LEVEL OF HOSPITAL PREPAREDNESS FOR INTERNAL DISASTERS IN TERTIARY CARE HOSPITALS IN PAKISTAN

(CASE STUDY OF RAWALPINDI CITY)

by

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Table of Contents

LIST OF ABBREVIATIONS

Abbreviation	Description
CBO	Community Based Organizations
CMH	Combined Military Hospital
DCO	District Coordinating Officer
DDMA	District Disaster Management Authority
DHO	District Health Officer
DHQ	District Head Quarter
DRM	Disaster Risk Management
DRR	Disaster Risk Reduction
FFH	Fauji Foundation Hospital
HFH	Holy Family Hospital
HICS	Hospital Incident Command System
IDPs	Internally Displaced Persons
MDGs	Millennium Development Goals
MHVRA	Multi-Hazard, Vulnerability and Risk Assessment
MSDS	Minimum Services Delivery Standards
NAP	National Action Plan

NDMA	National Disaster Management Authority
PAHO	Pan American Health Organization
PEMH	Pak Emirates Military Hospital
QIH	Quaid e Azam International Hospital
SDGs	Sustainable Development Goals
UNISDR	United Nation International Strategy for Disaster Risk Reduction
WHO	World Health Organization

LIST OF TABLES

LIST OF FIGURES

Abstract

Disasters are increasing worldwide with devastating effects than ever. Hospitals are symbols of social wellbeing which need to be functional and operational as demand for health services also increases in disasters. Disasters occurring within hospitals debilitating their capabilities are known as INTERNAL DISASTERS e.g. structural instability, fire, floods, power failures, radiation and toxic hazards etc. Resilient health facility should be able to continue functioning and delivering health services during internal disasters while rebuilding its own damages. Pakistan is a disaster-prone country that keeps on experiencing natural and man-made catastrophes. Disasters have consistently been a part of life and have influenced at least 800 million individuals around the world over the last two decades, causing a large number of deaths and financial misfortunes. The objectives of the study was to determine the existing hospital readiness and preparedness of tertiary care hospitals and provide viable recommendations for improvement. The study design is a cross sectional survey using close ended questionnaire, with data regarding level of preparedness and resilient hospitals was conducted using quantitative measure of HSI questionnaire developed by PAN WHO. Questionnaire was administered to five tertiary level care hospitals based on convenient sampling technique, with data analysis being carried out using HSI calculator. Out of five hospitals, two were military hospitals, while one each for private, pubic and semi-government. Pak Emirates Military hospital secured the highest safety index of 0.92, whereas Holy Family hospital lowest with 0.41. While QIH, CMH and FFH were almost equal in the safety index. Correspondingly, the vulnerability index showed similar trends in categorization. Four out of five hospitals were categorized as category A hospital, while remaining one as category B. On the basis of results, it can be rightly concluded that there is dire need to improve the overall hospital preparedness

plan for healthcare facilities, as they are primary sources of health service during time of disaster. The present study will provide an insight on importance of hospital preparedness that will help policy makers and concerned stakeholders to plan appropriate interventions. It is a starting point leading to awareness, discussion and action for both national and provincial policy makers.

Keywords: *Disaster, Hospital Preparedness, Tertiary level care hospitals, Pakistan*

Chapter 1

INTRODUCTION

1.1 BACKGROUND

"Avoid letting hospitals as victim & martyr of cataclysms"

Disasters have consistently been a part of life. Generally, they have been considered as retribution from the divine beings. Real disaster events over the most recent two decades have influenced at least 800 million individuals around the world, causing a large number of deaths and financial misfortunes. The seismic tremor of the west shoreline of Sumatra in 2004 brought about an expected aggregate of 214,000 expiries with additional 142,000 individuals being listed as misplaced. The earthquake of 8th October, 2005 asserted in excess of 87,000 lives, an expected 69,000 individuals being harmed while around 2.8 million were disregarded destitute in Pakistan. Occasions, for example, the terrorist assault of 11th September, 2001, on the World Trade Center, has carried a totally different significance to psychological warfare, which is at present one of the real reasons for man-manufactured catastrophes. The counteractive action of a disaster is troublesome. Be that as it may, its staggering impacts can be limited through adversity readiness and by successful and convenient, well-timed and appropriate response (Tsukahara, 2018).

Today the frame of mind towards calamities is changing, similar to our capacities to relieve the effect of the occasions responsible for them. "Disaster" comprises of two French words: "dis" and "aster". "Dis" indicates bad, terrible, and ruthless while "aster" signifies star. Resultantly, the words "disaster" alludes to 'Awful or Evil star'. There are different definitions with respect to disasters. In any case, the United Nations International Strategy for Disaster Reduction has delivered a wording for disaster

hazard decrease that is utilized as an overall institutionalized wellspring of definitions. A calamity is categorized as a unpretentious disruption of the functioning of a system or a wide-ranging public comprising extreme getting human, substantial, monetary or environmental misfortunes and special effects, which exceed the capacity of the influenced network or society to adapt utilizing its own assets A section from etymological importance, it has additionally been ascribed by the United Nations office of Disaster Risk decrease (UNISDR), which characterizes catastrophe as: "A serious disruption of the functioning of a community or a society involving widespread human, material, economic or environmental losses and impacts, which exceeds the ability of the affected community or society to cope using its own resources" (Lee, 2013).

Calamities are regularly depicted and descried as amalgam of: the overview and exposure to a hazard; the states of weakness/vulnerability that are existing and the limiting measures to adapt to the potential negative results. Catastrophe effects may incorporate death toll, damage, infection yet additionally other negative impacts on human physical, mental and social prosperity, together with harm to property, pulverization of advantages, loss of administrations, social and monetary disturbance and ecological exploitation (Perez and Thompson, 1994).

There is a developing concern that disaster can strike whenever and anyplace. On a normal, a catastrophe happens each day some place on the planet. The most disaster inclined locales on the planet are located in Asia and the Pacific regions where consistently calamities of various sorts bring about a gigantic cost of lives and material possessions/goods in the area. This area accounts for only 30% of total earth's land area however the catastrophe effects in the locale are altogether higher than different districts. As updates or any information on a catastrophe or crisis arrives globally main concern or worries will be for human losses, for the wellbeing and prosperity of the

fiasco stricken populace. One manner by which this is cultivated is by reinforcing and enhancing capacity and adaptation of new strategies for health offices, health centers, welfare system and nations to organize and mitigate the disasters (Henderson, 2004).

Pakistan with an all-out territory of 796,095 sq. km, lies in the range of 24 and 37 degrees north and longitudes 62 and 75 degrees east. Expose to multiple hazard and risk to dangers, the area in Pakistan is geologically presented with land, with complex topography, terrain and extreme weather condition and ecological limits. As Pakistan is one of the most seriously disaster prone country that keep on experiencing broad normal and man-made catastrophes. The calamitous events in Pakistan in terms of human effect can be made as basis of decision-cum-policy making as in the period 1993 to 2002, an aggregate of 6,037 individuals were killed and 8,989,631 influenced. Pakistan likewise has been a casualty of terrorism by partisan thought processes. More than 4,000 individuals have been executed in the previous two decades in partisan savagery (Shahbaz, 2019).

Whenever medical clinics, wellbeing offices or health system are destroyed and devasted/ flop in a disaster and crisis circumstances, regardless for support/functional element or practical/structural reasons, the outcome is the equivalent: they are not accessible to treat the effectives or injured when it is utmost requirement of these services. The 168 nations that received the Hyogo Framework for Action in 2005 perceived the significance of "making hospital safe from catastrophes by guaranteeing that every new emergency hospital are worked with a degree of flexibility and resilience that fortifies their ability to stay practical in disaster circumstances and execute relief and mitigation measures to strengthen existing wellbeing offices, especially those giving essential healthcare services. However, in spite of noteworthy steps to perceive and address the issue, in certain areas of the world a disturbing

number of healthcare offices and centers from huge complex emergency clinics in megacities to little provincial canters that might be the main center of healthcare services – are as yet constructed in exceptionally disaster inclined zones. In different areas, crises and emergencies keep on leaving health offices incapable to work deliberating its abilities to provide services when most needed (Khan, Ahsan and Siddique, 2017).

Many developing nations have enforced readiness for disaster response and preparedness. As indicated by United Nations Development Program, in Pakistan, there is no extensive, incorporated and assimilated disaster management strategy, proper systematic tactic and legitimate framework for disasters readiness at the national level. These circumstances firmly supports and mandates the requirement for a disaster managers/teams evaluators to structure, a readiness technique and approach that is design considering local circumstances and condition and is practiced in all parts of country. Pakistan is where an enormous flood of losses in a moderately brief time period has turned into a customary component of the emergency hospital framework system. With a normal of five suicide bombings for every month, the requirement for satisfactory capacity building and training of health care workforces who are directly involved in handling the victims of disasters, neither cannot be ignored nor can't ties of catastrophes be disregarded (Paton, 2013).

Disaster readiness is profoundly expected to deal with these erratic catastrophic circumstances successfully. To meet this point, numerous experts need to help this arrangement of disaster readiness. Since medical attendants are the most noteworthy number of human services suppliers, they have the obligation to be the main line of reaction in case of any cataclysmic health emergency crisis. They can settle on fundamental choices in crisis circumstances as a result of their capability, appraisal

abilities, relational abilities, joint effort and basic reasoning aptitudes. Notwithstanding, confirmations demonstrate that attendants are not prepared appropriately to work proficiently in disasters. In addition, there is a scarcity of distributed information on disaster and that proof based writing is missing about the best techniques to prepare nurture in a disaster reaction. Instructive projects must be set up to address the current learning shortfalls of attendants identified with catastrophe readiness. Improving hospital' proficient ability and competency through preparing and training will guarantee the arrangement of satisfactory social healthcare services in a disaster (Morissette and Soucy, 2017).

Hospitals and health amenities offices are substantially more than blocks and mortar. They are in fact center for social wellbeing and cohesion. They are home-or center for basic healthcare facilities, for example, laboratories, blood banks, rehabilitation facilities or pharmacies. They are the setting wherein health workers work energetically to guarantee the best output and service. This signify there role in in saving life’s and health of victims overwhelming their capacities in disaster stricken areas. Healthcare offices are of social and political importance and centers for community cohesion and welfare by integrating community sense of participation and empowerment. Though all facilities and centers should be safe and resilient enough to avoid the impacts and devastation of crises (Khalifa, 2011).

Hospitals and health facilities need to stay utilitarian throughout crises. The human expense of health facilities failures is made obvious in the consequence of disaster, as priority is on search, injury, rescue the injured and death toll. At the point when hospitals are nonfunctional and undermining its capabilities to provide emergency care when most needed will result unnecessary loss of life and morbidity. Despite that, healthcare service is not just basic crisis focuses; they are vital for, social union,

rehabilitation and development and advancement. The long haul effect of the loss of public health services on the Millennium Development Goals surpasses the effect of delay treatment of injury wounds (Paton, 2013. Medical clinics, hospitals and essential healthcare facilities, and other health centers are integral to sustainable rehabilitation and recovery key goals in:

- Continuing health reconnaissance to preclude epidemics
- Public health and hygiene related activities, predominantly pre-emptive medicine
- Introducing and promoting research and holding reference laboratories, motivating novelty, revolution and modernization
- Act as key person for public gathering and community association.

1.2 SIGNIFICANCE OF THE STUDY

During occurrence of any disaster, international as well as national institutions have worked closely to minimize mortality and morbidity, death toll as well as painful experiences during times of catastrophic events. One of the most suitable counteractive strategy is to build and enhance the technical capacity and resilience of healthcare system including facilities, so that timely measure and intervention can be adopted to mitigate the effects of disaster. The study findings will help in gap identification in perception of the health team about internal disaster management and the relevant hospital plan. Based on the results, short-term and long term plans to fill these gaps, will be formulated, that will be set benchmark for further studies. Additionally, the results will help decision makers and hospital administration to improve hospital preparedness towards hospital internal disaster management plan, which would lead to mitigation of losses of resources and will save many precious lives.

1.3 RATIONALE OF THE STUDY

Since Pakistan geographical areas are more exposed to active disasters with more frequency of earthquakes and floods, hospitals are of prime importance to deal with aftermaths of disaster. However, they too are exposed to both external and internal disasters. Therefore hospital need to be well equipped, prepared and organized, in case of a emergency and all strategic and operational plans to be in place during occurrence of disaster. Concerned actions must be taken to prevent the loss of life, loss to property, monetary and community disturbances in the event of a disaster.

1.4 AIM OF THE STUDY

The aim of the research work is to study level of preparedness for internal disaster in tertiary care hospitals at Rawalpindi.

1.5 OBJECTIVES OF THE STUDY

i. To evaluate existing SOPs on hospital preparedness in tertiary care hospitals at Rawalpindi

ii. To assess level of specific risks to health facilities and health system during disaster

iii. To suggest guidelines for hospital preparedness under local conditions of Pakistan

Chapter 2

LITERTURE REVIEW

The aim of this chapter is to review the literatures on the disaster resilience and preparedness of hospitals. Related basic theories consist of facility management, disaster management and business continuity management. This sets the stage to review hospital disaster resilience situations and research achievements based on these theories, including facility management model, risk/vulnerability assessment and mitigation strategies, disaster preparedness plans and business continuity strategies.

2.1 DISASTERS: DEFINITIONS AND CONCEPT

Disasters have consistently been a component of life. Traditionally, they have been considered as discipline from the divine beings. Today the perception towards catastrophes is changing, just like our abilities to relieve the effect of the event. There are different definitions in regard to disasters. Nonetheless, the United Nations/International Strategy for Disaster Reduction has delivered a wording for disaster risk reduction that is utilized as an overall institutionalized source of definitions. A fiasco is characterized as a major disturbance of the functioning of a network or a general public including human, material, financial or ecological damages and effects, which surpass the capacity of the influenced network or society to adapt utilizing its very own assets. Catastrophes are often represented as the merger of: the potential risk and hazardous exposure presentation to a danger; the conditions are not favorable and the inadequate measures to lessen or adapt to the potential negative results (Albrecht, 2017). Fiasco effects may result in increase in death toll, damage, yet additionally other negative consequences for human physical, mental and social

prosperity, together with harm to property, pulverization of advantages, loss of administrations, social and monetary interruption and ecological damages.(UN/ISDR2009) The most widely recognized medical definition of disasters are those in which the surge of injured is far more than the health facility ability resulting in compromised function and operation at site of emergency so health disaster results in medical disaster. (Paton, 2013). Despite the fact that the quantity of individuals killed or dead has decrease in the present time but the impact of calamites on individual or communities and its number is also increasing Accordingly, there are impressive impacts on humans wellbeing and financial effects of fiascos; e.g., of 2000-2011, calamities have delivered around 1.3 trillion dollars (USD) in monetary harm, caused 1.1 million deaths and influenced 2.7 billion individuals. There are two conventional classifications for catastrophes – normal and mechanical, despite the fact that, the order is fairly subjective since they can't genuinely be isolated. The catastrophic event class is partitioned into five sub-gatherings: geophysical, meteorological, hydrological, climatological and natural (Oliver-Smith et al., 2017).

Table 1- General classification of natural disasters

Category	Sub-group	Definition
Natural Disasters	**Geophysical**	Events originating from solid earth e.g. Earthquake
	Meteorological	Events caused by short-lived/small to meso scale atmospheric processes (in the spectrum from minutes to days) e.g. Storm
	Hydrological	Events caused by deviations in the normal water cycle and/or overflow of bodies of water caused by wind set-up e.g. Floods
	Climatological	Events caused by long-lived/meso to macro scale processes (in the spectrum from intra seasonal to multi-decadal climate variability) e.g. Droughts
	Biological	Disaster caused by the exposure of living organisms to

		germs and toxic substances e.g. Epidemics
Man-Made Disasters	**Caused by Warfare**	Conventional Warfare including siege and blockade
		Non-conventional warfare (nuclear, biological and chemical)
	Caused by Accidents	Vehicular Drowning Explosions Fires Biological Collapse of building and other structures Chemical including poisoning by pesticide and pollution

All disruption and damages that are outcome of calamity are identified with particular peril of risks and hazard its consequence is harms to a general public. A hazard is whatever may represent a threat and can possibly antagonistically influence human wellbeing, property, functionality and additionally the surrounding. Frequently, a hazard can be portrayed as contained potency, or it can initiate a response. An incidence happens when the risk is known and influencing the living standards and additionally their condition. The likelihood of an incidence for each hazard is known as probability if it takes place with sudden duration, onset and strength (Wadem 2003). Outcome is characterized as the genuine procedure of contact between an event and a community with both positive and negative impacts on the individuals and condition (Perez and Thompson, 1994).

Destruction is the negative consequence of an outcome. A destruction containing adequate magnitude brings about a calamity. There are factors that can influence this procedure, of which weaknesses, and adaptation to respond are basics. Incapability to respond incorporates the characteristics and circumstances of populace charter that increase the chances of damages and harming impacts of a hazard. It relies upon different physical, social, financial and natural variables of the included network/populace The level of vulnerability depends upon the adaptability of the individuals at occurrence of incidence An agenda, network or society strength presented

to risks to oppose, adapt to, assist and build up your strength from the impacts of a risk in an opportune and effective way, including the conservation and rebuilding of its fundamental essential structures and capacities. Resilience includes three components: (1) the retaining limit, (2) the buffering limit and (3) reaction to the occasion and recuperation from the harm continued (Tanaka, 1999).

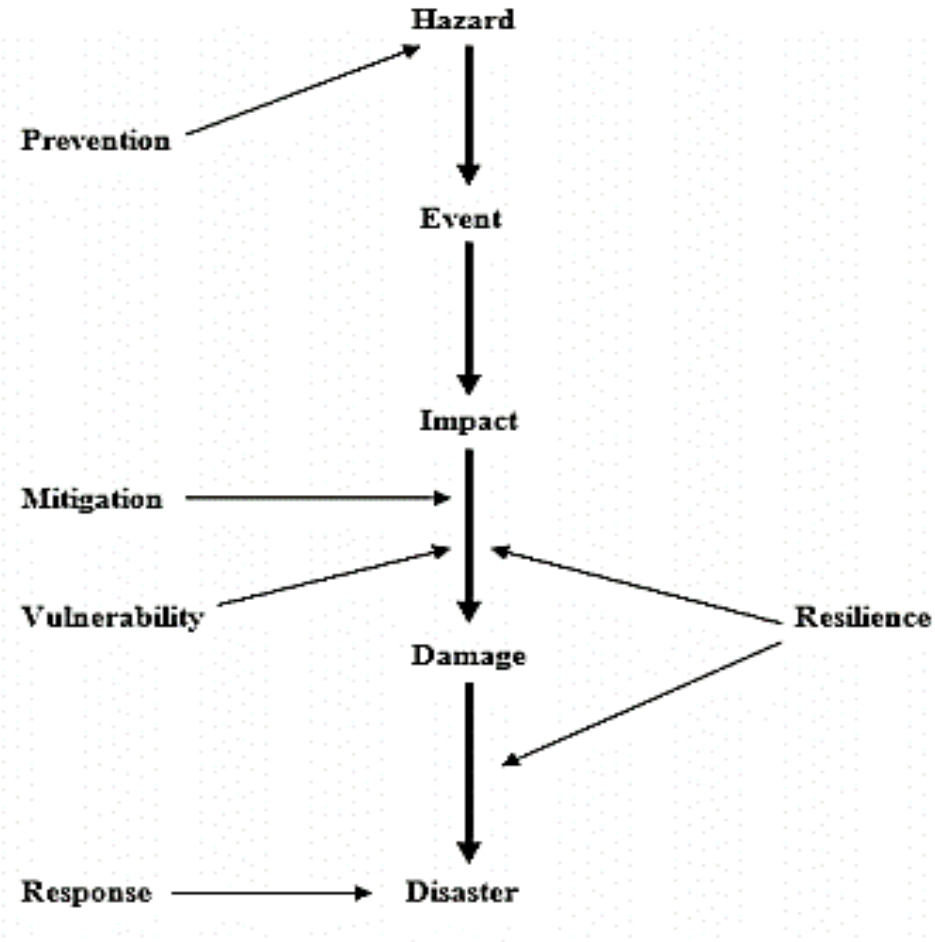

Figure 1: Process from hazard to disaster

2.2 REDUCING THE CATASTROPHE HAZARD: HYOGO FRAMEWORK FOR ACTION 2005-2015

Disasters are increasing worldwide, and their impact are more devastating than before. Communities that are more vulnerable and effects of exposure on these groups have highlighted the importance of DRR and nations have to join hand and work together

before it strikes to mitigate to prepare and to response. This section explains the worldwide strategy regarding disaster risk and is a roadmap in terms of disaster risk reduction and management. The aim of the Hyogo framework for action 2005-2015 is to make the world safer by working on the reduction of risks and the consequences of natural disasters. The strategy for disaster risk reduction, including safe hospital, training, capacity building and cooperation between countries with respect to disaster risk management, is the basis of this current thesis (Horekens, 2007).

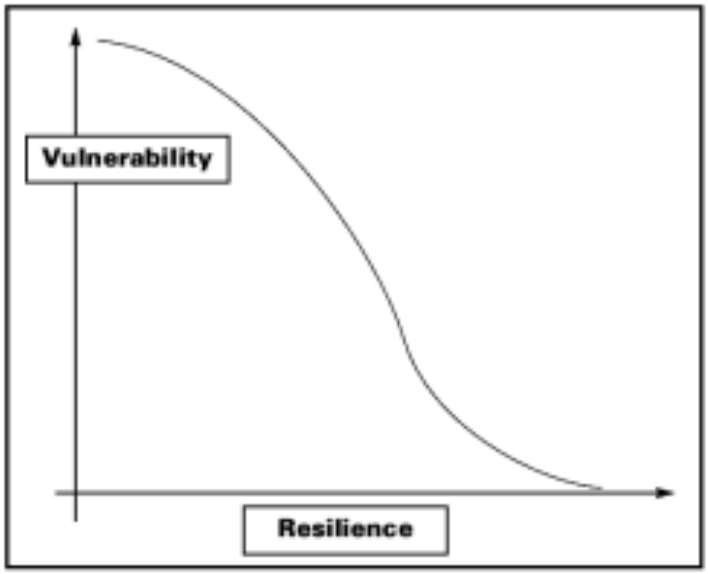

Figure 2: Relationship between vulnerability and resilience

The World Conference on Disaster Reduction was held in January 2005 in Kobe, Hyogo, Japan, in the wake of disasters such as the Bam earthquake (December 2003) and the tsunami in the Indian Ocean (December 2004), where it adopted a worldwide Framework for Action 2005-2015. Hence, the Hyogo Framework for Action 2005-20015. It focuses on building the resilience of nations and communities to disasters. The Conference provided a unique opportunity to promote a strategic and systematic approach for reducing vulnerabilities and risks to hazards. The strategic goals of the Hyogo framework with respect to disaster risk reduction at national and local levels include integration of disaster risk reduction into sustainable developmental policies

and planning, strengthening of capacities to build resilience to hazards, the implementation of emergency preparedness, response and recovery programs. It emphasizes an all-hazards approach, capacity building and community participation in disaster risk reduction programs (Cook and Lourdes Melo Zurita, 2016).

