

# STAR-H

## Strategic Toolkit for Assessing Risks in Health Facilities

**PAHO**



Pan American  
Health  
Organization



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REGIONAL OFFICE FOR THE  
Americas



# STAR-H

Strategic Toolkit for Assessing Risks  
in Health Facilities

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STAR-H: Strategic Toolkit for Assessing Risks in Health Facilities

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# Introduction

In recent years, the world has witnessed an alarming increase in the frequency and severity of disasters: in the last 10 years alone, 1101 disasters have occurred in the world, claiming 19 223 lives and costing more than USD 753 billion (1). In addition, the scale and complexity of health and humanitarian emergencies continue to increase. Due to climate change, natural disasters are becoming more frequent and have a greater impact on communities and health infrastructure, requiring greater capacity-building (2).

Recently, the COVID-19 pandemic has highlighted the fragility of health systems faced with disproportionate increases in the demand for care. By March 2022, over 400 million cases had been confirmed and, unfortunately, almost 6 million people had died (3).

The Sendai Framework for Disaster Risk Reduction 2015–2030, adopted by 187 Member States during the Third United Nations World Conference on Disaster Risk Reduction, emphasizes safe health facilities as a priority action to reduce disaster risk. A critical element of the Safe Hospitals initiative has been the development and implementation of the Health Facility Safety Index, a low-cost diagnostic tool that measures the likelihood that a health facility will continue to operate in the event of an emergency or disaster by identifying the facility's vulnerabilities.

Health facilities in the Region of the Americas continue to be affected by the impact of various hazards in recent years. This makes it necessary to have a methodology to assess the risk posed by each identified hazard based on a quasi-quantitative analysis, as a starting point for strategic planning to increase the capacity to deal with them.

Risk assessment tools and disaster risk reduction plans are important for saving lives and reducing future losses (4). These tools focus on structural and nonstructural aspects (5). Unfortunately, the impact of a hazard will always be disproportionate on the most vulnerable units.

Therefore, health facilities must be prepared to respond well to such disasters. An effective disaster risk management program in a health facility saves lives, reduces damages, and ensures continuity of service (6). It also allows the required care to be provided during and after a disaster in a timely manner and with the quality necessary to save lives and ensure the safety of the facility's occupants.

In the Region of the Americas, more than 70% of health facilities are exposed to at least one hazard. The main cause of most damage to healthcare facilities is related to inadequate site selection, lack of proper building design, or insufficient maintenance (7).

Damage or malfunction of structural and nonstructural components, as well as functional collapse due to poor health facility emergency and disaster response preparedness, will have a direct or indirect impact on the continuity of medical services and result in further injuries or deaths, or loss of investment. Therefore, the strategic risk assessment in health facilities will favor the programming of actions to prevent and reduce the risks associated with a specific hazard and prepare for them, contributing to the resilience of these critical facilities.

### **What is a strategic risk assessment for health facilities?**

A strategic risk assessment is a systematic and continuous process to evaluate the most important risks facing a health facility and its organization in order to prioritize and manage them.

### **Objective of the STAR-H methodology**

The purpose of the Strategic Toolkit for Assessing Risks in Health Facilities (STAR-H) is to support risk managers in identifying and assessing the hazards to which their facilities and their organization are exposed. This will be the starting point for strategic planning, which is aimed at improving the capacity to deal with probable risks that can become an emergency, and also to support a more effective and efficient response to any emergency or disaster.

### **Scope**

STAR-H is aimed at health facility personnel with duties related to management, planning, response coordination, and incident command, whether or not they belong to the facility's governing body or management team.

This publication establishes a methodology that allows the organization to manage its risks with a multi-hazard approach, within a process of continuous improvement. Therefore, activities related to this assessment should be coordinated by the facility's governing body.

### **Scope of application**

The STAR-H methodology was designed for health facilities of any size and with a variety of response capacities, allowing information gathered from each assessment to be stored and a historical report to be generated. It could also be used to establish a national or subnational risk profile if applied in target health facilities.

## Key principles of the STAR-H methodology

The STAR-H methodology is based on the following principles:

### Multi-hazard approach

The identification of multiple hazards should allow the health facility to:

- Develop a response framework with operational procedures, regardless of the type of hazard, its scale, frequency of occurrence, or type of evolution, whether slow or sudden.
- Establish roles and responsibilities in the organization, which allows for a better use of available resources, in addition to providing greater flexibility in the response to any type of event (8).

### Risk management approach

- Have an understanding of the scope of the problems that the health facility's organization will face from the impact of a hazard.
- Provide guidance for the health facility emergency and disasters committee to address these issues in order to manage them appropriately.
- The result of the risk analysis and characterization will produce general recommendations for managing these risks, tailored to each health facility. Therefore, these results should be incorporated into the Emergency and Disaster Response Plan for Health Facilities (EDRP-H).

# Operational objectives of STAR-H

- **Strategic planning:** Applying the STAR-H is one of the key steps in strategic planning, based on knowledge and prioritization of the hazards to which health facilities are exposed, which also serves as the basis of analysis for strategic risk management.
- **Approach to preparedness:** Using the STAR-H, health facilities can focus capacity-building efforts to effectively plan, respond to, and recover from the impacts of likely, imminent, or present disasters.
- **Response plan focused on the main identified hazards:** STAR-H makes it possible to prioritize hazards in order to include response or mitigation actions in the health facility's EDRP-H.

## The Hospital Safety Index and the STAR-H

The main objective of the Hospital Safety Index (HSI) is to increase the capacity to respond to emergencies and disasters by identifying vulnerabilities in health facilities. This is followed by an action plan for each hospital to ensure the continuity of its operations during an emergency or disaster situation, with early and efficient recovery to normal operations.

The first module of the HSI makes it possible to develop a list of hazards to which the facility is exposed, according to its geographic location (9) (the HSI is not used to analyze these hazards). The STAR-H includes a self-assessment tool to systematize the identification of hazards for a risk assessment for the facilities, and it is associated with the HSI assessment.

The usefulness of the HSI lies in prioritizing hazards and weighing risks in order to prevent or reduce them or take mitigation actions. By using both instruments together, the STAR-H results will enable strategic planning that includes the HSI facility assessment.

**FIGURE 1 STAR-H in the health disaster risk management cycle**

<b>Objectives</b>	Identify priority risks for management	Forward-looking management: preventing new or increased risks	Corrective management: eliminating or reducing the risks involved	Compensatory management: strengthening the social and economic resilience of individuals and societies to residual risks that cannot be effectively reduced			
<b>Stages of intervention</b>	Before planning	Before the health emergency or disaster		During the health emergency or disaster	After the health emergency or disaster		
<b>Phases of the cycle</b>	Strategic risk assessment	Reduction		Preparation	Response	Recovery	
						Early recovery	Rehabilitation
<b>Priority actions for resilience</b>	Assess hazards and prioritize risks	Prospective management of safety with a focus on inclusion		Strengthen capacity to cope with multiple hazards	Increase hospital response capacity	Reactivate and strengthen essential health care services and facility operations	
	Systematize the disaster risk management process in hospitals						
<b>Implementation tools or instruments</b>	Sustainability approach in hospitals						
	Strategic Toolkit for Assessing Risks in Health Facilities (STAR-H)	SMART Hospitals	Capacity expansion for hospitals	Post-Disaster Rapid Health Facility Assessment (R-HFA)			
		Hospital Safety Index (HSI)	Evacuation of hospitals			Damage Assessment and Needs Analysis in Hospitals (DANA-H)	
			Emergency and Disaster Response Plan for Health Facilities (EDRP-H)				
			Hospital Incident Command System				
		Inclusion in Hospital Disaster Risk Management (INGRID-H)					

The most accepted way of integrating hazards into risk assessment is to consider their potential impacts (consequences) and likelihood of occurrence, extrapolating data from previous events (10, 11).

