

# **Need for Resilience Healthcare Facilities Management (RHF) In Malaysia's Public Hospitals. A Critical Literature Review**

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## **Abstract**

In Malaysia, over the year's disasters has affected buildings and infrastructure including healthcare facilities severely. The past events should provide a valuable lesson for future preparedness and planning in healthcare facilities whether from natural, man-made or both disasters. However, recent hospital disaster shows that more in-depth effort should be emphasized in hospitals of Malaysia. Therefore, to ensure that hospitals and health facilities can withstand emergencies and disasters, resilience strategies has been examined to highlight the importance of assessing risks and preparing for them. In this study, a different toolkits of health care facility management were identified. The research is based on published literature review and past research to achieve the objective. Through the identification and integration of the factors and Resilience Healthcare Facilities Management (RHF) toolkit was identified to highlight the health care management in the hospital public sector. The toolkit contributes significantly to resilience healthcare facilities management process. These findings not only give benefit to the people involved in the hospital industry but also to the public officials in guiding them to be more accountable in handling risks, emergencies, disasters, and resilience strategies process.

## **Keywords**

Disaster Resilience, Facilities Management (FM), Healthcare, Resilience Toolkit, Malaysia.

## **1. Introduction**

The term "resilience" was introduced into the English language in the early 17th century from the Latin verb "resilire", which means to rebound or recoil (Online Etymology Dictionary, 2017). The term has become current in recent years, and the multitude of interpretations and usages has become diverse. According to McAslan (2010), the term resilience has broad range of definitions used in different contexts which are materials, environment/ecological, individuals, communities, organizations, and national security.

In the case of disaster, United Nations International Strategy for Disaster Reduction UNISDR (2009), defined resilience as "the ability of a system, community or society exposed to hazards to resist, absorb, accommodate to and recover from the effects of a hazard in a timely and efficient manner". While in the context of building design and communities, Resilience Design Institute, (2017) defines that it is the capacity to adapt to changing conditions and to maintain or regain functionality and vitality in the face of stress or disturbance.

Meanwhile, in the context of hospital and healthcare facilities, Zhong et al., (2014) defined “hospital disaster resilience” as “hospital’s capability to resist, absorb, respond to the shock of disasters while still retaining their most essential functionality (e.g., prehospital care, emergency medical treatment, critical care, decontamination and isolation), then recover to its original state or a new adaptive state”.

But hospitals are more than just a building. When a disaster happens, people seek for hospitals, health facilities, and health services to save their lives (United Nation, 2009), but if there is any interruption in their daily routine services such as disaster, people’s lives can be deadly. Just as Dr Margaret Chan, the Director-General of the World Health Organization (WHO) mentioned in her speech for World Health Day, 2009, when the health facilities were failed to fully function or operate during emergencies or disaster, it can cost lives.

Hospitals are constructed in a way to maintain their function during the breakdown in power and communications, extreme weather, fires, disasters, etc (Moy, 1995). Therefore, hospitals must also update their equipment regularly to meet the highest standards of technical and safety, although this can be pricey (Lennerts, 2009). The complexity of a healthcare facility building is a sign of the need for facilities management is at an early stage of the development of the hospitals. However, the problem is the participation of facility managers in any stage of building developments are not considered and being emphasized especially the briefing, designing and cost analysing stages (Shohet and Lavy, 2004). As such, facility managers need to provide the best that they can do with the support of stakeholders to ensure that hospitals are resilience towards disaster and the building can continue to operate during the time of disaster.

## 2. Research Methodology

To understand the resilient concept and to explore the existing healthcare facilities management requires a systematic procedure (Sulaiman et al.,2019). Further the research aim is to examine the previous RHFM Toolkit for hospital industry in the Malaysian public hospital sector. This part focuses on the major elements of research design: the literature review method. Critical literature review was conducted for the study. Online search such as Scopus, Google scholar and other linked databases were used to search to collect the relevant research from the published literature to achieve the objective. To achieve this aim, this research sought to answer the following research questions:

- (1) What are the elements of resilience healthcare?
- (2) How to identify the elements of resilience healthcare for resilience healthcare facilities management in the public hospitals of Johor?
- (3) To examine the resilience healthcare facilities management (RHFM) Toolkit and assess the resiliency of healthcare facilities management in the public hospitals?