To provide strategic goals, the Hyogo framework offers five priorities for action. A general consideration which is emphasized is to enhance international and regional cooperation and assistance in the field of disaster risk reduction through the transfer of knowledge, technology and expertise to enhance capacity building for disaster risk reduction, and also to strengthen disaster preparedness for an effective response at all levels. The Hyogo framework emphasizes “hospitals safe from disaster” as a goal of integrated disaster risk reduction planning in the health sector, a topic also highlighted in this thesis (UNISDR reports on Hyogo Framework for Action Implementation, 2013).

2.3 DISASTER MANAGEMENT

Disaster management is a continuous procedure to anticipate, improve, plan for, respond to, keep up coherence during, and recover from an occurrence that compromises life, property, functionality as well as surroundings. The procedure is best introduced as the typical DM cycle Risk appraisal is the first step to encounter the calamity. It is the procedure for hazard detestation proof, likelihood assessment, vulnerability assessment and effect /impact valuation. (NFPA 1600 2010). In light of the aftereffects of risk evaluation, exercises are directed to avoid/mitigate or potentially relieve the potential dangers (Natural Disaster Management, 1999).

Counteractive action or Prevention is the sum of practices and measures taken to guarantee that human activities or common marvels don't cause or bring about the event identified with a distinguished or unidentified hazard. On a fundamental level,

prevention can be attain by removing all hazard but , yet it would be troublesome and presumably difficult to keep a few hazards from happening.(WADEM 2003) Hence, mitigation ought to consistently be considered. The devastating impact of the fiasco should be curb at initial stages by structural and function measures of mitigation. It is indispensable that adaptation and precautionary measures are to be executed by health and medical centers before fiascos (Nakayachi, 2014).

Readiness is characterized as the information and capabilities formed by governments, proficient rescue response associations, networks and people to successfully foresee, react to, and recover from, the effects of likely, impending or current risk occasions or conditions. It incorporates alarming system frameworks, evacuation plans, save packs of therapeutic supplies, vitality, reaction systems, activities, and preparing. The response stage alludes to the quick and continuous exercises, projects, and frameworks to deal with the impacts of an occurrence that undermines life, property, tasks, or the envoirment, for example the negative impacts of a catastrophe (Dynes and Fischer, 1995).

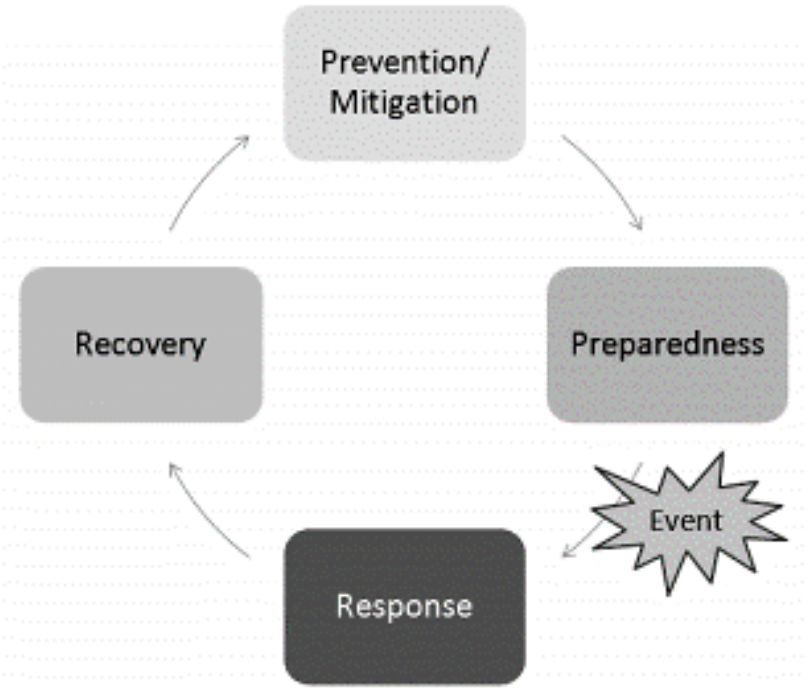

Figure 3: Disaster Management Cycle

Recovery is the rebuilding and improvement of offices, employments and living states of fiasco influenced networks, including endeavors to diminish disaster risk factors. It starts lately after the crisis stage has finished, and ought to be initiated on prior systems and strategies that encourage clear institutional duties regarding recuperation activity and empower open interest.(UN/ISDR 2009) The general reaction to fiascos is a combine effect of different steady capacities, for example coordination, correspondence, vitality, transportation, and general wellbeing and restorative administrations, which are called emergency defense measures. A most significant capacity and functioning for general wellbeing in public health sector and in medicinal services is crisis/emergency administrations and medicinal administration of disasters (Takada and Ukai, 2011).

2.4 MEDICAL DISASTER MANAGEMENT

All calamities, irrespective to its ethology, have serious consequences on health and medical outcome, for example uncontrollable surge of injured with regards to crisis management. Catastrophes vary in how extended their effect are and how much they disturb public health and general wellbeing and health system infrastructure/ framework of the disaster scene.(Susan M, Briggs)The prompt response for crises in health sector involves multiple disciple example, evaluation of general wellbeing/therapeutic needs, wellbeing reconnaissance, consumable water/wastewater and strong waste transfer, and so on. The earliest response to injured and victims of crises involves tagging, resuscitation and complete medicinal consideration. Its' critical target is to reduce the disabilities and mortality related with the disaster. The key standard of crises therapeutic consideration is to give the best care for the maximum

number of patients. This standard is one of the difficulties in medical disasters (Stopford, 2005).

Disasters change the medical ethical rules. During routine care we focus on categorizing the sickest patients and put all efforts and resources into these persons. The change is to leave the individual and do what is best for the group of individuals. The acute medical care system of disaster casualties is described as a chain consisting of medical rescue, medical transport and hospital treatment. As a result, these three medical response functions can be categorized in two levels: pre-hospital and in-hospital. The medical rescue and transport relate to the pre-hospital level (Steiner, 2003).

2.5 HOSPITAL DISASTER MANAGEMENT

Hospitals are the centers of social wellbeing and assert for communities. They are an essential for sustainability and economic improvement and have representative social and political qualities which add to wellbeing and sense of persuasion. Emergency clinics are required to be prepared to as a important task is to reduce mortality and morbidity Health center preparedness s might be characterized as the capacity to viably keep up emergency clinic activities, continue its operation and functioning in safe hospital envoirment and satisfactorily address the sudden restorative needs of the influenced populace (Nakayachi, 2014).

Hospital preparedness requires a concrete plan of activities with hazard and vulnerability appraisal and risk evaluation to highlight the specific threat to emergency clinic. Readiness proceeds to mitigation, readiness, and reaction and recuperation stages. The objectives of an extensive hospital plan (HDP) are to empower the emergency clinic to viably deal with emergency, provide uninterrupted o essential services and limit the associated: physical harm and damages to hospitals, medical

clinics, death toll, injury or illness of medical clinic work force and pain and suffering of the people influenced. A complete emergency hospital plan incorporates all risks, all orders/stages, and all levels/related associations in managing disasters activities In any case, one must not see the arrangement as the entire constituent of crisis readiness, but instead as one fundamental component in a range of exercises. Having a disaster plan doesn't equal to readiness, anyway a executive/comprehensive strategy is considered as the basis for health center readiness (Paton, 2013).

One significant part of a detailed disaster plan is all hazard approach, which directs to any occurrence or occasion that could represent a threat to human life, property or the condition of surrounding. An all-hazard approach does not truly mean being set up for all dangers that may show themselves in a specific setup including the emergency clinic. It implies that there are basic needs and responses required in a, crises for example, the requirement for treatment and triage of injured that can be tended to in a general planning and that preparation can give the evidence to hazard responders to get ready for sudden occasions. It gives an essential system to countering and responding to different disasters, however organizers commonly address the sorts of disasters that has anticipated to happen (Ukai, 2011)

Another part of a contingency planning is taking into account all the stages of DM cycle. A practicable health facility plan is developed for four phases of crisis (1) relief, (2) readiness, (3) reaction, and (4) recuperation. The mitigation measures include long term actions to counter the effects and eradicate the hazards and or decrease the effect of those dangers that can't be wiped out. The emergency centers must create and objectify a procedure to eradicate or reduce the impacts of risks that can't be dispensed by activities, for example the utilization of relevant structure development models; migration, retrofitting, or expulsion of structures in danger; decrease or restriction of

the impacts of the threat; risk warning and correspondence methodology; duplication of basic work force, basic frameworks, gear, supplies, pharmaceuticals, data frameworks, tasks, or materials. Additionally, effective emergency plan requires continues surveillance and monitoring to appraise on areas of greatest risk and risky circumstances which may emerge and create measures to guarantee staff wellbeing. Plans and methods must guarantee the wellbeing of faculty, offices and assets with the goal that the system can work viably (Omar, 2005).

The readiness stage incorporates actions to improve the ability and capacity of the emergency clinic to respond to a striking incidence inside or outside the hospital before occurrence. Readiness activities incorporate, however are not restricted to, surge of patient creating and keeping up preparing programs for clinic representatives, drill and exercise exercises, keeping up common participation with local medical clinics just as network associations in regards to crisis readiness exercises (Cyganick 2003, ASTM 2009). The reaction / response stage is the most basic and significant component of the DM cycle; it incorporates those activities important to limit negative impacts of an episode on the emergency clinics and lead to recuperation and rebuilding of basic medical clinic administrations. But, its effectiveness is an effect of the mitigation and readiness plans. The response contains all procedures that are aimed at reducing death toll and disabilities, which is the vital target of the medical plan. It incorporates yet isn't restricted to direction, control, correspondence, coordination, triage, treatment, flood limit activities, and so on (Cyganik, 2003).

The Incident Command System (ICS) is the driving force of the response stage, which isn't just the order control system during crisis responses/reactions. But at the same time is the arrange and separate out structure for crises management cycle all through including the relief, readiness, reaction, and recuperation stages. The recovery stage is

the last stage of DM cycle and alludes to all exercises planned for taking system and people back to pre-disaster conditions, including the usage of mitigation measures to encourage short-and long rehabilitation and recovery. Additionally, it incorporates the components of arranging, finance and organization, documentation, and business progression (Kim, 2016).

The recovery plan ought to be created utilizing methodologies dependent on the short- and long needs, essential assets, and adequate time allocations for renovation and rebuilding of administrations, offices, projects, and structures. The third significant part emergency plan is also be part of social community plan. Hospitals are integral part of society. The health centers cannot work independently during crises, it is fundamental for hospital emergency plan to be incorporated into the community disaster plan at all levels.(Kaji and Lewis, 2006) Collective funding correspondences with important network associations and other social insurance offices ought to be incorporated as a feature of emergency hospitals plans. These considerations ought to incorporate, however not be restricted to, work force, supplies, machinery, transportation and whatever else be required if a tragedy happens. Perhaps the advantage of emergency clinic collaboration with different medical clinics and locale centers is to address surge and capacities (Munasinghe and Matsui, 2019).

Correspondences and communication with these associations must be set up all the time to guarantee an efficient and prompt crisis response. This can be initiated systematically on codes, colors, wording and procedures to encourage powerful correspondence and coordination during a crisis. Some key organizations that a hospital should effectively interact with are:

i. Other healthcare organizations, tertiary care, clinics, control centers for poison and other care centers,

ii. Emergency medical services (EMS) agencies,

iii. Emergency management agencies,

iv. Law enforcement agencies,

v. Fire services,

vi. Media.

The linkage between the hospital and the community disaster plan needs to be based on a common language and agreed upon between the hospital and all responsible organizations (Le Roux, 2013).

2.6 VULNERABILITY OF HOSPITALS

The inspiration behind an emergency clinic, as the source of emotional and physical wellbeing of people, needs that it remains completely operational in the any serious catastrophe. To understand and highlight the area of emergency plan where facilitation provided by facility is more important than other in managing of disasters The significance of medicinal managements can be appraised as (1) unnecessary, (2) best, (3) important, (4) extremely vital and (5) essential in case of disaster. Extreme conditions effects health facility functioning and structure's this way or other way (Ochi et al., 2015).

A sudden increase in death toll and injured transfer from the influenced region towards different areas where the health centers services will become limited might be overpowered by the patient surge, an undermining its capabilities and the potential danger of a of transferable infections, and so on, are impacts of fiascos on wellbeing frameworks (WHO/PAHO2004). Experience demonstrates that the harm and damages caused from catastrophic events frequently disrupts the structure and operation of health centers and this not constrained to developing nation but also to developed. The effect

of calamity on emergency clinic is harm prompting a practical damage and breakdown, which results in a total or partial paralysis of operations.. There is an accord that information about potential effect on medical clinic and its functioning is of great concern significance for the following reasons:

i. Hospital offices must keep up their typical capacities and take care of the large number of victims for therapeutic treatment following a calamity.
ii. Hospitals provides place and treatment to patients in large number, who, because of their injuries, can't vacant a structure in case of a tragedy,
iii. Hospitals have advance and complicated system of electrical, mechanical and sterile offices, just as costly machinery, which are all fundamental for the normal activity of the medical clinic,
iv. The percentage of the expense of non-structural components to cost expense of the structure and building is a lot higher for medical clinics than different structures. (WHO/PAHO 2000)

In outline, the intricacy, inhabitancy level, institutions and explicit equipment of emergency clinics make them exposed to hazard. It is the commitment of experts to survey a clinic's incapacity, inability to respond to calamity harm and to get evaluations of existing risk levels so as to guarantee an appropriate response to crisis needs. A valid and in depth and vulnerability appraisal ought to be completed by considering three components of vulnerability: Structural, nonstructural and management / functional (Chatterjee and Nisha, 2011, WHO 2010).

2.6.1 Structural Elements

The basic components incorporate founding, sections, bearing dividers, shafts, staircases and floors. Assessment of the basic weakness and important issues are

obvious to the identification of risk. For the most part, the effect of calamities on basic components vary from slight harm to compete obliteration /damage.

2.6.2 Non-Structural Elements

The non-structural element risk assessment includes furniture, installation essential, apparatus and, machinery. The outcome of exposure to nonstructural components is ordered as low, moderate and high.

- Low; will most likely not make damage the peoples or meddle with the activity of the workplace.
- Moderate; speaks to a moderate likelihood of making damage the tenants or of meddling with the activity of the office, and
- High; will likely reason damage (and even demise) of the people or truly bargain the activity the hospitals.

The non- nonstructural based components' effect on medical clinic conditions can deliver various sorts of issues for emergency clinic work and the wellbeing of patients and faculty; these are characterized as life danger, property misfortune hazard and loss of capacity dangers.

Table 2: Non-structural elements in a hospital

Architectural Elements	Installations	Equipment and furnishings
•Detachments and partitions •Cores •Porticos •False ceilings •Covering fundamentals •Cornices •Promenades/boardwalks •Smokestacks •Glass •Accessories •Ceilings / Aerials	• Drinking water • Industrial water • Steam • Medical gasses • Industrial fuel • Vacuum network • Air conditioning • Piping • Waste disposal	• Medical apparatus • Industrial paraphernalia • Office equipment • Fixtures • Articles • Clinical files • Pharmacy shelving • Laboratory shelving

2.6.3 The Administrative / Organizational Elements

Health organization administration is one of major contributing factor to carry out hospital routine and emergency operations. They give directive regarding capacity building for staff to respond to emergency and also enhance their performance during routine.

2.6.3.1 Regulatory perspectives

Some significant issues that must be assessed in the setting of regulatory weakness are contracting, acquisitions and schedule upkeep, just as of the office.

2.6.3.2 Hierarchical viewpoints

A consistent and smooth everyday activity of an emergency clinic relies upon a streamlined association of staff, material, assets, and three-dimensional association. The technique for assessment of the regulatory/hierarchical weakness is abstract and subjective and dependent on the learning and experience of the medicinal staff that are with issues that may emerge during the activity of the emergency operations in hospitals. Hospitals functionality can be categorized by using vulnerability index such as; (WHO / PAOH 2000)

- Better: the parameter under survey acceptably fulfils guidelines for resilience to disasters and there is no compelling reason to change it;
- Normal: the parameter under survey fulfils nearby guidelines just reasonably and a minor change could improve essentially
- Poor: the parameter under survey does not satisfy guidelines and must be changed considerably to determine this insufficiency
- Core priority action according to Hyogo framework is to mitigate the impacts of disasters as hospitals are mostly affected by it and result in undermining capabilities to

provide services. The motto "Hospital Safe from Disasters: Reduce Risk, Protect Health Facilities, Save Lives" was given by the Secretariat of the United Nations International Strategy for Disaster Reduction (UNISDR) in association with the World Health Organization (WHO) in 2008-2009 (Du et al., 2011).

2.7 HOSPITAL SAFETY INDEX (HIS)

The point of the Hospitals Safe from Disasters methodology is to guarantee that emergency clinics won't just stay remaining if there should arise an occurrence of a disaster, however that they will work successfully and without interference and intrusion(WHO 2008). There are three goals, as for medical clinic wellbeing:

i. Secure the life of patients, attendants and emergency clinic staff
ii. Prevent damages to machinery and furnishing, and
iii. Safeguard the functionality of the health facilities

Attention to the identified objectives/aims as a major aspect of disaster risk reduction in health sector, it is critical to recognize the level of hospitals safety should a disaster happen? Emergency clinic assessments mean to recognize components that need improvement in a particular medical clinic, and to organize interventions in medical clinics because of area. Type that are basic during and after a disaster. To encourage this procedure and reduce specialized and money related requests, the medical clinic security HSI list has been advertised (Raeisi, Torabipour and Karimi, 2018). It is a quick and minimal effort analytic apparatus, which has been created by Pan American Health Organization to survey the likelihood of a medical clinic or hospital staying operational in offices crisis circumstances. There are different techniques for assessment of wellbeing offices for their vulnerability, although, WHO perceives that it is the best arrangement of fast assessment that exists. The medical clinic/hospitals

assessment tool isn't just a device for making specialized appraisals, rather it gives another way to deal with disaster by preventing and mitigating along with maintaining the functionality of the health sector. It's not a "win or bust" way to hospital safety yet takes into account improvement in an office later some time (Omar, 2005). The medical clinic security list is evaluated in two fundamental structures:

a) Form 1 incorporates general data about the wellbeing office, for example number of beds, emergency clinic inhabitancy rate, and so on.

b) Form 2 is the Safe Hospitals Checklist, which contains 145 factors, every one of which has three security levels: low, medium, and high. It is partitioned into four segments or modules:

i. Geographic area of the wellbeing office
ii. Structural security
iii. Nonstructural security
iv. Functional ability

The Safety Index has a most extreme estimation of 1 (one) and at least 0 (zero) and compares to the entirety of the individual scores from the Safe Hospital Checklist. In light of security record score, medical clinics are allotted A, B or C classification.

Table 3: Classification of Hospital Safety Index and its explanation based on total score

Safety index	Classification	What should be done?
0 – 0.35	**C**	Critical intercession measures are required. The medical clinic's present security levels are lacking to ensure the lives of patients and emergency clinic staff during and after a calamity.
0.36 – 0.65	**B**	Intercession measures are required for the time being. The emergency clinic's present security levels are with the end goal that patients, medical clinic staff, and its capacity to work during and after a fiasco are possibly in danger.
0.66 – 1	**A**	Almost certainly, the clinic will work if there should be an occurrence of a calamity. It is suggested, be that as it may, to proceed with measures to improve reaction limit and to complete preventive measures in the medium-and long haul to improve the security level if there should arise an occurrence of catastrophe.

Module 1: The main module is for the assurance of the risks that exist in the territory; it is excluded in the count of the security list.

Module 2: Module 2 assesses the auxiliary security of the office and includes the evaluation of its kind of structure, materials, and past introduction to common and different perils.

Module 3: This module assesses non-basic security which incorporates the wellbeing of basic systems like electrical and media transmission frameworks, warmth, ventilation, and cooling (HVAC) frameworks in basic regions, office and storeroom decorations and gear, for example, PCs, restorative symptomatic and treatment hardware and compositional components.

Module 4: Module 4 considers security dependent on practical limit. The association of emergency clinic in light of a fiasco is key to assessing a medical clinic's ability to work during and after a calamity.

