

Sustainable Flood-Resilient of the Selected Hospital Based on the Hospital Safety Index (HSI)

Neni Herlina Rafida¹, Fatmah^{1*}, and Fatma Lestari²

¹ *Disaster Management Program at School of Environmental Sciences, Universitas Indonesia*

² *Disaster Risk Reduction Center (DRRC), Universitas Indonesia*

*Corresponding author: ffatmah@yahoo.com

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Abstract

Hospital Safety Index (HSI) is used to assess the hospital readiness level in dealing with disaster situations. However, research on hospital readiness and resilience in Indonesia is still limited. The study aimed to develop the sustainable and disaster-resilient hospitals concept in five selected hospitals in DKI Jakarta based on HSI. A cross-sectional study design was used with purposive sampling techniques. These hospitals had conducted an HSI assessment for at least the last 2 years and had experienced a flood disaster that impacted their operations. The research used the quantitative (SWOT analysis, desk review) and the qualitative methods (FGD, in-depth interview). The results revealed that RSUD Cilincing Regional achieved the highest ranking for building integrity in Modules 2 and 3 of HSI. This was specifically due to their infrastructure protection elements, electrical systems, water supply systems, waste management systems, fuel storage systems, heating, ventilation, air conditioning (HVAC) systems, and medical and laboratory equipment and supplies used for diagnosis and treatment. RSUD Cilincing is the largest in Module 4 in terms of human resources, logistics, finance, patient services, support services, as well as evacuation, decontamination, and security systems. RSUD Cilincing scored 0.9 and was classified as a sustainable flood disaster-resilient hospital.

Keywords: Flood Disaster; Sustainability; Preparedness; Hospital Safety Index; Disaster Resilient Hospital

1. Introduction

Recent extreme weather events in many countries can increase the risk of disasters such as floods, which can hinder the achievement of the Sustainable Development Goals (SDGs). Geographical conditions and urbanization patterns are significant factors in the high threat of flooding which can lead to unsustainable conditions, causing disasters (Miller and Tyler, 1992). Duan *et al.* (2022) predict a significant increase in flooding frequency in Southeast Asia, East and Central Africa, and most of Latin America during the 2100s. Geographical conditions and urbanization patterns influence the high threat of flooding (Duan *et al.*, 2022).

As the capital of the Republic of Indonesia, DKI Jakarta Province is located on the northwest coast of Java Island in the lowlands, at an average altitude of 8 meters above sea level. The city is traversed by 14 river sections that stretch from the eastern canal bordering Bogor to the Tanjung Priok area in North Jakarta. Floods have occurred in DKI Jakarta in 1621, 1654, 1918, 1942, 1976, 1996, and early 2002. Jakarta, as the center of government activities and the economy in Indonesia, also serves as a buffer zone for the Bogor, Depok, Tangerang, and Bekasi areas. Unfortunately, it is also prone to annual flooding, which is triggered by climate change and rapid

development. According to the Indonesian Disaster Risk Index (IRBI) 2020, DKI Jakarta Province has a moderate risk index of 64.02 for hydrometeorological disasters (National Board for Disaster Management, 2020). By 2030, it is predicted that nearly 17% of Jakarta's land area will be submerged, with the majority at risk of submergence by 2050 (Kulp and Benjamin, 2019). This is a significant concern regarding disaster mitigation, specifically, flood disasters in DKI Jakarta.