## **When should an emergency and disaster risk assessment be carried out in health facilities?**

Ideally, it should be carried out at the beginning of the disaster risk management cycle, using the results obtained as the main input for preparedness planning. This does not mean that it cannot be carried out at any stage or time, even during an emergency or disaster (8), especially when there is a need to review and update the health facility's response plans.

A health facility risk profile obtained using STAR-H can provide the evidence needed for prevention actions and preparedness, response, and recovery planning. The methodology can help determine residual risk in order to implement actions aimed at compensatory management of risks that cannot be effectively reduced (Figure 1).

# Using STAR-H for risk assessment

## Preliminary steps

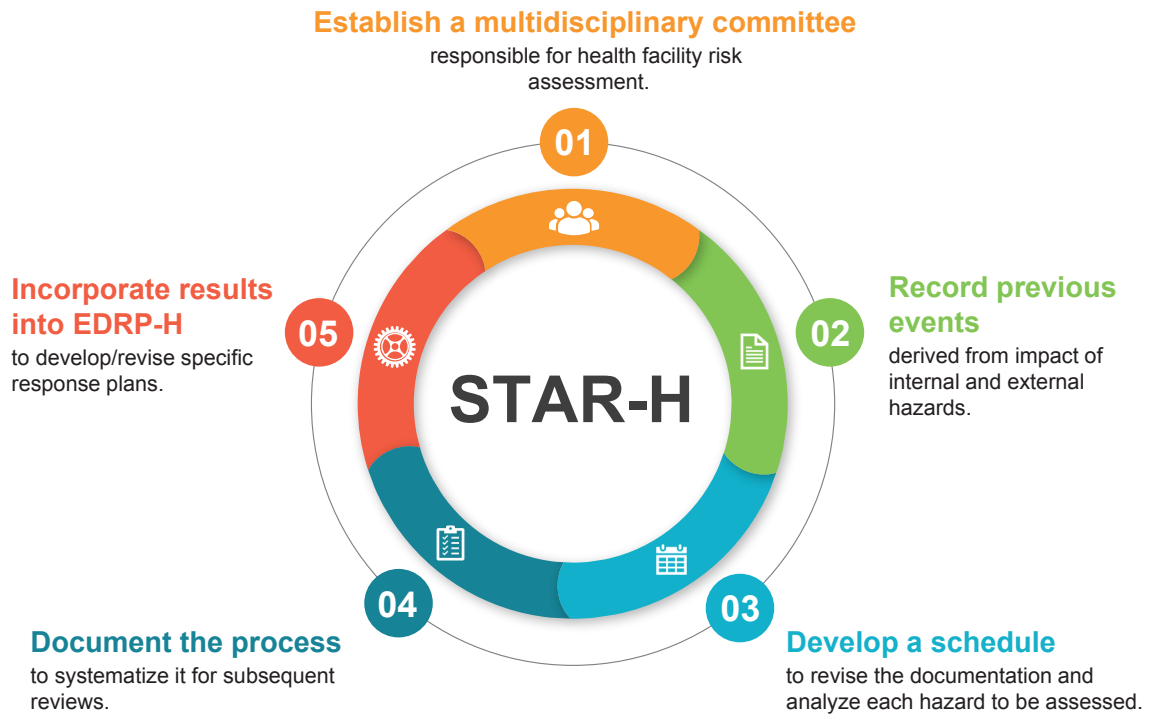
1. Identify professionals whose profile and experience can contribute to the health facility's disaster risk assessment.
2. Before implementing STAR-H, the members of the multidisciplinary committee who will conduct the STAR-H assessment must participate in and effectively complete the online risk assessment training.

## STAR-H implementation cycle

To facilitate structured implementation of STAR-H, the cycle described in Figure 2 is proposed, which includes these steps:

1. At the health facility, establish an interdisciplinary committee with decisionmaking authority, disaster risk management experience, and planning responsibilities.
2. Gather historical documentation of events that have occurred at the facility, if possible incorporating information on damages, human losses (if any), and disruption of health services.
3. Develop a planning schedule to allow time for document review and analysis of each of the listed hazards.
4. Document the operating procedure by which the methodology was carried out, in order to systematize the process for subsequent reviews.
5. Incorporate the results derived from the tool into the EDRP-H to develop specific response plans in the event of a hazard that may pose a high risk to the health facility.

**FIGURE 2** STAR-H implementation cycle



EDRP-H: Emergency and Disaster Response Plan for Health Facilities



# STAR-H

STAR-H can generate a report that includes hazard-specific risk scores, as well as general recommendations for using them appropriately. It includes four dimensions of assessment: (A) likelihood of the hazard occurring, (B) severity of impact on the lives of the occupants, the health facility and the facility's operations, (C) vulnerability, and (D) coping capacity. See Figure A4 in Annex 1.

The likelihood assessment is scored on five levels (1: very unlikely; 2: unlikely; 3: likely; 4: very likely; 5: almost certain) and the impact is also scored on five levels (1: no impact; 2: minor; 3: moderate; 4: severe; 5: critical).

The total risk score in this tool is obtained from the likelihood multiplied by the sum of the consequences, based on the formula:

$$\text{Risk} = \text{likelihood} \times \text{impact}$$

To estimate the consequences for the health facility and its occupants, the following formula is used in the STAR-H mathematical model, harmonized with the one used in the STAR guide of the World Health Organization (WHO) (8):<sup>1</sup>

$$\text{Impact} = \frac{(\text{severity} + \text{vulnerability} + \text{coping capacity})}{3}$$

## Calculate severity with STAR-H

The components for calculating severity in STAR-H are: (B1) impact on the occupants' lives, (B2) impact on the health facility, and (B3) impact on operations (health services), according to the criteria in Tables 2, 3, and 4, respectively.

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<sup>1</sup> The Strategic Toolkit for Assessing Risks (STAR) enables national and subnational governments to rapidly conduct a strategic, evidence-based assessment of public health risks for preparedness planning and prioritization, emergency health care, and disaster risk management activities.

The impact on life has been assigned the greatest relative weight in the mathematical model. The vulnerability of the health facility and its coping capacity for each hazard is weighted, and the resulting sum is divided by three.

**The assessment of the vulnerability level (C)** of the health facility is scored on three levels (1: high; 2: medium; 3: low), according to the criteria in Table 5.

**The assessment of the health facility's coping capacity (D)** is scored on three levels (1: high; 2: medium; 3: low), according to the criteria in Table 6.

## Step 1. Classify hazards based on exposure and origin

To differentiate the origin of the hazards, the person responsible for the assessment must choose between two options at this step (1: external hazards; or 2: internal hazards).

