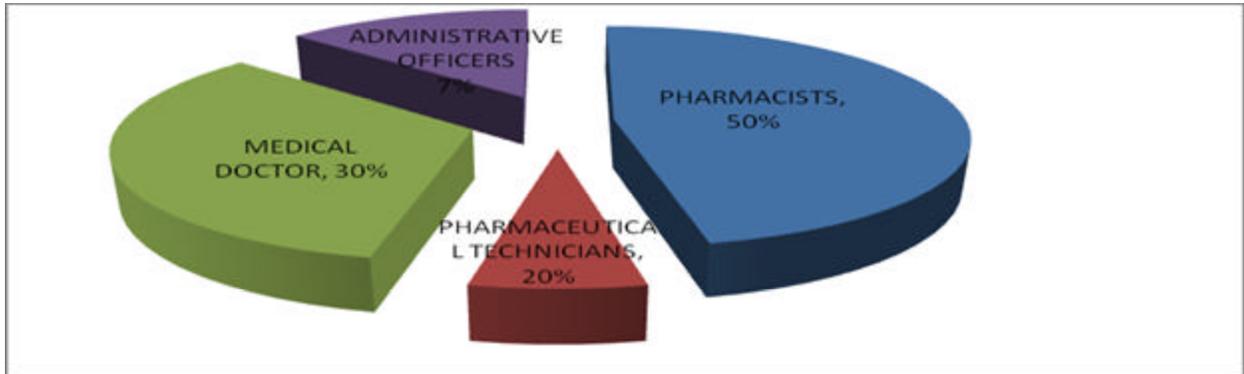


Figure 3.2 Participants' Professions

3.1.4 Work experience of study participants

Most of the study participants (47%) had worked for at least 6 to 10 years as shown in figure 3.3

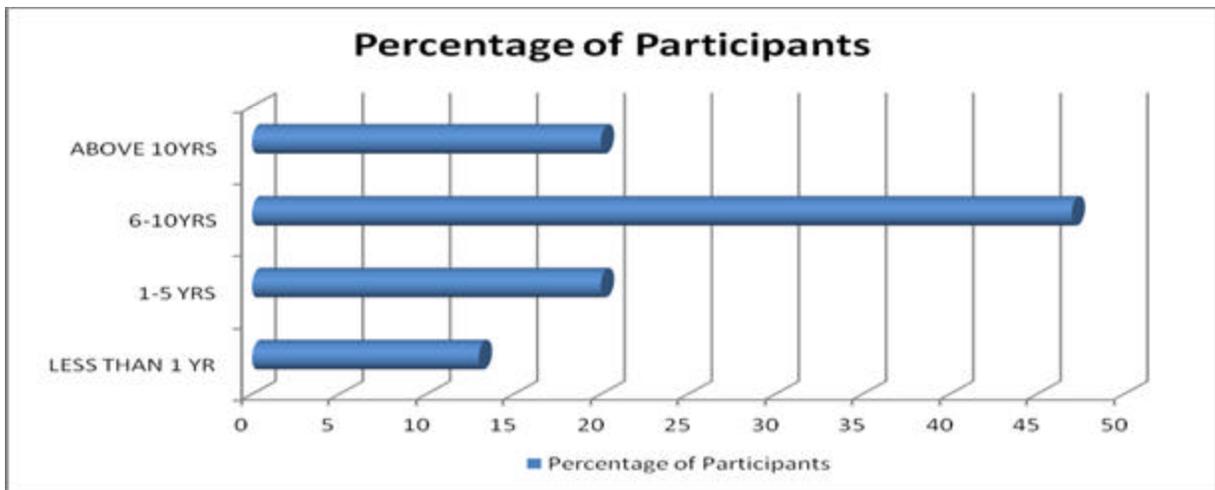


Figure 3.3 Participants work experience

3.2 Awareness to Disaster Terms

3.2.1 Disaster

All participants gave a definition close to the ISDR one. Twelve out of fifteen gave definitions focused on injuries and deaths of a large number of people as seen in the statements below.

“It is any serious event that affects the society, such as floods and earthquakes.”
(Respondent from Mwananyamala)

“It is a catastrophe. Something out of the ordinary that can be natural or manmade.”
(Respondent from Hindu Mandal)

3.2.2 Public Health Emergency

Most of the participants had difficulty in differentiating the term public health emergency from disaster. Some expressed a note of surprise when they were asked to define public health emergencies after defining disasters.

Five out of the fifteen participants defined public health emergencies by associating them to disasters as shown in the narrative below.

“All public health emergencies are disasters but not all disasters are public health emergencies and examples of public health emergencies include road accidents, and epidemics.” (Respondent from Mwananyamala)

Ten out of fifteen respondents referred to it as communicable diseases or epidemics.

“Any surge in disease occurrence, such as cholera due to floods or Malaria during rainfall season.” (Respondent from Hindu Man

3.2.3 Surge Capacity

Thirteen out of fifteen participants made it plain clear that they had never heard of the term. They could only understand the term capacity, which was defined as ability or strength. They tried to define it in the way they understood it.

“It is the overall responsibility of the department in question.” (Respondent from Mwananyamala).

“The capacity to act respons dibly” (Respondent from Mikocheni)

Two out of fifteen participants were able to define the term surge capacity.

“It is the ability to cope with the unexpected influx of patients”. (Respondent from Hindu Mandal)

“Being able to provide quality medical services despite the presence of a large number of patients” (Respondent from Aga Khan).

3.3 Disaster Management Committees

3.3.1 Existence of Disaster Management Committee

The Ministry of health and social welfare has a Health Emergency Preparedness and Response Committee that has pharmaceutical personnel as a permanent member. The following statement summarizes the information from one of the respondents.

“In disaster events, we usually call one of the pharmacists within the ministry to aid in quantification of the require Pharmaceuticals and other medical supplies that may be

required by health facilities. Then these are mobilized from our stores from the Medical Stores Department, usually within 24 hours. They are then distributed to selected government health facilities.” (A member of the Health Emergency Preparedness and Response committee within the ministry of health)

Two of the three visited private health facilities did not have a disaster management committee. The following statement summarizes the information from one of the respondents.

“No, we do not have a disaster management committee. So far, the emergency department deals with all emergency matters. In case of disaster we will have an emergency meeting and decide what to do.” (Respondent from Mikocheni Hospital)

All of the visited government facilities had a disaster management committee but the majority of these committees were only active and meeting during disasters. The following statement summarizes the information from one of the respondents.

“We do not have planned periodic meetings. We usually call an emergency meeting of the committee when disasters strike. Whoever isn’t available has to make sure he/she is represented by someone.” (Respondent from Mwananyamala Hospital)

One of the visited health facility seemed to have a disaster management committee but it was formed a long time ago and it had not met in the past two years. The following statement summarizes the information from one of the respondents.

“We have such a committee and I am one of the members. However, I do not know the head of the committee or the last time we had a meeting. Whoever is the head of this committee needs a reminder of his/her duties.” (Respondent from Temeke)

3.3.2 Composition of Disaster Management Committees

All of the emergency management committees had at least the head of casualty department, the chief surgeon, and the head of nursing department as members. However, not all of them had pharmaceutical personnel as a member.

Four out of five of the visited health facilities that had a disaster management committee had at least one pharmaceutical personnel as a member of that committee. The following statement summarizes the information from one of the respondents.

“Yes. We have a disaster management committee. The chief pharmacist and the head pharmacist for outpatients department are members. One of these represents us in the meetings of this department.” (Respondent from Muhimbili)

However, in one of the health facilities, permanent membership of the pharmaceutical personnel was not considered crucial. The following contention summarizes the information from Respondent from this facility.

“So far so good. Whenever we need a pharmacists input in dealing with an emergency case we can just call him and ask. He is always available. The rest can be managed by the nurses and the doctors.” (Respondent from Aga Khan Hospital)

3.3.3 Availability of Disaster Preparedness Policies, Plans and Protocols

3.3.3.1 Existence of written disaster preparedness plans

None of the visited health facilities had a written disaster preparedness plan. The following contention summarizes the information from one of my respondent.

“Currently there is only a verbal understanding between emergency department staff on what to do in case of patients overloads, such as during disasters. But the written plan is in the making and may be out anytime.” (Respondent from Muhimbili).

3.3.3.2 Pharmaceutical Personnel Recruitment Plan

None of the visited health facilities had a written personnel recruitment plan for disaster and public health emergency.

The only document that was from Muhimbili national hospital was a telephone list of pharmaceutical personnel from within and outside Muhimbili national hospital that could be called upon for recruitment during disasters.