On February 20, 2023, The Cipto Mangunkusumo Hospital (RSCM) building was submerged due to a flood, damaging hospital facilities. The hallway of the building had ankle-deep water, which entered the radiology and radiotherapy rooms, damaging several medical devices, including a tomotherapy cancer detection tool. The recent flood submerged radiology and radiotherapy equipment that had already been affected the previous weekend, as reported by the BBC (<https://www.bbc.com/indonesia/indonesia-51602075>). Additionally, Husada Hospital in West Jakarta was affected by flooding, with the hospital hallway being inundated, according to Sonora (<http://www.sonora.co.id/news/44811/rs-husada-evakuasi-sekitar-20-pasien-akibat-banjir>). In 2015, Jakarta Islamic Hospital (RSI Jakarta) experienced flooding that submerged the lobby, hallways, and treatment rooms. In January 2013, three private hospitals - Atmajaya Hospital, PGI Cikini Hospital, and Mintoharjo Naval Hospital - were unable to operate due to flooding (<https://www.liputan6.com/health/read/490770/3-rumah-sakit-di-jakarta-stop-terima-pasien-karena-kebanjiran>). Hospitals are essential healthcare facilities that are widely used by the community, especially during floods. Therefore, hospitals must have emergency plan in place to deal with the series of flood disasters that have occurred in Jakarta in recent years.

The hospital's preparedness for flooding was evaluated using the Health Safety Index (HSI) instrument developed by WHO/PAHO in 2015 (WHO, 2015) and the Hazard Vulnerability Analysis (HVA) (Kemenkes, 2022). HVA assesses the vulnerability of hazards both inside and outside the hospital, while HSI is used to evaluate the hospital's safety index during disasters. The HSI determines the necessary steps for immediate

decision-making. The objective is to enhance the hospital's security and emergency response capabilities by focusing on prevention, mitigation, emergency response, and recovery. The Hospital Safety Index (HSI) evaluates four components of the hospital: hazards that affect security and the hospital's role in managing emergencies and disasters, building structure security, non-structural security, and emergency/disaster management. It produces three categories of hospital preparedness in the face of disaster: A (score 0.66 - 1), B (score 0.36 - 0.65), and C (score 0 - 0.35) (WHO, 2015). The Hospital Safety Index (HSI) is a diagnostic tool used to assess the safety of hospital buildings, critical systems and equipment, availability of supplies, and emergency and disaster management capacity. Several studies have assessed Hospital Information Systems (HIS) in Jakarta, Bontang, and Cilegon (Lestari *et al.*, 2022; Febrian, 2019; Choirrini and Fatma, 2019). Fatma *et al.* (2021, 2022) classified hospitals and health centers in Jakarta as good/A. Denny *et al.* (2019) scored hospitals in Bontang as A (Febrian, 2019).

According to the 2010 Indonesian Minister of Health Regulation, there are four categories of general hospital types: A, B, C, and D. The categorization is based on a comprehensive evaluation of services, human resources, equipment, infrastructure, and administrative management. The minimum requirements for a type A general hospital include four essential specialist medical services, five specialist medical support services, twelve other specialist medical services, and thirteen specialist medical services. Class B general hospitals must possess the requisite facilities and capacity to provide at least four essential specialist medical services, four support specialist medical services, eight other specialist medical services, and two critical subspecialist medical services. Class C general hospitals must possess the requisite facilities and capabilities to provide at least four essential specialist medical services and four specialist medical support services. Class D general hospitals must have the facilities and capabilities of medical services and at least two basic specialist medical services (Indonesian Minister of Health Regulation, 2010).

To become disaster-resilient hospitals, Jakarta hospitals must prepare for flooding by recognizing threats in their area and organizing hospital resources to reduce vulnerability while increasing capacity to reduce flood risk. However, there have been few studies assessing the readiness of selected hospitals in DKI Jakarta to face floods and minimize the impact of flooding on hospital operations. An assessment study was conducted from August to October 2023 to evaluate the readiness of sustainable, disaster-resilient hospitals based on HSI and HVA indicators. The study aimed to develop the concept of sustainable flood-resilient hospitals in five selected Regional Public Hospital (RSUD) in DKI Jakarta Province based on HSI and HVA.