### External hazards

Many hospitals are in hazard-prone areas (e.g., areas that are susceptible to riverine flooding, coastal areas exposed to storm surges or tsunamis, or close to seismic faults and hazardous facilities), which can affect their structural and nonstructural safety. The analysis of the hospital's geographic location makes it possible to evaluate hazards in relation to previous health emergencies and disasters in the area, and to determine the type of hazards that may affect the facility according to the type of terrain (9). The persons responsible for the STAR-H tool should apply their knowledge and experience to assess how hazards and their proximity may reduce the hospital's safety and emergency and disaster response preparedness.

The use of geographic information systems (GIS) is recommended, as they provide valuable information on hazards that can be used in all phases of the emergency management process. Integrating GIS into disaster management allows for greater levels of planning, analysis, situational awareness, and recovery operations. The Pan American Health Organization (PAHO) has developed a GIS for natural hazards and public health emergencies in the Americas, making it possible to identify exposed populations and the nearest hospitals. This GIS is available through the portal <https://paho-health-emergencies-who.hub.arcgis.com/>.

### Internal hazards

Emphasis should also be placed on internal hazards, such as fire, failure of vital supplies (e.g., water, electricity, oxygen), and hazards to the security of the building, patients, visitors, and staff, as well as to the operation of the hospital (e.g., thefts, computer failures, and attacks) that may jeopardize the achievement of the hospital's strategic objectives and healthcare operations. Consideration was given to all events that can generate a hospital evacuation (12–16), but which originate in the health facility itself, and the WHO classification of hazards was used as a basis (Annex 2). Violence was also included in this list of internal hazards, as well as labor disputes that can lead to a shutdown of the health facility's operations.

Hazards of natural origin that may affect the occupants of the health facility were also included, among them antimicrobial resistance, considered one of the ten main public health hazards facing humanity, since, besides causing death and disability, it generates high health care costs (17). The spread of diseases, including COVID-19, has also been included. The classification of internal hazards can be found in Annex 3.

### Hazards related to infectious diseases, including COVID-19

The top five hazards to which a hospital is potentially exposed in the prevention and control of COVID-19 are: insufficient personal protective equipment (PPE), medical staff with inadequate diagnostic skills, inadequate patient and caregiver management strategies, lack of professional screening and triage skills, and lack of knowledge of COVID-19 among medical staff (18). These aspects reflect staff preparedness to care for patients with COVID-19, which exposes the staff to the risk of contagion and facilitates the spread of the disease among other patients and visitors.

Inadequate biohazard response planning not only exposes patients and workers to risk, but can cause an entire department or hospital to functionally collapse due to a lack of healthcare personnel, jeopardizing the timeliness and quality of inpatient care.

If a health facility's operation is interrupted, it will leave the community without access to health care. Therefore, these elements must be considered in the risk assessment, taking into account existing contingency plans, determination of supply needs, mechanisms to ensure that supplies meet the expected demand, and mechanisms for hiring or providing sufficient human resources in the event of a disproportionate increase in demand.

## Step 2. Determine the likelihood of a hazard occurring

The persons responsible for applying STAR-H should determine the likelihood of each hazard occurring in the next 12 months, choosing a score based on Table 1.

**TABLE 1** Assessing the likelihood of a hazard occurring

LEVEL	DESCRIPTION
1	<b>Very unlikely:</b> Less than 5% probability of an event occurring in the next 12 months. For example, seasonal hazards that have occurred one or fewer times in the last 20 years.
2	<b>Unlikely:</b> 5% to 29% probability of an event occurring in the next 12 months. For example, seasonal hazards that have occurred one to three times in the last 20 years.
3	<b>Likely:</b> 30% to 69% probability of an event occurring during the current year. For example, seasonal hazards that have occurred two or three times in the last 10 years, or once or twice in the last five years.
4	<b>Very likely:</b> 70% to 94% probability of an event occurring in the next 12 months. For example, seasonal hazards that occur every second or third year, or twice in the last five years.
5	<b>Almost certain:</b> 95% or greater probability of an event occurring in the next 12 months. For example, seasonal hazards that have occurred three or more times in the last five years, or five or more times in the last 10 years.

This step should include monitoring of local information sources and national risk management, civil protection, and climate reporting institutions that can generate indicators on risk precursor events (e.g., droughts and storms).

The result of this step will be the identification of risk scenarios, which may have implications during the response, in addition to identifying the risks inherent to the health facility.

### Considerations for determining the likelihood of hazards occurring

**Geographical unit:** It is useful to prepare maps with risk areas, supported by a GIS to geo-reference the infrastructure of the health facility as well as the hazards. This helps to define and prioritize hazards, and to determine the hospital unit's level of exposure.

**Time frame:** Considers the periods of occurrence and persistence (duration) of adverse events, as well as variations in seasonality associated with climate change.

**Hazard-specific historical conditions:** Consequences arising from an emergency or disaster that are historically relevant to the country or a specific geographic area, including lessons learned during the implementation of response actions.

It should be kept in mind that national and subnational political and social conditions can lead to social unrest and that a health facility's geographic location exposes it to the risks arising from fires and exposure to hazardous substances. For internal hazards, the history of failures and the quality of interventions to resolve them (especially those associated with vital supplies) should be analyzed, as should the implementation of a general maintenance program for equipment, power, and vital supplies.

To ensure the soundness of the analysis, it is important to obtain advice from and collaborate with technical government agencies, scientific institutions, universities, and other specialized organizations. The experience of the personnel responsible for the assessment is not sufficient.

### Step 3. Determine the severity of the impact of the hazard

In this step, the persons responsible for the assessment will determine the severity of the impact of the hazards analyzed by considering the following consequences:

- **For the life of the occupants:** possibility of injury or death
- **For the health facility:** physical loss or damage
- **For operations:** disruption of health services.

The persons responsible for applying STAR-H will determine the consequences of the impact of each analyzed hazard by choosing from five options for each aspect to be scored. Analyses based on risk scenarios and health facility complexity are very useful for this weighting (Tables 2, 3, and 4).

**TABLE 2** Determining the consequences in hospital occupants' lives

LEVEL	DESCRIPTION
1	<b>No impact:</b> No injuries or fatalities.
2	<b>Minor:</b> Consequences of the hazard to the health facility may cause minor injuries to occupants.*
3	<b>Moderate:</b> Consequences of the hazard to the health facility may result in serious injury to occupants, but no fatalities.
4	<b>Severe:</b> Consequences of the hazard to the health facility may cause serious injury and death to the occupants of an area or service at the health facility.
5	<b>Critical:</b> Consequences of the impact of the hazard pose a risk of serious injury or death to all occupants of the facility.

\* The occupants of a health facility are considered to be all internal or external staff, patients, visitors, and providers.

**TABLE 3** Determining the consequences to the health facility

LEVEL	DESCRIPTION
1	<b>No impact:</b> No damage to the health facility.
2	<b>Minor:</b> Minor nonstructural damage to the health facility that does not affect normal operations.
3	<b>Moderate:</b> Nonstructural damage to the health facility that temporarily affects normal operations.
4	<b>Severe:</b> Nonstructural damage to facilities may require temporary or selective evacuation before resumption of normal operations.
5	<b>Critical:</b> Possible structural damage to the health facility, requiring evacuation and shutdown.