## 3. Literature Review

### 3.1 Healthcare Facilities Management (HFM) In Malaysia

Health care and human well-being plans are the key indicators towards economic growth and sustainable development for any country. The health care plans have been changing traditionally from routine patterns to emerging requirements according to the population increased (Chai and Whynes, 2008).

Since 1957, The independence of Malaysia, we have seen the improvement in health care facilities and the major reconstruction of the health care facilities throughout the country. The first major reform had started as the Public primary health care facilities and enhanced till 1978, the Alma Ata Declaration. The Ministry of Health (MoH) is the leading government institute that provides health care facilities to the public of Malaysia (Merican, 2002).

The MoH has managing three levels of organizational structure, the Federal level, the state level, and the district level, which are committed to ensure efficiency and provide a safe health care environment. The level itself establishes the level of authority, supervision, sense of responsibility and information flow among all the three-level. The structure has covered all the aspects of healthcare facilities such as rehabilitation, promotive, curative, and preventive. The Ministry of Health focuses to deliver a better system of health care facilities with equitable health care resources (Juni, 1996).

With aiming to provide quality health care facilities, National Referral Centers were established to provide the basic care facilities in health clinics (Thomas, 2011).

Over the decades it has been observed that at the federal level, suitable health care measure is required to meet the needs of the population. The federal-level care concentrated on the curative model, which is based on the doctor and illness. This model is quite expensive and basically focused on the institution instead of focusing the individual health. Now we are on the verge of revolution the health care facilities are changing towards wellness as opposed to illness services. We need services that include the lifetime health care plan that principally focusing on whole family care.

These services built a healthy lifestyle environment for better risk prevention in healthcare care facilities management (Thomas, 2011).

### 3.2 Healthcare Facilities Management (HFM) And Disaster Management

In managing healthcare facilities, facility managers will face many risks and uncertainty to support the core business objectives of hospitals. One of the risks is the disaster. It is the facility manager's role to understand the risk of disaster and its' impact on hospitals and stakeholders. All stakeholders must understand how various risks impact the operational, financial and functional health of the organization as well as the organization's responsibility (and liability) for the health, safety and well-being of its employees and stakeholder communities (Slaughter and Teicholz, 2016).

To understand the risks and impacts of a disaster, the facility managers need to understand the facilities first. In a disaster situation, the hospital buildings are also likely to be affected by various situations such as isolated (telecommunications, exit/entry, etc.), blackouts, fires, debris and so on. Chan (2009) said that, apart from causing increased suffering and loss of life, the failure of health facilities during an emergency can provoke a public uproar, especially when poor construction or violations of building codes are thought to be at fault.

Pheng and Rui (2016) stated that facilities management (FM) in hospitals differs from normal types of FM, for example FM for office buildings. But there is no standard in FM services coverage in healthcare. The FM covers a variety of services and it differs from one organization to another. Thus, the exact scope of FM should be determined empirically on a case-by-case basis to fulfil the requirements of its home organization (Chotipanich, 2004). Note that this service coverage is likely to vary across the world and organizations (Payne and Rees 1999).

Traditionally, hospitals have lagged other public service providers in their level of disaster preparedness (Robert, 2010). Preparedness involves having the plans, supplies, and staff in place to respond in a timely and efficient manner during a disaster. Not to mention, the funding and executive-level support within the hospital as well as interagency support within the community are also needed to ensure implementation and cohesion of plans and processes.

Therefore, each hospital should properly plan its Hospital Disaster Management Committee (HDMC), who will be responsible for developing and implementing a Hospital Disaster Management Plan (HDMP) for both internal and external disasters. The members of this committee then shall be trained to institute and implement the response plan that has been developed. But still, the disaster management in a hospital will vary according to the capability of a hospital in terms of infrastructure, expertise, member strengths and affordability of resources (Pelan Tindakan Bencana of Hospital Seri Manjung, 2016). The emergency response plans are important and must be known and understood by each staff of the hospital. It must be easy to understand and can be applied in every situation by those involved in the disaster. This plan also should be reviewed and fixed periodically so that it is compatible with current needs (Pelan Tindakan Bencana Hospital Kuala Lumpur, 2011).