Functional capacity is characterized as the degree of readiness of the medical clinic staff for real crises and fiascos just as the degree of usage of the emergency clinic plan. It comprises of five sub-modules that are perfect with the readiness cycle, which comprises of arranging, sorting out, preparing, preparing, working out, assessing and making remedial move for development. Truth be told, the practical limit module thinks about a progressing procedure for catastrophe readiness. The practical limit module of the Safe Hospital Index thinks about the accompanying positions:

i. Organization of the Hospital Disaster Committee and the Emergency Operations Center
ii. Operational plan for inner and additionally outer fiascos
iii. Contingency plans for medicinal treatment in catastrophes
iv. Plans for the activity, pre-emptive support, and reclamation of basic administrations
v. Accessibility and availability of meds, supplies, instruments, and other hardware for use in crises

2.8 ORGANIZATION OF THE DISASTER COMMITTEE AND THE EMERGENCY OPERATIONS CENTRE

A hospital disaster committee is a multi-disciplinary team, from inside and outside a hospital, which coordinates the preparation, development, implementation, evaluation, and maintenance of a hospital disaster plan. The hospital Emergency Operation Center, EOC, (also called Hospital Command Center, HCC) is a pre-defined location for hospital incident management team to convene and coordinate response activities, resources and information. This area can be used for relevant activities during other phases of the disaster management cycle, e.g. preparedness activities. A standard EOC/HCC has some features such as security, safety, accessibility, etc. that should be considered in designing and establishing the location (Coles and Zhuang, 2011). This sub-module of the HSI consists of following parameters according to WHO:

1) The panel is officially settled to react to significant crises or debacles
2) Committee enrolment is multi-disciplinary
3) Each part knows about his/her particular duties
4) Space is assigned for the medical clinic EOC
5) The EOC is in a secured and safe area
6) The EOC has a PC framework and PCs
7) Both interior and outer correspondences frameworks in the EOC work appropriately
8) The EOC has an elective interchanges framework
9) The EOC has satisfactory gear and decorations
10) An forward-thinking phone catalogue is accessible in the EOC
11) "Action Cards" accessible for all work force

2.9 OPERATIVE STRATEGIES AND SOP FOR INTERNAL OR EXTERNAL CALAMITIES

The emergency operations plan provides the structure and processes that the organization utilizes to respond to and initially recover from an event. It assigns responsibilities to organizations and individuals for carrying out specific actions that exceed routine responsibility at projected times and places during an emergency. It is flexible enough for use in all disasters. This sub-module consists of following parameters:

1. Strengthen fundamental medical clinic administrations
2. Measures to enact and neutralize the arrangement
3. Special authoritative techniques for catastrophes
4. Financial assets for crises are planned and ensured
5. Actions for growing functioning space, including the accessibility of additional beds
6. Techniques for admission to the crisis division
7. Procedures to grow crisis office and other basic administrations
8. Procedures to ensure patients' therapeutic records
9. Systematic security investigations are engaged by proper expert
10. Measures for clinic epidemiological investigation
11. Procedures for getting ready locales for ephemeral situation of dead bodies and for measurable prescription
12. Actions for triage, revival, adjustment, and treatment
13. Transport and coordination support
14. Food apportions for medical clinic staff during the crisis
15. Duties appointed for extra staff activated during the crisis
16. Measures to guarantee the prosperity of extra work force activated during the crisis

17. Cooperative courses of action with locality crisis plan
18. Mechanism to set up a statistics of passed patients and those alluded to different clinics
19. System for referral and counter-referral of patients
20. Procedures for speaking with the general population and media
21. Actions for reaction during night, end of the week, and occasions
22. Procedures for the clearing of the office
23. Emergency and other leave courses are open
24. Mock-up activities and drills

2.10 CONTINGENCY PLANS FOR MEDICAL TREATMENT IN DISASTERS

Planning process that analyses specific probable events or emerging situations that might impend the management and arrangements in advance to for effective and appropriate responses to cope timely with such events and situations. It is coordinated course of action require stakeholders at multiple level assigned to them the responsibilities, functional management and funding from particular sources at time of. Probability that crises, emergency occurs, it allows key actors to foresee, anticipate and resolve problems that can arise during crises. It undertakes activities to ensure that proper and immediate response will be taken by management and employees in the case of a specific disaster (Martínez, 2011). This sub-module considers the contingency plans for following disasters:

1) Quakes, tidal wave, volcanoes, and avalanches

2) Community skirmish and violent radicalization

3) Floods and cyclones/hurricanes/typhoons

4) Fires and detonations
5) Biochemical calamities OR disclosure to ionizing particle emission
6) Pathogens with wide-ranging virulence potential
7) management for patients, relatives, and health personnel / workforce with psychosocial problems

2.11 PREVENTIVE MEASURES FOR CRITICAL SERVICES MAINTENANCE

Critical services such as the communication system, water supply, medical gases, etc., are important elements of hospital operations. Mitigation of disaster impacts on these critical services is a subject in the area of the non-structural module, however to provide and restore back-up systems is a responsibility of the organizational module. The function of a hospital, especially indispensable services like the Intensive Care Unit (ICU) and Emergency Department (ED), is dependent on these critical services (E. Bryan, 2014). This sub-module consists of following parameters:

1) Wastewater systems
2) Fire safety system
3) Power supply and back-up generators
4) Solid waste management
5) Reserves for Fuel
6) Medical gases
7) Communication systems
8) Potable water

2.11.1 Emergency Supplies of Drugs

Sufficient amounts of medical supplies including essential medicines are vital elements of hospital. Anticipation of needs on the basis of experiential data and disaster assessment can provide enhanced medical care during disasters. This sub-module includes:

1) Instruments

2) Medicines

3) Items for treatment and other supplies

4) Life-support equipment

5) Crash cart for cardiopulmonary arrest

6) Medical gases

7) Personal protection equipment for epidemics (disposable)

8) Mechanical volume ventilators

9) Electro-medical equipment

10) Tagging and supplies for managing mass casualties

The functional capacity module of the HSI is a standardized module; however it does overlap with other standardized models and systems in the field of hospital management for disasters such as surge capacity and the hospital incident command system. For example, surge capacity is said to include staff, structure and services and is not considered a sub-module in the HSI, but its elements are seen in different sub modules of the functional capacity module (Muhwezi and Nuwagaba, 2015).

2.12 SURGE CAPACITY

It is a term that is used to describe the number of persons that can be assessed or treated within the health care system at any given time. In other words, surge is the maximum potential delivery of required resources, either through increase or adjustment of resource management and allocation. Surge capacity is a critical component of hospital preparedness. Conceptually, an optimized sustainable system for surge has the following components: comprehensive supplies and equipment, trained personnel, physical space, and management infrastructure, policies and procedures for escalation, which can respectively be referenced as "stuff, staff, structure, and systems"

There is another concept related to surge capacity that is called surge capability which refers to the capacity to oversee patients requiring strange or very particular restorative assessment and care. Flood necessities length the scope of particular medicinal administrations (ability, data, systems, hardware or staff) that are not ordinarily accessible at the area where they are required. Flood ability likewise incorporates quiet issues that require extraordinary intercession to secure restorative suppliers, different patients and the respectability of the human services association. Hospitals are expected to manage surge capacity issues without external aid for up to 96 hours. However, other health care agencies and community emergency management organizations help the hospitals with respect to surge capacity and capability. Community infrastructure including emergency medical services, communications infrastructure, government institutions (e.g. public safety agencies), and private infrastructure (supply chains, utilities, transportation assets) may have significant impact on the ability of a hospital to maximize its surge capacity (Le Roux, 2013).

2.13 MAKING THE CASE FOR HOSPITALS SAFE FROM DISASTERS

The destruction and devastation caused by disasters undermining the capacities and abilities of health facility is very high price we pay for the failure of hospitals. In comparison, the cost of making hospitals safe from disasters is minimum. Disaster deliberates the health systems and is a human and health tragedy, results in huge financial/ monetary losses, results in setback to achieving MDGs development goals, and trust and confidence is affected. It is a moral, social and ethical need along with economic requirement to make hospitals and health facilities safe from disasters (Montejano-Castillo and Moreno-Villanueva, 2018).

2.13.1 Economic Case

Hospitals represent an huge investment and budget for any nation. Their damages, devastation and the cost of rebuilding and renewal and rehabilitation and restoration carry out a major economic and financial burden. Indirect costs of damaged health infrastructure are often not completely accounted for, but can be higher than the direct costs of replacement and rebuilding (Heo, Yu and Kim, 2013). Indirect costs measured in studies have included:

- Proficiency losses due to disruption of hospital network services like laboratories or blood banks
- Increased costs of providing emergency health and shelter services
- The cost to individuals of lost opportunities, income, time and productivity.

Other kinds of indirect costs are difficult to measure, but have significant impact:

- Longer-term damage to public health, wellbeing and productivity
- The undermine to overall national development and business confidence

Development. The loss of health services and its increase will impact as delayed treatment and morbidity will impede and blows on the Millennium Development Goals. To achieve health driven goal all hospitals, primary health centers, and other health facilities are vital to sustainable recovery from disaster, and, taking key roles in:

- health surveillance to prevent outbreaks
- public health and sanitation campaigns,
- health research and reference laboratories, driving innovation
- as focal points for community organization.

2.13.2 The Social Case

The social consequences of hospital failure carry enormous risks. Hospitals, have a unique symbolic value as standards of public faith and community. They are sanctuaries for the most vulnerable people, meaning that there is a morally are vital to provide hospitals and health facilities with adequate protection. The failures of health facility to serve community resulting in deaths of children, old and unwell can have crippling effect on public confidence can ignite political trust. However, an effective prompt response and efficient and operational health service during a disaster can reinforce a sense of social resilience and cohesiveness Hospitals and wellbeing offices are symbols of societal progress, and are basics for stability and economic growth (Kim, 2016).. Public confidence in all levels of the United States government dropped after perceived inadequacies of the emergency response to Hurricane Katrina in New Orleans, during which the country witnessed the recovery of 44 dead bodies from an abandoned and damaged hospital. At least 140 elderly patients of hospitals and nursing homes died in the wake of the hurricane, and health and aged care facilities were later accused of euthanizing or abandoning their elderly charges great potential political gain (Reid,

2013). . Whether health services function or fail is an area of great political risk for governments, but also an area of political gain (Reid, 2013).

2.14 DISASTER PLANNING AND IMPENDING HEALTHCARE CHALLENGES DURING NATURAL DISASTERS IN PAKISTAN

Large-scale destruction of infrastructure, housing, livestock, agriculture, equipment and other assets of livelihoods were destroyed (Zaheer, 2012). The geographical setting of Pakistan makes the country more prone and vulnerable to large number of natural as well man-induced disasters which are further exacerbated by poor infrastructure, scanty emergency response services and poverty, particularly in rural areas lowering coping mechanisms at all levels. With the advent of this century, Pakistan has witnessed series of natural disasters, including 2005's devastating earthquake, horrendous river floods of 2010, 2013 and 2014. Thousands of precious lives were lost causing losses of billions of rupees in addition to high mortality and morbidity incidents. Pakistan is developing and vulnerable country experiencing disasters over its short period of time and the managing these catastrophes is dilemma of its time. At time of occurrence of any emergency/crises although all SOPS and polices are in details per claim but we fail to practice what is needed and system paralyzed or collapsed. Although having abundant resources/means failing of the management of crises creates a chaotic situation. (Ahmad, Bashir, 2012)

With regards to health, Pakistan has been a part of the Alma Ata Declaration for its effective implementation in the country as well as being a signatory to the Millennium Development Goals 2015 and Sustainable Development Goals 2030. Post 18th amendment of the constitution that took place in 2011, the provinces have now been empowered and given autonomy in the field of health to improve the indicators pledged

under these international obligations. There is now a need to make more efforts to strengthen the existing systems in terms of overall coordination between central and provincial chapters, equity and developing uniform standards in order to reduce the overall vulnerability of health issues among common masses, especially during disasters (Shahbaz, 2019).

NDMA which was set up in 2007, took a lead in organizing reaction and attempted help exercises while at common place and region levels, the reaction was composed by the separate experts. Because of the gigantic extent of this issue and absence of readiness, real wellbeing concerns were distinguished by the NDMA including absence of proactive human services reaction as far as arrangement of medications, preventive administrations and general wellbeing. Despite the fact that Emergency Medical Services – Rescue 1122 was operational in Punjab, there was an absence of composed referral administrations to tertiary consideration offices, specially appointed treatment plans and coordination component with national offices and different accomplices. In such a circumstance where position obligations ought to be characterized with organized reaction agenda, HEICS can fill in as a standard working technique. This gives a structure to direction and control and an instrument for coordination between regulatory, calculated, educational, monetary and coordination between regulatory, calculated, educational, monetary and operational assignments. Since disasters are unusual, thusly, performance of the crisis managements ought to be assessed at standard interims for support and improvement (Maheen, 2017).

Because of its geology, Pakistan is especially weak against catastrophes and requires brief thought and facilitated endeavors to fortify its social insurance foundation. Being developing country, monetary imperatives and political complexities are a portion of the difficulties faced by Pakistan in creating and actualizing a strategy for concrete

action plan to overcome these difficulties. An agreeable endeavor between people in general and private areas can give chances to use the accessible assets more adequately in all periods of the calamity reaction. In a calamity the institutions that has decentralized duties, limit working of regional experts and collaboration among the network is fundamental. The human resource government divisions of Pakistan need to be focused on abilities, assets, machinery and expert information to counter the difficulties of calamities. Regardless of the foundation of District Disaster Management Authorities in Pakistan, whose job is to go about as person on call in the event of a disaster, there is no reaction competency to emergency as far as readiness at region level.. Essential social insurance focuses need adequate readiness and staff, therefore tertiary consideration trots are overpowered with various patients being alluded with no triage at the time of tragedies (Challenges in the Healthcare Systems of Pakistan, 2017).

Catastrophic events are unavoidable, yet their most noticeably awful impacts can be limited by preventive techniques custom-made to the local conditions. Orientation programs among the network and people to aware/educate them with information of preventive measures and important fundamental emergency response preparedness can lessen the damages and losses as result of calamity. A reliable and efficient system should be in place to identify the threat, to aware the community expose to hazard by executing action plan conducting drills and exercises so readiness can impede the impact of calamity. Rather than bringing in damage control methods from nations, which shift in social and financial setting, there is a need to figure systems dependent on nearby research and needs evaluation. Subsidizing sources ought to be made accessible for preparing, research, and supplies (Marks and Goldberg, 2002).

Comprehensive plan to be executed during emergency is responsibility of the administrations managing crises. There is a need to set up Disaster Medical Services

Division at the joint effort at government level under the separate departments focusing and preparing for readiness and response, across the country. The division ought to be in charge of planning the brief transmission of therapeutic assets to governments at time of calamity for restorative response. This incorporates the procurement of staff and medicinal supplies from unaffected locales to address the issues of the influenced zones. It ought to likewise encourage the organized management and treatment of injured and affected people in medical clinics in the zones not affected by the disaster. There is a need to build up a worldwide coordination place for cataclysmic events under the umbrella of United Nations and its separate offices. Such as a worldwide database for volunteer human services experts, which can be enrolled proficiently and adequately if there should arise an occurrence of a calamity according to established truths and necessities on the ground. As of late, a noteworthy move has been watched universally in the disaster the mitigation techniques with more accentuation on risk decreases rather than on reaction drills and simulation exercises. Hazard decrease is essential in limiting the negative effects of the catastrophes. Consequently, the experts might need to figure the procedures practice towards hazard decrease so as to accomplish economic advancement in a crises management (Challenges Faced by Pakistani Healthcare System: Clinician's Perspective, 2018).

2.15 PRE-HOSPITAL MEDICAL RESPONSE TO DISASTERS

Community-based planning, including collaboration between hospitals and other organizations, is critical for effective community resilience and response to disasters. Experience from major disaster has highlighted that effective response and efficient DM can be achieved by multiple level collaboration and coordinated efforts of multiple types of agencies, e.g. search and rescue, EMS and hospitals. Preparedness planning

should concern community disaster planning rather than planning specifically for the preparedness and survival of individual hospitals. It is essential for emergency medical services (EMS) and hospital disaster plans to be integrated with each other and the community disaster plan. A coordinated cooperation between EMS and hospitals affects hospital function and the capacity in managing casualties; the performance of EMS in the correct triage of victims and transportation of mildly injured victims to appropriate alternative care sites helps unburden acute care facilities allowing them to manage greater numbers of higher acuity victims. The priority of the pre-hospital medical response to disasters is the rescue and provision of emergency care for victims who have life threatening injuries. Pre-hospital medical management of disasters is usually a combination of mutual efforts of several medical and logistic organizations such as EMS, Army, Red Cross, etc. Therefore, triage, primary medical care and transportation of casualties are often overlapping missions among EMS and other organizations with or without enough experience or overriding control. Crisis medicinal administrations are authoritative during all periods of catastrophic response, including mass-casualty triage, treatment, correspondence, clearing, coordination of patient transfer and following (Karimiyan et al, 2017).

A viable technique for EMS can be to utilize Incident Command System to give on scene emergency response system. Since EMS suppliers are ordinarily engaged with the prompt time frame following the beginning of a tragedy, it is very much placed to perform starting and continuous triage of patients who will require intense medical and treatment consideration. Triage in a crisis setting begins with an obviously settled operational plan that characterizes the jobs and robotized calculations of the multidisciplinary rescue groups and therapeutic squads included (Ray-Bennett, 2009). The medical and rescue activates are to a great extent futile when leading triage without

a working clearing process. Truth be told, the foundation of patient sorting and transfer is a high-need task, particularly during the initial 2–6 hours after the beginning of a calamity. The foundation of rescue activities joins the coordination of network transportation frameworks along other transportation courses cooperating to make advanced administrations for attendants and patients. The resulting objective of a therapeutic vehicle hall is to give a road to the protected and quick vehicle of patients to a predefined target, for example accepting clinics. Example People with serious injury possibly get an opportunity of survival if treatment in an injury focus is quickly accessible (Nakayachi, 2014). Medicinal administrations are imperative during all periods of response, with key jobs including mass-loss triage, on scene treatment, correspondence, clearing, coordination of patient vehicle and patient following (Karimiyan et al., 2017).

Routine treatment condensed during and following to the triage procedure must be objective coordinated and will rely upon the abilities and limit of the responding assets. Since the triage procedure is dynamic, a significant capacity is interim injured individual reassessment if essential. Treatment methodologies prone to diminish dreariness and mortality among exploited people organized in the treatment unit incorporate keeping up an aviation route, needle tracheotomy, controlling discharging and spinal adjustment. In this proposition medical clinic security file was assessed utilizing a PAN WHO Evaluation structure to decide the general DM framework at emergency clinics and consequent readiness plan (Du et al., 2011).

2.16 DISASTER MANAGEMENT IN PAKISTAN

Large-scale destruction of infrastructure, housing, livestock, agriculture, equipment and other assets of livelihoods were destroyed (Zaheer, 2012). The geographical setting of

Pakistan makes the country more prone and vulnerable to large number of natural as well man-induced disasters which are further exacerbated by poor infrastructure, scanty emergency response services and poverty, particularly in rural areas lowering coping mechanisms at all levels. With the advent of this century, Pakistan has witnessed series of natural disasters, including 2005's devastating earthquake, horrendous river floods of 2010, 2013 and 2014. Thousands of precious lives were lost causing losses of billions of rupees in addition to high mortality and morbidity incidents. Pakistan is developing and vulnerable country experiencing disasters over its short period of time and then managing these

With regards to health, Pakistan has been a part of the Alma Ata Declaration for its effective implementation in the country as well as being a signatory to the Millennium Development Goals 2015 and Sustainable Development Goals 2030. Post 18th amendment of the constitution that took place in 2011, the provinces have now been empowered and given autonomy in the field of health to improve the indicators pledged under these international obligations. There is now a need to make more efforts to strengthen the existing systems in terms of overall coordination between central and provincial chapters, equity and developing uniform standards in order to reduce the overall vulnerability of health issues among common masses, especially during disasters. (Shahbaz, 2019)

With the promulgation of National Disaster Management Act 2010, a robust disaster management system spread over the over country with its national, provincial and district level chapters, however, the element of health in this entire effort has not been addressed properly to date. At the government level, the coping mechanism is in place but needs to be strengthened and therefore NDMA is one move away from a response centric approach towards preparedness and prevention of diseases in emergencies by

taking up health as a priority, thus bringing about a paradigm shift in its overall disaster risk management agenda. (Khan, Ahsan and Siddique, 2017).

Various international entities put their efforts to reduce the risk of hazards and strengthening of health systems during disasters. Noteworthy are the WHO's International Health Regulations (IHR 2005), and Hyogo Framework for Action (HFA, 2005-2015) on DRR, followed by the Sendai Framework for Disaster Risk Reduction (SFDRR, 2015-2030) has laid down seven (07) fundamental principles agreed in an International Conference held during 10-11 March 2016 in Bangkok, Thailand, on the implementation of the health aspects of the SFDRR, which has served the basis of guidance to establish a National Action Plan in Pakistan for mainstreaming Disaster Risk Reduction into Health Sector (Khalifa, 2011). National Action Plan for the Implementation of Bangkok Principles on Health Aspects of the Sendai Framework for Disaster Risk Reduction is based on following principles:

Principle-1: Promote methodical incorporation of wellbeing into national and sub-national DRR approaches and designs and the consideration of crisis and catastrophe chance management programs in national and sub-national wellbeing systems.

Principle-2: Enhance participation between health specialists and other applicable partners to fortify nation limit with respect to disaster risk management and administration for hospitals wellbeing, the execution of the International Health Regulations (2005) and working of strong health system.

Principle-3: Inspire individuals engrossed to open and private interest in disaster risk management, incorporating into wellbeing offices and foundation.

Principle-4: Integrate DRR into wellbeing instruction and preparing and fortify for the wellbeing workforce in a disaster casual reduction.

Principle-5: Incorporate disaster related mortality, dreariness and incapacity information into multi-dangers early warning framework, wellbeing center pointers and national hazard appraisals.

Principle-6: Advocate for, and support cross-sectoral, trans-limit cooperation including data sharing, and learning and innovation for all risks, including natural perils.

Principle-7: Promote awareness, understanding and further advancement of neighboring and national approaches and procedures, indorsed structures, guidelines, and institutional inclined plans.

Chapter 3

RESEARCH METHODOLOGY

3.1 STUDY DESIGN

The study design is a descriptive cross-sectional survey using close ended, with data regarding level of preparedness and resilient hospitals was conducted using quantitative measure of HSI questionnaire developed by PAN WHO. Although the questionnaire contained open ended questions as well, due to unfilled responses, data was refined to closed ended answers only for analysis purpose.

3.2 STUDY POPULATION

Medical superintendents, commandant and administrators.

3.3 STUDY SETTING

Non-contrived / Normal.

3.4 STUDY SITE

i. Quaid e Azam International Hospital, Rawalpindi
ii. Holy Family Hospital, Rawalpindi
iii. Combined Military Hospital, Rawalpindi
iv. Pak Emirates Military Hospital, Rawalpindi
v. Fauji Foundation Hospital, Rawalpindi

3.5 SAMPLING TECHNIQUE

Convenient sampling was used for data collection.

3.6 DATA COLLECTION TOOL

Evaluation forms for safe hospitals, Hospital safety index, developed by Pan American Health Organization, WHO was used for data collection without any modification (Annexure – A).

3.7 STATISTICAL ANALYSIS

Completed questionnaires data was entered and analyzed using online HSI calculator, which processed data as per designated weightage of each component and subsequent classification. Generation of graphical representation was carried out in MS Excel by using data from HSI calculator.

3.8 STUDY DURATION

12 months after approval of synopsis.

3.9 INCLUSION CRITERIA

Only tertiary care hospitals in Rawalpindi district were included in this study.

3.10 EXCLUSION CRITERIA

All other levels of care i.e. primary and secondary were excluded.

3.11 ETHICAL CONSIDERATION

Study was carried out after taking formal approval from NUST Ethical Committee and concerned focal person of hospitals as listed in study settings.

3.12 HOSPITAL SAFETY INDEX (HIS) CALCULATOR

A tool that is cost effective, easily applicable, rapid, efficient and rapid. It is convenient to apply and user friendly by specialized team of disaster managers, engineers, administrators and health specialized. The data is entered in MS Excel and the HIS calculator will automatically generate results. Then results will be presented in tabular form. These results are on basis of three components of resilient facility such as Structural, Non Structural and functional elements. It will categorize the hospital into A, B and C accordingly.

There are 145 items in questionnaire and to evaluate the hospitals it is in Likert scale of High, Average and Low. Although all items were not applicable to hospitals under study and only those areas were answered that are applicable in local condition of health facility under study. This tool developed by PAHO to assess the probability that hospitals under study are prepared for disasters internal/ external and to evaluate that it will continue functioning in emergency taking in account of structural, nonstructural and functional components also the environment and social networking.