**TABLE 4** Determining the consequences to the health facility's operation

LEVEL	DESCRIPTION
1	<b>No impact:</b> No disruption of health services.
2	<b>Minor:</b> Temporary disruption of one or more services for 4 hours or less.
3	<b>Moderate:</b> Temporary disruption of one or more services for 24 hours or less.
4	<b>Severe:</b> Temporary disruption of one or more services for 72 hours or less.
5	<b>Critical:</b> Significant long-term loss (2 weeks or more) or irreparable loss of function of the health facility, including from structural damage.

Source: Pan American Health Organization. Operational continuity in hospitals in emergency and disaster situations. Lima, Peru: PAHO; 2017. Available in Spanish from: <https://iris.paho.org/handle/10665.2/34351>.

The result of this weighting is added to the weighting of the vulnerability and coping capacity of the health facility.

**Consider that rare but rapidly occurring events can have catastrophic consequences for hospitals (e.g., floods and earthquakes) and may be underestimated during strategic risk assessment.**

## **Step 4. Determine the level of vulnerability of the health facility**

To determine the level of vulnerability, issues related to the structural, nonstructural, and administrative and organizational elements of the health facility should be considered, as well as how they interact with internal and external hazards.

Various conditions can affect the degree of vulnerability. To determine vulnerability to a specific hazard, risk assessors should use published studies or vulnerability indicators from reliable primary or secondary data sources (academic, governmental, scientific entities, etc.). The formation of a multidisciplinary team with experts in each of these areas should be considered in order to assess the vulnerability of the health facility.

Considering that some of the results of the structural vulnerability analysis study serve as input for the studies of the nonstructural aspects, and that certain results of the latter are crucial to determine the vulnerability of the administrative and organizational aspects, a comprehensive study of hospital vulnerability should consider all the aspects to be analyzed, and the analysis should be carried out in the following order (19):

1. **Structural vulnerability:** Refers to the parts of a building that keep it standing. This includes foundations, columns, load-bearing walls, beams, and diaphragms (understood as floors and roofs designed to transmit horizontal forces, such as earthquake forces, through beams and columns to the foundations).
2. **Nonstructural vulnerability:** The term “nonstructural” refers to the components of a building that are attached to the structural parts (partitions, windows, roofs, doors, enclosures, ceilings, etc.), which perform essential functions in the building (plumbing, heating, air conditioning, electrical connections, etc.) or that are simply inside the buildings (medical equipment, mechanical equipment, furniture, etc.). These can be grouped into three categories: architectural components, facilities, and equipment.
3. **Administrative and organizational vulnerability:** This concept refers to, among other things, the layout and relationship between architectural spaces and medical and support services, as well as the interior of hospitals and to administrative processes (contracting, procurement, routine maintenance practices, etc.) and to the physical and operational relationships between the different departments of a hospital. Appropriate zoning and the relationship between the departments that make up the establishment can ensure proper operation not only under normal conditions but also

in the event of emergencies and disasters. The layout and equipping of the outpatient, external, and emergency departments, as well as the design of a general services area with special operating and protection conditions, can ensure appropriate care and prevent functional collapse, which can occur even when the building has not been seriously damaged.

Table 5 shows the level of vulnerability by category. For scoring to be consistent across all identified hazards, vulnerability levels should be defined by a multidisciplinary team from the health facility based on the analysis performed.

**TABLE 5** Determining the level of vulnerability of the health facility

LEVEL	DESCRIPTION
1	<b>High:</b> If the facility is structurally and nonstructurally vulnerable to the hazard being assessed, and it has poor disaster risk management; or if the facility has been assessed using the HSI and obtained a score of less than 0.36.
2	<b>Medium:</b> If the facility is structurally and nonstructurally vulnerable to the hazard being assessed, but has good disaster risk management; or if the facility has been assessed using the HSI and obtained a score between 0.37 and 0.65.
3	<b>Low:</b> If the facility has no structural or nonstructural vulnerabilities to the hazard being assessed, and its disaster risk management is optimal; or if the facility has been assessed using the HSI and obtained a score greater than 0.66 and up to 1.

HSI: Hospital Safety Index.

## Step 5. Assess the coping capacity for specific hazards

Once the hazards have been identified, the capacity of the health facility to cope with specific hazards is scored on a three-level scale (1: high; 2: medium; 3: low). To weigh this aspect, the capacities developed in the health facility to cope with specific hazards, their implementation, and function are considered (Table 6).

**TABLE 6** Assessing the coping capacity for specific hazards

LEVEL	DESCRIPTION
1	<b>High:</b> All the coping capacities required to manage the specific hazard are available and sustainable.
2	<b>Medium:</b> Some coping capacities required to manage the specific hazard are available. They have never been stressed under real conditions (response) or tested during simulation exercise. Functionality and sustainability have not been ensured, for example by including a secure funding source in the EDRP-H.
3	<b>Low:</b> The core coping capacities required for the hazard (human, material, strategic, and financial) are mostly or completely unavailable.

EDRP-H: Emergency and Disaster Response Plan for Health Facilities

For this step, coping capacity is weighted inversely: the higher the coping capacity of the health facility, the lower the resulting score in the mathematical model of the STAR-H tool with which the risk level is calculated.

## Step 6. Obtain the risk level for the assessed hazards

In this step, the STAR-H tool automatically generates the overall risk score according to the data entered and the weights set by the persons responsible for the assessment. To view it at any time, go to the “REPORT” sheet.

The model will automatically determine the risk level associated with each hazard using the scale in Table 7.

**TABLE 7** Scale for determining the risk level in STAR-H

LEVEL OF RISK	RISK = LIKELIHOOD x IMPACT
Very low	from 1 to 3
Low	from 4 to 6
Moderate	from 7 to 11
High	from 12 to 16
Very high	from 17 to 25

STAR-H was developed in Excel (Office 365©) and is compatible with desktop versions only. Each element of the risk calculation formula contributes to a score that is automatically represented as very high, high, moderate, low, and very low risk and displayed graphically in a risk matrix.

## Step 7. Report of findings and suggested actions for risk management

STAR-H generates a graphic report prioritizing the identified risks, classified as internal or external, listed in descending order according to the level of risk; it also presents general recommended actions for risk management that may be considered in implementing contingency plans and strengthening the EDRP-H.