Gongo la Mboto bombings of 2011. *“I was told to go to Muhimbili to help. But we were later told that Muhimbili had enough personnel, thus we should return to Mwananyamala.” (Respondent from Mwananyamala)*

3.3.3.3 Awareness of disaster committee’s plans and protocols by non-members of disaster preparedness committees.

Most of these committees failed to involve other staff members on their disaster management plans. In most of the hospitals, staff members including physicians and pharmacists who were not part of the disaster management committee either had no idea it existed or knew that it existed but had no idea what were the committees plans.

The following contention summarizes the information from one of the respondents.

“I have heard that there is such a committee in this hospital, but I don’t know its members or what they do.” (Respondent from Mwananyamala.)

3.4 Pharmaceutical dispensing units Capacity and Experience

3.4.1 Pharmaceutical dispensing units dedicated for the emergency department

One out of the seven visited facilities had a **pharmaceutical dispensing unit** that was dedicated to serving the emergency department.

“We have one pharmaceutical dispensing unit. It is located within the emergency department and it is run by a pharmacist and a pharmaceutical technician.” (Respondent from Muhimbili)

Six out of the seven visited health facilities did not have a pharmacy unit specialized for the emergency department. The following statement summarizes the information from one of the respondents.

“So far we do not have a pharmaceutical dispensing unit for the emergency department. We do not have enough staff to do that. The emergency department is served by the inpatient pharmaceutical department.” (Respondent from Amana)

3.4.2 Availability of Pharmaceutical personnel for disaster management

Five out of the seven visited health facilities claimed that they do not have enough pharmaceutical personnel. This included all public health facilities.

“We do not have enough pharmaceutical personnel for the current pharmaceutical departments thus we cannot increase the number of departments. It gets worse when we have no interns around.” (Respondent from Amana)

3.4.3 Pharmaceutical Capacity

On average, there was less than one pharmacist per pharmaceutical dispensing unit as seen in table 4.3 below. Only three health facilities had at least one pharmacist per pharmaceutical dispensing unit.

Table 3.2 Pharmaceutical Capacity

NO	Name of Hospital	Pharmacists	Pharmaceutical Technicians	Number Of Pharmaceutical dispensing units
1	Muhimbili National Hospital	13	21	12
2	Amana	1	7	3
3	Temeke	3	8	4
4	Mwananyamala	4	2	3
5	Aga Khan Hospital	1	2	2
6	Mikocheni Hospital	1	4	2
7	Hindu Mandal Hospital	3	8	3
	TOTAL	26	54	

3.4.4 Pharmaceutical Personnel Experience in Disaster Management

All of the government health facilities were well experienced in managing disaster victims. The following statement summarizes the information from one of the respondents.

The 2011 Gongo la Mboto Bombings “There were so many patients that they had to clear the whole reception area as well as the parking lot and use it to stabilize the victims. But most of them were released after a few hours” (Respondent from Amana)

Participants from private health facilities had less experience in attending to disaster victims as seen in the following statement.

“We usually receive few victims and are often instructed to refer them to the nearest government hospital.” (Respondent from Hindu Mandal)

Medical doctors from both government and private hospitals had experience in managing disaster victims.

“We received a few patients from the Gongo la Mboto bombings, but we hadn’t done much for them before we were instructed to refer them to the emergency department of Muhimbili national hospital. Knowing how well equipped that department is, we obliged.” (Respondent from Hindu Mandal)

However, none of the pharmaceutical personnel had ever managed a disaster or public health victim.

“Although I dispense emergency pharmaceuticals, I do not have any extra training in emergency preparedness or management of victims. I am just like any other pharmacist.” (A participant from Muhimbili)

3.4.5 Personnel Awareness to Disaster Preparedness Training

To most of the participants, disaster preparedness training meant either first aid training or emergency management of victims. Very few of them associated the term with the overall facility plans and protocols, which are to be applied during disaster management.

Muhimbili national hospital was the only health facility whereby all of the participants were aware of hospital conducting training in disaster preparedness although some of the participants revealed that it only involved other health workers.

“It only involved doctors and nurses from the emergency department, pharmaceutical personnel being excluded. Training is usually done and funded by the Abbot Fund.” (Respondent from Muhimbili)

There was however, mixed responses about disaster preparedness training from both government and private health facilities. For example, in Mwananyamala a dispensing pharmacist had no idea if there was any training on emergency preparedness while the chief pharmacist assistant knew it existed. This was because often only members of the disaster preparedness committee had received some first aid training from staff members from Muhimbili who had visited once.

“There are no enough pharmacists to manage drug dispensing during disasters thus it is difficult to think of training them for other roles. When we have enough pharmacists and dispensing goes smoothly, then we can start thinking of training pharmacists in emergency techniques. (Respondent from Amana)

4.4.6 The Perceived Role of Pharmaceutical Personnel in Disaster Management

All of the medical doctors perceived pharmaceutical personnel as medicines dispensers and added that they are satisfied with the current role of pharmacists being drug dispensers as seen in the quotation below.

“I don’t expect to see a pharmacist aiding in managing victims like a doctor or a nurse or other first responders. They are not trained in that field and that training will be very expensive. I am satisfied with their current role. We also have enough first responders and other medical personnel for that. That will not be different from the current practice of police officers aiding in moving and helping accidents victims. They usually end up moving victims with broken bones or other conditions thus worsening the situation.” (Respondent from the Ministry of health)

Five out of nine pharmaceutical personnel were comfortable with the role of drug dispenser. The following statement summarizes the information from one of the respondents.

“For the medical field to work, we each must assume our roles and not interfere with others. Our role is to dispense and manage medicines.” (Respondent from Temeke.)

On the other hand, the other half thought they could do more, many as a result of personal tragic experiences as seen in the quotations below.

“I once nearly lost a child to Malaria simply because there was no nurse available to administer quinine to my child, and I couldn’t do it myself. I had the injection in my hand but I could not do anything. I have never felt so helpless in my life.”

“I almost lost a brother who was asthmatic. He visited me and had an attack at night. My whole family was disappointed that I could not administer it so we had to rush him to the nearest health facility. By the time we reached there, his condition had worsened. Thank God he survived.” (Respondent from Temeke)

3.5 Management of Emergency Pharmaceuticals

3.5.1. Stockpiling of Emergency Pharmaceuticals

None of the health facilities maintained a special stock of medicines for disasters. In most cases, the pharmacy department had a list of drugs that should never run out of stock, in case of disasters.

“We sat together with the doctors and the nurses and developed a list of medicines that should always be present at the emergency pharmacy. Before the hospital runs out of these medicines, the Abbot funds provided funds for replacements. We started with a few drugs but now they are many. More drugs are added to the list whenever necessary.” (Respondent from Muhimbili)

Only one of the visited facilities had a written list of medicines that were usually under close watch and never out of stock. The list included 108 medicines. This list had almost all of the

important medicines especially those, which will be used to cater for a natural disaster such as cholera outbreak due to floods and all-important antidotes for managing a chemical disaster such as Ammonia or Nitrogen Oxide. However, the list was inadequate with regards to coping with a biological warfare attack such as anthrax. The list did not include vaccines or oral formulations of Doxycycline and ciprofloxacin that could be used for post exposure prophylaxis. See list in Appendix vii.

Six out of seven of the visited health facilities did not maintain a written list of emergency pharmaceuticals. They all had a verbal agreement on which medicines should never be out of stock. The following contention summarizes the information from one of the respondents.

“We usually inform the new interns and new employees not to finish all medicines, especially the infusions and antidotes. Who knows, a high official in the government may be in an accident and may need them. We are all pharmacists, so we all have some idea on which drugs should always be available.” (Respondent from Temeke)

3.5.2 Management of Dispensed Emergency Pharmaceuticals

In three out of the four government facilities, there was lack of control and documentation on the consumption of the dispensed emergency pharmaceuticals.

“We usually give priority to the emergency department. All the other wards will have to wait until we finish their list. However, we have no means of following up on the consumption of these medicines. We just trust that the doctors are using them accordingly.” (Respondent from Mwananyamala)

“Sometimes the hospital runs out of prescription papers or requisition and issue books that the doctors end up using any piece of paper they find.” (Respondent from Mwananyamala)

The remaining hospitals including Muhimbili national hospital had proper record keeping and stock control methods. The following contention summarizes the information from one of my respondent.