By applying Safe Hospital checklist we can determine the safety level. There are 145 items that will be in the standardized format and determine safety level on the basis of impact on these areas in hospitals. The safety is ranked as low, medium and high.

The HIS is divided into four level, first is geographical location of health facility and exposure to natural hazard areas etc, then the structural and nonstructural elements in form 2 similarly the functional capacity of health facility to assess issue such as

exercise, drills, plans in place and regular updating and revising disaster management plan.

3.12.1 Standardizing Relative Weight, Modules and Submodules

One module is grouped into submodules, whereas some modules have further sections but not all of them have.

1. Each item is given weight and is to be multiplied by its assign value in module
2. Then sum up the values as it gives the total value of submodule and is 100 % of areas in submodule.
3. Each submodule is weight with respect to relative submodules of same modules. And sum of all these modules give total to 100% of such module.
4. To identify the results for section modules and submodules will highlight areas that will rate hospital low so to improve safety of hospital.
5. Two models for weighing these modules for safety index calculation;

Model 1; (earthquake, cyclones in area is high risk)

- Structural safety is 50% of safety index;
- Nonstructural has 30% of safety index;
- Disaster management and emergency response is 20%

Model 2; all modules assign is equal weight,

- 33.3% of structural safety index;
- 33.3% of non-structural safety;
- Management and functionality safety index of 33.3%;

13.12.2 Data Entry in HSI Calculator;

a. The data from checklist is entered into excel sheet and formula is applied by HIS calculator that will give weightage of items in submodule, module and section.

b. A specific weigh is given by formula to index for each elements in structural, nonstructural and functional element for calculation of safety index.

c. The results are entered as numbers and a series of formulas is applied. The steps followed are:

- Input errors are corrected
- For questions left blank, denominators are adjusted for further calculations.
- the values are given for each item to determine the safety index in respective components of index
- safety specific module is charted & calculated
- module specific safety index is categorized into three sublevels as per their scores e.g a score from 0 to 0.35 is categorized as “c” similarly from 0.35 to 0.66 as “b” and from 0.66 to 1 as “a”.
- hospital overall safety index is calculated.
- hospitals are automatically classified as A, b and C.

Subsequent to these classification viable recommendation are given for improvement of the health facility.

Chapter 4

RESULTS

The present study was carried out to assess the level of preparedness of internal disaster in tertiary care hospitals of Rawalpindi district namely;

i. Quaid e Azam International Hospital
ii. Holy Family Hospital
iii. Combined Military Hospital
iv. Pak Emirates Military Hospital
v. Fauji Foundation Hospital

Hospital Safety Index Evaluation form designed by Pan American Health Organization, was floated to administrative departments of concerned hospitals for filling out the required information. Following criteria was followed for classification of hospitals as mentioned below:

Safety index	Category	What should be done?
0 – 0.35	**C**	Urgent intervention measures are needed. The hospital's current safety levels are inadequate to protect the lives of patients and hospital staff during and after a disaster.
0.36 – 0.65	**B**	Intervention measures are needed in the short-term. The hospital's current safety levels are such that patients, hospital staff, and its ability to function during and after a disaster are potentially at risk.
0.66 – 1	**A**	It is likely that the hospital will function in case of a disaster. It is recommended, however, to continue with measures to improve response capacity and to carry out preventive measures in the medium- and long-term to improve the safety level in case of

Table 4: Quaid e Azam International Hospital

Category	Unlikely to function	Likely to function	Highly likely to function	Total
Structural	11.25	26.25	62.50	100.00
Non-structural	0.90	2.88	96.23	100.00
Functional	3.22	6.87	89.91	100.00

Input of Vertical Weight Data

Vertical Weight	
Structural	**0.5**
Non-structural	**0.3**
Functional	**0.2**

Category	Unlikely to function	Likely to function	Highly likely to function	Total
Structural	5.63	13.13	31.25	50.00
Non-structural	0.27	0.86	28.87	30.00
Functional	0.64	1.37	17.98	20.00
Total	6.54	15.36	78.10	100.00

Input of Horizontal Weight Data

Horizontal weight		Safety factors
Unlikely to function	**1**	0.07
Likely to function	**2**	0.31
Highly likely to function	**4**	3.12
Overall Safety Factor		**3.50**

Range = Upper horizontal factor - lower horizontal factor = **4 - 1** = **3**

Safety Index = *S* = $\frac{\text{Safety factor - Lower Range Limit}}{\text{Range}}$ = **0.83**

Unsafety Index = *1-S* = $\frac{\text{Upper range limit - Safety Factor}}{\text{Range}}$ = **0.17**

Safety index	**0.83**
Vulnerability index	**0.17**
Health Facility Status:	**A**

Overall percentage of core components

	Low	Average	High
	%	%	%
Structural Safety	*11*	*26*	*63*
Non-Structural Safety	*1*	*3*	*96*
Functional Safety	*3*	*7*	*90*

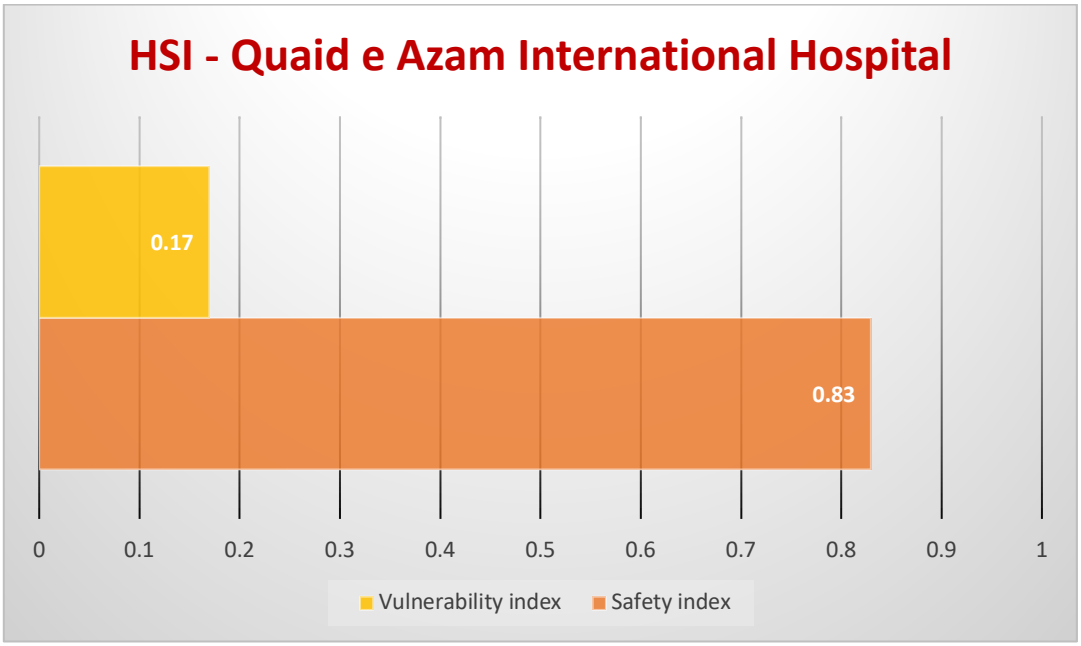

Figure 4: HSI for QIH

4.1 REMARKS

QIH is a 400 bedded private hospital, with hospital occupancy rate of around 80%. Based on classification system, the hospital was assigned Category A, with safety index of 83%, while vulnerability index of 17%.

Table 5: Holy Family Hospital

Category	Unlikely to function	Likely to function	Highly likely to function	Total
Structural	61.25	35.00	3.75	100.00
Non-structural	20.35	39.42	40.23	100.00
Functional	2.64	18.16	79.20	100.00

Input of Vertical Weight Data

Vertical Weight	
Structural	**0.5**
Non-structural	**0.3**
Functional	**0.2**

Category	Unlikely to function	Likely to function	Highly likely to function	Total
Structural	30.63	17.50	1.88	50.00
Non-structural	6.11	11.83	12.07	30.00
Functional	0.53	3.63	15.84	20.00
Total	37.26	32.96	29.78	100.00

Input of Horizontal Weight Data

Horizontal weight		Safety factors
Unlikely to function	**1**	0.37
Likely to function	**2**	0.66
Highly likely to function	**4**	1.19
Overall Safety Factor		**2.22**

Range = Upper horizontal factor - lower horizontal factor = **4 - 1** = **3**

Safety Index = *S* = $\dfrac{\text{Safety factor - Lower Range Limit}}{\text{Range}}$ = **0.41**

Unsafety Index = *1-S* = $\dfrac{\text{Upper range limit - Safety Factor}}{\text{Range}}$ = **0.59**

Safety index	**0.41**
Vulnerability index	**0.59**
Health Facility Status:	**B**

Overall percentage of core components

	Low	Average	High
	%	%	%
Structural Safety	*61*	*35*	*4*
Non-Structural Safety	*20*	*40*	*40*
Functional Safety	*3*	*18*	*79*

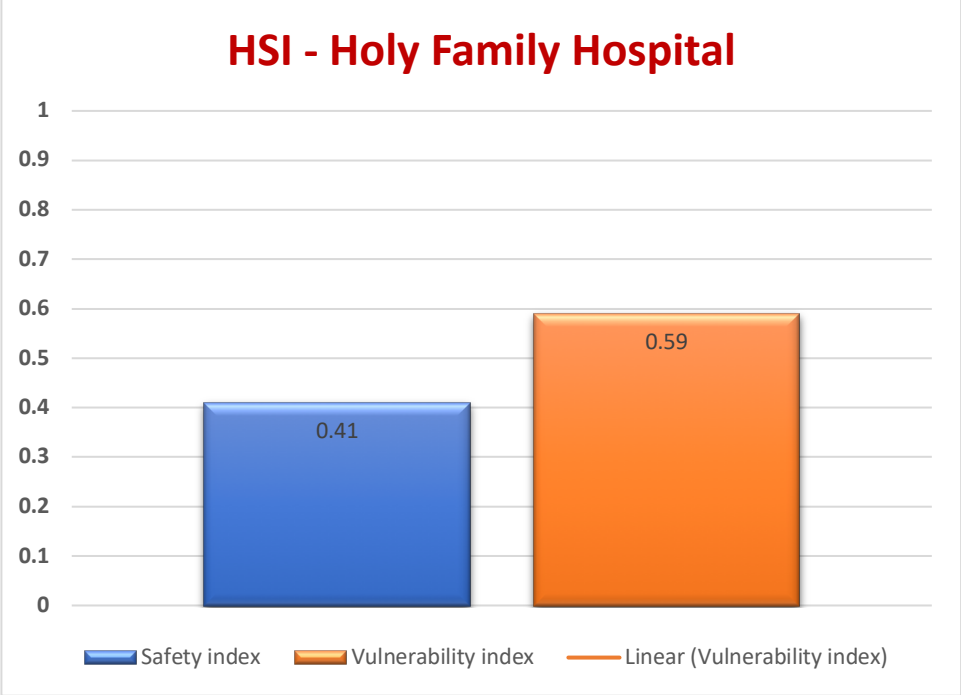

Figure 5: HSI for HFH

4.2 REMARKS

HFH is a 850 bedded government hospital, with hospital occupancy rate of around 80%. Based on classification system, the hospital was assigned Category B, with safety index of 41%, while vulnerability index of 59%.

Table 6: Combined Military Hospital

Category	Unlikely to function	Likely to function	Highly likely to function	Total
Structural	25.00	0.00	75.00	100.00
Non-structural	4.53	8.68	86.80	100.00
Functional	5.69	11.82	82.49	100.00

Input of Vertical Weight Data

Vertical Weight	
Structural	**0.5**
Non-structural	**0.3**
Functional	**0.2**

Category	Unlikely to function	Likely to function	Highly likely to function	Total
Structural	12.50	0.00	37.50	50.00
Non-structural	1.36	2.60	26.04	30.00
Functional	1.14	2.36	16.50	20.00
Total	15.00	4.97	80.94	100.00

Input of Horizontal Weight Data

Horizontal weight		Safety factors
Unlikely to function	**1**	0.15
Likely to function	**2**	0.10
Highly likely to function	**4**	3.20
Overall Safety Factor		**3.45**

Range = Upper horizontal factor - lower horizontal factor = **4 - 1** = **3**

Safety Index = *S* = $\frac{\text{Safety factor - Lower Range Limit}}{\text{Range}}$ = **0.82**

Unsafety Index = *1-S* = $\frac{\text{Upper range limit - Safety Factor}}{\text{Range}}$ = **0.18**

Safety index	**0.82**
Vulnerability index	**0.18**
Health Facility Status:	**A**

Overall percentage of core components

	Low	Average	High
	%	%	%
Structural Safety	*25*	*0*	*75*
Non-Structural Safety	*4*	*9*	*87*
Functional Safety	*6*	*12*	*82*

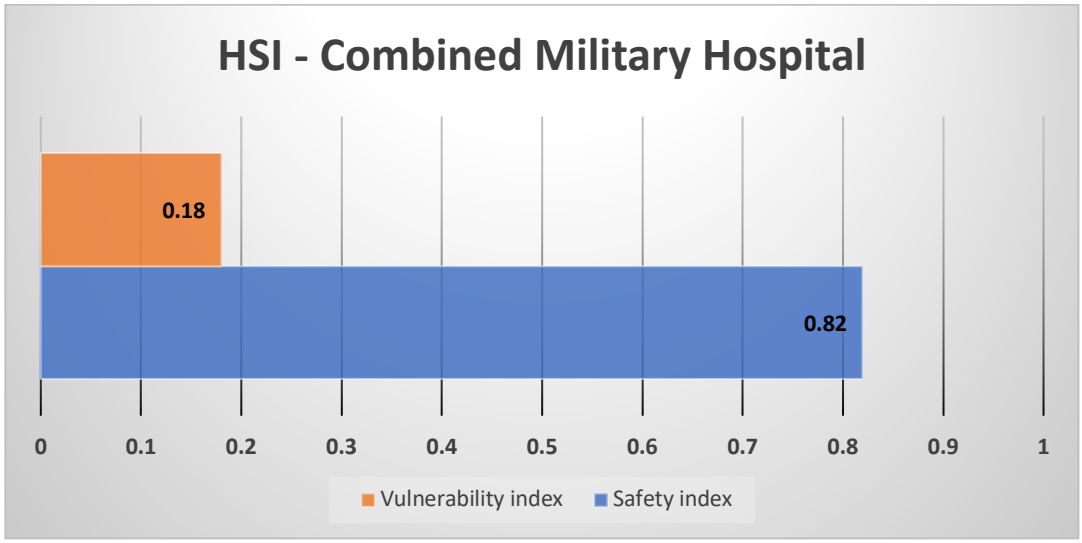

Figure 6: HSI for CMH

4.3 REMARKS

CMH is a 1021 bedded military hospital, with hospital occupancy rate of around 86%. Based on classification system, the hospital was assigned Category A, with safety index of 82%, while vulnerability index of 18%.

Table 7: Pak Emirates Military Hospital

Category	Unlikely to function	Likely to function	Highly likely to function	Total
Structural	11.25	7.50	81.25	100.00
Non-structural	0.00	0.00	100.00	100.00
Functional	0.00	0.00	100.00	100.00

Input of Vertical Weight Data

Vertical Weight	
Structural	**0.5**
Non-structural	**0.3**
Functional	**0.2**

Category	Unlikely to function	Likely to function	Highly likely to function	Total
Structural	5.63	3.75	40.63	50.00
Non-structural	0.00	0.00	30.00	30.00
Functional	0.00	0.00	20.00	20.00
Total	5.63	3.75	90.63	100.00

Input of Horizontal Weight Data

Horizontal weight		Safety factors
Unlikely to function	**1**	0.06
Likely to function	**2**	0.08
Highly likely to function	**4**	3.63
Overall Safety Factor		**3.76**

Range = Upper horizontal factor - lower horizontal factor = **4 - 1** = **3**

Safety Index = *S* = $\dfrac{\text{Safety factor - Lower Range Limit}}{\text{Range}}$ = **0.92**

Unsafety Index = *1-S* = $\dfrac{\text{Upper range limit - Safety Factor}}{\text{Range}}$ = **0.08**

Safety index	**0.92**
Vulnerability index	**0.08**
Health Facility Status:	**A**

Overall percentage of core components

	Low	Average	High
	%	%	%
Structural Safety	*11*	*8*	*81*
Non-Structural Safety	*0*	*0*	*100*
Functional Safety	*0*	*0*	*100*

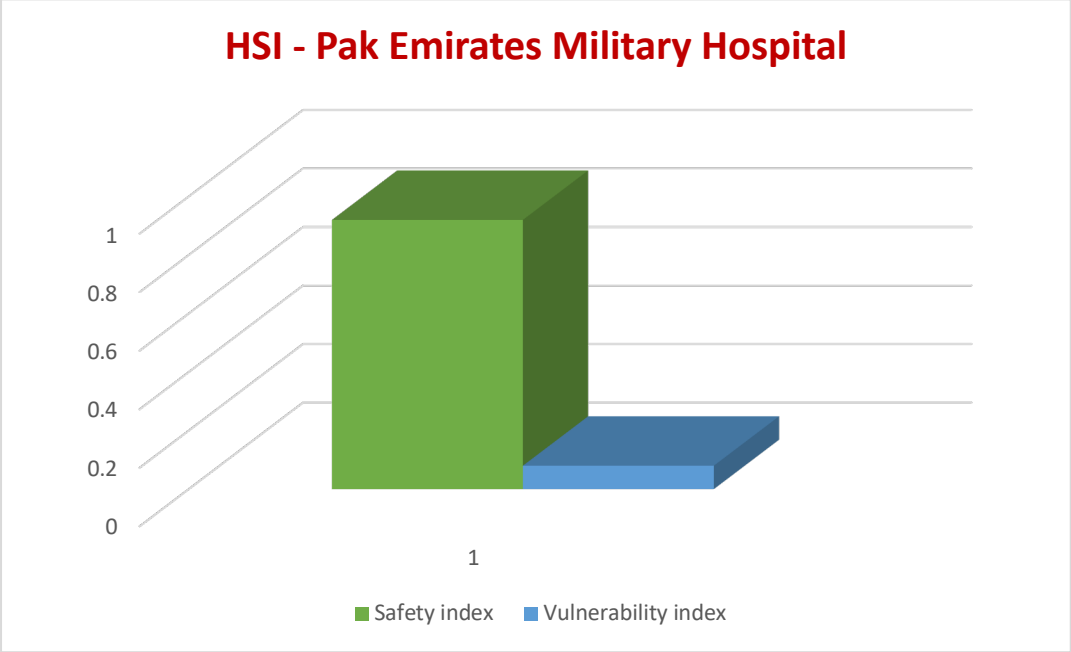

Figure 7: HSI for PEMH

4.4 REMARKS

Pak Emirates MH is a 1000 bedded military hospital, with hospital occupancy rate of around 90-95%. Based on classification system, the hospital was assigned Category A, with safety index of 92%, while vulnerability index of 8%. This can large be attributed to the fact that PEMH has undergone tremendous infrastructural over hauling with start of the art architectural designs, in line with the required objectives of safe hospitals.

Table 8: Fauji Foundation Hospital

Category	Unlikely to function	Likely to function	Highly likely to function	Total
Structural	0.00	25.00	75.00	100.00
Non-structural	0.00	12.40	87.60	100.00
Functional	12.26	20.57	67.17	100.00

Input of Vertical Weight Data

Vertical Weight	
Structural	**0.5**
Non-structural	**0.3**
Functional	**0.2**

Category	Unlikely to function	Likely to function	Highly likely to function	Total
Structural	0.00	12.50	37.50	50.00
Non-structural	0.00	3.72	26.28	30.00
Functional	2.45	4.11	13.43	20.00
Total	2.45	20.33	77.21	100.00

Input of Horizontal Weight Data

Horizontal weight		Safety factors
Unlikely to function	**1**	0.02
Likely to function	**2**	0.41
Highly likely to function	**4**	3.09
Overall Safety Factor		**3.52**

Range = Upper horizontal factor - lower horizontal factor = **4 - 1** = **3**

Safety Index = *S* = $\frac{\text{Safety factor - Lower Range Limit}}{\text{Range}}$ = **0.84**

Unsafety Index = *1-S* = $\frac{\text{Upper range limit - Safety Factor}}{\text{Range}}$ = **0.16**

Safety index	**0.84**
Vulnerability index	**0.16**
Health Facility Status:	**A**

Overall percentage of core components

	Low	Average	High
	%	%	%
Structural Safety	*0*	*25*	*75*
Non-Structural Safety	*0*	*12*	*88*
Functional Safety	*12*	*21*	*67*

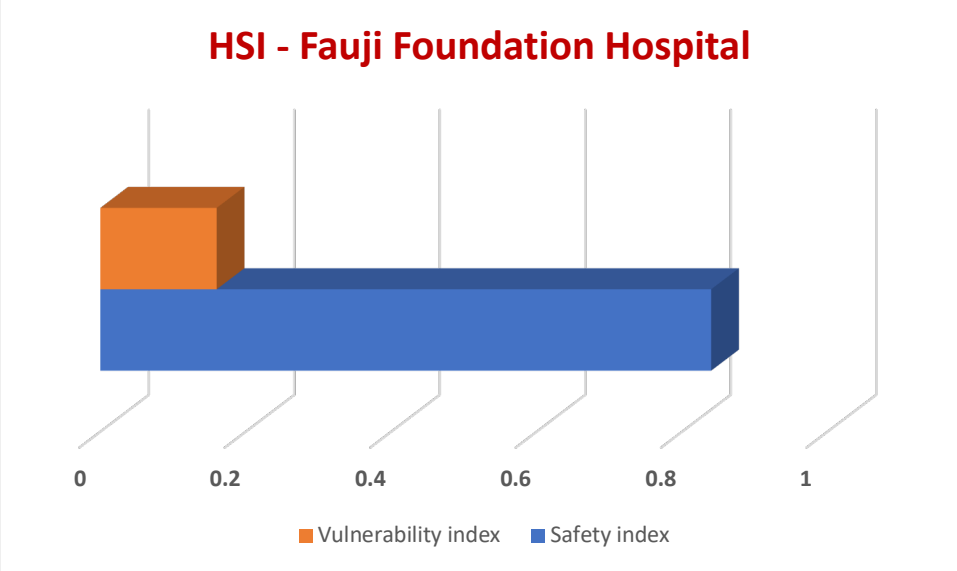

Figure 8: HSI for FFH

4.5 REMARKS

FFH is an 811 bedded semi-government hospital owned by Fauji Foundation, with hospital occupancy rate of around 80%. Based on classification system, the hospital was assigned Category A, with safety index of 84%, while vulnerability index of 16%.