# References

1. Center for Research on the Epidemiology of Disasters. EM-DAT. The International Disaster Database Brussels. Brussels: CRED; 2015 [accessed on 27 July 2021]. Available from: <https://www.emdat.be>.
2. United Nations Office for Disaster Risk Reduction. Promoting Synergy and Alignment Between Climate Change Adaptation and Disaster Risk Reduction in the Context of National Adaptation Plans: A Supplement to the UNFCCC NAP Technical Guidelines. Geneva: UNDRR; 2021. Available from: <https://www.undrr.org/publication/promoting-synergy-and-alignment-between-climate-change-adaptation-and-disaster-risk>.
3. World Health Organization. WHO Coronavirus (COVID-19) Dashboard, updated 10 August 2021 [accessed on 15 August 2021]. Available from: <https://covid19.who.int>.
4. Chan EYY, Huang Z, Lam HCY, Wong CKP, Zou Q. Health Vulnerability Index for Disaster Risk Reduction: Application in Belt and Road Initiative (BRI) Region. *Int J Environ Res Public Health*. 2019;16(3):380. Available from: <https://doi.org/10.3390/ijerph16030380>.
5. Heidaranlu E, Ebadi A, Khankeh HR, Ardalan A. Hospital Disaster Preparedness Tools: a Systematic Review. *PLOS Currents Disasters*. 2015;(1):7. Available from: <https://doi.org/10.1371/currents.dis.7a1ab3c89e4b433292851e349533fd77>.
6. Abbasabadi Arab M, Khankeh HR, Mosadeghrad AM, Farrokhi M. Developing a Hospital Disaster Risk Management Evaluation Model. *Risk Manag Healthc Policy*. 2019;12:287–296. Available from: <https://doi.org/10.2147/RMHP.S215444>.
7. Fallah-Aliabadi S, Ostadtaghizadeh A, Ardalan A, Fatemi F, Khazai B, Mirjalili MR. Towards developing a model for the evaluation of hospital disaster resilience: a systematic review. *BMC Health Serv Res*. 2020;20(1):64. Available from: <https://doi.org/10.1186/s12913-020-4915-2>.
8. World Health Organization. Strategic Toolkit for Assessing Risks: A comprehensive toolkit for all-hazards health emergency risk assessment. Geneva: WHO; 2021. Available from: <https://www.who.int/publications/item/9789240036086>.
9. Pan American Health Organization. Hospital Safety Index: Guide for Evaluators. Second Edition. Washington, D.C.: PAHO; 2018. Available from: <https://iris.paho.org/handle/10665.2/51448>.
10. Montibeller G, Franco LA, Carreras A. A Risk Analysis Framework for Prioritizing and Managing Biosecurity Threats. *Risk Analysis*. 2020;40:2462–2477. Available from: <https://doi.org/10.1111/risa.13542>.
11. Deloitte. COSO. Evaluación de riesgos. Mexico City: Deloitte; 2015 [accessed on 20 July 2021]. Available from: <https://www2.deloitte.com/content/dam/Deloitte/mx/Documents/risk/Evaluacion-Riesgos-COSO.pdf>.
12. World Health Organization. Rapid risk assessment of acute public health events. Geneva: WHO; 2012 [accessed on 28 July 2021]. Available from: <https://apps.who.int/iris/handle/10665/70810>.
13. European Union Agency for Cybersecurity. Smart Hospitals: Security and Resilience for Smart Health Service and Infrastructures. Heraklion: ENISA; 2016. Available from: <https://data.europa.eu/doi/10.2824/28801>.
14. Murray V, Abrahams J, Abdallah C, Ahmed K, Angeles L, Benouar D, et al. Hazard information profiles: Supplement to UNDRR-ISC Hazard Definition & Classification Review – Technical Report. Geneva: United Nations Office for Disaster Risk Reduction; 2021. Available from: <https://council.science/wp-content/uploads/2020/06/Hazard-Information- Profiles-Supplement-to-UNDRR-ISC-Hazard-Definition-Classification-Review-Technical-Report-2021.pdf>.

15. Vítolo F. Evacuación de hospitales: Principios básicos. Biblioteca Virtual Noble. 2019:24. Available from: <http://asegurados.descargas.nobleseguros.com/download/posts/March2019/xgH80pqsFPuu2QfxmtbP.pdf>.
16. Zane R, Biddinger P, Hassol A, Rich T, Gerber J, DeAngelis J. Hospital Evacuation Decision Guide. Rockville: Agency for Healthcare Research and Quality, U.S. Department of Health and Human Services. 2010. Available from: <https://archive.ahrq.gov/prep/hospevacguide/hospevac.pdf>.
17. Liu J, Gan Y, Jiang H, Li L, Dwyer R, Lu K, et al. Prevalence of workplace violence against healthcare workers: a systematic review and meta-analysis. *Occup Environ Med*. 2019;76(12):927–937. Available from: <https://doi.org/10.1136/oemed-2019-105849>.
18. Ma L, Zou S, Liu Y, Lai J, Yang J. The application of hazard vulnerability analysis in the prevention and control of COVID-19 in medical institutions. *Iran J Public Health*. 2021;50(2):271-279. Available from: <https://doi.org/10.18502/ijph.v50i2.5339>.
19. Pan American Health Organization. Principles of disasters mitigation in health facilities. Washington, D.C.: PAHO; 2000. Available from: <https://iris.paho.org/handle/10665.2/816>.

# Glossary

## Capacity

The combination of all the strengths, attributes, and resources available within a community, society, or organization that can be used to manage and reduce disaster risks and strengthen resilience.

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## Coping capacity

Capacity of people, organizations, and systems to manage adverse conditions, risks, or disasters, using available knowledge and resources. It requires ongoing awareness-raising, resources, and good management, both under normal circumstances and during disasters or adverse conditions. Coping capacity contributes to disaster risk reduction.

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## Disaster risk

The possibility of death, injury, or destruction and damage to the assets of a system, society, or community occurring during a specific period, determined probabilistically as a function of hazard, exposure, vulnerability, and emergency response capacity.

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## Disaster risk assessment

A qualitative or quantitative approach to determine the nature and extent of disaster risk by analyzing potential hazards and assessing existing conditions of exposure and vulnerability that together could cause harm to people, property, services, livelihoods, and the environment on which they depend. Disaster risk assessments include identifying hazards; examining the technical characteristics of the risks, such as their location, intensity, frequency, and likelihood; analyzing the degree of exposure and vulnerability, including physical, social, health, environmental, and economic dimensions; and assessing the effectiveness of both existing and alternative coping capacities with respect to likely risk scenarios.<sup>1</sup>

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## Disaster risk management

Implementation of disaster risk reduction policies and strategies to prevent new events, reduce existing risks, and manage residual risks, helping to strengthen resilience and reduce disaster losses.

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## Exposure

The situation of people, infrastructure, housing, production capacities, and other tangible human assets in hazard-prone areas.

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<sup>1</sup> Pan American Health Organization. Hospital Safety Index: A Guide for Evaluators. Second edition. Washington, D.C.: PAHO; 2018. Available from: <https://iris.paho.org/handle/10665.2/51448>.

## Hazard

A process, phenomenon, or human activity that may cause death, injury, or other health effects, property damage, social and economic disruption, or environmental harm.

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## Mass casualty incident

An emergency situation that generates more patients at one time than locally available resources can manage using routine procedures, requiring the application of extraordinary measures and assistance, while disrupting the normal course of health and emergency services.

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## Nonstructural components

Elements that are not part of the load-bearing system of the building. They include architectural elements and the equipment and systems needed for operating the facility. Among the most important nonstructural components are architectural elements such as facades, interior partitions, roofing structures, and accessory or supplementary elements that may support or decorate facades or other structures. Nonstructural systems and components are telephone alert lines; industrial, medical, and laboratory equipment; furniture; electrical distribution systems; heating, ventilation, and air conditioning systems; and elevator and escalator systems.