“We maintain a small stock of emergency pharmaceuticals within the emergency department. The Doctors control these. Whenever a patient uses these drugs, the prescription is brought to the pharmacy and thus the medicines are replaced. This way all the medicines are accounted for.” (Respondent from Mikocheni hospital)

3.5.3 Storage and Distribution Areas for Emergency Pharmaceuticals

None of the visited health facilities had designated an area for storage of emergency pharmaceuticals in case of disasters and public health emergencies. They claimed that they would store those medicines with the usual stock of medicines.

“We do not have enough storage area but we have to manage with what we have. In case we receive large stocks of medicines, we will just find a less busy corridor and store them there. The ones which are sensitive to heat will then have to be forced into the current storage areas.” (Respondent from Temeke)

3.6 Challenges perceived by pharmaceutical personnel when dispensing emergency pharmaceuticals

The challenges that faced or anticipated by pharmaceutical personnel in management of disaster and public health victims were identified into the following themes:

3.6.1 Lack of Training

All pharmaceutical personnel mentioned lack of training as a challenge. They openly pointed out that they have low knowledge on how to deal with disaster victims which in turn affects

their performance during disasters. They usually have to wait for instructions from their fellow workers on how to proceed.

“If I had a bit of training in disaster management at least I will know which medicines and items are more likely to be used in different situations thus I will make sure they are always available. It would also help me in calculating their consumption during disasters.”
(Respondent from Temeke)

“I do not have confidence in dispensing emergency pharmaceuticals. I just dispense according to the list I get from the doctors. Sometimes I make mistakes especially in giving out some of the medical instruments that are stored in the pharmacy. ” said Respondent from Mwananyamala.

3.6.2 Emergency pharmaceuticals Being Out of Stock

Another common challenge mentioned by government hospital staff was emergency pharmaceuticals and medical equipment being out of stock from the Medical Stores Department. The situation was so serious that most government hospitals have adopted a system of using part of their income to buy medicines from wholesalers or local industries. However, this budget is for all medicines and not specific for emergency pharmaceuticals.

“When emergency pharmaceuticals are out of stock, other medical personnel usually blame the pharmaceutical personnel. But they forget that there are other offices involved, like the procurement office.”

3.6.3 Lack of Special Pharmaceutical dispensing units for Emergency Departments.

Lack of special pharmacy units for emergency departments was the major challenge mentioned by all pharmaceutical respondents. The following contention summarizes the information from one of the respondents from Temeke.

“In disaster situations, the emergency department usually ends up ordering large quantities of emergency pharmaceuticals which have to be supplied fast. In order to save lives, the dispensing pharmacist has to give this department priority over other departments. Thus, the longer the list and amount of medicines ordered, the longer other departments have to wait before they receive their requirements. This disrupts the normal smooth running of other hospital departments.” (Respondent from Temeke)

3.6.4 Availability and Reliability of Transport for Emergency Pharmaceuticals

This challenge was also very common among respondents from government health facilities. Although most of the times these hospitals are allocated a portion of emergency pharmaceuticals during disasters, transport of the allocated pharmaceuticals to respective hospitals is usually a problem. The following contention summarizes the information from one of the respondent.

“The transport vehicles are few and are used by all departments of the hospital. And even when the trucks are finally sent for the drugs, traffic jams may cause delays.” (Respondent from Amana)

However, none of the respondents mentioned lack of disaster preparedness policies, plans, and protocols as a challenge.

CHAPTER FOUR

4.0 DISCUSSION

This is the first study in Tanzania to assess hospital pharmacies' surge capacity for disasters and public health emergencies. The study found that there are a number of issues that need to be addressed by pharmacy units in order for them to be disaster prepared including;

4.1 Knowledge on Disaster Preparedness

As previously defined, surge capacity encompasses the overall ability of the hospital to manage the large inflow of patients from disaster without affecting the normal running of the hospital (Dayton et al, 2008). In order to be able to grasp the concept of surge capacity, a comprehensive understanding of disaster preparedness by health personnel is needed. From this study, it is clear that there is a lack of knowledge with regard to disaster preparedness among the health personnel in Dar es salaam tertiary health facilities. These results call for an urgent comprehensive training of the hospital management, personnel and in particular the disaster committees on disaster preparedness. It is only through proper training and awareness campaigns on disaster preparedness, that hospitals will be able to effectively implement strategies that will prepare them to cope with disasters. Without proper disaster preparedness training particularly for pharmacists, pharmacist will not be able to plan, procure stock and dispense the correct pharmaceuticals in the disaster events. With adequate knowledge, hospital pharmacist will be able to prepare appropriate standard operating procedures (SOPS) for emergency preparedness procedures such as repacking of the medicines for ease distribution, additional personnel recruitment and emergency stock management. Comprehensive disasters knowledge and preparation is required for future training of Tanzanian pharmacists in preparedness. Tanzanian pharmacists not only need to be able to cater for victims of natural disasters but need also training for disaster victims of nuclear, biological, or chemical (NBCs) weapons. In these events, hospital pharmacies will be required

to provide antidotes, antibiotics, antitoxins, and other pharmaceuticals in large amounts and/or have the capability for prompt procurement. It is therefore imperative that current and future practicing pharmacists acquire knowledge on the therapies related to e.g., cyanide gas, serine, anthrax, botulism, and other possible NCBs (Burda et al 2004).

4.2 Disaster Management Committees /Teams

Disaster Management Committees are the main actors in ensuring smooth running of hospitals during disasters. They have the duties to prepare protocols and plans to guide staff during disasters. According to the UNDP guidelines for hospital emergency preparedness planning, formation of a disaster committee is the first step towards making a disaster plan for the hospital (GOI-UNDP DRM 2008).

Although most (5/7) of the visited facilities had disaster management committees, the majority of these committees were inactive, meeting only during disasters. As a result, most of these committees did not have documentation of their meetings nor had they developed documents related to hospital plans, procedures, and Standard Operating Procedures that could be used by their respective health facilities during disasters and emergencies. Availability of written plans and procedures for additional personnel recruitment, personnel duty allocation and emergency pharmaceuticals stocking, emergency pharmaceutical procurement, distribution and dispensing procedures are crucial documents for the effective management of disasters by disaster team.

Not only did disaster committees lack written protocols but also failed to inform other health personnel about their duties and activities. In disaster preparedness, demarcating clear lines of commands and communication is essential for timely and smooth execution of procedures. Lack of proper communication channels and documented protocols and procedures leads to chaos and confusion. When questions arise during disasters or emergencies on who is in charge? What should be done, and in what order should it be done,

delays become inevitable. Any delays in procuring, dispensing, and distribution of pharmaceuticals during disasters or emergencies may lead to unnecessary morbidity and mortality of the victims being attended. A bitter lesson learnt from the September 11 disaster of 2001 (Gaudette et al 2002).

The issue of whether a pharmacist should have a permanent role on the disaster management committee is a debatable issue even among pharmacists themselves and the idea seems very objectionable to doctors.

This view is in contrast to the global view of competency training of today's pharmacists. More and more countries are requiring that pharmacist be trained for disaster preparedness. This training is both for natural and manmade disasters such as hurricanes and biological warfare (Feret et al 2005, Burda et al 2004, Moore et al 1997). A well-trained pharmacist can aid the rest of the medical personnel who most likely to be over stretched in the event of a disaster. A simple first aid technique performed by a pharmacist may save a life (Ferris et al 2010; Hogue et al 2009). Currently in Tanzania, there are approximately 3 doctors and 39 nurses and midwives per 100 000 population (MOHSW, 2006). With the current population of Tanzania of around 46 million, it is clear we cannot continue to depend on only nurses and doctors in emergencies (NBST, 2012). It is high time that pharmacists in Tanzania be trained in basic life support plus vaccination so that they can effectively assist in disasters, particularly with view that Tanzania has huge crises in Human resource for Health (HRH) (Kwesigabo et al, 2012).

4.3 Pharmaceutical Dispensing Units Capacity and Experience

The inclusion of a pharmacist in the emergency department, is an idea generated from the need for inter professional collaboration as recommended by the 2006 Institute Of Medicine of the national academies (IOM) report on hospital based emergency care (Witsil et al, 1997). For health facilities to be compliant with disaster preparedness, all hospitals should have such

units. Lack of these units prompts delays in the emergency departments acquiring pharmaceuticals and disturbs the routine dispensing of in and out patient hospital pharmacies that may result in additional casualties. Having a pharmaceutical dispensing unit with a trained pharmacist dedicated to deal with emergencies and disasters, ensure accurate dispensing of pharmaceuticals for the specific event and improves the quality of care. As was reflected in recent study by Rollin et al in 2007, which showed that 99% of nurses and physicians felt that the presence of dedicated pharmacists within the emergency department greatly improved the quality of care in the emergency departments.