### 3.3 Hospital Disaster

Disasters can be both internal and external. For example, when a backup generator fails due to a flood in the hospital building, the aftermath can be life-threatening. This is because electricity powers not just heating, cooling, lighting, and alarms. It also associates with the services critical to patient care, such as life-support systems, blood, bone, and tissue storage systems, operating rooms, and new-born intensive care units. According to Morse (2015), when Superstorm Sandy knocked out the power supplies throughout coastal New Jersey and New York on October 29th, 2012, both NYU Langone Medical Centre and Bellevue Hospital were blank into a blackout. And as both Manhattan hospitals lost power and their backup systems failed, nearly 1,000 patients had to be evacuated to other facilities. Whereas, in 2005, after Hurricane Katrina struck New Orleans, about 215 patients died in hospitals and nursing homes, partly because generators stopped working. Furthermore, in 2011, a Connecticut hospital evacuated more than 40 patients when its generator failed during Hurricane Irene.

Based on the researcher study on recent disaster and crisis incidents between 2014 to 2017, there was plenty of devastating hospital disaster recorded here in Malaysia as well. This can be seen in Table 1 below.

Table 1. Disasters and Crisis Incidents Affecting Hospitals and Healthcare Facilities in Malaysia (2014 – 2017)  
(Source: Newspaper articles, 2014-2017)

Disasters	Year	Affected Hospital	Condition
<b>Flood/ Flash Flood</b>	May 2016	Sarawak General Hospital	Flash flood in the ground floor happened 2 times in a week Geriatric ward was flooded – the location was lower, and drains were not maintained properly.

		Tengku Ampuan Rahimah Hospital	
	Nov 2016	Sultanah Aminah Hospital	Electric was shut down – patients were moved to Mahmoodiah Health Clinic
	Dec 2016	4 Health Clinics in Terengganu	All clinics had to be closed for operation until the flood was over
	June 2017	Hulu Terengganu Hospital	The hospital was not accessible – staff had to be brought in using bulldozer while visitors were advised not to come to the hospitals or get medical care at the nearest clinics
	Aug 2017	Sultanah Fatimah Specialist Hospital	Flash flood affected in the main entrance and car park
	Nov 2017	Penang Hospital Sultan Abdul Halim Hospital	Transportation Unit, ground floor of Block C & D was affected – 104 patients and 4 newborn infants were moved to other wards Car park were flooded with flash flood
<b>Earthquake</b>	Jun 2015	Ranau Hospital & clinics	The hospital and 9 clinics in Ranau, Tuaran & Papar were badly affected – cracks on walls, stairs and pillars
<b>Fire/Smoke</b>	July 2016	Lundu Hospital Sabah KPJ Specialist Hospital	Short circuit was the source of fire Main switch room was on fire
	Aug 2016	Sri Kota Specialist Medical Centre	Store in Level 9 were affected
	Oct 2016	Sultanah Aminah Hospital	Fire in ICU ward causes 6 patients died and the day after another fire occurred in an operation theater
	Jan 2017	Tanjung Rambutan Mental Hospital	A store and ceiling in ward 11 were on fire – 21 residents were evacuated to other ward
	Feb 2017	Shah Alam Hospital	Small fire occurred in NICU ward – all patients and infants were evacuated to the nearest ward
	March 2017	Segamat Hospital	Linen room in men’s ward were on fire – all patients including patients from women’s ward beside it were moved to the lobby
	May 2017	Canselor Tunku Mukhriz Hospital	Fire occurred in Office Equipment Store in Level 3, Clinical Block
	July 2017	Tanjung Karang Hospital	Fire caused by a fan in ward 2 – all patients were moved, and the entire block was evacuated
	Nov 2017	Sibu Hospital	Smoke were detected coming out of ward 23 ceiling – 1000 patients, staff and visitors in ward 18 were moved

From the literature review done on all hospital disaster that had occurred, there are three main issues that lead to the cause of a hospital disaster in Malaysia; (1) climate change, (2) old hospital buildings, and (3) poor practices of facilities management (FM) in hospitals.