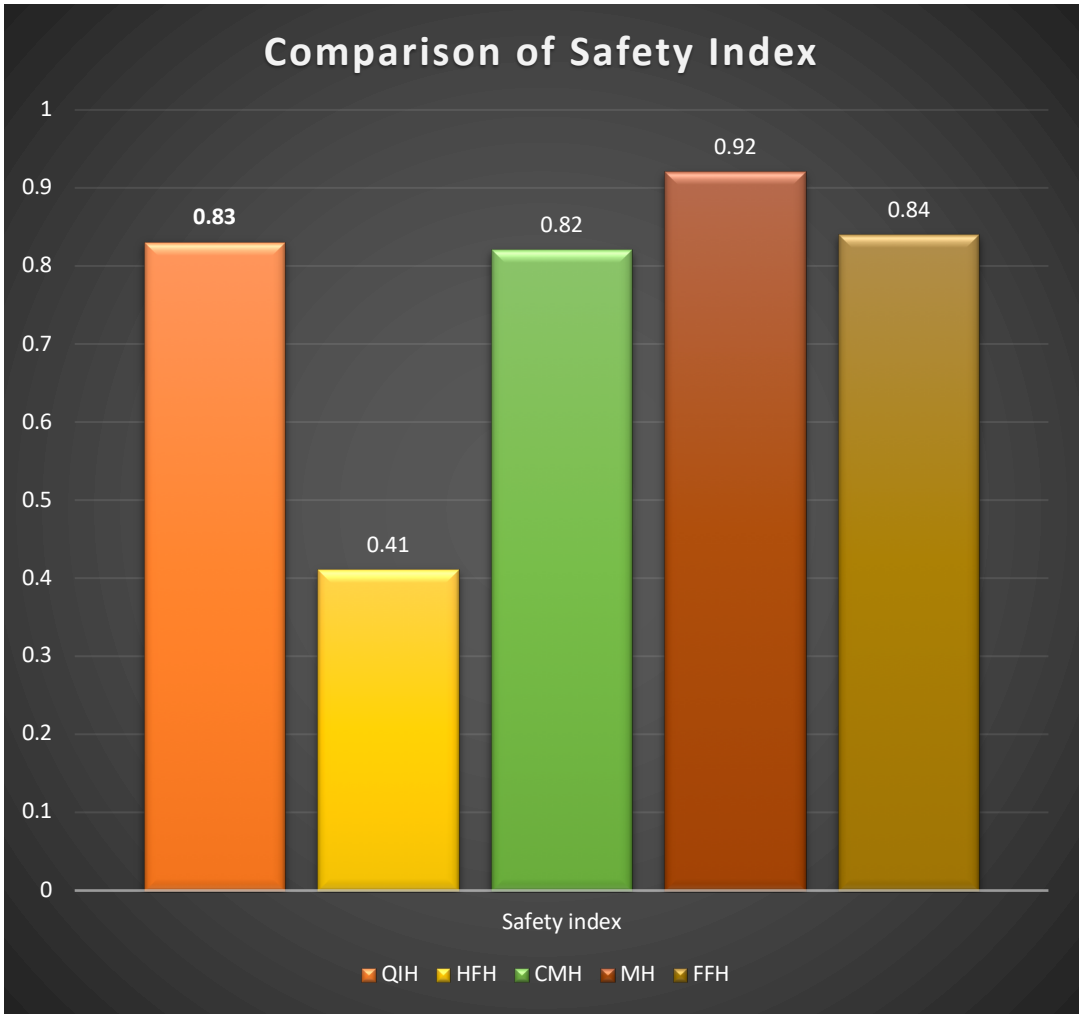

Figure 9 – Comparison of HSI of all hospitals

4.6 REMARKS

Based on comparison of Safety Index of hospitals, four out of five were placed in category A. Pak Emirates Military Hospital topped the safety index with 92%, while QIH, CMH and FFH were almost equal in the safety index. However, major exception was of HFH whose safety index was merely 41%, thus making it more prone to disasters and rendering dysfunctional as well.

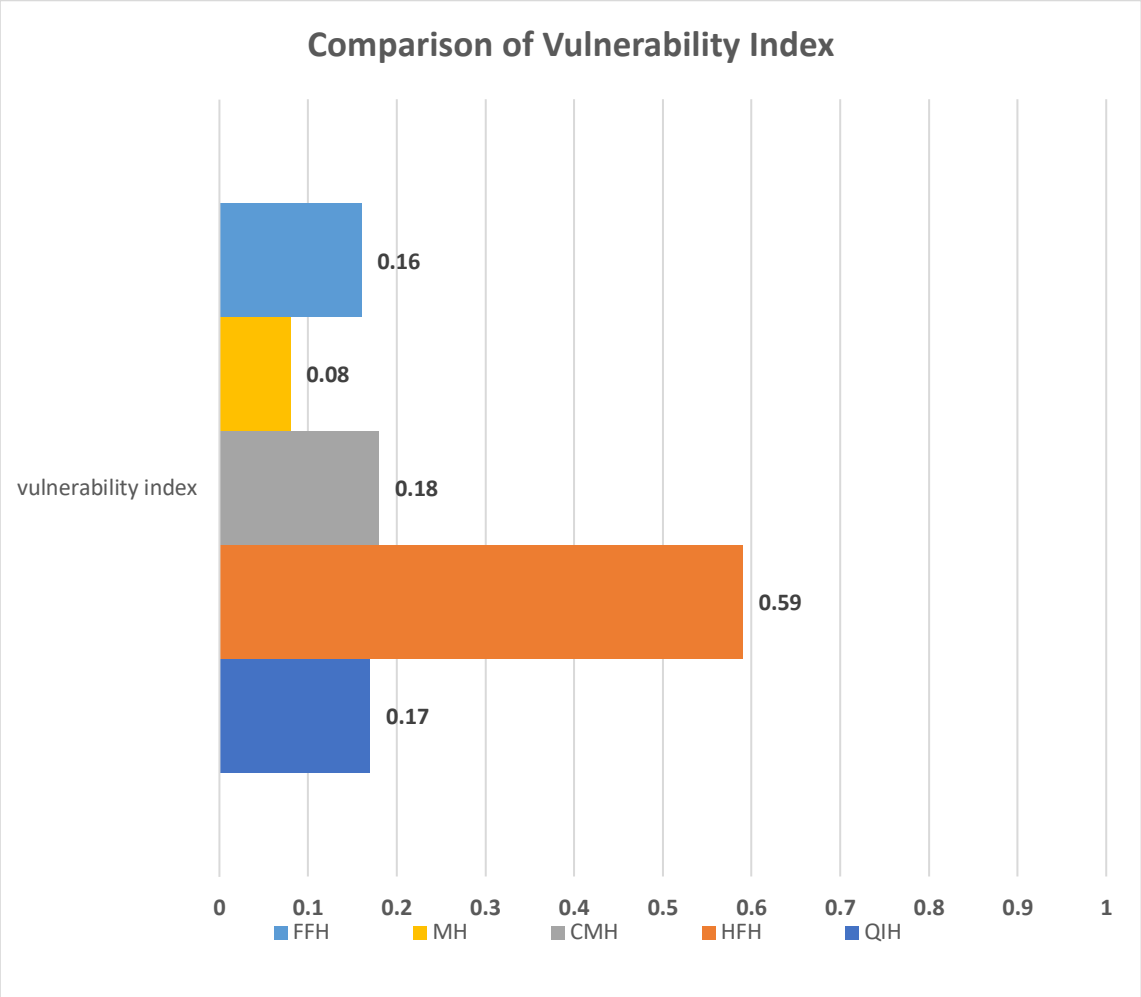

Figure 10: Comparison of Vulnerability index of all hospitals

4.7 REMARKS

Based on comparison of vulnerability index of hospitals, four out of five were placed in category A. Pak Emirates Military Hospital topped the vulnerability index with 8%, while QIH, CMH and FFH were almost equal in the vulnerability index. However, major exception was of HFH whose vulnerability index was whooping 59%, thus making it more prone to disasters and rendering dysfunctional as well.

Chapter 5

DISCUSSION

Disaster is a phenomenon that not only produces mass level disruptions and destructions to societal infrastructure, but also impair daily functioning of life, by presenting immediate threat to public health, thus warranting significant external response. Therefore, it is essential that in order to cope with disaster, a carefully chalked out strategy must be formulated, known as disaster management plan, which will respond effectively and efficiently to minimize the threat.

Generally, the emphasis is made on general impact of disaster in terms of damages to infrastructure such as roads, buildings and house etc., hospitals though integral part of societal infrastructure are often neglected. They are infact the primary source of treatment during disaster, thus must incorporated in overall plan so as to continue with recovery and rehabilitation phases. There is little written information available about disasters occurrence within hospitals and subsequent consequences. Hospitals play a vital role, thus a prerequisite checklist of factors has to be followed while selecting location of any health facility, as well as design layout, building structure, and operational capabilities.

More important is the accessibility and reachability status of hospital during disasters. Infact the core importance lies in the fact, that for a hospital to remain operational during disaster, the hospital must withstand during disaster, because disaster are the litmus test for determining the emergency response capabilities. Every disaster poses new types of risks, thus strategies and contingency plans have to reviewed and revised annually. Unfortunately, there are many difficulties associated with disasters and their response, lessons learned are neither shared nor translated into effective planning for future occurrences.

The main objective of this thesis was to systematically analyze the level of preparedness and safety of hospitals with respect to medical response to disasters. The results showed that the preparedness level of the health medical system is at best at an intermediate level with respect to response to disasters. There is growing need for a studyon a wider scale on the human dimensions of DRR as well as the local operational processes involved, along with the institutionalization of DRR policies and application of risk management practices.

The study was carried out in five hospitals of Rawalpindi district, with following core information:

Table 9 – Summary of Hospital Safety Index of Hospitals

Hospital	Type	No. of beds	Hospital Occupancy Rate	HSI category	Safety Index	Vulnerability Index
QIH	Private	400	80%	A	0.83	0.17
HFH	**Public**	**850**	**100%**	**B**	**0.41**	**0.59**
CMH	Military	1021	85%	A	0.82	0.18
PE MH	**Military**	**1000**	**90 – 95%**	**A**	**0.92**	**0.08**
FFH	Semi-government	811	80%	A	0.84	0.16

** Scored highest ** Scored lowest

Out of five hospitals, two were military owned, while remaining one each was of private, public and semi-government in nature. Pak Emirates Military hospital top scored the safety index with 92%, this can be attributed to the fact that they have recently re-innovated the entire infrastructure in collaboration with United Arab Emirates. In any disaster it is probability that health facility will continue its function. The intervention is to increase response capacity and mitigation measures for

prevention recommended in long and short term for safety level improvement, whereas HFH, being public sector hospital that was established in 1948, scored the least in terms of safety index at 41%, which is alarmingly a low figure considering the overall patient catchment and services delivery at government level. Corresponding the vulnerability index is 59% as well, an alarming figure too. Thus it is even more prone to disasters, and can be rightly interfered that during disaster, hospital can suffer from internal disaster as well, this risking the lives of patients as well. In addition, the spread of diseases as result of contamination from chemicals, food and water borne disease provide even a greater magnitude of problem. According to HSI the safety level for hospital is low as the that patient, staff, operations and functioning is compromised and at risk. Intervention measures are needed in the short-term. The hospital's current safety levels are such that patients, hospital staff, and its ability to function during and after a disaster are potentially at risk. HFH being oldest hospital among current study sites, is situated in the heart of district. Infrastructural design poses major threat, as it is most likely become double disaster event in case of any natural disaster owing to faulty and old building design without proper disaster management plan and SOP or guidelines. Moreover, presence of residential areas and narrow accessible road, are more likely to be another hindering factor that may act as multiplier force in case of disaster, thus disaster management will more likely to effected. Thus district administration and hospital management should actively look for securing alternate routes and modify disaster coping strategies by conducting mock drills to ensure readiness and preparedness of concerned staff. Thus optimizing the overall strategic outcome.

Chapter 6

RECOMMENDATIONS & CONCLUSION

6.1 RECOMMENDATIONS

6.1.1 Structural Level

- There should be provision for primary and secondary decontamination in case of NBCW disaster
- All care must be provided under one roof to prevent the logistic issue in moving of critical patients
- Expansion of limited triage area in A&E buildings specially if designated area is affected in disasters.

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6.1.2 Functional Level

- Cross specialty support (medical and allied) must be provided
- Central PA (public address) system should be installed for effective communication in all towers or corresponding buildings
- There should be effective inter-coordination between different hospitals

6.1.3 General Recommendations

a) **Policy Formulation:** Policies for resilient health facility for standardizing the Hospital Safety according to International standards requires management and social sectors to formulate a policy that is founding stone for hospital resilience and its implementation should be endorsed at all levels. This will

influence staff practices and safety measures. There is dire need to influence the policy makers to formulate National Policy for resilient health facility.

Federal as well as provincial governments should clearly design a comprehensive policy plan that should be integrated into PC 1, by ensuring necessary structural requirements, pre-requisite specifications which must be complied upon. Moreover, taskforces such as Healthcare commission should be empowered to seal small home-run clinics and hospitals, which pose a significant threat of internal disaster.

b) **Capacity Building:** Promoting capacity building for hospital staff at all levels so they can be specialized and trained to respond to emergency. Workshops should be mandatory. The courses for capacity building and HR training design by UN/ISDR for Public Health and emergency Management for Asia and Pacific (PHEMAP) special courses for hospital safety and resilient health facility at international and national level should be conducted

c) **Accessibility of Health Facility:** The hospitals in study were in areas where the accessibility is compromised during routine because of rush hour because hospitals are in crowded areas. when disaster strikes or in emergency the area is completely blocked so there should be special service lanes or drive through s to emergency that is especially for hospitals and it should be part of urban planning

d) **Web Based Tool:** The hospital safety index should be incorporated into HIMS (Hospital Information Management System) and there should be web-based tool that is periodically updated by specialized disaster managers / engineers and updated to national and regional authorities. It should be important for accreditation and licensure of hospital. There should be

Ministry of Health portal for monitoring, evaluation and surveillance of Hospital Preparedness and Safety.

e) **Attendants and Volunteers:** Management of patient attendants and volunteers in emergency itself become internal disaster so there should be awareness campaign for community how to respond in emergency

f) **Community Empowerment:** Empowering the community by their participation in managing internal disaster by guiding them how they can contribute by remain confined to waiting area, not more than one attendant, keeping area clean by giving pumpless, awareness and demonstration in waiting areas slide show on screen how to respond in emergency, mitigation measures against any emergency such as cholera outbreak, dengue fever, floods, burns, heatwave etc

g) **Curriculum Incorporation:** Disaster Management studies should be part of curriculum; its module should be included in medical studies. Medical schools ought to incorporate disaster drills into their courses to expand the availability and readiness of students at under graduate level

h) **Financial Support:** A devoted national expenditure plan ought to be assigned to support medical clinic readiness over all emergency clinics in Pakistan. The joint collaboration between NGOs and social insurance suppliers will absolutely diminish the staggering impacts of catastrophes and the sufferings of casualties.

6.2 LIMITATIONS OF THE STUDY

a) One limitation of this study is that the studies samples were the not the same. Although I could not evaluate an entire system in the same time and place, the most important parts of a whole medical system were evaluated with respect to

disaster management therefore results can be considered in local and national medical disaster planning.

b) This thesis was performed mainly in Rawalpindi district which restricts the ability to generalize our results. However, the Hospital Safety Index with its job action sheets are standardized tools designed to be used worldwide.

c) Another important limitation of this study was that the preparedness (HSI) evaluation tool have not formally been tested with respect to their validity to predict the capability and performance of the system during real disasters. It is a worldwide subject today, and there is still a need for a valid evaluation tool with respect to hospital preparedness. However, the evaluation of hospital disaster management capability using internationally structured tools is important in a vulnerable country. Outcome studies using a valid tool remain to be performed.

d) The number of participating hospitals in the evaluation of preparedness was too small. However, this is the first study of its kind using an internationally standardized methodological tool for evaluating hospital preparedness and using an all-hazards approach, therefore further researches need to be carried out to augment the reliability of tool and to have clear and broader picture.

e) The selection of the participating hospitals in this thesis was a convenience sample. Therefore a selection bias is possible and the generalization of our results may be impaired. However, all hospitals need to be prepared to respond to possible disasters.

f) An additional limitation is that the evaluators were not the same throughout the study. However, this is the first study to consider the most important parts of the medical system, with respect to hospital preparedness.

g) Furthermore, the structured format of the evaluation tools minimizes the potential variation due to subjective interpretation. A qualitative study can counter subjective interpretation.

h) Additional limitation is that the cut-off levels for the categorizing of HSI are arbitrary. However, they were based on expert consensus. There is currently no better way to perform this categorization. Standardizing these cut-off levels requires prospective outcome-based studies, which still remain to be performed.

6.3 CONCLUSION

Disasters are increasing all over with more devasting effects than ever. Disasters affect the social, financial and political infrastructure of inflicted community and inundate the health system. Hospitals are assets and are source of social coherence and financial stability and plays important part in sustainable recovery of communities. The disruption of health facility will result in economic burden because of huge investment up to 70% health budget. The readiness of health facility and its performance is dependable on resilience of hospitals. Resilient health facility has three components Structural, Non-Structural and Functional. Hospital Safety Index (HIS) is cost effective and reliable tool by PANHO/WHO to measures the preparedness of health facilities. This tool provides opportunity to rank the level of safety, to prioritize actions and to monitor the progress. The present study design is a cross sectional survey using quantitative measure of Hospital Safety Index (HIS). Questionnaire was administered to five tertiary care hospitals based on convenient sampling technique, with data analysis being carried out using HSI calculators Out of five hospitals, Military hospital secured the highest safety index of 0.92, whereas Holy Family hospital secured lowest with 0.41. While the vulnerability index showed similar trends in categorization. Four

hospitals were categorized as category A hospital, while remaining as category B. It was concluded that there is a dire need to improve the overall disaster preparedness status of hospitals. Paradigm shift from recovery to mitigation can be achieved in Pakistan by adapting internationally recognized frameworks taking context specific priority actions for resilient health facility and safe hospitals. Empowerment and participation at all levels of hospital will strengthened the argument for resilient health facility and advocate the core concern area. The study provides an insight on importance of hospital preparedness enabling policy makers and stakeholders to plan appropriate interventions. It is a starting point leading to awareness, discussion, tangible measures and sustained actions for both national and provincial policy makers. It is recommended, however, to continue with measures to improve response capacity and to carry out preventive measures in the medium- and long-term to improve the safety level.

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Annex 1

Form 1

General Information About the Hospital

Please note:

1 This form should be completed by the hospital, preferably by the Hospital Emergency/Disaster Management Committee before the evaluation.

2 If necessary, you may photocopy this form or print additional copies from the USB drive included in the folder, or from the website.

GENERAL INFORMATION ABOUT THE HOSPITAL

1. **Name of the hospital:**.....
2. **Address:** .....
3. **Names of hospital senior managers** (e.g. chief executive, medical director, nursing director, administration director): .....
   .....
   .....
   .....
4. **Names and contact details of hospital emergency/disaster managers** (e.g. chair of emergency/disaster management committee, coordinator, manager of security/fire services): .....
   .....
   .....
   .....
5. **Telephone** (include area/city code): .....
6. **Website :** .....
   E-mail: .....
7. **Total number of beds:** .....
8. **Average bed occupancy rate (in normal situations):** .....
9. **Total number of personnel:** .....
   a. **Number of clinical staff** (e.g. physicians, nurses, medical technologists) .....
   b. **Number of nonclinical staff** (e.g. executive management, administration, engineers, information technology) .....
10. **General description of the hospital:** e.g. institution to which it belongs (e.g. ministry, private entity, university), type of establishment (e.g. tertiary referral hospital, specialized services), role in the network of health services, role in emergencies and disasters, type of structure, total population served, catchment area (routine services/emergencies and disasters) etc.....
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11. **Physical distribution:**

List and briefly describe the main buildings in the hospital. Provide maps and diagrams of the hospital site and the local setting, including the physical distribution of the services, in the box below. Use additional pages, if necessary.

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12. **Hospital treatment and operating capacity:** Indicate the total number of beds and staff for daily routine services, and additional capacities to expand services in emergencies and disasters to obtain the maximum hospital capacity, according to the hospital's organization (by department or specialized services). The number of staff available can be used for responding to Item 132: Staff availability.

a. Internal medicine

Department or service	Routine capacity (number of beds)	Maximum hospital capacity for emergencies/disasters (number of beds)	Planned number of staff	Actual number of available staff	Observations
General medicine					
Paediatrics					
Cardiology					
Pulmonology					
Neurology					
Endocrinology					
Haematology					
Gastroenterology					
Dermatology					
Burns unit					
Physiology and rehabilitation					
Psychiatry/psychology					
Others, specify					
Others, specify					
Others, specify					
Total					

b. Surgery

Department or service	Routine capacity (number of beds)	Maximum hospital capacity for emergencies/disasters (number of beds)	Planned number of staff	Actual number of available staff	Observations
General surgery					
Obstetrics and gynaecology					
Orthopaedics and traumatology					
Urology					
Otolaryngology					
Ophthalmology					
Neurosurgery					
Plastic surgery					
Cardiovascular surgery					
Others, specify					
Others, specify					
Total					

c. Intensive care unit (ICU)

Department or service	Routine capacity (number of beds)	Maximum hospital capacity for emergencies/disasters (number of beds)	Planned number of staff	Actual number of available staff	Observations
General intensive care					
General intermediate care					
Cardiovascular ICU					
Paediatrics ICU					
Burns ICU					
Others, specify					
Total					

d. Operating theatres

Department or service	Number of operating theaters - routine	Maximum number of theatres of hospital (for emergencies/ disasters)	Observations
Septic surgery			
Aseptic surgery			
Paediatrics surgery			
Obstetrics and gynaecology surgery			
Emergency surgery			
Others, specify			
Total			

e. Clinical and non-clinical support services

Department, unit or service	Planned number of staff	Actual number of available staff	Observations
Diagnostic services			
Blood bank services			
Pharmacy			
Medical engineering and maintenance			
Building/critical systems engineering and maintenance			
Decontamination			
Security			
Other, specify			
Other, specify			

f. Emergency and disaster operations

Department, unit or service	Planned number of staff	Actual number of available staff	Observations
Hospital emergency/ disaster operations/ incident management (command, control, coordination)			
Logisticians			
Communications and information officers			
Administration (human resources, finance officers)			
Media spokespersons			
Ambulance staff			
Advanced medical post/hospital dispatch teams			
Others, specify			
Total			

13. **Areas likely to increase operating capacity**

Indicate the characteristics of the locations, areas and spaces that can be used to increase hospital capacity in case of emergencies or disasters. Specify square metres, available critical systems and any other information that can be used to evaluate the suitability for expanding space and capacity for hospital medical and other services in emergencies and disasters. Include access, security and critical services, such as water, power, communications, waste management, heating, ventilation and air-conditioning.