2. Methodology

2.1 Study design

The study design was cross-sectional and employed a mixed-methods approach to collect research data. Quantitative methods were used to assess hospitals' ability to deal with flood disasters using the HSI assessment. Qualitative methods were used to identify hospitals' vulnerability factors and the risks of hazards posed by flood disasters in DKI Jakarta. This study has received approval from the Ethics Committee of the UI School of Environmental Sciences (No. KET-020/UN2.F13.D1.KE1/PPM.00/2023).

2.2 Site selection

The research was conducted for 2 months (September-October 2023) in 5 selected public hospitals in DKI Jakarta, namely: RSUD Tarakan (Central Jakarta), RSUD Cilincing (North Jakarta), RSUD Kebayoran Lama (South Jakarta), RSUD Kalideres (West Jakarta), and RSUD Budhi Asih (East Jakarta).

The study employed purposive sampling to select five hospitals that met the inclusion criteria, specifically RSUDs located in flood-prone areas or surrounded by flood-prone areas. The informants were selected based on the inclusion criteria, which included stakeholders or

implementing staff of hospitals involved in assessing HSI or vulnerability of flooded areas.

The study's independent variables were the hospital's vulnerability to floods, identification of its hazard risks to floods, and its capacity. The dependent variable was the HSI assessment of the hospital, which included structural safety, non-structural safety, and functional aspects of emergency and disaster management (Hospital Disaster Plan).

2.5 Data analysis

Univariate analysis was utilized to describe the state of flood disaster preparedness in hospitals, including vulnerability, risk factors, and potential disasters in structural safety, non-structural safety, and functional aspects. The information is presented in tables and narratives to explain disaster preparedness in hospitals. The assessment of vulnerability factors of the RSUD with the HVA instrument, namely disaster threat, nature, and proportion of flood events in each hospital was analyzed by: Evaluation of the potential occurrence and response of several categories in the HVA was carried out using a special scale, namely:

- a) Problems that need to be developed against the possibility of events or probabilities that are not limited to known risks, historical data, and statistical data.
- b) Issues that need to be developed for responses that are not limited to the time or moment of occurrence, scope of response capability, and evaluation of the history of successful responses.
- c) Issues to be developed on human impact that are not limited to the potential for injury or death to hospital workers and the potential for injury or death to hospital patients;
- d) Issues to be developed on property or equipment impacts which are not limited to the cost to replace, the cost to temporarily exchange, and the cost to repair the equipment.

- e) Issues that need to be developed on the overall business impact which is not limited to disruption of business, employees who cannot report to work, customers who cannot reach the facility, companies that violate contractual agreements, costs due to companies being penalized, disruption of critical equipment supply and disruption of distribution of products or products from the company.
- f) Issues that need to be developed for overall preparedness are not limited to the status of current plans, the status of training, insurance, availability of backup or shutdown systems, and sources of community strength.
- g) Issues to be developed on overall internal sources of strength which are not limited to the type of supplies on hand, the number of supplies on hand, the availability of staff or employees, and coordination with the mass
- h) Issues to be developed on overall external sources of strength which are not limited to the type or types of agreements with community agencies, coordination with local agencies, and government agencies.

The aforementioned components serve as the foundation for assessing the risk of natural, technological, and man-made disasters, as well as disasters caused by all materials. The description includes the specific, relative, and overall hazards, and can also indicate the proportion of flood disasters. Subsequently, a bivariate analysis was conducted to explain the HSI assessment, utilizing quantitative descriptive analysis and qualitative content analysis of Modules 2, 3, and 4. The Hospital Safety Index (HSI) assessment instrument comprises four assessment parts:

Module I

Assesses hazards that affect hospital safety and the role of hospitals in emergencies and disaster response. The module determines the hazards that can directly affect hospital

safety and the hazards that hospitals are expected to provide health services in response to emergencies and disasters.

Module II

The section discusses the structural safety of the hospital building, including its assessment and past exposure to natural and other hazards. The purpose of this assessment in module 2 is to determine if the structure meets the requirements to serve the occupants even in a major emergency or disaster situation, or if the structure can be compromised in a way that would jeopardize its structural integrity and usability.