### 3.4 Climate Change and Extreme Weather

Malaysia is geographically situated outside of the “Pacific Rim of Fire” and is relatively free from any severe consequences and destruction caused by natural disasters such as earthquakes, typhoons and volcanic eruptions, however, Malaysia still get hit by the natural disasters and calamities, as it is often hit by floods, droughts, landslides, haze, tsunamis, and human made disasters (Parker, et al. 1997). Additionally, in recent years, climate-related disasters have caused the nation more vulnerable especially in some parts of the country, due to climate change (Centre for Excellence in Disaster Management and Humanitarian Assistance, 2016). Table 2 represents the relative frequency of disaster hazards in Malaysia.

The Ministry of Natural Resources and Environment Malaysia (2010) acknowledged that both climate change and extreme weather causing natural disasters more worsen such as the rise of sea-levels, floods, landslides, coastal and land erosion, drought, forest fires and haze. The consequences of disaster not only impacted on the safety and health of people but also, threaten the economy of a nation and caused changes to natural landscape and built environment (Ministry of Natural Resources and Environment Malaysia, 2010). As such, Slotterback (2015) said that as the occurrences of extreme weather are becoming more intense globally, many health care systems are not resilient enough to withstand the disaster and are failing when needed the most.

Table 2. Relative Frequency of Disaster Hazard in Malaysia  
(Source: Centre for Excellence in Disaster Management and Humanitarian Assistance, 2016)

High	Medium	Low
Flood	Forest Fire Landslide	Earthquake Tsunami Drought Storm Haze

The combination of extreme weather and climate change can bring damages to the hospital infrastructure, interrupt with power supplies, affected the critical resources and health care staff availability (Canadian Coalition for Green Health Care & Nova Scotia Department of Environment, 2014).

Thus, healthcare facility globally should not only adapt to the disaster but also able to withstand during the disaster occurrence by applying sustainability to their building. And this can be done by investing in healthier buildings, green environment, and implementing sustainable operations (Karliner & Guenther, 2011).

Floods are the major natural disaster threat facing Malaysia. Every year the country experiences the monsoonal flood, which brought loses, including loss of lives and damages to houses, buildings, infrastructure, and businesses. But the most recent memorable event was the 2014-15 flood. This flood has been described as the worst floods in decades and it was called “Bah Kuning” due to the yellow-coloured flood which was caused by the high mud content. According to Baharuddin et. al. (2015), Hospital Universiti Sains Malaysia (HUSM) was the only fully functioning hospital in the state and had to receive and manage cases from the hospitals and clinics throughout Kelantan. Two public hospitals (Hospital Raja Perempuan Zainab II and Kuala Krai Hospital) were badly affected forcing them for total closure during the flood. All the patients were transferred to HUSM. The flooding that hit Johor, Terengganu, Pahang, Kelantan, Perak, and Selangor had affected 102 health facilities, 38 of which were still operating (“Six Kelantan and Pahang hospitals hit by floods,” 2014). The Ministry of Health (MoH) estimated that total losses caused by the floods in terms of destruction to hospitals and clinics in the East Coast was stood at RM281 million.

Meanwhile, in February 2016, The Star Online reported that patients on the ground floor of Sarawak General Hospital here had to be evacuated as ankle-deep floodwaters entered the medical facility caused by flash floods. Due to the poor drainage system, the car park and paediatrics block of the hospital were affected by the flash floods (The Star, 2016). Later at the end of the year, during the ravaging monsoon in December, has forced three health clinics in Terengganu to be relocated, following constant flooding (David, 2016). These three clinics were badly affected and the damages to the equipment and furniture causing the staff unable to carry out their duties. Those clinics had to be moved to alternate sites to avoid flood.

### 3.5 Aging hospital buildings

From the fire incident that happen in Sarawak General Hospital in 2014, there was a construction worker was burned and died (“Floods wreak havoc in Sarawak,” 2016) as well as the disasters that occur in 2016 at the Hospital Sultanah Aminah, Johor Bahru that take the life of 6 victims (“Fire breaks out at JB hospital,” 2016) showed that a lot of lessons need to be learned by the hospital management and the facilities management team for managing old hospital buildings.