Locations/areas	Area m^2	Water		Electricity/ power		Telephone/ communications		Observations
		Yes	No	Yes	No	Yes	No	

Locations/areas	Area m^2	Waste management		Heating, ventilation and air-conditioning		Other		Observations
		Yes	No	Yes	No	Yes	No	

Note: Specify the adaptability of use in each space (hospitalization, triage, ambulatory care, observation, staff welfare areas etc.).

14. **Additional information**

(including history of prior emergencies and disasters the hospital had to cope with):

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Name/signature (Chairperson/Head, Hospital Emergency/Disaster Management Committee)

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Annex 2

Form 2

Safe Hospitals Checklist

Notice:

This form should be distributed to all members of the evaluating team. If necessary, you may photocopy this form or print additional copies from the USB drive included in the folder, or from the website.

Module 1: Hazards affecting the safety of the hospital and the role of the hospital in emergency and disaster management

1.1 Hazards	Hazard Level				Should the hospital be prepared to respond to this hazard? If yes, mark the box.	Observations (evaluator's comments)
	No hazard	Hazard level				
		LOW	AVERAGE	HIGH		
1.1.1 Geological hazards						
Earthquakes Refer to regional and local hazard maps or other hazard information, and rate the level of earthquake hazard for the hospital's location (including catchment area) in terms of geotechnical soil analyses. Determine whether the hospital should be prepared to respond to an emergency or disaster due to earthquakes (based on exposure of the catchment population or the specialized role of the hospital for the treatment of injured patients).	☐	☐	☐	☐	☐	
Volcanic activity and eruption Refer to regional and local hazard maps or other hazard information, and rate the level of volcanic hazard for the hospital's location. This should take into account proximity to volcanoes, volcanic activity, routes of lava flow, pyroclastic flow and ash fall. Determine whether the hospital should be prepared to respond to an emergency or disaster due to volcanic activity and eruption (based on exposure of the catchment population or the specialized role).	☐	☐	☐	☐	☐	
Dry mass movement – landslides Refer to regional and local hazard maps or other hazard information for the region, and rate the level of landslide hazard for the hospital's location. Note that landslides may be caused by unstable soils. Determine whether the hospital should be prepared to respond to an emergency or disaster due to landslides (based on exposure of the catchment population).	☐	☐	☐	☐	☐	
Tsunamis Refer to regional hazard maps or other hazard information, and rate the level of tsunami hazard caused by submarine seismic or volcanic activity for the hospital's location. Determine whether the hospital should be prepared to respond to an emergency or disaster due to tsunamis (based on exposure of the catchment population).	☐	☐	☐	☐	☐	
Other geological hazards (e.g. rockfalls, subsidence, debris and mudflows (specify) ..... Refer to regional and local hazard maps or other hazard information to identify other geological phenomena not listed above. Specify the hazard and rate the corresponding hazard level for the hospital. Determine whether the hospital should be prepared to respond to an emergency or disaster due to the identified geological hazards (based on exposure of the catchment population).	☐	☐	☐	☐	☐	

Continue >>

(Continued) 1.1 Hazards	Hazard Level				Should the hospital be prepared to respond to this hazard? If yes, mark the box.	Observations (evaluator's comments)
	No hazard	Hazard level				
		LOW	AVERAGE	HIGH		
1.1.2 Hydro-meteorological hazards						
1.1.2.1 Meteorological hazards						
Cyclones/hurricanes/typhoons Refer to regional hazard maps or other hazard information, and rate the hazard level for the hospital location in terms of cyclones, hurricanes and typhoons. Determine whether the hospital should be prepared to respond to an emergency or disaster due to cyclones, hurricanes or typhoons (based on exposure of the catchment population).	☐	☐	☐	☐	☐	
Tornadoes Refer to regional hazard maps or other hazard information, and rate the tornado hazard level for the hospital's location. Determine whether the hospital should be prepared to respond to an emergency or disaster due to tornadoes (based on exposure of the catchment population).	☐	☐	☐	☐	☐	
Local storms Rate the hazard level for the hospital in relation to flooding and other damage due to intensive (or torrential) rainfall from local storms based on the history of such events. Determine whether the hospital should be prepared to respond to an emergency or disaster due to local storms (based on exposure of the catchment population).	☐	☐	☐	☐	☐	
Other meteorological hazards (e.g. sand-storms, wind gusts) (specify) ..... Rate the hazard level for the hospital in relation to risk of other meteorological hazards based on the history of such events. Determine whether the hospital should be prepared to respond to an emergency or disaster due to other meteorological hazards (based on exposure of the catchment population).	☐	☐	☐	☐	☐	
1.1.2.2 Hydrological hazards						
River floods Refer to regional and local hazard maps or other hazard information, and rate the river flood hazard level of the hospital's location (including catchment area) in terms of river floods (and other watercourses, such as creeks). Determine whether the hospital should be prepared to respond to an emergency or disaster due to river floods (based on exposure of the catchment population).	☐	☐	☐	☐	☐	
Flash floods Refer to regional and local hazard map, other hazard information and past incidents, and rate the flash flood hazard level for the hospital's location. Determine whether the hospital should be prepared to respond to an emergency or disaster based on flash floods (due to exposure of the catchment population).	☐	☐	☐	☐	☐	
Storm surge Refer to regional hazard maps or other hazard information, and rate the storm surge hazard level associated with risks of cyclones, hurricanes, typhoons and other storms for the hospital's location. Determine whether the hospital should be prepared to respond to an emergency or disaster due to storm surge and related floods (based on exposure of the catchment population).	☐	☐	☐	☐	☐	

Continue >>

(Continued) 1.1 Hazards	Hazard Level				Should the hospital be prepared to respond to this hazard? If yes, mark the box.	Observations (evaluator's comments)
	No hazard	Hazard level				
		LOW	AVERAGE	HIGH		
Wet mass movements – landslides Refer to regional and local hazard maps or other hazard information, and rate the level of hazard due to landslides caused by saturated soils for the hospital's location. Determine whether the hospital should be prepared to respond to an emergency or disaster due to landslides caused by saturated soils (based on exposure of the catchment population).	☐	☐	☐	☐	☐	
Other hydrological hazards (e.g. high tides, avalanches, coastal floods) (specify) ..... Refer to regional and local hazard maps or other hazard information to identify other hydro-meteorological hazards not listed above. Specify the hazard and rate the corresponding hazard level for the hospital's location. Determine whether the hospital should be prepared to respond to an emergency or disaster due to other hydrological hazard (based on exposure of the catchment population).	☐	☐	☐	☐	☐	
1.1.2.3 Climatological hazards						
Extreme temperature (e.g. heat wave, cold wave, extreme winter conditions – dzud) Refer to regional and local hazard maps or other hazard information, and rate the level of hazard due to extreme temperature or weather condition. Specify the hazard and rate the corresponding hazard level for the hospital's location. Determine whether the hospital should be prepared to respond to an emergency or disaster due to extreme temperatures (based on exposure of the catchment population).	☐	☐	☐	☐	☐	
Wildfires (e.g. forests, croplands, populated areas) Refer to regional and local hazard maps or other hazard information, and rate the wildfire hazard level for the hospital's location. Determine whether the hospital should be prepared to respond to an emergency or disaster due to wildfires (based on exposure of the catchment population or the specialized role of the hospital for the treatment of burns patients).	☐	☐	☐	☐	☐	
Drought Refer to regional and local hazard maps or other hazard information, and rate the drought hazard level for the hospital's location. Determine whether the hospital should be prepared to respond to an emergency or disaster due to drought (based on exposure of the catchment population or the specialized role of the hospital for the treatment of malnutrition).	☐	☐	☐	☐	☐	
Other climatological hazards including those attributable to climate change (e.g. sea-level rise) (specify) ..... Rate the hazard level for the hospital in relation to the risk of other climatological hazards based on hazard maps, the history of such events and hazard modelling. Determine whether the hospital should be prepared to respond to an emergency or disaster due to other climatological hazards (based on exposure of the catchment population).	☐	☐	☐	☐	☐	

Continue >>

(Continued) 1.1 Hazards	Hazard Level				Should the hospital be prepared to respond to this hazard? If yes, mark the box.	Observations (evaluator's comments)
	No hazard	Hazard level				
		LOW	AVERAGE	HIGH		
1.1.3 Biological hazards						
Epidemics, pandemics and emerging diseases With reference to any risk assessments, past incidents at the hospital and specific pathogens, rate the hazard level of the hospital related to epidemics, pandemics and emerging diseases. Determine whether the hospital should be prepared to respond to an emergency or disaster due to epidemics, pandemics and emerging diseases (based on exposure of the catchment population or the specialized role of the hospital for the treatment of patients with infectious diseases).	☐	☐	☐	☐	☐	
Foodborne outbreaks With reference to any risk assessments and past incidents at the hospital location (including catchment area), rate the hazard level of the hospital related to foodborne outbreaks. Determine whether the hospital should be prepared to respond to an emergency or disaster due to food-borne outbreaks (based on exposure of the catchment population).	☐	☐	☐	☐	☐	
Pest attacks (e.g. infestations) With reference to any risk assessments and past incidents at the hospital, rate the hospital's exposure to hazards from pest attacks or infestations (flies, fleas, rodents, etc.). Determine whether the hospital should be prepared to respond to an emergency or disaster due to pest attacks or infestations (based on exposure of the catchment population).	☐	☐	☐	☐	☐	
Other biological hazards (specify) ..... With reference to any risk assessments, rate the hazard level for the hospital in relation other biological hazards. Determine whether the hospital should be prepared to respond to an emergency or disaster due to other biological hazards (based on exposure of the catchment population or the specialized role of the hospital for the treatment of patients exposed to biological hazards).	☐	☐	☐	☐	☐	
Human-made hazards						
1.1.4 Technological hazards						
Industrial hazards (e.g. chemical, radiological) Refer to regional and local hazard maps of industrial facilities or other hazard information and any past incidents involving industrial hazards, and rate the industrial hazard level for the hospital's location and potential contamination of the hospital's systems. Determine whether the hospital should be prepared to respond to an emergency or disaster due to industrial hazards (based on exposure of the catchment population or the specialized role of the hospital for the treatment of patients exposed to industrial hazards).	☐	☐	☐	☐	☐	
Fires (e.g. building) Refer to local hazard maps or other hazard information on building fires inside and outside the hospital and any past incidents involving building fires, and rate the fire hazard level for the hospital. Determine whether the hospital should be prepared to respond to an emergency or disaster due to building fires (based on exposure of the catchment population or the specialized role of the hospital for the treatment of burns patients).	☐	☐	☐	☐	☐	

Continue >>

(Continued) 1.1 Hazards		Hazard Level				Should the hospital be prepared to respond to this hazard? If yes, mark the box.	Observations (evaluator's comments)
		No hazard	Hazard level				
			LOW	AVERAGE	HIGH		
Hazardous materials (chemical, biological, radiological) Refer to local hazard maps or other hazard information on hazardous materials (incidents and spills) inside and outside the hospital and any past incidents involving hazardous material spills or leaks, and rate the hazardous material hazard for the hospital and the potential contamination of its systems. Determine whether the hospital should be prepared to respond to an emergency or disaster due to hazardous materials (based on exposure of the catchment population or the specialized role of the hospital for the treatment of patients exposed to hazardous materials).	**Chemical**	☐	☐	☐	☐	☐	
	Biological	☐	☐	☐	☐	☐	
	Radiological	☐	☐	☐	☐	☐	
Power outages Refer to any past incidents involving power outages for the hospital location, and rate the power outage hazard for the hospital. Determine whether the hospital should be prepared to respond to an emergency or disaster due to power outages.		☐	☐	☐	☐	☐	
Water supply disruption Refer to any past incidents involving the disruption of the water supply for the hospital location, and rate the hazard for the hospital. Determine whether the hospital should be prepared to respond to an emergency or disaster due to disruption of the water supply.		☐	☐	☐	☐	☐	
Transportation incidents (e.g. air, road, rail, water transport) Refer to records of past major transport incidents, and determine whether the hospital should be prepared to respond to an emergency or disaster due to transport incidents (based on exposure of the catchment population).		☐	☐	☐	☐	☐	
Other technological hazards (e.g. air pollution, structural collapses, food/water contamination, nuclear) (specify) ..... Refer to regional and local hazard maps, or other hazard information and past incidents to identify other technological hazards for the hospital. Specify the hazard and rate the corresponding hazard level for the hospital's location. Determine whether the hospital should be prepared to respond to an emergency or disaster due to other technological hazards (based on exposure of the catchment population or any specialized role of the hospital for the treatment of patients exposed to other technological hazards).		☐	☐	☐	☐	☐	
1.1.5 Societal hazards							
Security threat to hospital building and staff Refer to risk/threat assessments and past security incidents affecting the hospital and staff, and rate the security hazard level to the hospital and staff. Determine whether the hospital should be prepared to respond to an emergency or disaster due to security threats to the hospital building and staff.		☐	☐	☐	☐	☐	

Continue >>

Module 1: Hazards affecting the safety of the hospital and the role of the hospital in emergency and disaster management

(Continued) 1.1 Hazards	Hazard Level				Should the hospital be prepared to respond to this hazard? If yes, mark the box.	Observations (evaluator's comments)
	No hazard	Hazard level				
		LOW	AVERAGE	HIGH		
Armed conflicts Refer to risk assessments of armed conflicts and past incidents that have affected the hospital, and rate the hospital's hazard level in relation to armed conflicts. Determine whether the hospital should be prepared to respond to an emergency or disaster due to armed conflicts (based on exposure of the catchment population).	☐	☐	☐	☐	☐	
Civil unrest (including demonstrations) Refer to risk assessments and past incidents of civil unrest that have affected the hospital, and rate the hospital's hazard level in relation to demonstrations and civil unrest. Determine whether the hospital should be prepared to respond to an emergency or disaster due to demonstrations and civil unrest (based on exposure of the catchment population).	☐	☐	☐	☐	☐	
Mass gathering events Determine whether the hospital should be prepared to respond to an emergency or disaster due to mass gatherings (based on exposure of the catchment population).	☐	☐	☐	☐	☐	
Displaced populations Refer to risk assessments and rate the hospital's hazard level in terms of people who have been displaced as a result of conflict, community unrest and other sociopolitical circumstances, or due to high levels of immigration. Determine whether the hospital should be prepared to respond to an emergency or disaster due to displaced populations.	☐	☐	☐	☐	☐	
Other societal hazards (e.g. explosions, terrorism) (specify) ..... Refer to risk assessments, regional and other hazard information and past incidents to identify other societal hazards. Specify the hazard and rate the corresponding hazard level for the hospital's location. Determine whether the hospital should be prepared to respond to an emergency or disaster due to other societal hazards (based on exposure of the catchment population or any specialized role of the hospital in treatment of patients exposed to societal hazards).	☐	☐	☐	☐	☐	
1.2 Geotechnical properties of soils						
Liquefaction With reference to the geotechnical soil analysis at the hospital site, rate the level of the facility's exposure to hazards from saturated and loose subsoil.	☐	☐	☐	☐	☐	
Clay soils With reference to soil maps or other hazard information, rate the hospital's exposure to hazards from clay soil.	☐	☐	☐	☐	☐	
Unstable slopes Refer to geological maps or other hazard information and specify the hospital's exposure to hazards from the presence of slopes.	☐	☐	☐	☐	☐	

Comments on the results of Form 2, Module 1: .....

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.....

Name/signature of evaluator(s).....

Module 2: Structural Safety

2.1 Prior events affecting hospital safety	**Safety level**			**Observations (evaluators' comments)**
	Low	Average	High	
1. Prior major structural damage or failure of the hospital building(s) *Safety ratings: Low = Major damage and no repairs; Average = Moderate damage and building only partially repaired; High = Minor or no damage, or building fully repaired.* *IF SUCH AN EVENT HAS NOT OCCURRED IN THE VICINITY OF THE HOSPITAL, LEAVE BOXES BLANK AND PROVIDE COMMENT.*	☐	☐	☐	
2. Hospital built and/or repaired using current safety standards *Safety ratings: Low = Current safety standards not applied; Average = Current safety standards partially applied; High = Current safety standards fully applied.*	☐	☐	☐	
3. Effect of remodelling or modification on the structural behaviour of the hospital *Safety ratings: Low = Major remodelling or modifications have been carried out with major compromising effect on the performance of the structure; Average = Moderate remodelling and/or modifications with minor effect on the performance of the structure; High = Minor remodelling and/or modifications; no modifications were carried out; or major remodelling and/or modification enhancing the structural behaviour or having no negative effect.*	☐	☐	☐	
2.2 Building integrity	**Safety level**			**Observations (evaluators' comments)**
	Low	Average	High	
4. Structural system design *Safety ratings: Low = Poor structural system design; Average = Moderate structural system design; High = Good structural system design.*	☐	☐	☐	
5. Condition of the building *Safety ratings: Low = Cracks on the ground and first floors; Major deterioration caused by weathering or normal ageing; Average = Some deterioration caused only by weathering or normal ageing; High = No deterioration or cracks observed.*	☐	☐	☐	
6. Condition of the construction materials *Safety ratings: Low = Rust with flaking; cracks larger than 3mm (concrete), excessive deformations (steel and wood); Average = Cracks between 1 and 3 mm present (concrete), moderate and visible deformations (steel and wood) or rust with no flaking; High = Cracks less than 1 mm (concrete), no visible deformations; no rust.*	☐	☐	☐	
7. Interaction of nonstructural elements with the structure *Safety ratings: Low = Partition walls rigidly attached to the structure, suspended ceilings or facades interacting with the structures, damage would have significant effect on the structure; Average = Some of the preceding nonstructural elements interacting with the structures, damage would not affect the structure; High = There are no nonstructural elements affecting the structure.*	☐	☐	☐	
8. Proximity of buildings (for earthquake-induced pounding) *Safety ratings: Low = Separation is less than 0.5% of the height of the shorter of two adjacent buildings; Average = Separation is between 0.5% and 1.5% of the height of the shorter of two adjacent buildings; High = Separation is more than 1.5% of the height of the shorter of two adjacent buildings.* *IF THE HOSPITAL IS NOT IN A HIGH/MODERATE SEISMIC ZONE, THEN LEAVE BOXES BLANK AND PROVIDE COMMENT.*	☐	☐	☐	

Continue >>

(Continued) **2.2 Building integrity**	Safety level			Observations (evaluators' comments)
	Low	Average	High	
9. Proximity of buildings (wind tunnel effect and fire) *Safety ratings: Low = Separation less than 5 m; Average = Separation between 5 m and 15 m; High = Separation more than 15 m.*	☐	☐	☐	
10. Structural redundancy *Safety ratings: Low = Fewer than three lines of resistance in each direction; Average = Three lines of resistance in each direction or lines without orthogonal orientation; High = More than three lines of resistance in each orthogonal direction of the building.*	☐	☐	☐	
11. Structural detailing, including connections *Safety ratings: Low = No evidence of engineered building records, or built according to an old design standard; Average = Built according to previous design standards and no retrofitting work to a current standard; High = Built according to a current standard.*	☐	☐	☐	
12. Ratio of column strength to beam strength *Safety ratings: Low = Strength of beams is obviously greater than strength of columns; Average = Strength of beams is similar to strength of columns; High = Strength of columns is greater than strength of beams.*	☐	☐	☐	
13. Safety of foundations *Safety ratings: Low = No evidence that foundations were designed according to standards (foundation size, soil survey) and/or there is evidence of damage; no plans are available; Average = Little evidence (drawings, soil survey) that foundations were designed according to standards; and/or there is evidence for moderate damage; High = Strong evidence that foundations were designed according to standards with strong evidence of no damage.*	☐	☐	☐	
14. Irregularities in building structure plan (rigidity, mass, resistance) *Safety ratings: Low = Shapes are irregular and structure is not uniform; Average = Shapes on plan are irregular but structure is uniform; High = Shapes on plan are regular and structure has uniform plan, and there are no elements that would cause significant torsion.*	☐	☐	☐	
15. Irregularities in elevation of buildings *Safety ratings: Low = Significant discontinuous or irregular elements, significant variation in elevation of buildings; Average = Several discontinuous or irregular elements, some variation in the elevation of buildings; High = No significant discontinuous or irregular elements, little or no variation in elevation of buildings.*	☐	☐	☐	
16. Irregularities in height of storeys *Safety ratings: Low = Height of storeys differs by more than 20%; Average = Storeys have similar heights (they differ by less than 20% but more than 5%); High = Storeys are of similar height (they differ by less than 5%).*	☐	☐	☐	
17. Structural integrity of roofs *Safety ratings: Low = Monopitch or flat light roofs, and/or large roof overhangs; Average = Pre-stressed concrete roof, gable roof with gentle slope, satisfactorily connected, no large roof overhangs; High = Reinforced cast in place on concrete roof deck or hipped light roof, satisfactory connections, no large roof overhangs.*	☐	☐	☐	
18. Structural resilience to hazards other than earthquakes and strong winds *Safety ratings: Low = Low structural resilience to hazards present at the site of the hospital; Average = Satisfactory structural resilience (taking account of structural risk reduction measures in place); High = Good structural resilience (taking account of risk reduction measures in place).*	☐	☐	☐	

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Comments on the results of Form 2, Module 2. (Include reference to the building type(s), structural system(s) and age(s) of buildings.

Attach site plan, list all buildings and indicate those that were assessed.)

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Name/signature of evaluator(s).....