Module III

It is important to assess the non-structural safety of buildings, particularly in hospital operations. Non-structural elements, which are not part of the structural system of the hospital building, require special attention. This includes architectural features and other non-structural elements. This section covers emergency access and egress routes to the hospital, critical systems such as electricity, water supply, waste disposal, and fire protection, as well as medical, laboratory, and office equipment, both fixed and mobile, for analysis and treatment.

Module IV

The module discusses emergency and disaster management, evaluating the preparedness of the hospital's personnel and critical areas to provide patient care in such situations. The text is free from grammatical errors, spelling mistakes, and punctuation errors. The content of the improved text is as close as possible to the source text, and no new aspects have been added. The evaluation of hospital operations during and after a disaster is central to all issues related to preparing and organizing the hospital to respond to emergency and disaster situations. The text adheres to a clear and concise structure, avoiding sprawling descriptions and complex terminology. Technical term abbreviations are explained when first used, and the language is clear, objective, and value neutral. This module involves reviewing the hospital's emergency and disaster response coordination,

evacuation and response plans, patient care services, mass casualty management, triage, decontamination, and resources for disaster preparedness and response, as well as communication and information management. The language used is clear, concise, and objective, with a formal register and precise word choice. The text adheres to conventional structure and formatting, including consistent citation and footnote style. The content has not been altered beyond improving clarity and objectivity.

The process of evaluating the HSI involves completing a form with 151 questions and inputting the responses into the HSI calculator. For low scores, enter the value 1. For average scores, enter the value 1 in the average column. For high scores, enter the value 1 in the high score column. The HSI calculator will then automatically fill in the numbers for modules 2, 3, and 4. Weighted contribution calculations will be generated for each module based on the assessment criteria in the WHO/PAHO HSI calculator, which includes measures to prevent bias. The HSI calculator will also automatically calculate the safety index for individual modules and the overall safety index for the hospital, resulting in a final status. The evaluation of overall health facilities is based on a range of values for each letter grade (A, B, and C) and corresponding actions that the facilities should take.

Quantitative descriptive analysis and qualitative analysis using SWOT analysis are then conducted by classifying internal and external factors. Internal factors are categorized into Strengths, Weaknesses, and

Opportunities. These factors can be modified to enhance disaster preparedness, including flood disasters. Threats are external factors that are beyond the control of the hospital. Internal factors include the assessment of HIS Modules 2, 3, and 4. External factors encompass the vulnerability or potential hazards that a hospital may face due to its geographical location and the disasters it frequently experiences. Hospitals undergo SWOT analysis and are categorized as A, B, or C based on predetermined criteria. Those that meet the criteria for A are designated as sustainable disaster-resilient hospital.

3. Results and Discussion

Table 1 presents the vulnerability factors (hazard and vulnerability) related to natural disasters that were identified through HVA assessments for the internal vulnerability of hospitals. RSUD Kebayoran Lama has the highest proportion of flood hazards, with a value of 56% and a corresponding risk value of 13%. RSUD Budhi Asih has the lowest proportion of flood threats at 11% and a risk value of 2% from natural disasters. It is noteworthy that RSUD Tarakan has a relatively low proportion of flood threats at 28%, but the highest risk value of 53% from natural disasters (Table 1). Thus, among the five regional hospitals, RSUD Tarakan has the highest proportion of flood threat at 56%, while RSUD Kebayoran Lama has the second-highest proportion at 53%. RSUD Tarakan and RSUD Kebayoran Lama Regional Hospital face significant challenges in carrying out flood disaster preparedness.