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## Resilience

The ability of a system, community, or society exposed to hazards to resist, absorb, accommodate, transform, and recover from the effects of a hazard in a timely and efficient manner, including through the preservation and restoration of its essential basic structures and functions through risk management.

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## Strategic risk

Any hazard that could disrupt the organization's objectives. A strategic risk may be a potential event that undermines the achievement of the health facility's strategic goals, and may result from operational, financial, technological, safety, legal, or other risks; strategic risks may be unprecedented or generated from outside the health facility.<sup>2</sup> Emerging strategic risks are difficult to detect, and their impact may be underestimated using traditional risk assessment tools.

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## Structural components

Elements that are part of the load-bearing system of the structure, such as columns, beams, walls, foundations, and slabs.

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## Vulnerability

Conditions determined by physical, social, economic, and environmental factors or processes that make an individual, community, property, or system more susceptible to the effects of hazards.

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<sup>2</sup> World Health Organization. Strategic Toolkit for Assessing Risks: a comprehensive toolkit for all-hazards health emergency risk assessment. Geneva: WHO; 2021. Available from: <https://www.who.int/publications/i/item/9789240036086>.

# Annexes

## Annex 1. Components of STAR-H

### 1. Star-H navigation bar

The elements of the STAR-H navigation bar (Figure A1) are described below:

**HELP:** contains the instructions for risk assessment with STAR-H.

**INFO:** general information about the health facility, location, and contact details of the person responsible for the assessment.

**STAR-H:** automated form for registering hazards in STAR-H.

**REPORT:** strategic risk assessment report.

**FIGURE A1** Screenshot of the STAR-H navigation bar



## 2. Instructions

The instructions present the tables with the options for weighing each STAR-H component, which the person responsible for the risk assessment can use as a guide (Figure A2).

**FIGURE A2** Screenshot of the STAR-H help page



### 3. General information about the facility

On the general information page, users enter general information about the health facility and the person responsible for the assessment, which will be printed in the STAR-H report (Figure A3).

**FIGURE A3** Screenshot of the form for recording general information on the health facility in STAR-H

**HEALTH FACILITY GENERAL DATA**

**HEALTH FACILITY GENERAL DATA:**

COUNTRY:  INSTITUTION:

NAME OF THE FACILITY:

LEVEL OF OPERATION:  INSURANCE:

DATE OF CONSTRUCTION:  AGE OF BUILDING:  years DATE OF ASSESSMENT:

IF YOU DON'T HAVE THE EXACT DATE START ON DAY 1 ON MONTH 1

TELEPHONE:

MOBILE PHONE/WHATSAPP LANDLINE PHONE SWITCHBOARD EXTENSION(S)

E-MAIL ADDRESS:  ALTERNATE:

FULL ADDRESS SPECIFY

Website:

**HEALTH FACILITY LOCATION DATA**

CITY:  PROVINCE/ENTITY/STATE:

LOCALITY/MAYOR'S OFFICE/MUNICIPALITY:

LATITUDE:  LONGITUDE:  ALTITUDE:  SUBREGION:

meters above sea level

**CONTACT INFORMATION:**

PERSON RESPONSIBLE FOR THE ASSESSMENT:

TELEPHONE:

MOBILE PHONE/WHATSAPP LANDLINE PHONE SWITCHBOARD EXTENSION(S)

E-MAIL ADDRESS:  ALTERNATE:

FULL ADDRESS SPECIFY

< > **HELP** **INFO** **STAR-H** **REPORT** +

## 4. STAR-H form

The STAR-H sheet is used to record the identified hazards according to their origin and classification (Annex 2). A hazard is recorded in each row, and in the columns there is a drop-down menu to set the weights of each of the risk components (Figure A4).

**FIGURE A4** Screenshot of the STAR-H sheet

STRATEGIC RISK ASSESSMENT OF EMERGENCIES AND DISASTERS IN HEALTH FACILITIES  
STAR-H

Classification of hazards				LIKELIHOOD OF THE HAZARD OCCURRING	SEVERITY			IMPACT		Level of risk
No.	GROUPS	SUBGROUPS	HAZARDS		On the life of occupants	On the health facility	On operations (health services)	Level of vulnerability of the facility	Coping capacity	
				A	B1	B2	B3	C	D	
1	Natural	Geological	Earthquakes	Very unlikely	Critical	Severe	Severe	High	Medium	Low
2	Natural	Hydrological	Flash flood	Unlikely	Severe	Moderate	Moderate	Medium	High	Low
3	Natural	Hydrological	Landslide	Very likely	Moderate	Moderate	Moderate	Medium	Low	High
4	Natural	Meteorological	Heat wave	Unlikely	Minor	Minor	Minor	Low	High	Very low
5	Natural	Biological	Zoonosis	Unlikely	Critical	Moderate	Severe	Medium	Medium	Low
6	Human-induced	Social	Social unrest	Very likely	Moderate	No impact	Severe	Medium	Medium	Moderate
7	Human-induced	Technological	Fuel shortage	Unlikely	Moderate	Minor	Severe	Medium	Medium	Low
8	Human-induced	Technological	LP gas leak	Unlikely	Minor	Moderate	Severe	Medium	Medium	Low
9	Environmental	Environmental degrada	Salinization	Unlikely	Moderate	Moderate	Severe	Medium	High	Low
10	Environmental	Environmental degrada	Sea level rise	Very likely	Severe	Minor	Moderate	High	Low	Very high
11	Environmental	Environmental degrada	Erosion	Likely	Moderate	Minor	Minor	Medium	High	Low
12										
13										
14										
15										
16										
17										
18										
19										
20										
21										
22										

The form should be filled out from left to right to ensure a logical connection between the origin of the hazard and the classification. The weightings can be modified using the drop-down list in each cell and updated as many times as needed.

The persons responsible for the strategic risk assessment can save the file locally to save the changes made. Each new assessment must be carried out in a separate file.

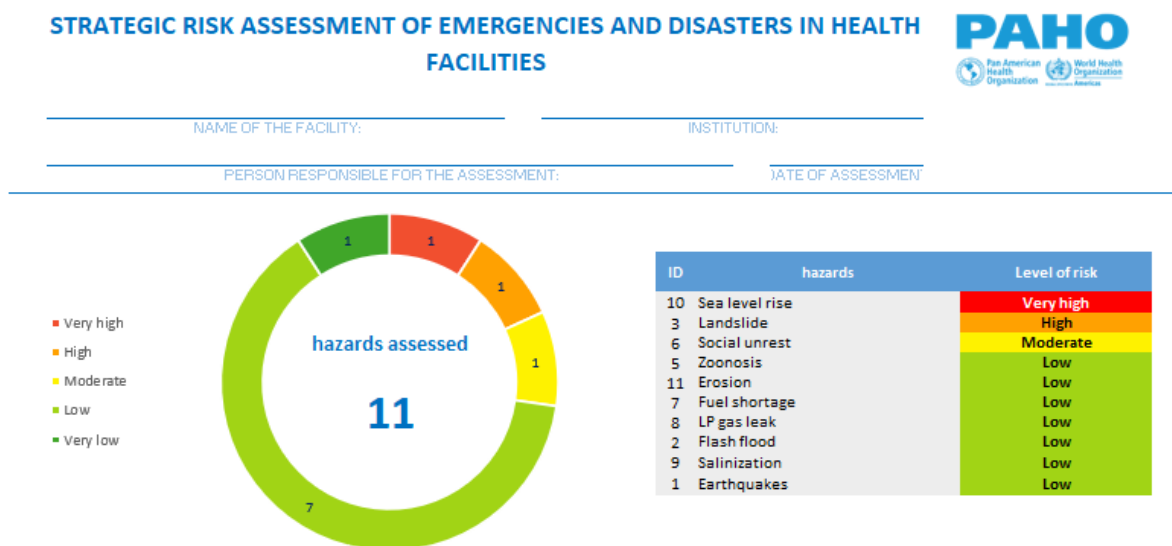
In the STAR-H tool, each hazard is assigned an identification number (“No.”), which will be used to locate and consult it in the different sections of the assessment report. This identification is specific to each hazard and may be displayed not in sequential order, but according to the level of risk in the STAR-H report.