Module 3: Nonstructural safety

3.1. Architectural safety	**Safety level**			**Observations (evaluators' comments)**
	Low	Average	High	
19. Major damage and repair of nonstructural elements *Safety ratings: Low = Major damage and no repairs completed; Average = Moderate damage, building only partially repaired; High = Minor or no damage, or building fully repaired.* *IF SUCH AN EVENT HAS NOT OCCURRED IN THE VICINITY OF THE HOSPITAL, LEAVE BOXES BLANK AND PROVIDE COMMENT.*	☐	☐	☐	
20. Condition and safety of doors, exits and entrances *Safety ratings: Low = Doors, exits and entrances in poor condition, subject to damage which would impede the function of this and other elements, systems or operations; entrance width is less than 115cm; Average = In fair condition, subject to damage but damage would not impede the function of this and other elements, systems or operations; or entrance width is less than 115cm; High = In good condition, no or minor potential for damage that would impede the function of this and other elements, systems or operations; and entrance width is equal to or larger than 115cm.*	☐	☐	☐	
21. Condition and safety of windows and shutters *Safety ratings: Low = Windows and shutters in poor condition, subject to damage which would impede the function of this and other elements, systems or operations (e.g. weak protective glazing); Average = In fair condition, subject to damage but damage would not impede the function of this and other elements, systems or operations; High = In good condition, no or minor potential for damage that would impede the function of this and other elements, systems or operations; protective glass (e.g. polycarbonate glazing, blast film) has been added in critical wards.*	☐	☐	☐	
22. Condition and safety of other elements of the building envelope (e.g. outside walls, facings) *Safety ratings: Low = Building envelope in poor condition, subject to damage which would impede the function of this and other elements, systems or operations; Average = In fair condition, subject to damage but damage would not impede the function of this and other elements, systems or operations; High = In good condition, no or minor potential for damage that would impede the function of this and other elements, systems or operations.*	☐	☐	☐	
23. Condition and safety of roofing *Safety ratings: Low = Roofing in poor condition, subject to damage which would impede the function of this and other elements, systems or operations; Average = In fair condition, subject to damage but damage to element(s) would not impede the function of this and other elements, systems or operations; High = In good condition, no or minor potential for damage that would impede the function of this and other elements, systems or operations.*	☐	☐	☐	
24. Condition and safety of railings and parapets *Safety ratings: Low = Railings and parapets in poor condition, subject to damage which would impede the function of this and other elements, systems or operations; Average = Subject to damage but damage to element(s) would not impede the function of this and other elements, systems or operations; High = No or minor potential for damage that would impede the function of this and other elements, systems or operations.*	☐	☐	☐	
25. Condition and safety of perimeter walls and fencing *Safety ratings: Low = Perimeter walls and fencing in poor condition, subject to damage which would impede the function of this and other elements, systems or operations; Average = In fair condition, subject to damage but damage to element(s) would not impede the function of this and other elements, systems or operations; High = In good condition, no or minor potential for damage that would impede the function of this and other elements, systems or operations.*	☐	☐	☐	

Continue >>

(Continued) **3.1. Architectural safety**	Safety level			Observations (evaluators' comments)
	Low	Average	High	
26. Condition and safety of other architectural elements (e.g. cornices, ornaments, chimneys, signs) *Safety ratings: Low = Other architectural element(s) in poor condition, subject to damage which would impede the function of this and other elements, systems or operations; Average = In fair condition, element(s) are subject to damage but damage would not impede the function of this and other elements, systems or operations; High = In good condition, no or minor potential for damage that would impede the function of this and other elements, systems or operations.*	☐	☐	☐	
27. Safe conditions for movement outside the hospital buildings *Safety ratings: Low = Obstacles or damage to structure or road and walkways will impede vehicle and pedestrian access to buildings or endanger pedestrians; Average = Obstacles or damage to structure or road and walkways will not impede pedestrian access, but will impede vehicle access; High = No obstacles, or potential for only minor or no damage that will not impede pedestrian or vehicle access.*	☐	☐	☐	
28. Safe conditions for movement inside the building (e.g. corridors, stairs) *Safety ratings: Low = Obstacles and damage to element(s) will impede movement inside the building and endanger occupants; Average = Obstacles or damage to elements will not impede movement of people but will impede movement of stretchers, wheeled equipment; High = No obstacles, potential for no or minor damage which will not impede movement of people or wheeled equipment.*	☐	☐	☐	
29. Condition and safety of internal walls and partitions *Safety ratings: Low = Internal walls and partitions in poor condition, subject to damage which would impede the function of this and other elements, systems or operations; Average = In fair condition, element(s) are subject to damage but damage would not impede the function of this and other elements, systems or operations; High = In good condition, no or minor potential for damage that would impede the function of this and other elements, systems or operations.*	☐	☐	☐	
30. Condition and safety of false or suspended ceilings *Safety ratings: Low = False or suspended ceilings in poor condition, subject to damage which would impede the function of this and other elements, systems or operations; Average = In fair condition, element(s) subject to damage but damage would not impede the function of this and other elements, systems or operations; High = In good condition, no or minor potential for damage that would impede the function of this and other elements, systems or operations.* *IF THE HOSPITAL DOES NOT HAVE FALSE OR SUSPENDED CEILINGS, LEAVE BOXES BLANK.*	☐	☐	☐	
31. Condition and safety of the elevator system *Safety ratings: Low = Elevator system in poor condition, subject to damage which would impede the function of this and other elements, systems or operations; Average = In fair condition, element(s) subject to damage but damage would not impede the function of this and other elements, systems or operations; High = In good condition, no or minor potential for damage that would impede the function of this and other elements, systems or operations.* *IF THERE ARE NO ELEVATORS, LEAVE BOXES BLANK AND PROVIDE COMMENT.*	☐	☐	☐	
32. Condition and safety of stairways and ramps *Safety ratings: Low = In poor condition, subject to damage or there are obstacles, which would impede the function of this and other elements, systems or operations; Average = In fair condition, subject to damage but damage and obstacles would not impede the function of this and other elements, systems or operations; High = In good condition, no obstacles, potential for no or minor damage that would impede the function of this and other elements, systems or operations.* *IF THERE ARE NO STAIRS AND RAMPS, LEAVE BOXES BLANK AND PROVIDE COMMENT.*	☐	☐	☐	

Continue >>

(Continued) **3.1. Architectural safety**	Safety level			Observations (evaluators' comments)
	Low	Average	High	
33. Condition and safety of floor coverings *Safety ratings: Low = Floor coverings in poor condition, subject to damage which would impede the function of this and other elements, systems or operations; Average = In fair condition, subject to damage but damage would not impede function; High = In good condition, no or minor potential for damage that would impede the function of this and other elements, systems or operations.*	☐	☐	☐	
3.2 Infrastructure protection, access and physical security	Safety level			Observations (evaluators' comments)
	Low	Average	High	
34. Location of hospital's critical services and equipment in the hospital in relation to local hazards *Safety ratings: Low = No protection measures taken; subject to damage, failure and disruption of critical services and hospital operations in emergencies and disasters; Average = Partial measures to protect critical services from local hazards are taken; subject to damage with some disruption of critical services and hospital operations in emergencies or disasters; High = Many measures are taken to protect critical services; high probability that critical services and hospital will operate with no or limited disruption in emergencies and disasters.*	☐	☐	☐	
35. Hospital access routes *Safety ratings: Low = Access routes subject to obstacles and damage that would impede access and the function of other elements, systems or operations; Average = Access routes subject to some obstacles and damage that would not impede access and function; High = No or minor potential for obstacles or damage that would impede access and the function of other elements, systems or operations.*	☐	☐	☐	
36. Emergency exits and evacuation routes *Safety ratings: Low = Exit and evacuation routes are not clearly marked and many are blocked; Average = Some exit and evacuation routes are marked and most are clear of obstacles; High = All exit and evacuation routes are clearly marked and free of obstacles.*	☐	☐	☐	
37. Physical security of building, equipment, staff and patients *Safety ratings: Low = No measures are in place; Average = Some physical security protection is in place (e.g. locked storage for supplies and equipment, asset tracking and inventory control); High = Wide range of security measures in place (e.g. design and layout, physical barriers, access control and door security systems, locked storage for supplies and equipment).*	☐	☐	☐	
3.3 Critical systems	Safety level			Observations (evaluators' comments)
	Low	Average	High	
3.3.1 Electrical systems				
38. Capacity of alternate sources of electricity (e.g. generators) *Safety ratings: Low = Alternate source(s) is(are) missing or covers less than 30% of demand in critical areas, or can only be started manually; Average = Alternate source(s) covers 31–70% of demand in critical areas and starts automatically in less than 10 seconds in critical areas; High = Alternate source(s) start(s) automatically in less than 10 seconds and cover(s) more than 70% of demand in critical areas.*	☐	☐	☐	
39. Regular tests of alternate sources of electricity in critical areas *Safety ratings: Low = Tested at full load every 3 months or more; Average = Tested at full load every 1 to 3 months; High = Tested at full load at least monthly.*	☐	☐	☐	
40. Condition and safety of alternate source(s) of electricity *Safety ratings: Low = No alternate sources; generators are in poor condition, there are no protective measures; Average = Generators are in fair condition, some measures provide partial protection and security; High = Generators are in good condition, well-secured and in good working order for emergencies.*	☐	☐	☐	

Continue >>

(Continued) 3.3 Critical systems	Safety level			Observations (evaluators' comments)
	Low	Average	High	
41. Condition and safety of electrical equipment, cables and cable ducts *Safety ratings: Low = Electrical equipment, power lines, cables and ducts are in poor condition, there are no protective measures; Average = Electrical equipment, power lines, cables and ducts are in fair condition; some measures provide partial protection and security; High = Electrical equipment, power lines, cables and ducts are in good condition, well-secured and in good working order.*	☐	☐	☐	
42. Redundant system for the local electric power supply *Safety ratings: Low = There is only one entrance for the local power supply; Average = There are two entrances for the local power supply; High = There are more than two entrances for the local power supply.*	☐	☐	☐	
43. Condition and safety of control panels, overload breaker switches and cables Safety ratings: Low = Control panels or other elements are in poor condition, there are no protective measures; Average = Control panels or other elements are in fair condition; some measures provide partial protection; High = Control panels or other elements are in good condition, well-protected and in good working order.	☐	☐	☐	
44. Lighting system for critical areas of the hospital Safety ratings: Low = Poor level of lighting, there are no protective measures; Average = Lighting is satisfactory in the critical areas; some measures provide partial protection; High = Good levels of lighting and protection measures in place.	☐	☐	☐	
45. Condition and safety of internal and external lighting systems Safety ratings: Low = Internal and external lighting systems are in poor condition, there are no protective measures; Average = In fair condition; some measures provide partial protection; High = In good condition, well-protected and in good working order.	☐	☐	☐	
46. External electrical systems installed for hospital usage Safety ratings: Low = No electrical substations installed for hospital demands; Average = Substations installed; some measures provide partial protection, but would be vulnerable to damage or disruption, do not provide enough power to the hospital; High = Electrical substations installed, well-protected, and provide enough power to the hospital in an emergency or disaster.	☐	☐	☐	
47. Emergency maintenance and restoration of electric power supply and alternate sources Safety ratings: Low = Documented procedures and maintenance/inspection records do not exist; Average = Documented procedures exist, maintenance/inspection records are up to date, personnel have been trained, but resources are not available; High = Documented procedures exist, maintenance/inspection records are up to date, personnel have been trained, and resources are in place for implementing emergency maintenance and restoration.	☐	☐	☐	
3.3.2 Telecommunications systems				
48. Condition and safety of antennas Safety ratings: Low = Antennas and bracing in poor condition, there are no protective measures; Average = Antennas and bracing are in fair condition, some measures provide partial protection; High = Antennas and bracing are in good condition, well-secured and protection measures are in place. IF THERE ARE NO ANTENNAS, LEAVE BOXES BLANK AND PROVIDE COMMENT.	☐	☐	☐	
49. Condition and safety of low- and extra-low-voltage systems (internet and telephone) Safety ratings: Low = Low voltage systems in poor condition, there are no protective measures; Average = Low voltage systems in fair condition, some measures provide partial protection; High = Good condition, well-secured and other protection measures in place.	☐	☐	☐	

Continue >>

(Continued) 3.3 Critical systems	Safety level			Observations (evaluators' comments)
	Low	Average	High	
50. Alternate communication systems Safety ratings: Low = Alternate communications systems do not exist, are in poor condition, or do not function; Average = Hospital-wide alternate communications system in fair condition, but is not tested on an annual basis; High = Alternate communication system in good condition and tested at least annually.	☐	☐	☐	
51. Condition and safety of telecommunications equipment and cables Safety ratings: Low = Telecommunications equipment and cables are in poor condition; there are no protective measures; Average = Equipment and cables are in fair condition; some measures provide partial protection; High = In good condition, well-secured and protected from hazards.	☐	☐	☐	
52. Effect of external telecommunications systems on hospital communications Safety ratings: Low = External telecommunications systems cause major interference with hospital communications; Average = External telecommunications system cause moderate interference with hospital communications; High = External communications cause no interference with hospital communications.	☐	☐	☐	
53. Safety of sites for telecommunication systems Safety ratings: Low = Sites for telecommunications systems are in poor condition, at high risk of failure due to hazards; there are no protective measures; Average = Sites in fair condition, some measures provide partial protection; High = Good condition, well-secured and other protective measures in place.	☐	☐	☐	
54. Condition and safety of internal communications systems Safety ratings: Low = Internal communications systems do not exist or are in poor condition; Average = Internal communications systems are in fair condition, but there are no alternate systems; High = Internal communications and back-up systems are in good working order.	☐	☐	☐	
55. Emergency maintenance and restoration of standard and alternate communications systems Safety ratings: Low = Documented procedures and maintenance/inspection records do not exist; Average = Documented procedures exist, maintenance/inspection records are up to date, personnel have been trained, but resources are not available; High = Documented procedures exist, maintenance/inspection records are up to date, personnel have been trained, and resources are in place for implementing emergency maintenance and restoration.	☐	☐	☐	
3.3.3 Water supply system				
56. Water reserves for hospital services and functions Safety ratings: Low = Sufficient for 24 hours or less or water tank does not exist; Average = Sufficient for more than 24 hours but less than 72 hours; High = Guaranteed to cover at least 72 hours.	☐	☐	☐	
57. Location of water storage tanks Safety ratings: Low = The site is vulnerable with high risk of failure (e.g. structural, architectural and/or system vulnerabilities); Average = The site is exposed to moderate risk of failure (e.g. structural, architectural and/or system vulnerabilities); High = The site is not exposed to visually identifiable risks (e.g. structural, architectural and/or system vulnerabilities). IF THE HOSPITAL DOES NOT HAVE A WATER STORAGE TANK, LEAVE BOXES BLANK AND PROVIDE COMMENT.	☐	☐	☐	
58. Safety of the water distribution system Safety ratings: Low = Less than 60% are in good operational condition; Average = Between 60% and 80% are in good condition; High = Above 80% are in good condition.	☐	☐	☐	

Continue >>

(Continued) 3.3 Critical systems	Safety level			Observations (evaluators' comments)
	Low	Average	High	
59. Alternate water supply to the regular water supply Safety ratings: Low = Provides less than 30% of daily demand in an emergency or disaster scenario; Average = Provides 30–80% of daily demand in an emergency or disaster scenario; High = Provides more than 80% of daily demand in an emergency or disaster scenario.	☐	☐	☐	
60. Supplementary pumping system Safety ratings: Low = There is no back-up pump and operational capacity does not meet minimum daily demand; Average = Supplementary pumps are in fair condition but would not meet the minimum daily demand for water; High = All supplementary pumps and back-up systems are operational and would meet the minimum demand for water.	☐	☐	☐	
61. Emergency maintenance and restoration of water supply systems Safety ratings: Low = Documented procedures and maintenance/inspection records do not exist; Average = Documented procedures exist, maintenance/inspection records are up to date, personnel have been trained, but resources are not available; High = Documented procedures exist, maintenance/inspection records are up to date, personnel have been trained, and resources are in place for implementing emergency maintenance and restoration.	☐	☐	☐	
3.3.4 Fire protection system				
62. Condition and safety of the fire protection (passive) system Safety ratings: Low = Element(s) are subject to damage, and damage would impede the function of this and other elements, systems or operations; Average = Element(s) are subject to damage but damage would not impede function; High = No or minor potential for damage that would impede the function of this and other elements, systems or operations.	☐	☐	☐	
63. Fire/smoke detection systems Safety ratings: Low = No system has been installed; Average = System is partially installed, or infrequently maintained and tested; High = System is installed and well-maintained and tested frequently.	☐	☐	☐	
64. Fire suppression systems (automatic and manual) Safety ratings: Low = No system has been installed; inspections do not occur; Average = System is partially installed, or system is installed, but no maintenance or testing; inspections are incomplete or outdated; High = System is fully installed and regularly maintained and tested frequently; inspections are complete and up to date.	☐	☐	☐	
65. Water supply for fire suppression Safety ratings: Low = A source of permanent supply which could be used for fire suppression does not exist; Average = A source of permanent supply of water is available for fire suppression; there is limited capacity available, and no maintenance and testing has been conducted; High = A source of permanent water supply with significant capacity for fire suppression is available, regularly maintained and frequently tested.				
66. Emergency maintenance and restoration of the fire protection system Safety ratings: Low = Documented procedures and maintenance/inspection records do not exist; Average = Documented procedures exist, maintenance/inspection records are up to date, personnel have been trained, but resources are not available; High = Documented procedures exist, maintenance/inspection records are up to date, personnel have been trained, and resources are in place for implementing emergency maintenance and restoration.	☐	☐	☐	

Continue >>

(Continued) 3.3 Critical systems	Safety level			Observations (evaluators' comments)
	Low	Average	High	
3.3.5 Waste management systems				
67. Safety of nonhazardous wastewater systems Safety ratings: Low = System for nonhazardous wastewater disposal does not exist or is in poor condition; Average = System is in fair condition, but little or no evidence of compliance and maintenance; High = Wastewater disposal system is in good condition with good capacity and evidence of compliance and maintenance.	☐	☐	☐	
68. Safety of hazardous wastewater and liquid waste Safety ratings: Low = System for hazardous wastewater disposal does not exist or is in poor condition; Average = System is in fair condition but little or no evidence of compliance and maintenance; High = Disposal system has good capacity and evidence of compliance and maintenance.	☐	☐	☐	
69. Safety of nonhazardous solid waste system Safety ratings: Low = System for solid waste disposal does not exist or is in poor condition; Average = System is in fair condition, but little or no evidence of compliance and maintenance; High = Disposal system is in good condition with good capacity and evidence of compliance and maintenance.	☐	☐	☐	
70. Safety of hazardous solid waste system Safety ratings: Low = System for hazardous waste disposal does not exist or is in poor condition; Average = System is in fair condition but little or no evidence of compliance and maintenance; High = Disposal system is in good condition with good capacity and evidence of compliance and maintenance.	☐	☐	☐	
71. Emergency maintenance and restoration of all types of hospital waste management systems Safety ratings: Low = Documented procedures and maintenance/inspection records do not exist; Average = Documented procedures exist, maintenance/inspection records are up to date, personnel have been trained, but resources are not available; High = Documented procedures exist, maintenance/inspection records are up to date, personnel have been trained, and resources are in place for implementing emergency maintenance and restoration.	☐	☐	☐	
3.3.6 Fuel storage systems (e.g. gas, gasoline and diesel)				
72. Fuel reserves Safety ratings: Low = Sufficient for 24 hours or less, or fuel tank does not exist; Average = Sufficient for more than 24 hours but less than 72 hours; High = Guaranteed to cover at least 72 hours.	☐	☐	☐	
73. Condition and safety of above-ground fuel tanks and/or cylinders Safety ratings: Low = Tanks are in poor condition; there are no anchors or tank enclosure; tanks are not safely located with respect to hazards; Average = Tanks are in fair condition, anchors and bracing are inadequate for major hazards; tank enclosure has some safety and security measures; High = Tanks are in good condition; anchors and bracing are in good condition for major hazards; the tank enclosure has adequate safety and security. IF THE HOSPITAL DOES NOT HAVE THESE SERVICES, LEAVE BOXES BLANK AND PROVIDE COMMENT.	☐	☐	☐	
74. Safe location of fuel storage away from hospital buildings Safety ratings: Low = Fuel storage is not accessible and is not located in a secure site; Average = Site in fair condition and in fair location in relation to hazards; some measures provide partial protection; High = In good condition and good location, well-secured and other protection measures in place; fuel tanks are accessible. IF THERE IS NO FUEL TANK, LEAVE BOXES BLANK AND PROVIDE COMMENT.	☐	☐	☐	

Continue >>

(Continued) 3.3 Critical systems	Safety level			Observations (evaluators' comments)
	Low	Average	High	
75. Condition and safety of the fuel distribution system (valves, hoses, connections) Safety ratings: Low = Less than 60% of the system is in safe operational condition; Average = between 60% and 90% of the system is in good operational condition and has automatic shut-off valves; High = More than 90% of the system is in good operational condition and has automatic shut-off valves. IF THERE IS NO FUEL DISTRIBUTION TANK, LEAVE BOXES BLANK AND PROVIDE COMMENT.	☐	☐	☐	
76. Emergency maintenance and restoration of fuel reserves Safety ratings: Low = Documented procedures and maintenance/inspection records do not exist; Average = Documented procedures exist, maintenance/inspection records are up to date, personnel have been trained, but resources are not available; High = Documented procedures exist, maintenance/inspection records are up to date, personnel have been trained, and resources are in place for implementing emergency maintenance and restoration.	☐	☐	☐	
3.3.7 Medical gases systems				
77. Location of storage areas for medical gases Safety ratings: Low = No sites reserved for medical gases, or sites for medical gases are at high risk of failure due to hazards; there are no protective measures, and storage is not accessible; Average = Reserved areas in fair condition and fair location; some measures provide partial protection; High = In good condition, well-secured and other protective measures in place; storage is accessible.	☐	☐	☐	
78. Safety of storage areas for medical gas tanks and/or cylinders Safety ratings: Low = Medical gas tanks and cylinders in storage areas are poor condition; no protection measures, not secured; personnel are not trained to operate medical gas and fire extinguishing equipment; Average = Medical gas tanks and cylinders in storage areas are in fair condition, some measures provide partial protection; the quality of anchors and braces is inadequate; personnel are trained to operate equipment; High = Good condition, well-secured and protected, anchors are of good quality for major hazards; medical gas and fire extinguishing equipment operated by qualified personnel.	☐	☐	☐	
79. Condition and safety of medical gas distribution system (e.g. valves, pipes, connections) Safety ratings: Low = Less than 60% of the system is in good working condition; Average = Between 60% and 80% of the system is in good working condition; High = More than 80% of the system is in good working condition.	☐	☐	☐	
80. Condition and safety of medical gas cylinders and related equipment in the hospital Safety ratings: Low = Medical gas tanks and cylinders in hospital areas are in poor condition, no protective measures; not secured; Average = Medical gas tanks and cylinders are in fair condition; the quality of anchors and braces is inadequate; some measures provide partial protection; High = Good condition, well-secured and protected; anchors are of good quality for major hazards.	☐	☐	☐	
81. Availability of alternative sources of medical gases Safety ratings: Low = Alternative sources are not available; Average = Alternative sources in place but delivery of supplies takes longer than 15 days; High = Sufficient alternative sources are available at short notice (less than 15 days).	☐	☐	☐	