Table 1. Percentage of flood threat and risk value of disaster threat (Module 1)

Name of Hospital	Proportion of flood hazard threat (%)	Risk value from disaster threats (%)	Note
RSUD Tarakan	28	53	Highest value of disaster threat risk
RSUD Cilincing	28	7	-
RSUD Kalideres	22	7	-
RSUD Kebayoran Lama	56	13	The highest value for the proportion of flood hazards
RSUD Budhi Asih	11	2	

Table 2. Hospital Safety Index (HSI) assessment of RSUD using the HSI

Module	RSUD Tarakan	RSUD Cilincing	RSUD Kalideres	RSUD Kebayoran Lama	RSUD Budhi Asih	Mean value
Module 2	0.66	0.85	0.87	0.62	0.88	0.776
Module 3	0.58	0.98	0.81	0.55	0.85	0.754
Module 4	0.22	0.60	0.32	0.21	0.47	0.364
Mean value	0.48	0.81	0.66	0.46	0.73	0.630

The vulnerabilities of each hospital affect the preparedness measures taken. These findings align with the HSI study conducted by Jahangiri *et al.* (2019) in 2016. Geological hazards, climatological threats, epidemics, and traffic accidents are the most frequent dangers that threaten health service centers in Ilam Province. The community health center levels of structural, non-structural, and functional security were 20.34 %, 27.67 %, and 21.53 %, respectively. The overall security of the health center is estimated to be 22.79 % (Jahangiri *et al.*, 2019).

Table 2 presents the HSI assessment results of RSUDs based on Modules 2, 3, and 4. Four RSUDs, namely Tarakan, Cilincing, Kalideres, and Budhi Asih, meet criterion A with scores greater than 0.66 - 1 in Module 2. RSUD Kebayoran Lama, on the other hand, does not meet criterion A with a score of 0.34 - 0.65 and instead meets criterion B. Related to the strength of this building, RSUD Kebayoran Lama needs immediate repairs. The building's strength value must be above 0.66 to ensure it is fully prepared to face any potential disasters. RSUD Cilincing achieved the highest ranking for building integrity in Module 2 and Module 3, specifically for infrastructure protection elements, electrical systems, water supply systems, waste management systems, fuel storage systems, heating, ventilation, air conditioning (HVAC) systems, and medical and laboratory equipment and supplies used for diagnosis and treatment. RSUD Cilincing, which ranks as the largest in Module 4 for elements of human resources, logistics, finance, patient services, support services, as well as evacuation, decontamination, and security systems, also shows the same picture. The highest score of the 21 elements in the HSI

is in the second element, with a score of 75.00 at RSUD Cilincing. When considering the total value of all elements, RSUD Cilincing has the highest score at 278.05, followed by RSUD Budhi Asih in second place with a score of 216.36, and RSUD Kalideres in third place with a score of 184.14.

Module 3 includes RSUD Cilincing, RSUD Kalideres, and RSUD Budhi Asih Hospital, which meet criteria A with a score range of > 0.66 - 1. RSUDs Tarakan and Kebayoran Lama are still below the score range of > 0.66 - 1 and fall into criterion B with a value range of 0.34 - 0.65. RSUDs meeting the A criteria with a score range of > 0.66 - 1 are not yet in Module 4. RSUD Cilincing and RSUD Budhi Asih Hospital meet the B score criteria with a score range of 0.34 - 0.65. RSUD Tarakan, RSUD Kalideres, and RSUD Kebayoran Lama Regional met criteria C with a value range of less than 0.33. This indicates that hospitals, particularly those with criteria C, have not performed well in disaster emergency management. Module 4 is of utmost concern for all RSUDs as the related element's value is still significantly lower than expected (Table 3). RSUD Cilincing has been rated as the most disaster-resilient hospital with a criteria A rating and the highest SWOT value of 0.9.