Following the fire that broke out at the intensive care unit of Hospital Sultanah Aminah (HSA), a total of 48 hospitals over 50 years old have already undergone fire safety audits to identify fire risks. According to the Deputy MoH, Datuk Seri Dr Hilmi Yahya (Khoo, 2017), the fire safety audit reveals numerous risks had been identified such as the ageing fire prevention system, old electrical wirings installations and the installation of medical gas system which did not comply with current standards, and other findings. He also added that, the ministry undertook a fire risk survey on the hospitals, and found a large number of the hospitals were fire hazards and in need of an overhaul, upgrade and repair to be carried out to ensure the hospitals are safe and did not affect its daily operations.

It was not known to the public that both hospitals were more than 50 years old. By 2016, there are 48 hospitals nationwide, which are more than 50 years old (Safety audit report, 2016), and 11 hospitals in Malaysia were more than 100 years old (Hj. Kuman, n.a). For example, both Hospital Raja Perempuan Zainab II and Kuala Krai Hospital that was badly affected by 2014 flood was respectively aged 76 and 97 years old at the time of disaster. While the main building of Hospital Sultanah Aminah that was caught on fire was aged around 78 years old at the time of incident and blaming on old buildings is not just the case. With the budget allocated by the Government every year, the upgrading and maintenance done should be at the highest standard. Still, disaster happened in these hospitals, arising the question on how facilities management in these old building being managed?

### **3.6 Poor Practices of Facilities Management in Malaysian Hospitals**

In Malaysia, the starting point of integrating FM and health care was through the privatization of hospital support services in 1996. A concession contract was awarded for a period of 15 years, which included 127 public hospitals and medical institutions under the MoH (Hong, 2016). After the contract ended in 2011, the government signed a new agreement with the concessionaires, where there were now 6 scope of FM, with additional elements of:

- (1) Facility Management Services (FMS)
- (2) Facility Engineering Management Services (FEMS)
- (3) Biomedical Engineering Maintenance Services (BEMS)
- (4) Linen and Laundry Services (LLS)
- (5) Clinical Waste Management Services (CWMS)
- (6) Cleaning Services (CLS)
- (7) Energy Management (EM)
- (8) Indoor Air Quality (IAQ)
- (9) Reduce, Reuse & Recycle (3R)

But it seems like the FM in hospital and healthcare facilities is not more than cleaning, maintenance and waste management alone. It's very challenging for facility manager in managing a hospital and other healthcare facilities as it covers all maintenance, management of buildings as well as supervision of various activities (Tan, 2014). Ninggal (2015) pointed out that FM practitioners need to acquire multiple knowledge and skills including architecture, planning, engineering, management, operation, environmental psychology, and other related disciplines to fit their daily job tasks. And the lack of this multiple competencies will lead to numerous problems in the future.

For example, findings from audit assessment of the facilities maintenance management in a public hospital in Malaysia by Ali and Wan Mohamad (2009) indicates that there are many lacking in contractor's service performance. Both Ali and Wan Mohamad (2009) said that the audit findings imply that the contractor did not have the right competencies and capability to manage FEM services successfully, especially in the criticality and complexity of buildings like hospitals.

A study by Hamid et. al. (2012) revealed various critical issues and challenges of FM in healthcare sectors that was divided into four (4) main scope which are people, process, financial and technology. They also suggested that hospitals should have a stand-alone department for FM and should be led by a competent facility manager. By doing so, the role and function of FM will be more focused and efficient, as well as value added to the service quality.

The misconception and misunderstanding that the role of FM is not important by the hospital management also may lead to various unexpected scenarios. Research on human weaknesses and disaster resilience by Samsuddin, Takim and Nawawi (2017) found that the respondents agreed that the absence of clear guidelines/assessment tool/framework established for disaster resilient hospital is one of the reasons for hindering the capability of existing public hospitals to achieve disaster resilience. This implies that it is important to involve the FM team in the management of hospitals. Chand and Loosemore (2016) stated that facilities managers should be involved in the process of planning the disaster management planning. By observing the performance of built facilities during as extreme weather events, any lesson learnt from that events can be used to improve the resilience of existing and future hospital buildings into the future. But, rather than that, facility manager in Malaysia's hospital were involved only when the contract agreement signed by hospital and the concessionaire's company.