Continue >>

(Continued) 3.3 Critical systems	Safety level			Observations (evaluators' comments)
	Low	Average	High	
82. Emergency maintenance and restoration of medical gas systems Safety ratings: Low = Documented procedures and maintenance/inspection records do not exist; Average = Documented procedures exist, maintenance/inspection records are up to date, and personnel have been trained, but resources are not available; High = Procedures exist, maintenance/inspection records are up to date, personnel have been trained, and resources are in place for implementing emergency maintenance and restoration.	☐	☐	☐	
3.3.8 Heating, ventilation, and air-conditioning (HVAC) systems				
83. Adequate location of enclosures for HVAC equipment Safety ratings: Low = HVAC enclosures are not accessible and they are not located in a safe site; there are no protective measures; Average = HVAC enclosures are accessible, located at a safe site; some measures provide partial protection from hazards; High = HVAC enclosures are accessible, in a safe location and protected from hazards.	☐	☐	☐	
84. Safety of enclosures for HVAC equipment Safety ratings: Low = HVAC equipment is not accessible; no protection measures for safe operation and maintenance; Average = HVAC is accessible; some measures provide partial protection; High = HVAC equipment is accessible, wide range of protection measures in place.	☐	☐	☐	
85. Safety and operating condition of HVAC equipment (e.g. boiler, exhaust) Safety ratings: Low = HVAC equipment in poor condition, not maintained; Average = HVAC equipment in fair condition; some measures provide partial protection, but no regular maintenance; High = Good condition, well-secured and protected from hazards (e.g. anchors are of good quality); regular maintenance and testing of controls and alarms conducted.	☐	☐	☐	
86. Adequate supports for ducts and review of flexibility of ducts and piping that cross expansion joints Safety ratings: Low = Supports are lacking and connections are rigid; Average = Supports are in fair condition or connections are flexible; High = Supports are in good condition and connections are flexible.	☐	☐	☐	
87. Condition and safety of pipes, connections and valves *Safety ratings: Low = Less than 60% of pipes are in good condition; limited protective measures against hazards; Average = Between 60% and 80% are in good condition; some measures provide partial protection against hazards; High = Above 80% are in good condition and are well-secured and protected against hazards.*	☐	☐	☐	
88. Condition and safety of air-conditioning equipment Safety ratings: Low = Air-conditioning units in poor condition, not secured; Average = Air-conditioning units are in fair condition; some measures provide partial protection (e.g. quality of anchors and braces is inadequate); High = Good condition, well-secured and protected from hazards (e.g. anchors are of good quality).	☐	☐	☐	
89. Operation of air-conditioning system (including negative pressure areas) Safety ratings: Low = Air-conditioning system has no capability for establishing zones of the hospital; Average = Air-conditioning system can establish zones, but has no capacity to separate air circulating between high-risk areas and other areas of the hospital; High = Air-conditioning system can isolate air from high-risk areas; negative pressure rooms are available.	☐	☐	☐	

Continue >>

(Continued) 3.3 Critical systems	Safety level			Observations (evaluators' comments)
	Low	Average	High	
90. Emergency maintenance and restoration of HVAC systems Safety ratings: Low = Documented procedures and maintenance/inspection records do not exist; Average = Documented procedures exist, maintenance/inspection records are up to date, personnel have been trained, but resources are not available; High = Documented procedures exist, maintenance/inspection records are up to date, personnel have been trained, and resources are in place for implementing emergency maintenance and restoration.	☐	☐	☐	
3.4 Equipment and supplies	**Safety level**			**Observations (evaluators' comments)**
	Low	Average	High	
3.4.1 Office and storeroom furnishings and equipment (fixed and movable)				
91. Safety of shelving and shelf contents Safety ratings: Low = Shelving is not safely located (or in seismic and wind-prone areas not attached to walls in more than 20% of cases); Average = Shelving is safely located (and attached to walls in seismic and wind-prone areas) and contents are secured in 20–80% of cases; High = More than 80% of shelving and the contents of shelves are safely located, attached to walls, and contents are secured.	☐	☐	☐	
92. Safety of computers and printers Safety ratings: Low = No measures to protect computers from hazards are in place; Average =Computers are in safe locations, some measures offer partial protection from hazards; High = Computers are in safe locations, well-secured and good protective measures in place.	☐	☐	☐	
3.4.2 Medical and laboratory equipment and supplies used for diagnosis and treatment				
93. Safety of medical equipment in operating theatres and recovery rooms Safety ratings: Low = The operating theatres are in an unsafe location, equipment is lacking or in poor condition or there are no protective measures; Average = The operating theatres are in a safe location, equipment is in fair condition, and some measures provide partial protection; High = Operating theatres are in a safe location, equipment is in good condition, is well-secured and measures provide protection.	☐	☐	☐	
94. Condition and safety of radiology and imaging equipment *Safety ratings: Low = The radiology and imaging equipment is not in a safe location, equipment is lacking or in poor condition, or there are no protective measures; Average = The equipment is in a safe location, is in fair condition, and some measures offer partial protection; High = Equipment is in a safe location, is in good condition, well-secured and measures provide good protection.*	☐	☐	☐	
95. Condition and safety of laboratory equipment and supplies Safety ratings: Low = Biosafety measures are poor, laboratory equipment is lacking or in poor condition, or there are no protective measures; Average = Biosafety measures are in place, the equipment is in fair condition, and some measures provide partial protection; High = Biosafety measures are in place, equipment is in good condition, well-secured and measures provide good protection.	☐	☐	☐	
96. Condition and safety of medical equipment in emergency care services unit Safety ratings: Low = The medical equipment is lacking or in poor condition or there are no protective measures; Average = The equipment is in fair condition and some measures provide partial protection; High = Equipment is in good condition, well-secured and measures provide good protection.	☐	☐	☐	

Continue >>

(Continued) 3.4 Equipment and supplies	Safety level			Observations (evaluators' comments)
	Low	Average	High	
97. Condition and safety of medical equipment in intensive or intermediate care unit Safety ratings: Low = The medical equipment is lacking or in poor condition, or there are no protective measures; Average = The equipment is in fair condition and some measures provide partial protection; High = Equipment is in good condition, is well-secured and measures provide good protection.	☐	☐	☐	
98. Condition and safety of equipment and furnishings in the pharmacy Safety ratings: Low = The equipment in the pharmacy is lacking or in poor condition, or there are no protective measures; Average = The equipment is in fair condition and some measures provide partial protection; High = Equipment is in good condition, is well-secured and measures provide good protection.	☐	☐	☐	
99. Condition and safety of equipment and supplies in the sterilization services Safety ratings: Low = Equipment is lacking or in poor condition, or there are no protective measures; Average = Equipment is in fair condition and some measures provide partial protection; High = Equipment is in good condition, is well-secured and measures provide good protection.	☐	☐	☐	
100. Condition and safety of medical equipment for obstetric emergencies and neonatal care Safety ratings: Low = Equipment is lacking or in poor condition, or there are no protective measures; Average = Equipment is in fair condition and some measures provide partial protection; High = Equipment is in good condition, is well-secured and measures provide good protection.	☐	☐	☐	
101. Condition and safety of medical equipment and supplies for emergency care for burns Safety ratings: Low = Equipment is lacking, is in poor condition, or there are no protective measures; Average = Equipment is in fair condition and some measures provide partial protection; High = Equipment is in good condition, is well-secured and measures provide good protection.	☐	☐	☐	
102. Condition and safety of medical equipment for nuclear medicine and radiation therapy Safety ratings: Low = Equipment is lacking, is in poor condition, or there are no protective measures; Average = Equipment is in fair condition and some measures provide partial protection; High = Equipment is in good condition, is well-secured and measures provide good protection. IF THE HOSPITAL DOES NOT HAVE THESE SERVICES, LEAVE BOXES BLANK AND PROVIDE COMMENT.	☐	☐	☐	
103. Condition and safety of medical equipment in other services Safety ratings: Low = More than 30% of equipment is at risk of material or functional failure and/or equipment puts the entire service's operation at direct or indirect risk; Average = Between 10% and 30% of equipment is at risk of loss; High = Less than 10% of equipment is at risk of loss.	☐	☐	☐	
104. Medicines and supplies Safety ratings: Low = Nonexistent; Average = Supply covers less than 72 hours at maximum capacity; High = Supply guaranteed for at least 72 hours at maximum hospital capacity.	☐	☐	☐	
105. Sterilized instruments and other materials Safety ratings: Low = Nonexistent; Average = Supply cover less than 72 hours at maximum capacity; High = Supply is guaranteed for at least 72 hours at maximum hospital capacity.	☐	☐	☐	

Continue >>

(Continued) 3.4 Equipment and supplies	Safety level			Observations (evaluators' comments)
	Low	Average	High	
106. Medical equipment specifically used in emergencies and disasters Safety ratings: Low = Nonexistent; Average = Supply covers less than 72 hours at maximum hospital capacity; High = Supply guaranteed for at least 72 hours at maximum hospital capacity.	☐	☐	☐	
107. Supply of medical gases Safety ratings: Low = Less than 10 days' supply; Average = Supply for between 10 and 15 days; High = Supply for at least 15 days.	☐	☐	☐	
108. Mechanical volume ventilators Safety ratings: Low = Nonexistent; Average = Supply covers less than 72 hours at maximum hospital capacity; High = Supply guaranteed for at least 72 hours at maximum hospital capacity.	☐	☐	☐	
109. Electromedical equipment Safety ratings: Low = Nonexistent; Average = Supply covers less than 72 hours at maximum hospital capacity; High = Supply guaranteed for at least 72 hours at maximum hospital capacity.	☐	☐	☐	
110. Life-support equipment Safety ratings: Low = Nonexistent; Average = Supply covers less than 72 hours at maximum hospital capacity; High = Supply guaranteed for at least 72 hours at maximum hospital capacity.	☐	☐	☐	
111. Supplies, equipment or crash carts for cardiopulmonary arrest Safety ratings: Low = Nonexistent; Average = Supplies and equipment for cardiopulmonary emergencies (or crash carts) in good condition but cover less than 72 hours at maximum hospital capacity; High = Supplies and equipment for cardiopulmonary emergencies (or crash carts) guaranteed in good condition and adequate supplies for at least 72 hours at maximum hospital capacity.	☐	☐	☐	

Comments on the results of Form 2, Module 3.

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Name/signature of evaluator(s).....

Module 4: Emergency and disaster management

4.1 Coordination of emergency and disaster management activities	**Safety level**			**Observations (evaluators' comments)**
	Low	Average	High	
112. Hospital Emergency/Disaster Committee Safety ratings: Low = Committee does not exist, or 1–3 departments or disciplines represented; Average = Committee exists with 4–5 departments or disciplines represented, but is not fulfilling functions effectively; High = Committee exists with 6 or more departments or disciplines represented and is fulfilling functions effectively.	☐	☐	☐	
113. Committee member responsibilities and training Safety ratings: Low = Committee does not exist or members are untrained and responsibilities not assigned; Average = Members have received training and have been officially assigned; High = All members are trained and are actively fulfilling their roles and responsibilities.	☐	☐	☐	
114. Designated emergency and disaster management coordinator Safety ratings: Low = There is no staff member who has been assigned responsibilities as the emergency/disaster management coordinator; Average = Emergency/disaster management coordination tasks have been assigned to a staff member, but it is not his/her main task; High = A staff member is assigned the emergency and disaster management coordination responsibilities as his/her main task, is fulfilling the role of implementing the hospital's preparedness programme.	☐	☐	☐	
115. Preparedness programme for strengthening emergency and disaster response and recovery Safety ratings: Low = A programme for strengthening preparedness, response and recovery does not exist or, if it exists, no preparedness activities are being implemented; Average = A programme for strengthening preparedness, response and recovery exists and some activities are being implemented; High = A programme for strengthening preparedness, response and recovery is being fully implemented under the leadership of the Hospital Emergency/Disaster Committee.	☐	☐	☐	
116. Hospital incident management system Safety ratings: Low = No arrangements for hospital incident management exist; Average = Staff assigned to key hospital incident management positions but with no written procedures to operationalize its functions; High = Hospital incident management procedures exist and are fully operational with properly trained personnel to assume different coordination roles and responsibilities.	☐	☐	☐	
117. Emergency Operations Centre (EOC) Safety ratings: Low = The EOC is not designated or is in an unsafe or insecure location; Average = The designated EOC is in a safe, secure and accessible location, but would have limited operational capacity immediately in an emergency; High = The EOC is in a safe, secure, and accessible location with immediate operational capacity.	☐	☐	☐	
118. Coordination mechanisms and cooperative arrangements with local emergency/disaster management agencies Safety ratings: Low = No arrangements exist; Average = Arrangements exist but are not fully operational; High = Arrangements exist and are fully operational.	☐	☐	☐	
119. Coordination mechanisms and cooperative arrangements with the health-care network Safety ratings: Low = No arrangements exist; Average = Arrangements exist but are not fully operational; High = Arrangements exist and are fully operational.	☐	☐	☐	

4.2 Hospital emergency and disaster response and recovery planning	**Safety level**			**Observations (evaluators' comments)**
	Low	Average	High	
120. Hospital emergency or disaster response plan Safety ratings: Low = Plan is not documented; Average = Documented plan is complete, but is not easily accessible, not up to date (more than 12 months since the last update); High = Plan is complete, easily accessible, reviewed/updated at least annually, and resources are available to implement the plan.	☐	☐	☐	
121. Hospital hazard-specific subplans Safety ratings: Low = Hazard-specific response subplans are not documented; Average = Documented plans are complete but not easily accessible, not up to date (more than 12 months since last review/update); High = Documented plans are complete, reviewed/updated at least annually, and resources are available to implement the plans.	☐	☐	☐	
122. Procedures to activate and deactivate plans Safety ratings: Low = Procedures do not exist or exist only as a document; Average = Procedures exist, personnel have been trained, but procedures are not updated or tested annually; High = Up-to-date procedures exist, personnel have been trained, and procedures have been tested at least annually.	☐	☐	☐	
123. Hospital emergency and disaster response plan exercises, evaluation and corrective actions Safety ratings: Low = Response plan and subplans have not been tested; Average = Response plan or subplans are tested, but are not tested at least annually; High = Response plan or subplans are tested at least annually and updated according to the exercise results.	☐	☐	☐	
124. Hospital recovery plan Safety ratings: Low = Recovery plan is not documented; Average = Documented plan is complete, but not easily accessible, not up-to-date (more than 12 months since last review/update); High = Documented plan is complete, easily accessible, and reviewed/updated at least annually.	☐	☐	☐	
4.3 Communication and information management	**Safety level**			**Observations (evaluators' comments)**
	Low	Average	High	
125. Emergency internal and external communication Safety ratings: Low = Central internal and external communication system functions inconsistently or incompletely; operators are not trained in emergency communication; Average = System functions appropriately, operators have received some training in emergency communication, tests are not conducted at least annually; High = System functions completely and operators are fully trained in emergency use, and tests of the system are conducted at least annually.	☐	☐	☐	
126. External stakeholder directory Safety ratings: Low = Directory of external stakeholders does not exist; Average = Directory exists but is not current (more than 3 months since it was updated); High = Directory is available, is up to date and is held by key emergency response staff.	☐	☐	☐	
127. Procedures for communicating with the public and media Safety ratings: Low = Procedures do not exist, no spokesperson nominated; Average = Procedures exist and nominated spokespersons have been trained; High = Procedures exist, nominated spokespersons have been trained, and procedures have been tested at least annually.	☐	☐	☐	
128. Management of patient information Safety ratings: Low = Procedures for emergency situations do not exist; Average = Procedures for emergency situations exist and personnel have been trained but no resources are available; High = Procedures for emergency situations exist, personnel have been trained, and resources are in place for implementation.	☐	☐	☐	

4.4 Human resources	Safety level			Observations (evaluators' comments)
	Low	Average	High	
129. Staff contact list Safety ratings: Low = Contact list does not exist; Average = List exists, but is not current (more than 3 months since it was updated); High = List is available and up to date.	☐	☐	☐	
130. Staff availability Safety ratings: Low = Less than 50% of staff are available to run each department adequately; Average = 50–80% of staff are available; High = 80–100% of staff are available.	☐	☐	☐	
131. Mobilization and recruitment of personnel during an emergency or disaster Safety ratings: Low = Procedures do not exist or exist only in a document; Average = Procedures exist and personnel have been trained, but the human resources for an emergency situation are not available; High = Procedures exist, personnel have been trained, and the human resources are available to meet anticipated needs in an emergency.	☐	☐	☐	
132. Duties assigned to personnel for emergency or disaster response and recovery Safety ratings: Low = Emergency assignments do not exist or are not documented; Average = Duties are identified, some (but not all) personnel receive written assignments or training; High = Written duties are assigned, and training or an exercise is conducted for all personnel at least annually.	☐	☐	☐	
133. Well-being of hospital personnel during an emergency or disaster Safety ratings: Low = A designated space and measures do not exist; Average = Space has been designated, but measures cover less than 72 hours; High = Measures are ensured for at least 72 hours.	☐	☐	☐	
4.5 Logistics and finance	**Safety level**			**Observations (evaluators' comments)**
	Low	Average	High	
134. Agreements with local suppliers and vendors for emergencies and disasters Safety ratings: Low = No arrangements exist; Average = Arrangements exist, but are not fully operational; High = Arrangements exist and are fully operational.	☐	☐	☐	
135. Transportation during an emergency Safety ratings: Low = Ambulances and other vehicles and modes of transportation are not available; Average = Some vehicles are available, but not in sufficient numbers for a major emergency or disaster; High = Appropriate vehicles in sufficient numbers are available during emergencies/disasters.	☐	☐	☐	
136. Food and drinking-water during an emergency Safety ratings: Low = Procedures for food and drinking-water for emergencies are non-existent; Average = Procedures exist, food and drinking-water is guaranteed for less than 72 hours; High = Food and drinking-water for emergencies is guaranteed for at least 72 hours.	☐	☐	☐	
137. Financial resources for emergencies and disasters Safety ratings: Low = Emergency budget or mechanism to access emergency funds is not in place; Average = Funds are budgeted and mechanisms are available but cover less than 72 hours; High = Sufficient funds are guaranteed for 72 hours or more.	☐	☐	☐	

4.6 Patient care and support services	**Safety level**			**Observations (evaluators' comments)**
	Low	Average	High	
138. Continuity of emergency and critical care services Safety ratings: Low = Procedures do not exist or exist only as a document; Average = Procedures exist, personnel have been trained but would not be available at all times; High = Procedures exist, personnel have been trained, and resources are available to implement procedures at maximum hospital capacity for emergency and disaster situations at all times.	☐	☐	☐	
139. Continuity of essential clinical support services Safety ratings: Low = Procedures do not exist or exist only as a document; Average = Procedures exist and personnel have been trained but would not be available at all times; High = Procedures exists, personnel have been trained, and resources are available to implement procedures at maximum hospital capacity for emergency and disaster situations at all times.	☐	☐	☐	
140. Expansion of usable space for mass casualty incidents Safety ratings: Low = Space for expansion has not been identified; Average = Space has been identified; equipment, supplies and procedures are available to carry out the expansion and staff have been trained, but testing has not been conducted; High = Procedures exist and have been tested, personnel have been trained, and equipment, supplies and other resources are available to carry out the expansion of space.	☐	☐	☐	
141. Triage for major emergencies and disasters Safety ratings: Low = Designated triage location or procedures do not exist; Average = Triage location and procedures exist and personnel have been trained, but procedures have not been tested for emergency and disaster situations; High = Location and procedures exist and have been tested, personnel have been trained, and resources are in place to implement at maximum hospital capacity in emergency and disaster situations.	☐	☐	☐	
142. Triage tags and other logistical supplies for mass casualty incidents Safety ratings: Low = Nonexistent; Average = Supply covers less than 72 hours of maximum hospital capacity; High = Supply guaranteed for at least 72 hours of maximum hospital capacity.	☐	☐	☐	
143. System for referral, transfer and reception of patients Safety ratings: Low = Procedures do not exist or exist only as a document; Average = Procedures exist and personnel have been trained, but procedures have not been tested for emergency or disaster situations; High = Procedures exist and have been tested, personnel have been trained, and resources are available to implement measures at maximum hospital capacity in emergency or disaster situations.	☐	☐	☐	
144. Infection surveillance, prevention and control procedures Safety ratings: Low = Policies and procedures do not exist; standard precautions for infection prevention and control are not followed routinely; Average = Policies and procedures exist, standard precautions are routinely followed, personnel have been trained, but the level of resources required for emergency and disaster situations, including epidemics, is not available; High = Policies and procedures exist, infection prevention and control measures are in place, personnel have been trained, and resources are available to implement measures at maximum hospital capacity in emergency and disaster situations.	☐	☐	☐	
145. Psychosocial services Safety ratings: Low = Procedures do not exist or exist only as a document; Average = Procedures exist and personnel have been trained, but the level of resources required for emergency and disaster situations is not available; High = Procedures exist, personnel have been trained, and resources are available for implementation of procedures at maximum hospital capacity in emergency and disaster situations.	☐	☐	☐	

146. Post-mortem procedures in a mass fatality incident Safety ratings: Low = Procedures for a mass fatality incident do not exist or exist only as a document; Average = Procedures exist and personnel have been trained, but the level of resources required for emergency and disaster situations is not available; High = Procedures exist, personnel have been trained, and resources are available for implementation of procedures at maximum hospital capacity in emergency and disaster situations.	☐	☐	☐	
4.7 Evacuation, decontamination and security	**Safety level**			**Observations (evaluators' comments)**
	Low	Average	High	
147. Evacuation plan Safety ratings: Low = Plan does not exist or exists only as a document; Average = Plan exists and personnel have been trained in procedures, but tests are not conducted regularly; High = Plan exists, personnel have been trained, and evacuation drills are held at least annually.	☐	☐	☐	
148. Decontamination for chemical and radiological hazards Safety ratings: Low = No personal protective equipment is available for immediate use by hospital staff, or no decontamination area exists; Average = Personal protective equipment is available for immediate use, decontamination areas are established, staff training and drills are not conducted annually; High = Personal protective equipment is available for immediate use, decontamination areas are established and personnel are trained and tested at least annually.	☐	☐	☐	
149. Personal protection equipment and isolation for infectious diseases and epidemics Safety ratings: Low = No personal protective equipment is available for immediate use by hospital staff, or no isolation area exists; Average = Supply is available for immediate use, but is sufficient for less than 72 hours of maximum hospital capacity, isolation areas are established, staff training and testing of procedures are not conducted annually; High = Supply is guaranteed for at least 72 hours of maximum hospital capacity and alternate sources are in place for resupply, isolation areas are established, staff training and testing of procedures are conducted at least annually.	☐	☐	☐	
150. Emergency security procedures Safety ratings: Low = Emergency security procedures do not exist or exist only as a document; Average = Documented procedures exist and personnel have been trained in emergency security procedures but testing is not conducted at least annually; High = Personnel are trained and tests of the documented procedures are held at least annually.	☐	☐	☐	
151. Computer system network security Safety ratings: Low = The hospital does not have a computer security system plan and procedures in place; Average = The hospital has a basic cyber security plan in place but it is not monitored and updated regularly; High = The hospital has a cyber security plan in place and it is updated regularly.	☐	☐	☐	

Comments on the results of Form 2, Module 3.

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Name/signature of evaluator(s).....