The results of the current study contrast with those of Sunindiyo *et al.* (2019), who assessed 10 hospitals in West Java and 5 hospitals in Yogyakarta, giving them an HSI score of B. However, Sunindiyo *et al.* did not consider external vulnerabilities of hospitals, such as IRB and geographical conditions, which can affect hospital preparedness for natural disasters (Sunindijo *et al.*, 2020). Four similar studies from overseas support the importance of HSI in assessing hospital disaster preparedness

(Sima et al., 2019; Feizolahzadeh et al., 2019; Lamine et al., 2023; Raeisi et al., 2018)). Feizolahzadeh et al. (2019) found that HSI assists decision-makers and policymakers in prioritizing management and intervention for the general public in hospitals with a disaster safety level score of B. The assessment of safety aspects, both functional and structural, in hospital facilities, is of utmost importance. Hamdi Lamine et.al (2022) conducted a study on 9 hospitals in Tunisia using the HSI and analyzed them with the Module Calculator and Safety Index. The results indicated that 7 hospitals were rated B with a range of 0.37 - 0.62, while 2 hospitals were rated category C with a value of less than 0.2.

Hospital readiness to face the COVID-19 pandemic is crucial for effective crisis management strategies and care for disaster victims. Hospital Safety Index serves as an important evaluation tool, as demonstrated in the study by Lestari et al (2021). The research findings indicated that community health centers X and Y scored 0.65 and 0.6 in terms of disaster preparedness, respectively. Both scores are in classification B, indicating the need for intervention shortly to address safety and health risks faced by community health centers during disasters. This is supported by the literature review and the modified HSI in Modules 1, 2, 3, and 4 (Goniewicz et al., 2023).

Table 3. Assessment of RSUD HSI results is based on 21 elements from 3 modules

Elements in the module 2,3,4	RSUD Tarakan	RSUD Cilincing	RSUD Kalideres	RSUD Kebayoran Lama	RSUD Budhi Asih
Module 2					
Previous events that affected hospital safety	6.25	6,25	25.00	6.25	25.00
Build integrity	47.25	75.00	54.75	39.75	56,25
Module 3					
Architectural security	14.00	19.80	20.00	16.00	17.00
Infrastructure protection	0.00	10.00	5.00	2.50	5.00
Electrical system	4.30	50.00	5.60	6.75	41.18
Telecommunication system	0.00	5.00	3.10	4.50	9.20
Water supply system	0.00	10.00	6.50	0.00	4.60
Fire protection system	0,00	7.50	5.25	0.00	10.00
Waste management system	2.25	2.50	1.00	0.00	1.12
Fuel storage system	4.00	5.00	4.00	0.75	2.50
Medical gas system	0.00	5.00	14.43	1.50	3.75
Heating, ventilation, and air conditioning systems (HVAC)	0.00	5.00	4.00	0.00	5.00
Office and warehouse furniture and equipment (fixed and movable)	0.00	1.70	14.43	0.00	5.00
Medical and laboratory equipment & supplies used for diagnosis & treatment	13.27	15.30	0.85	10.15	13.13
Module 4					
Coordination of emergency and disaster management activities	1.50	0.00	13.58	0.00	1.70
Disaster plan and controlling	0.00	0.00	1.50	10.15	13.43
Information & Communication Management	0.00	0.00	0.00	0.00	1.50
Human resources	0.00	20.00	1.40	0.00	0.00
Financial and logistic	0.00	8.00	0.00	0.00	0.00
Patient services and support services	3.75	25.00	0.00	0.00	1.00
Evacuation, decontamination & security systems	0.70	7.00	3.75	0.00	0.00
Total	97.27	278.05	184.14	98.30	216.36

Table 4. SWOT analysis of the hospital

Hasil	RSUD Tarakan	RSUD Cilincing	RSUD Kalideres	RSUD Kebayoran Lama	RSUD Budhi Asih
SWOT Analysis	0.4	0.9	0.51	0.22	0.5
Criteria	B	A	B	C	B