Moreover, according to Slaughter & Teicholz (2016), facility management resilience plans are one of the crucial parts of overall organizational planning as they can also act as critical inputs for an organization's strategic planning, for example for maintaining critical operation during any disruption including disaster. It is agreed by Trifonova and Pramatarov (2016) that to ensure a comfortable environment for the patients and employees in a hospital building is the main role and responsibility of the facility manager.

### **3.7 A Resilient Hospital**

Resilience is different from, but complementary to, sustainability. According to Resilience Design Institute (2017), resilience is the capacity to adapt to changing conditions and to maintain or regain functionality and vitality in the face of stress or disturbance, while sustainability is defined as the ability to be used without being completely used up or destroyed (Merriam-Webster Online Dictionary, 2017). In built environment, the strategy of adopting sustainability is often on improving the efficiency and effectiveness of using resources, as well as reducing, removing and reduce the environmental impact (Slaughter and Teicholz, 2016). As such, these strategies can be used to improve resilience in the built environment.

Meanwhile, a safe and resilient hospital includes; (1) climate free and will not collapse in disasters, saving patients and staff lives ; (2) Provides a continuous function and deliver its services as per equipped with international standards when it is most needed; and (3) is planned and synchronize , with contingency and likelihood plans according to health workforce trained to keep the network operational (WPRO), 2008 and UN, 2009).

Realizing that protecting critical health care facilities from the consequences of disaster is essential, many international organisations and countries have developed tools instrument to assess the resilience of healthcare facilities towards disaster. This shows how crucial it is to make health facilities disaster resilience to reduce death and suffering. Table 3 below show some of the initiatives taken to assess the resilience of healthcare facilities towards disasters.

Table 3. Instruments for assessing the resilience of healthcare facilities  
Source: The Researcher (2020)

No.	Instrument Name	Year of Release	Type of Disaster	Areas of resiliency focus	Format
1.	Pan America Health Organization (PAHO) SMART Hospitals Toolkit Country: The Caribbean Region (Balbus et al., 2016)	2017	All-hazard	<ul style="list-style-type: none"> <li>Sustainability include environmental, human, social and economic</li> <li>Building Infrastructure</li> </ul>	<ul style="list-style-type: none"> <li>Hospital Wellbeing, safety&amp; security Index</li> <li>Basic Assessment Tool</li> <li>Cost Benefit Assessment Methodology</li> <li>The Green Checklist and Contention Handbook                             <ul style="list-style-type: none"> <li>Training aids</li> </ul> </li> <li>Previous experience from the SMART Hospitals Initiative</li> </ul>
2.	World Health Organization for Safe And Sound Hospitals in Urgent Situation and Tragedies Country: Western Pacific Region World Health Organization. Regional Office for the Western Pacific. (2010)	2010	All-hazard	<ul style="list-style-type: none"> <li>Structural, non-structural, and functional vulnerabilities</li> <li>Continuous relief operation through the crisis situation/ disaster</li> </ul>	<ul style="list-style-type: none"> <li>Checklist</li> </ul>
3.	WHO Hospital emergency response checklist Country: Europe Hospital emergency response checklist (2011)	2011	All-hazard	<ul style="list-style-type: none"> <li>Continuity of services</li> <li>Post disaster recovery</li> </ul>	<ul style="list-style-type: none"> <li>Checklist</li> </ul>
4.	Health Care Facility Climate Change Resilience Toolkit	2013	All-hazard	<ul style="list-style-type: none"> <li>Emergency management</li> <li>Sustainability</li> </ul>	<ul style="list-style-type: none"> <li>Enablers Guide</li> </ul>