Only one health facility in our study had an emergency pharmaceutical dispensing unit dedicated for emergencies. The major barrier for the other health facilities for not establishing dedicated pharmaceutical dispensing units for emergencies and disasters was clearly lack of sufficient pharmaceutical personnel. This lack of sufficient pharmaceutical personnel is a direct reflection of the low pharmacist to patient ratio of 1:50,000 in Tanzania, as compared with the WHO recommended ratio of 1:2000 (NBST NBS Tanzania and ICF Macro, 2011). Lack of sufficient personnel is a huge challenge for disaster preparedness in Tanzania. In the event of a disaster, the large influx of patients would not only strain the few staff available but would result in a disruption of the routine hospital in and out patient services. This could result to unnecessary mortality and morbidity of both in and out patients as all resources including drugs, equipment, and personnel are being diverted to handle the disaster victims. The lack of HRH seems to be a common problem in African countries. An assessment on effect of hospital staff surge capacity on preparedness for a conventional mass causality event in South Africa showed that the vacancy rate for advanced emergency care personnel was 66.8%. With vacancy for medical practitioners ranging from 23.5% to 25.5% for pharmacist at 33.1% and that of Pharmacy assistants at 42.6 % (Wetzel et al, 2010). Lack of emergency HRH particularly pharmacist needs to be urgently addressed in Tanzania so that we can prepare for disasters. A study by Kamuhabwa and Chavda in 2009 clearly emphasizes this point in its recommendations that the government needs to strengthen the health-care systems in terms of

health personnel as well as medical and laboratory supplies to effectively deal with public health emergencies.

A comprehensive and long-term solution for this problem would be to increase the training capacity of health institutions to produce sufficient numbers of pharmacists. However for the time being short term measure could include; recruiting retired staff, medical and pharmacy university students to volunteer and assist in disasters (WHO Hospital emergency response checklist, 2011). These may be a very useful resource for simple tasks such as re-packing and labeling of medicines. Nevertheless having large numbers of pharmacists is only part of the solution of being disaster prepared. For an emergency and disaster preparedness system to function effectively, they need not only an increase in the available numbers of pharmacists that can be called upon. They need to have proper and specialized disaster training, so they can feel confident to help in disaster victims' management. Specialized skills are crucial for a pharmacist to provide rapid and effective pharmaceutical care during a disaster due to the unique circumstances and challenges presented during such crisis. (Laura et al, 2011).

Historically, the pharmacist role during disaster has been to dispense the required medicines and medical equipment as required by the rest of the medical personnel to maintain smooth running of the hospital environment. This included receiving the emergency pharmaceuticals, repacking them if needed, distributing them to the required places, and if possible, supervise their use in managing disaster victims. However, of recent there has been an evolution on the role of pharmacists, especially during disasters. Recently, pharmacists have taken an even larger step in patients' management by aiding in administering antidotes and vaccines to their fellow staff before they take part in managing disaster victims to prevent them from being infected. In other situations, pharmacists have even acted as part of the first responders and have aided in stabilizing victims, moving them to safe areas, calming them down and counseling them (Hogue et al, 2009). Furthermore, some countries have provided their pharmacists with the ability to prescribe some medicines, even in the absence of doctors to reduce the doctors' loads in patient overloaded disaster stricken areas (Leslie, 2012).

The need to train pharmacists in basic life support skills cannot be over emphasized. This exercise should be given immediate attention.

4.4 Management of Emergency pharmaceuticals

Maintenance of a written list of emergency pharmaceuticals is crucial for smooth running of the emergency departments during disasters. Lack of such written lists may result in the emergency department and health facility lacking some essential emergency pharmaceuticals. For effective and smooth running of the emergency department, the list of the emergency pharmaceuticals needs to be all-inclusive to deal with all types of disasters and public health emergencies. Unfortunately, most of the facilities in our study did not even have such a list. The only facility that had such a list was MNH. Nevertheless, the MNH list was still not complainant for the needs of a biological warfare attack such as anthrax as the list did not contain oral formulations of Ciprofloxacin and Doxycycline, which are crucial for long-term management and prophylaxis of anthrax (Stern 2008). For the largest national hospital in Tanzania to lack emergency pharmaceuticals against biological hazards is a serious setback for Tanzania in terms of pharmaceutical disaster preparedness.

Due to lack of emergency pharmaceuticals lists, these health facilities fail to adequately stock emergency pharmaceuticals thus they remain dependant on Medical Stores Department to supply the emergency pharmaceuticals within twenty-four hours of disaster or public health emergencies. It is a known fact that quite often MSD runs out of stock of essential pharmaceuticals required in (Kagashe and Massawe 2012). The lack of emergency pharmaceutical lists also affects the development of plans for procurement of emergency pharmaceuticals elsewhere including local pharmaceutical industries and wholesalers. In addition to this rapid procurement of emergency pharmaceuticals is further hampered by lack of specific budgets allocated to emergency pharmaceuticals by health facilities.

Even if facilities had emergency lists, the lack of standard operating procedures for procurement, storage, distribution, and dispensing of emergency pharmaceuticals would lead to mismanagement of the limited available emergency pharmaceuticals. It is a surprise that in this era of science and technology, hospitals in Dar es salaam do not have computerized systems for stock management. Hospitals are still using loose pieces of papers as prescriptions. These pieces of papers can easily be lost or misplaced. As a result, pharmaceuticals dispensed during disasters cannot be properly accounted for. This situation is made worse by the lack of designated areas for storage and distribution of emergency pharmaceuticals. Without having proper, allocated areas for such activities, there is room for misplacement and mishandling of emergency pharmaceuticals, which may lead to obliteration, theft, and fraud. If there was proper, plans and protocols in place mismanagement of emergency pharmaceuticals will be minimized.

4.5 Study Limitations

1. The study was not able to get the views of all doctors in charge, pharmacists, and nurses of the emergency departments. Their views may have given more insight on challenges to disaster preparedness
2. Military hospitals and Medical Stores Department refused to be part of the study.
3. Difficulty in obtaining clearance from government offices and hospitals administration

CHAPTER FIVE

5.0 CONCLUSION AND RECOMMENDATIONS

5.1 CONCLUSION

Currently hospital pharmacies in Dar es salaam have limited surge capacity to cater for natural and manmade disasters. This is due to lack of knowledge, available pharmaceutical personnel, training, and appropriate emergency plans and protocols. In addition to this, there is negative perception of the pharmacists' role in disaster preparedness by pharmaceutical personnel and medical officers, inactive hospital disaster management committees, lack of specialized emergency pharmaceuticals' dispensing units as well as poor management of the scarcely available emergency pharmaceuticals.

5.2 RECOMMENDATIONS

1. Ministry of Health and Social Welfare should formulate a clear plan of action to ensure skilled staffs are available. This is by facilitating the Schools of Pharmacy in the country to enroll more students and revise their curricula accordingly to incorporate basic life saving skills such as first aid and disaster preparedness modules in their curriculum. This will guarantee production of competent pharmacists.
2. Ministry of Health and Social Welfare should conduct continuous education programs for in service medical personnel on basic life saving skills for all government and private health facilities.
3. The Prime Minister's Office and Ministry of Health and Social Welfare should, in collaboration with other stakeholders should prepare a set of regulations to govern the

tertiary health facilities, both public and private the health facilities in disaster preparedness.. These regulations should ensure that health facilities have active hospital disaster preparedness committees, written and well-known disaster management plans and special budgets for disasters.

4. Ministry of Health and Social Welfare and hospitals should also collaborate with local pharmaceutical industries and suppliers to ensure proper stocking of emergency pharmaceuticals instead of always depending on Medical Stores Department.
5. Ministry of Health and Social Welfare and hospital administrations should ensure the availability of computerized inventory control systems at the health facilities and ensure effective utilization of such tools.