## 5. Strategic risk assessment report

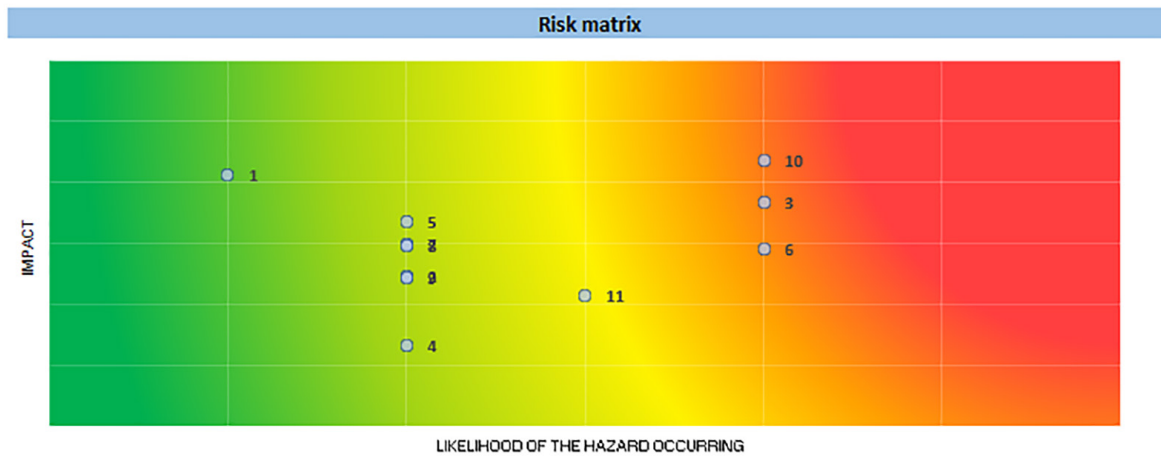
The first part of the report presents general information about the health facility assessed, the date of the assessment, and the name of the person responsible for the assessment, as well as the hazards identified, ordered according to the level of risk (Figure A5).

**FIGURE A5** Screenshot of the STAR-H report



In the second part of the report of findings, the scores obtained for the first 10 hazards analyzed, arranged by origin and risk level, are recorded and displayed in graphic format. The identified hazards will be shown graphically represented by a circle and with the corresponding identification in a risk matrix (Figure A6).

**FIGURE A6** Screenshot of the second part of the STAR-H report



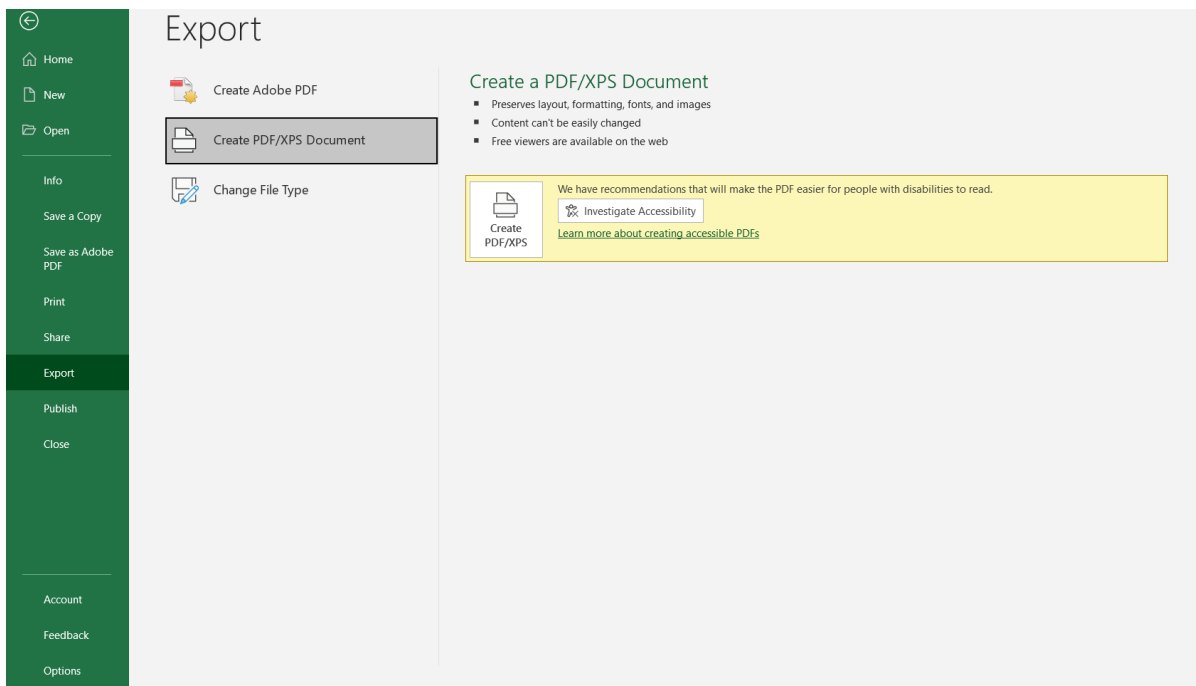
The bottom part of the report presents general recommendations for disaster risk management according to the hazard identified (Figure A7).

**FIGURE A7** Screenshot of the general recommendations section of the STAR-H report

ID	hazards	General recommendations
10	Sea level rise	Develop and implement a specific contingency plan, identify and analyze the various "most likely" and "severe" scenarios to support decision-making for risk reduction or mitigation.
3	Landslide	Develop and implement a specific contingency plan, identify and analyze the various "most likely" and "severe" scenarios to support decision-making for risk elimination, reduction, or mitigation. Establish a continuous monitoring system for this hazard incorporating existing early warning systems.
6	Social unrest	Develop and implement a specific contingency plan, identify and analyze the various "most likely" and "severe" scenarios to support decision-making for risk reduction or mitigation.
5	Zoonosis	Develop and implement a specific contingency plan, identify and analyze the various "most likely" and "severe" scenarios to support decision-making for risk elimination, reduction, or mitigation. Strengthen or implement an epidemiological surveillance system, calculate and plan supplies based on the expected demand and according to the identified nosological entities. Develop action protocols and therapeutic algorithms based on scientific evidence and establish a continuing education program for staff. Provide for adequate staffing in the
11	Erosion	Develop and implement a specific contingency plan, identify and analyze the various "most likely" and "severe" scenarios to support decision-making for risk reduction or mitigation.