Disaster-resilient hospitals are hospitals that can provide a holistic primary care-based health system; adaptable; to provide high-quality, effective health services; and community-centered; as well as respond to outbreaks (biological disasters) in the future (Khalil *et al*, 2022). Referring to this definition and the definition established in the research, namely hospitals with good HSI assessment and SWOT analysis results, the value range follows the automatic comparison value of the safety index with the recommendations in the HSI. In contrast to several previous studies above, the current study carried out a comprehensive HSI assessment using SWOT analysis to determine the strategy for a Sustainable Flood Disaster Resilient Hospital. The SWOT analysis analyzed the weaknesses and strengths of internal and external factors. The objective of the SWOT analysis was to find out factors that can be worked on to further increase their value to reach the expected value. From the SWOT analysis, the following results were obtained: there was only 1 (one) hospital with the best score and could be designated as a Sustainable Disaster Resilient Hospital i.e RSUD Cilincing with category A and a score of 0.9. For the other 4 regional public hospitals, 3 regional hospitals had criteria B, and 1 regional hospital has criteria C with the following details: RSUD Tarakan 0.40; RSUD Kalideres 0.50; RSUD Kebayoran Lama 0.22; and RSUD Budhi Asih 0.51. The determination of resilient hospital for sustainable flood disasters refers to the HSI score being A in the value range of 0.66-1 and SWOT analysis. Of the 4 regional hospitals selected as research locations, RSUD Cilincing was selected as a sustainable disaster-resilient hospital and could be used as a strategic strategy for the Sustainable Flood Disaster Resilient Hospital concept. The location where the hospital is near the northern part of Jakarta (sea) which has floods

more frequently compared to other hospital at different municipality in DKI Jakarta. North Jakarta is crossed by 3 rivers, the Pesanggrahan, the Ciliwung and the Sunter. Naturally, these conditions make the North Jakarta area highly vulnerable to flooding (National Disaster Management Agency of Jakarta, 2022).

4. Conclusion

Hospitals in DKI Jakarta are susceptible to flood disasters. Each hospital owns an HVA form that assesses the risk of danger posed by floods. The preparedness of each hospital is affected by its vulnerability. The Hospital Safety Index assessment evaluates the capability of hospitals in dealing with flood disasters. The assessment of five regional hospitals using the Hospital Safety Index calculator found that three of them received an A grade: RSUD Cilincing scored 0.81; RSUD Kalideres scored 0.66; and RSUD Budhi Asih scored 0.73. Meanwhile, RSUD Tarakan received a B score of 0.48, and RSUD Kebayoran Lama received a B score of 0.46. To create a sustainable strategy for dealing with floods in hospitals, a SWOT analysis was conducted on the Hospital Safety Index (HSI) assessment. The results showed that only RSUD Cilincing received the highest score and was designated as a Sustainable Disaster Resilient Hospital with a category A score of 0.9. The other four regional hospitals received lower scores: three with category B criteria and one with category C criteria. RSUD Tarakan received a score of 0.40; RSUD Kalideres received a score of 0.50; RSUD Kebayoran Lama received a score of 0.22; and RSUD Budhi Asih received a score of 0.51.

RSUD Cilincing will be designated as a sustainable flood disaster-resilient hospital if it receives an A grade. This text describes

the criteria for a sustainable and disaster-resilient hospital. The hospital should offer a holistic, easily adaptable, primary care-based health system that provides high-quality and effective health services. Additionally, it should be community-centered and able to respond to future outbreaks and disasters. It is recommended that RSUDs in the DKI Jakarta Province area, as well as privately owned hospitals and The Indonesian National Army (TNI)/The Republic of Indonesia Police (POLRI), conduct the HSI assessment annually. Hospitals should conduct assessments not only during accreditation but also after to ensure preparedness for disasters, particularly floods which occur annually. This will enable hospitals to continue functioning as health services with minimal disruption. Hospitals in disaster-prone areas should prioritize the Hospital Vulnerability Assessment and take steps to improve modules 2, 3, and 4 in the HSI assessment. Hospitals in disaster-prone areas should prioritize the HVA and take steps to improve modules 2, 3, and 4 in the HSI assessment.

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