6.0 REFERENCES

1. Achiando, H 2012 *Disaster Management And Preparedness: An Action Plan*
http://EzineArticles.com/expertHarold_AchiandoArticleSource
2. Aljazeera Online Newspaper 2011, *Dar es Salaam's regional commissioner Aljazeera*
(newspaper online) Dec 22, 2011 available at
www.aljazeera.com/news/africa/2011/12/20111222221140630417.html
3. Bates W, Spell N, Cullen D et al 1997. *The costs of adverse drug events in hospitalized.*
Journal of American Medical Association. 1997 ;277(4):307-1
4. Bodansky, Y 1999 *Forum (Rocklin, CA); Report of the Accountability Review Boards on the Embassy Bombings in Nairobi and Dar es Salaam on August 7, 1998, Bin Laden: the Man Who Declared War on America, January 1999,*
(http://www.fas.org/irp/threat/arb/accountability_report.html)
5. Burda M and Sag T. 2004 *Pharmacy Preparedness for Incidents Involving Nuclear, Biological, or Chemical Weapons.* *Journal of Pharmacy Practice* August. vol. 17 no. 4 251-265
6. Center For Hazards and Risk Research at Columbia University 2005, *Tanzania Natural Disaster Profile* <http://www.ldeo.columbia.edu/res/pi/CHRR/>
7. Costella,C, Machume, E, Manjolo, 2009, “*Building Resilient Communities: risk Management and Response to Natural Disasters through Social Funds and CDD operations*’ Toolkit: Natural Disaster And Crises Response By The Tanzania Social Action Fund;World Bank.
8. Eric Jacob Stern Kristin Broome Uhde Sean Vincent Shadomy and Nancy E. Messonnier 2008 *Conference Report on Public Health and Clinical Guidelines for Anthrax* 800-CDC-INFO (800-232-4636).
9. Fairbanks J, Hildebrand M, Kolstee R et al 2007 *Clinical Pharmacists in Emergency Medicine* Bookshelf ID: NBK43767 PMID:21249962.

10. Feret B, Bratberg J, Cordy C et al 2005. Establishment of a Pharmacist Consulting Team for Statewide Bioterrorism Preparedness. *Prehospital and Disaster Medicine / Volume 20 / Supplement S3 / October 2005*, p
11. Ferris, D 2010, *Pharmacist's assistance after Haiti earthquake* American Journal of Health System Pharmacy July15;67(14):p1138, 1141.
12. Gaudette R, Schnitzer J, George E and Briggs S, 2002 Lessons Learned From the September 11th World Trade Center Disaster: Pharmacy Preparedness and Participation in an International Medical and Surgical Response Team .*Pharmacotherapy*. 2002;22(3)
13. Guha-Sapir, D., Hargitt, and Hoyois, P, 2004 *Thirty Years of Natural Disasters 1974-2003: The Numbers*. . Centre for Research on the Epidemiology of Disasters. ISBN : 2-930344-71-7 Pg 13
14. Hayward, M 2003 *Pre-hospital response to major incidents*. Nurse Standard April 9; 17 (30) p37-40. Available from: E:/EntrezPubMed.h
15. Hick, J.L, Hanfling, D.G., Burstein, J.L., DeAttley, C., Barbisch, D., Bogdan, G.M., et al. 2004 *Health care facility and community strategies for patient care surge capacity*. *Annals of Emergency Medicine*, 44, p253-261.
16. Hogue MD, Hogue HB, Lander RD, Avent K, Fleenor M 2009 *The nontraditional role of pharmacists after hurricane Katrina: process description and lessons learned*. *Public Health Rep*.2009 Mar-Apr;124(2) p217-23.
17. James, B 2012, *Marine Disasters earn Tanzania dubious distinction*, The Citizen July2012 available at <http://www.thecitizen.co.tz/news/4-national-news/24427-marine-disasters-earn-tanzania-dubious-distinction.html> 2012
18. Jorgic, N Ng'wanakilala ,F. 2012 (Online Newspaper) (Reuters) - Muslim Protesters Clashed With Police In Tanzania's Commercial Capital And On The Semi-Autonomous Island Of Zanzibar On Friday, Raising Religious Tensions In The East African Country. Stone Town/Dar Es Salaam | Fri Oct 19, 2012.
19. Kagashe GAB, Massawe T. 2012 *Medicine Stock Out And Inventory Management Problems In Public Hospitals In Tanzania: A Case Of Dar Es Salaam Region Hospitals* *International Journal of Pharmacy* pg 252-259.

20. Kamuhabwa.A,Chavda,R 2009, *Health-care providers' preparedness for H1N1/09 influenza prevention and treatment in Dar es Salaam, Tanzania* Journal of Infection in Developing Countries 2012; 6(3) p262-270.
21. Kimati,B 2012 Tanzania: *Ubungo Gas Plant - A Ticking Time Bomb* *Allafrica* [online newspaper} 25 March 2012 available at <http://allafrica.com/stories/201203250300.html>
22. Kwesigabo G, Mwangu MA, Kakoko DC, Warriner .I et al. 2012 *Tanzania,s health system and workforce crisis*. Journal of Public health policy 33, 35-44.
23. Laura L.et al 2011 *Pharmacist readiness roles for emergency preparedness* Am J Health-Syst Pharm; 68:620-3.
24. Lechat M. 1979 *Disaster and Public Health*: Bulletin of the World Health Organization, 1979 57(1):11-1.
25. Leslie K 2012 *Pharmacists in Ontario can give flu shots and renew non-narcotic prescriptions* Toronto The Canadian Press
<http://www.theglobeandmail.com/news/politics/pharmacists-in-ontario-can-give-flu-shots-and-renew-non-narcotic-prescriptions/article4598872/>
26. Mason, B 2002, *Tanzania's worst ever rail crash* World Socialist Web available at <http://www.wsws.org/articles/2002/jul2002/tanz-j02.shtml> 2 July 2002.
27. Matari, E 2006. *Tanzania Meteorological Agency Presentations and Abstracts for the Climate and Land Degradation Workshop Arusha, Tanzania 11-15 December 2006* Effects of Some Meteorological Parameters on Land Degradation in Tanzania
28. Moore, et al 2004 *After Hurricane Floyd Passed: Investigating the Social Determinants of Disaster Preparedness and Recovery* Family and community health. Volume 27 p 204-217.
29. National Bureau of Statistics (NBS) (Tanzania) and ICF Macro. (2011) *Tanzania Demographic and Health Survey 2010*. Dar es Salaam, Tanzania: National Bureau of Statistics and ICF Macro, <http://www.measuredhs.com/publications/publication-fr243-dhs-final-reports.cfm>.

30. Nkwame, V 2008 '*Ghost miners' haunt Mererani disaster*. The Arusha Times April 5-11 2008 issue 0856-9135 <http://www.arushatimes.co.tz/2008/13/frontp1>
31. Norman et al 2012 *Hospital All-Risk Emergency Preparedness in Ghana* Ghana Med Journal. 2012 March; 46(1): p34-42.
32. Pedersen A et al 2003, *Pharmacists' opinions regarding level of involvement in emergency preparedness and response*. J Am Pharm Assoc 2003 Nov-Dec;43(6):694-701
33. Smith WM 2009 *A white paper prepared for the June 10-11, workshop on medical surge capacity hosted by the Institute of Medicine Forum on Medical and Public Health Preparedness for Catastrophic event*. Emergency Preparedness, UPMC Pg4
34. Stern J, Broome, Uhde B, Shadomy V, Messonnier, E. 2008 *Conference Report on Public Health and Clinical Guidelines for Anthrax* Volume 14, Number 4—April 2008
35. Tang, C, Sporrang, K, and Bergström, I (2008): *The Role of Pharmacists in Asia and Africa -A Comparative Study to the UK and Sweden*. Uppsala Universitet, Institut Fur Farmaci Pg 2
36. Teri R, Juma M, Hendry S, Michael R, and Victor M 2012 *Emergency care capacity in Africa: A clinical and educational initiative in Tanzania*. J Public Health Policy. 2012 December; 33(S1): S126-S137
37. ISDR Secretariat 2004 *Terminology: Basic terms of disaster risk reduction* http://www.unisdr.org/files/7817_7819isdrterminology11.pdf
38. UNISDR Report 2011 *Global assessment report on disaster risk reduction :Revealing risk, redefining development*
39. Welzel B, Koenig L, Bey T, Visser E 2010 *Effect of hospital staff surge capacity on preparedness for a conventional mass casualty event*. West J Emerg Med May;11(2):189-96.