To print the report, click on the button in the upper right-hand corner. If you prefer to select a different printer or save in PDF format, choose the “print” option from the Microsoft Excel “file” menu or use the key combination control + “p.” You may also simply choose the “export to PDF format” option in the “file” menu (Figure A8).

**FIGURE A8** Screenshot of “File” tab options to export the STAR-H report to PDF format



# Annex 2.

## Classification of external hazards

GENERAL HAZARD GROUPS	1. Natural					2. Human-induced		3. Environmental	
SUBGROUPS	1.1 Geophysical	1.2 Hydro-meteorological		1.3 Climatological	1.4 Biological	1.5 Extraterrestrial	2.1 Technological	2.2 Societal	3.1 Environmental degradation
		1.2.1 Hydrological	1.2.2 Meteorological						
<b>MAIN TYPES</b>	<b>Tsunami</b>	<b>Flood</b>	<b>Storm</b>	<b>Drought</b>	<b>Diseases</b>	<b>Impact</b>	<b>Industrial hazards</b>	<b>Acts of violence</b>	<b>Erosion</b>
-Subtypes	<b>Earthquake</b>	-Riverine flood	-Extratropical storm	<b>Wild fire</b>	-Airborne (COVID-19, flu, measles)	-Meteorite	-Chemical spill	-Armed conflict	<b>Deforestation</b>
	<b>Ground movement</b>	-Flash flood	-Tropical cyclone (cyclonic wind, cyclonic rain, cyclonic storm surge, rainstorm)	-Land fire (brush, bush, pasture)	-Waterborne	<b>Space weather</b>	-Gas leak	-Patient in police custody	<b>Salinization</b>
	-Landslide	-Coastal flood	-Tropical depression (tornado, wind, rain, winter storm, snowstorm, thunderstorm, hail, sandstorm)	-Forest fire	-Vector-borne	-Energetic particles	(radiological, nuclear)	-Violence against health workers	<b>Sea level rise</b>
	-Rock fall	-Ice jam flood		<b>Glacial lake outburst (flood)</b>	<b>Food-borne outbreaks</b>	-Geomagnetic storms	<b>Structural collapse</b>	-Dam/bridge failures	<b>Desertification</b>
	-Subsidence	-Slow flooding			-Locust	-Shock wave	-Building collapse	-Mass casualty incidents (trauma)	<b>Wetland loss / degradation</b>
	<b>Liquefaction</b>	<b>Mass movement (hydro-meteorological trigger)</b>			<b>Insect infestation</b>		-Dam/bridge failures	<b>Mass patient arrival incidents (medical cause)</b>	<b>Glacier melting</b>
	<b>Volcanic activity</b>	-Ashfall			-Grasshopper		-Occupational hazards	<b>Armed conflicts</b>	
	-Ashfall	-Landslide			-Locust		-Mining	-International	
	-Pyroclastic flow	-Avalanche			<b>Animal diseases</b>		<b>Transportation incidents</b>	-Local	
	-Lava flow	-Mudflow			<b>Plant diseases</b>		-Air, road, water, space		
		-Debris flow			-Aeroallergens		-Transportation accidents near the facility		
		<b>Wave action</b>			<b>Antimicrobial resistance</b>		<b>Explosion near the facility</b>		
		-Rogue wave			<b>Human-animal contact</b>		<b>Perimeter fire</b>		
		-Standing wave (seiche)			-Venomous animals (snakes, spiders)		<b>Flooding, regardless of origin</b>		
		<b>Extreme temperature</b>			<b>Hospital-acquired infections (viral, bacterial, fungal)</b>		<b>Environmental pollution</b>		
		-Heat wave					-Fog		
		-Cold wave					<b>Infrastructure disruption</b>		
		-Strong wind (gale, snow or ice, frost or freeze, dzud)					-Power outage (blackouts, connection failure)		
		<b>Fog</b>					-Fuel supply (shortage, blockage)		
							-Water supply		
							-Solid waste, wastewater		
							-Telecommunications		
							<b>Cybersecurity</b>		
							<b>Hazardous materials in air, soil, water</b>		
							-Biological, chemical, radiological		
							<b>Food contamination</b>		
								<b>Bomb threat</b>	
								<b>Active shooter</b>	

Source: World Health Organization. Strategic Toolkit for Assessing Risks: A comprehensive toolkit for all-hazards health emergency risk management. Geneva: WHO; 2021. Available from: <https://www.who.int/publications/i/item/9789240036086>.

# Annex 3.

## Classification of internal hazards

GENERAL HAZARD GROUPS	1. Natural	2. Human-induced	
SUBGROUPS	1.1 Biological	2.1 Technological	2.2 Social
<b>MAIN TYPES</b> -Subtypes	<b>Diseases</b> -Internal spread of airborne diseases (COVID-19, flu, measles) -Foodborne outbreaks -Pest infestation -Antimicrobial resistance -Healthcare-associated infections (viral, bacterial, fungal)	<b>Industrial hazards</b> -Chemical spill -Gas leak (natural gas network, liquefied gas storage, pipelines) -Radiation (radiological, nuclear) -Flooding regardless of origin -Internal exposure to hazardous materials  <b>Structural collapse</b> -Building collapse  <b>Hazardous substance explosion</b> -Gases, fluids, fuel  <b>Fire</b> -Fire caused by electrical failure -Fire of undetermined origin  <b>Flood</b> -Flooding from pipe rupture, water leakage  <b>Infrastructure disruption</b> -Power outage -Interruption of oxygen supply -Electrical short circuit -Flood damage to biomedical equipment  <b>Communication systems</b> -Failure of communication systems  <b>Cybersecurity</b> -Cyber attack -Failure of computer systems  <b>Exposure to hazardous materials in air, soil, water</b> -Biological, chemical, radiological	<b>Acts of violence</b> -Violence against health workers  <b>Armed conflicts</b> -National -Local  <b>Civil unrest</b> -Stampede  <b>Labor</b> -Labor disputes (absenteeism, strike, work stoppage) -High staff turnover -Staff mental health  <b>Security failure</b> -Infant abduction -Theft of equipment, supplies, materials, and medicines  <b>Occupational injuries</b>

Source: World Health Organization. Strategic Toolkit for Assessing Risks: A comprehensive toolkit for all-hazards health emergency risk management. Geneva: WHO; 2021. Available from: <https://www.who.int/publications/i/item/9789240036086>.

Health facilities in the Region of the Americas frequently suffer the effects of health emergencies and disasters, which jeopardize their ability to provide services to the population. The STAR-H methodology helps staff responsible for health emergency and disaster risk management to identify and assess risks as part of strategic planning to improve facility preparedness. It is intended to help them develop, with a multi-hazard approach, a response framework with operating procedures to deal with hazards of any type, scale, or frequency; determine roles and responsibilities; facilitate the effective use of resources; undertake strategic planning exercises, and improve the preparedness of facilities to effectively respond to and recover from impacts.

This methodology is designed for use in health facilities of any size and capacity, and makes it possible to generate historical reports and national or subnational risk profiles. This information can be used to develop an effective health emergency and disaster risk management program.

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