	Country: Canada (Health Care Facility Climate Change Resiliency Checklist, 2013)			<ul style="list-style-type: none"> <li>• Infrastructure</li> </ul>	<ul style="list-style-type: none"> <li>• Online Resiliency Evaluation List (78 questions)</li> <li>• Resiliency scoring offered <ul style="list-style-type: none"> <li>• Resources guide</li> <li>• Case studies</li> </ul> </li> </ul>
5.	Sustainable and Climate Resilient Health Care Facilities Toolkit Country: United States (US Sustainable and Climate Resilient Health Care Facilities Toolkit, 2014)	2014	Extreme weather events	<ul style="list-style-type: none"> <li>• Infrastructure</li> <li>• Critical services and personnel, supply chain, sustainability/energy, and water efficiency, and enhancing ecosystem services</li> </ul>	<ul style="list-style-type: none"> <li>• Best Practices Document</li> <li>• 5 Element Framework</li> <li>• Detailed checklists for each checklist linked to resources <ul style="list-style-type: none"> <li>• Case studies</li> </ul> </li> </ul>
6.	PAHO Hospital Safety Index Guide for Evaluators (Second Edition) Country: The Pan America Region (Hospital Safety Index: Guide for Evaluators. Second Edition, 2008)	2008	All- hazard	<ul style="list-style-type: none"> <li>• Structural and non-structural safety, and the emergency and disaster management capacity of the hospital</li> </ul>	<ul style="list-style-type: none"> <li>• Guide for evaluators</li> <li>• General information about the hospital</li> <li>• Safe Hospitals Checklist</li> </ul>

Overall, these instruments were developed and designed for healthcare disaster professionals, safety and security officer, hospital administrators, safety engineers and personal maintenance office who working with the management of hospitals in any operation to evaluate the resiliency of healthcare facilities to climate change to reduce vulnerability in health care facilities (Pan American Health Organization, 2008) and Health Care Facility Climate Change Resiliency Checklist (2013). Additionally, these instruments can help to assure the continuity of quality health and human care before, during and after extreme weather events (Guenther and Balbus, 2014).

#### 4. The Need for Resilience Healthcare Facilities Management

Every year the Government has allocated budget for the purpose of upgrading hospitals and other healthcare facilities. But still many hospital buildings and other healthcare facilities were affected by disaster, whether natural or man-made, especially older hospital buildings. It is proven in Malaysia that the impacts of various types of disasters from previous cases, such as flood, fire, ceiling collapses, unhygienic hospital conditions, stolen equipment, and technical glitches, are affecting negatively towards public hospitals' resilience (Samsuddin et. al., 2015).

Furthermore, focusing on the 2014 flood disaster that affected hospitals in Kelantan, the Director General of Health, YBhg Datuk Dr Noor Hisham bin Abdullah (2015) said that the post-mortem of the flood has revealed several critical issues that need to be addressed to prevent future disaster. Firstly, the affected health facilities were facing inadequate logistical assistance. During the disaster, several badly affected MoH facilities faced with the difficulties in transferring the patients to safety, transporting the staff and supplies required as the land transportation was cut-off. For that reason, disaster planning is provides a backbone strategy in logistic management when the disaster strikes, planning provides heath care officers and professionals to identify, track , mobilize, key one eye on the support teams and to manage the critical resources required in time of emergency after and before disaster(VanVactor, 2011).

Secondly, delay in early warning to the high-risk MoH facilities had caused extensive damage to the equipment and facilities. According to Ibrahim (2014), flood management in Malaysia is categorised as one of the finest, but the current system can be improved, especially in terms of geological and geotechnical data that provides detailed information on areas with high population density. Additionally, mapping of disaster prone and high-risk areas is essential to enhance disaster detection efforts (Abid et al., 2020).

Abdullah (2015) also reveal that the communication devices were not functioning due to extensive power failure and congestion in the telecommunication lines. This problem has caused the Crisis Preparedness Response Centre (CPRC) in certain districts and states were uncontactable by the MoH headquarters for a prolonged period (Abdullah, 2015). From what has happened, it was shown that telecommunication, early warning system, logistic management are interrelated to each other. It was a mess when disaster happen and interrupted the power supply which eventually affected other systems in the hospital.