40. Westerhof 2010, *Tanzania: New cholera outbreak: 4 die AFP / News24*(newspaper online) 8 December 2010 Posted on December 9, 2010 available at <http://washafrika.wordpress.com/2010/12/09/tanzania-new-cholera-outbreak-4-die/>
41. WHO 2002 *Meningococcal disease in the Great Lakes area (Burundi, Rwanda)* Global Alert and Response (GAR)
42. William M. 2009 *A white paper prepared for the June 10-11, 2009 workshop on medical surge capacity hosted by the Institute of Medicine Forum on Medical and Public Health Preparedness for Catastrophic event.* Emergency Preparedness, UPMC
43. Witsil J, Aazami. R, Murtaza I, Hays D, Fairbanks R 2010. *Strategies for implementing emergency department pharmacy services: Results from the 2007 ASHP Patient Care Impact* Am J Health-Syst Pharm—Vol 67 Mar 1, 2010
44. World Health Organization Regional Office for Europe 2012. *Hospital Emergency Response Checklist: An all hazards tool for hospital administrators and emergency managers.* <http://www.who.int/heli/risks/urban/transpdirectory/en/index6.html>

7. APPENDICES

APPENDIX I

DATA COLLECTION TOOL FOR ASSESSMENT OF HOSPITAL PHARMACIES' SURGE CAPACITY FOR DISASTERS AND PUBLIC HEALTH EMERGENCIES (PHARMACIST IN CHARGE AND MEDICAL OFFICER IN CHARGE)

Code No..... Name of Health facility.....() Public () Private

Sex.....Age (in years)Professional status.....

Academic Qualifications.....

A. Experience

1. How long have you worked in this hospital
2. What do you understand by the terms Disaster and Public Health Emergency? Describe
 - a) List the types of disasters that could occur in Tanzania.
 - b) List the types of Public Health Emergencies that could occur in Tanzania?
3. What do you understand by the term Pharmaceutical Stockpiling?
4. Has your Hospital ever participated in managing disaster or public health emergency victims? If Yes describe
5. Have you ever personally attended to disaster and public health emergency victims? If Yes, for what disaster or public health emergency? When?
6. What do you understand by the term Surge capacity?

B. Training for Hospital Personnel

7. Have you ever heard of disaster preparedness training? If yes, elaborate.
8. Are you aware of your hospital conducting training in Disaster Preparedness?

If yes:

- a. When was the last training provided?
- b. Who is being trained?
- c. Is training mandatory?
- d. How often is in-service provided?

- e. Who provides this training to your hospital staff?
- f. What type of training was provided?
- g. Is the training in-house or outsourced?

C. Personnel Capacity

9. How many pharmaceutical personnel are working in your hospital? And what are their qualifications.
10. How many pharmaceutical personnel are currently working in the emergency department? And what are their qualifications?
11. How many pharmaceutical personnel have been trained in disaster management?
12. Does your hospital have guidelines and protocols to recruit more pharmaceutical personnel in the emergency department in the event of disasters? If yes, where would you acquire the additional staff?
13. What do you think is the role of Pharmaceutical personnel in disaster management?
14. What additional skills and expertise should pharmaceutical personnel acquire to improve their usefulness in disaster management.

D. Pharmaceutical Stockpiling

15. Does your hospital have a stock of pharmaceutical specifically designated for Disaster or Public Health Emergency?
16. What pharmaceutical items make up the emergency stockpile?
17. Is there a portion of these drugs and pharmaceutical items designated for use on hospital personnel?
18. Is there a portion of this stockpile reserved for use by the community?
19. Where are these supplies stored?
20. Who is in charge in issuing the use of these emergency pharmaceutical items?
21. Are there Standard Operating Procedures (SOPs) or protocols that are used to initiate use of this stockpile? (ask for evidence)
22. Are there protocols for replenishment of this stock?

23. How long would it take to replenish these supplies if they were used?
24. From where would get pharmaceuticals to replenish the used emergency stocks during a disaster?
25. How often are the protocol and plans for use and replenishment updated?
26. Have you ever received emergency pharmaceutical supplies from the government, NGOs, Private pharmacies or Others, Specify.....
27. Do you have other areas of the hospital designated for emergency storage and distribution of emergency pharmaceuticals (e.g., an auditorium, lobby) in the event of a declared disaster? If yes:
 - a) Where are these areas located?
 - b) Do these areas provide proper storage conditions of pharmaceuticals?
 - c) Do you have a mechanism to provide security to pharmaceuticals stored in this areas?

E. Management Policies, Plans and Protocols

28. Does this hospital have a disaster management committee? What is its composition and functions?
 29. Is there an emergency preparedness plan at your hospital that you are aware of to address mass casualty incidents
 30. Is there an emergency preparedness plan at your hospital that you are aware of to address mass casualty incidents specifically involving;
 - a) Natural disasters
 - b) Chemical disasters
 - c) biological agents disasters
 - d) Public health emergencies like Cholera, Influenza outbreaks?
- If yes:
- a. How frequently is this facet of your plan exercised and updated?
 - b. What was the date of your last exercise?
 - c. How is your disaster/public health emergency plan initiated?

- d. How are hospital personnel and medical staff within the hospital notified about the plan's initiation?
- e. How is affiliated medical staff notified about the plan's initiation?
- f. How does the hospital monitor staff's knowledge of the plan?

F. Challenges

- 31. What challenges have you encountered or do you anticipate in management of disaster and Public Health Emergencies victims?
- 32. What are your recommendations for the improvement of pharmaceutical surge capacity?
- 33. Do you think hospital pharmacies have the surge capacity to handle disasters and PHE?
 - a) If Yes Why?
 - b) If No Why?

**STOCK STATUS ASSESSMENT FORM FOR SELECTED LIST OF EMERGENCY
PHARMACEUTICALS AND PHARMACEUTICAL ITEMS**

ITEM	DOSAGE FORM	QUANTITY ON HAND	EXPIRY DATE

APPENDIX II**DATA COLLECTION TOOL FOR ASSESSMENT OF HOSPITAL PHARMACIES
PREPAREDNESS FOR DISASTER AND PUBLIC HEALTH EMERGENCIES
(MINISTRY OF HEALTH AND SOCIAL WELFARE AND PRIME MINISTER'S OFFICE)****A. Personnel**

1. How many personnel are currently working in the Health Emergency Preparedness and Response Section/ Tanzania Disaster Relief Committee (TANDREC)
2. What are their professional qualifications?
3. How many of them are pharmacists?
4. Have they received any training in disaster and public health emergencies management?
5. Is there a special section of this committee that deals with drugs and pharmaceutical items?
6. What do you think is the role of Pharmaceutical personnel in disaster management?
7. What additional skills and expertise should pharmaceutical personnel acquire to improve their usefulness in disaster management.

B. Pharmaceutical Stockpiling

8. What drugs and pharmaceutical items make up the national emergency stockpile?
 - a) Where are these supplies stored?
 - b) Do these areas provide proper storage conditions of pharmaceuticals?
 - c) Do you have a mechanism to provide security to pharmaceuticals stored in this areas?
 - d) Who is in charge of forecasting, procurement, issuing the use of these drugs and pharmaceutical items?
9. What are the Standard Operating Procedures (SOPs) or protocols that are used for use of the national pharmaceutical stockpile?
 - a) What are the protocols for replenishment of this stock?
 - b) How long would it take to replenish these supplies if they were used?
 - c) How often are the protocol and plans for use and replenishment updated?

10. Are there any specific protocols, written plans, or Standard Operating Procedures (SOP) used in transport and distribution of national pharmaceutical stockpile during disasters and public health emergency?

C. Policies

11. What are the plans, policies, and guidelines do you use in coordinating and managing incidents of disasters and public health emergencies?

If yes:

- a. How frequently are these updated?
- b. How is the disaster/public health emergency plan initiated?

D. Challenges

12. What challenges have you encountered or do you anticipate in management of disaster and PHE victims?
13. What are your recommendations for the improvement of pharmaceutical management?
14. Do you think Tanzania is pharmaceutically prepared to handle disaster and PHE?
- a) If Yes Why?
 - b) If No Why

APPENDIX III

DODOSO YA MAHOJIANO YA KUPIMA UFANISI WA UTOAJI WA HUDUMA WAKATI WA MAJANGA NA MAGONJWAYA MLIPUKO WA FAMASI/ VITENGO VYA MADAWA VILIVYOPO KWENYE VITUO VYA DHARURA NA MAJERUHI KATIKA HOSPITALI KUBWA ZA BINAFSI NA ZA SERIKALI DAR ES SALAAM

(MFAMASIA MKUU / MGANGA WA KITENGO CHA DHARURA NA MAJERUHI)

Namba.....Jana la hospital.....() Umma () Binafsi Jinsia.....Umri

Cheo.....Kiwango cha elimu.....

A. Uzoefu

1. Ni kwa muda gani umefanya kazi katika hospital hii?
2. Unadhani maneno Janga, Magonjwa ya dharura yanamaanisha nini?
 - a) Naomba unitajie aina ya majanga yanayoweza kutokea Tanzania.
 - b) Naomba unitajie baadhi yak magonjwa yak mlipuko yanayoweza kutokea Tanzania.
3. Uhifadhi wa madawa unamaanisha nini kwako?
4. Je hospital hii imewahi kuhudumia majeruhi wa majanga au magonjwa yak mlipuko? Kama ndiyo, elezea.
5. Je wewe binafsi umewahi kushiriki katika kuhudumia majeruhi wa majanga au magonjwa yak mlipuko? Kama jibu ni ndiyo, elezea.
6. Unaelewa nini unaposikia neno ufanisi wa kitengo cha madawa?

B. Mafunzo

7. Umeshawahi kusikia chochote kuhusu mafunzo yak utayari wa kukabiliana na majanga na magonjwa yak mlipuko?

8. Je, hospital hii inatoa mafunzo yoyote kea wafanyakazi wake juu yak utayari wa jinsi yak kuhudumia majeruhi wa majanga na magonjwa yak mlipuko?

Ikiwa jibu ni ndiyo, Je:

- a) Lini ilikuwa mara ya mwisho kwa hospitali hii kutoa mafunzo hayo?
- b) Ni kina nani walipata mafunzo hayo ?
- c) Je mafunzo hayo yalikuwa ni ya lazima kwa kila mfanyakazi?
- d) Ni mara ngapi mafunzo haya yanatolewa kwa vitendo na majaribio?
- e) Ni taasisi gani inayotoa mafunzo haya ?
- f) Ni mafunzo ya aina gani yalitolewa?
- g) Mafunzo haya yalitolewa na hospitali au taasisi tofauti?

C. Rasilimali watu

9. Je kuna wafanyakazi wangapi katiaka vitengo vya madawa katika hospitali hii? Wafanyakazi hawa wana viwango gani vya elimu?
10. Je kuna kitengo cha madawa ya dharura na majeruhi katika hospitali hii? Kuna wafanyakazi wangapi katika kitengo hicho cha madawa cha dharura na majeruhi cha hospitali hii? Wafanyakazi hawa wana viwango gani vya elimu?
11. Ni wafanyakazi wangapi wa kitengo cha madawa cha dharura na majeruhi wamepata mafunzo juu ya utayari na huduma kwa majeruhi wa majanga na magonjwa ya mlipuko?
12. Je hospitali hii ina miongozo yoyote ya jinsi ya kuongeza wafanyakazi wa kitengo cha madawa cha dharura unaotumiwa wakati wa majanga na magonjwa ya mlipuko?
13. Unadhani wafanyakazi wa kitengo cha madawa wana nafasi gani katika kuhudumia majeruhi wa majanga na magonjwa ya mlipuko?
14. Unadhani wafanyakazi wa kitengo cha madawa cha dharura na majeruhi wanahitaji mafunzo gani ya ziada ili kuongeza ufanisi wao katika kuhudumia majeruhi wa majanga na magonjwa ya mlipuko?

D. Akiba ya Madawa

15. Je hospitali hii ina akiba yoyote ya madawa iliyotengwa kwa ajili ya kutumika wakati wa majanga na magonjwa ya mlipuko?
16. Je ni aina gani ya madawa yamehifadhiwa kwenye akiba hiyo?
17. Je kuna kiasi chochote cha akiba hiyo kimetengwa kwa ajili ya wafanyakazi wa hospitali?
18. Je kuna kiasi chochote cha dawa hizo kilichotengwa kwa ajili ya jamii inayozunguka hospitali?
19. Je ni vyanzo gani vya dawa hutumika kurejesha akiba hiyo?
20. Miongozo na mipango hii hupitiwa na kuboreshwa kila baada ya muda gani?
21. Mmewahi kupokea kiasi chochote cha dawa kutoka serikalini, mashirika yasiyo ya kiserikali, maduka binafsi au sehemu nyingine yoyote.....wakati wa majanga na magonjwa ya mlipuko?
22. Je mmetenga maeneo yoyote ya ziada kwa ajili ya kuhifadhiwa na kugawa madawa wakati wa majanga na magonjwa ya mlipuko? Kama jibu ni ndiyo:
 - a) Mmetenga maeneo gani, yataje?
 - b) Je maeneo haya yanafuata vigezo na masharti ya uhifadhi sahihi wa dawa?
 - c) Je kuna mwongozo wowote wa kusimamia na kulinda madawa yanapokua kwenye maeneo hayo?

E. Uongozi, Miongozo na Mipango

23. Je, hospitali hii ina kamati ya kusimamia huduma wakati wa majanga na magonjwa ya mlipuko? Ni kina nani wanaounda kamati hii na ina kazi gani?
24. Je una taarifa ya uwepo wa mwongozo au mipango wa hospitali hii wa kusimamia huduma wakati wa mlundikano wa majeruhi?
25. Je una taarifa ya uwepo wa mipango wa utayari wa hospitali wa kutoa huduma za dharura za majeruhi wataokanao na;

- a) Majanga ya kiasili mfano tetemeko la ardhi
- b) Majanga ya kikemikali mfano gesi hatarishi, tindikali
- c) Majanga ya kibiolojia mfano virusi vya anthraxi
- d) Magonjwa ya mlipuko mfano kuhara, mafua ya ndege nk

Kama jibu ni ndiyo :

- a. Je ni mara ngapi mpango huu unajaribiwa na kuboreshwa?
- b. Lini ilikua mara ya mwisho ya majaribio ya mpango huu?
- c. Je utekelezaji wa mpango huu unaanzishwaje?
- d. Je, wafanyakazi wa hospitali wanajulishwaje kuhusu uanzishwaji wa utekelezwaji wa mpango huu?
- e. Wafanyakazi wanaohusika na mpango huo wanataarifiwaje juu ya kuanza kwa mpango huu?
- f. Hospitali hii inasimamiaje usambazaji wa taarifa kuhusu uwepo wa mpango huu kwa wafanyakazi wake?

F. Vikwazo

- 26. Je, wewe kama mfanayakazi wa kitengo cha madawa umekutana/ unadhani utakutana na vikwazo gani katika kutoa huduma kwa majeruhi wa majanga na magonjwa ya mlipuko?
- 27. Unatoa ushauri gani katika kuboresha ufanisi wa utoaji wa huduma ya dawa katika vitengo vya dharura?
- 28. Je, unadhani vitengo vya dawa vilivyopo kwenye vituo vya dharura na majeruhi vina uwezo wa kutosha wa kuhudumia majeruhi wa majanga na magonjwa ya mlipuko?
 - a) Kama jibu ni ndiyo, kwa nini?
 - b) Kama jibu ni hapana, kwa ni

DODOSO YA MAHOJIANO YA KUPIMA UFANISI WA UTOAJI WA HUDUMA WAKATI WA MAJANGA NA MAGONJWAYA MLIPUKO WA FAMASI/ VITENGO VYA MADAWA VILIVYOPO KWENYE VITUO VYA DHARURA NA MAJERUHI KATIKA HOSPITALI KUBWA ZA BINAFSI NA ZA SERIKALI DAR ES SALAAM

(WIZARA YA AFYA NA USTAWI WA JAMII, OFISI YA WAZIRI MKUU)

A. Rasilimali watu

1. Je ni wafanyakazi wangapi wanafanya kazi katika kamati ya kujiandaa na kukabiliana na majanga?
2. Wafanyakazi hawa wana kiwango gani cha elimu?
3. Ni wafanyakazi wangapi kati ya hawa wana elimu ya madawa?
4. Je wafanyakazi hawa wamewahi kupata mafunzo yoyote juu ya majanga na magonjwa ya mlipuko?
5. Je kuna kitengo cha kamati hii kinachohusika na madawa na vifaa vya huduma wakati wa majanga na magonjwa ya mlipuko?
6. Je unadhani Mfamasia ana sehemu gani katika kukabiliana na majanga na magonjwa ya mlipuko?
7. Unadhani wafanyakazi wa kitengo cha madawa cha dharura na majeruhi wanahitaji mafunzo gani ya ziada ili kuongeza ufanisi wao katika kuhudumia majeruhi wa majanga na magonjwa ya mlipuko?
 - i. Akiba ya madawa
 8. Je ni aina gani ya madawa yamehifadhiwa kwenye akiba ya taifa ya dawa?
 9. Akiba hiyo ya dawa imehifadhiwa wapi?
 10. Je msimamizi wa matumizi ya akiba hiyo ya dawa ana cheo gani?
 11. Je kuna mwongozo wowote unaotumika kuruhusu matumizi ya madawa hayo ?