In addition, the lack of profiling of the facilities with high flood risk has reduced the organized preparedness in dealing with the flooding. One of the first steps in identifying the possible impact of climate scenarios is to assess the risk and vulnerability. An organisation's vulnerability to climate change and natural disasters is a measure of how susceptible the asset is to damage resulting from disaster events and is a function of exposure, sensitivity, and adaptive capacity (O'Brien et al., 2004). As such, according to Warren (2010), organisational resilience can be achieved through risk assessment and the preparation of risk minimisation and mitigation approaches.

Moreover, Abdullah (2015) stated that updating the floods emergency response plan based on the latest SOPs at various levels must be emphasized. Planning is a process; created plans should be tested and evaluated through practice (AlBattat and MatSom. 2014). Therefore, any organizational emergency response plan should be planned specifically for any risk of hazards and update regularly and tested through training. Also, good plans and teams are essential requirements for surviving from disasters (AlBattat and MatSom. 2014). So, in order to respond effectively, hospitals must interface with incident command at multiple levels and be prepared to deal with transitions between levels (Institute of Medicine, 2007).

Lastly, Safe Hospitals and Health Facilities Initiative should be included in the disaster preparedness program by the MoH. The Comprehensive Safe Hospital Framework has been released by World health organization (WHO) at the 3rd Global Conference for Disaster Risk Reduction (DDR) in Sendai, Japan, 2015, providing guidelines to execute and build to safe and resilient hospital programmes at local and national level. The guidelines provided by WHO beneficial for both government and private organizations, disaster management professionals, Non-government organization and other multi agencies, to develop their own "safe hospital" guideline, protocol or even tools and improved preparedness of hospitals and health systems. In Malaysia's situation, the MoH have endorsed the guideline for public hospitals to use in planning disaster and emergency guidelines, but not resilience planning. Thus, based on recent disaster impacted on hospitals, all top management in hospitals must seriously plan for a safe and resilience hospital towards disaster.

## 5. Conclusion

As per the Department of Employment and Workplace Relations (2007) and the international standards of workplace approved that the newly construct buildings are more resilient to hazards and climate change but they found that still need of improvement in term of scope of the resilience of current buildings with the adaptation of new resilience strategies to mitigate the impact of disasters. Strategies must be developed, internal hospital planning needs to respond to hazards and disaster need a lot of collaboration, cooperation and participation of all parties including the hospital staff, community, local authorities, ministry, and the government.

Climate-change and extreme weathers is not something humans can control, but still we must adapt to whatever may come and in any form of how it comes. While existing hospital buildings that may be 50 – 100 years, adaptation to hazards and disaster can be hard. Old buildings may not be able to withstand the shock and they have no other way but to absorb the shock. But to be able to respond to and recover from disaster, the facilities management plays a crucial part in the hospital management. As such, a proper hospital disaster resilience plan needs to be established in all hospitals. The checklist raised awareness of potential cost-savings actions such as installation of new energy efficient systems, water conservation methods and better infrastructure that can withstand extreme weather. The above checklists were found very effective and useful to identify and evaluate the health resilient risks from extreme weather changes which ultimately impact on the infrastructure and vulnerable community with greater exposure to climate related risks and hazards.

Based on the above-mentioned tools for assessing the resilience in hospitals and healthcare facilities, the focus of assessment includes the elements of structural, non-structural, and functional in a building. When compared between the toolkits and literature review on resilience in hospitals, these elements were identified related to the scope of facilities management and the role of facility manager. As such, it showed the interrelationship between resilience and facilities management also the importance of the need for resilience facilities management in a hospital or healthcare buildings. In recent disasters, immediate and speedy action in disaster emergency was one of the critical challenges for the future. Thus, to overcome these challenges, all parties should be responsible for ensuring that all constraints in terms of knowledge, understanding and solution regarding hospital resilience need to be identified, addressed, and fulfilled. Hospital management need to be educated that the effective resilience planning is significant because it is

not only helping mitigates risks but also can improve the long-term value of built facilities. Moreover, investing in safe hospital not only ensure the lives of patients and communities but also protect the healthcare facilities operations necessary in crucial moments after extreme events and emergencies.

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