12. Kuna mwongozo au mpango wowote wa jinsi ya kurejesha akiba hiyo ikishatumika?
13. Kwa wastani inachukua muda gani kurejesha akiba hiyo ya dawa baada ya kuwa imekwisha?
14. Miongozo na mipango hii hupitiwa na kuboreshwa kila baada ya muda gani?
- Mmetenga maeneo gani, yataje?
 - Je maeneo haya yanafuata vigezo na masharti ya uhifadhi sahihi wa dawa?
 - Je kuna mwongozo wowote wa kusimamia na kulinda madawa yanapokua kwenye maeneo hayo?
 - Je kuna mwongozo wowote unaotumika kusimamia usafirishaji na ugawaji wa madawa hayo yanayotumika wakati wa majanga na magonjwa ya mlipuko?
15. Je kuna mwongozo maalum unaotumika kusimamia na kukabiliana na majanga na magonjwa ya mlipuko?
- Kama jibu ni ndiyo:
- Je ni mara ngapi mpango huu unajaribiwa na kuboreshwa?
 - Je utekelezaji wa mpango huu unaanzishwaje?

ii. Vikwazo

16. Je, wewe umekutana/ unadhani utakutana na vikwazo gani katika kutoa huduma kwa majeruhi wa majanga na magonjwa ya mlipuko?
17. Unatoa ushauri gani katika kuboresha ufanisi wa utoaji wa huduma ya dawa katika vitengo vya dharura?
18. Je, unadhani vitengo vya dawa vilivyopo kwenye vituo vya dharura na majeruhi vina uwezo wa kutosha wa kuhudumia majeruhi wa majanga na magonjwa ya mlipuko?
- Kama jibu ni ndiyo, kwa nini?
 - Kama jibu ni hapana, kwa nini?

INFORMATION SHEET AND INFORMED CONSENT FORM**HOSPITAL PHARMACIES' SURGE CAPACITY FOR DISASTER AND PUBLIC HEALTH EMERGENCIES.**

Dear participant,

Lessons learnt from worldwide disaster and public health emergencies have shown that poor surge capacity increased morbidity and mortality. Tanzania has experienced a number of public health emergencies and disaster events including the MV Bukoba capsizing in 1996 that killed over 1000 people, the bombing of the United States Embassy in Dar es Salaam in 1998 that killed 11. The influenza outbreak in 2009 and the recent capsizing of MV spice Islander and MV Skagit in 2012 that killed 203 and 144 people respectively. The mortality and morbidity associated with these disasters could have been minimized if the hospital emergency departments were the victims were sent were better prepared to cater for this additional workload in terms of pharmaceutical supplies , medical equipment and personnel. It is evidently clear that the surge capacity of Hospitals emergency departments in particular the pharmacy needs to be assessed urgently. It is hoped that the findings of this study will shed a light on how to improve the current preparedness status of our tertiary hospital pharmacies so that in future they are able to work with other departments to mitigates the effects of disasters.

With this in mind, we are embarking on a study to determine the tertiary hospital pharmacies surge capacity for disaster and public health emergencies.

This study will be conducted by Maria F. Lerise, a student second year student studying for M.Sc. Pharmaceutical Management at MUHAS.

We hope that the results of this survey will facilitate to highlight on how to improve the current preparedness status of our tertiary hospital pharmacies so that in future they are able to work with other departments to mitigates the effects of disasters.

In this study:

- We would like to orally interview you.
- All information given by you will be kept strictly confidential no names will be used. The recorded information will be stored without your name attached. Only the researchers involved in this study will see them.
- There is no risk for you through this study. .
- You may withdraw from the study any time you wish.

We thank you for your cooperation. We would now like to ask you to agree to take part in the study by giving the following declaration:

I have been given detailed information about this study, and I understand what will be required of me if I take part in the study.

I understand that my participation in this study is completely voluntary. I know that at any time I may withdraw from this study without giving a reason.

If I have questions occurring during the study, I can directly contact the investigators Dr. D. Mloka or Maria Lerise at School of Pharmacy MUHAS, P.O. Box 65013 Dar es Salaam, Tanzania, Tel.: 0754 233457

I agree to take part in the study.

.....
Signature of participant	Signature of witness (if participant cannot read)	Date
.....	
Signature of Investigator		

FOMU YA TAARIFA**MAHOJIANO YA KUPIMA UFANISI WA UTOAJI WA HUDUMA WAKATI WA MAJANGA NA MAGONJWAYA MLIPUKO WA FAMASI/ VITENGO VYA MADAWA VILIVYOPO KWENYE VITUO VYA DHARURA NA MAJERUHI KATIKA HOSPITALI KUBWA ZA BINAFSI NA ZA SERIKALI DAR ES SALAAM**

Ndugu mshiriki,

Kutokana na matukio ya majanga na magonjwa ya mlipuko duniani kote, tumejifunza kuwa ufanisi mdogo wa vitengo vya madawa ya dharura na majeruhi huongeza idadi ya vifo na majeruhi. Tanzania kama nchi pia imekumbwa na matukio mengi ya majanga na magonjwa ya mlipuko kama kuzama kwa MV Bukoba mnamo mwaka 1996 iliyosababisha vifo vya takribani watu elfu moja, kulipuliwa kwa ubalozi wa Marekani mjini Dar es salaam mnamo mwaka 1998 kulikosababisha vifo vya takribani watu kumi na mmoja. Mafua ya ndage ya mwaka 2009 na hivi karibuni MV Spice Islander ilizama na kusababisha vifo takribani 203 na MV Skagit iliyosababisha vifo vya watu 144. Idadi hii ya vifo na najeruhi ingeweza kuongua kwa kiasi kikubwa iwapo famasi za vitengo vya dharura na majeruhi vingekua vimejiandaa vizuri kutoa huduma katika hali ya ongezeko kubwa la majeruhi wa majanga na magonjwa ya mlipuko. Hivyo, kuna umuhimu wa kupima ufanisi wafamasi za vitengo vya dharura na majeruhi.

Tunamatarajio kuwa matokeo ya tafiti hii yatasaidia katika kutoa mwanga wa jinsi ya kuboresha vitengo vya dharura na majeruhi kwa kuhakikisha famasi za vitengo hivi zinafanya kazi katika ufanisi wa kutosha vikishirikiana na vitengo vingine, na hivyo kupunguza idadi ya vifo na majeruhi watokanao na majanga na magonjwa ya mlipuko.

Kwa muongozo huo tumeamua kufanya tafiti ya kupima ufanisi wa famasi za vitengo vya dharura na magonjwa ya mlipuko. Tafiti hii kwa njia ya mahojiano itafanywa na Maria F.

Lerise, mwanafunzi wa mwaka wa pili wa uzamili, katika chuo cha Afya na Sayansi Shirikishi Muhimbili.

Katika tafiti hii;

- ? Tungependa kufanya uchunguzi kwa njia ya mahojiano na wewe.
- ? Mahojiano hayo yatakuwa ni ya faragha baina yako na mtafiti tu, hayatatolewa kwa mtu mwingine yeyote. Jina lako halitatumika au kutajwa kwenye tafiti hii.
- ? Hakuna madhara yeyote yatakayotokana na kufanya mahojiano haya.
- ? Unaweza kujitoa kwenye mahojiano haya wakati wowote utakapoamua wewe.

Tunashukuru kwa ushirikiano wako. Tunaomba ukubali kufanya mahojiano haya kwa kukubali yafuatayo:

Mimi nimepata taarifa kamili kuhusi tafiti hii na nimeelewa nini natakiwa kufanya kama mshiriki wa tafiti hii. Pia ninaelewa kuwa ushiriki wangu ni wa hiari na ninaweza kujitoa kwenye tafiti hii wakati wowote. Ukiwa na maswali zaidi unaweza kuwasiliana na Dr. D Mloka au Maria F Lerise wa shule ya Ufamasia, Chuo cha Afya na Sayansi Shirikishi Muhimbili. S.L.P 65013 Dar es salaam. Simu namba yangu ni 0754 23345.

Vile vile unaweza kuwasiliana na Mkurugenzi wa Utafiti na Machapisho, Prof Mainen Moshi wa Chuo kikuu cha Afya na Sayansi Shirikishi kwa simu ya ofisi namba 22 2152 489. Nimekubali kufanya mahojiano haya.

.....
Saini ya Mshiriki	Saini ya shahidi (ikiwa mshiriki hajui kusoma)	Tarehe
.....
Saini ya Mtafiti		