



World Health
Organization
REGIONAL OFFICE FOR South-East Asia

**READY RECKONER
FOR
CLIMATE RESILIENT AND
ENVIRONMENTALLY SUSTAINABLE
HEALTH CARE FACILITIES**



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Acknowledgement

The Ready Reckoner for Climate-Resilient and Environmentally Sustainable Health Care Facility is based on the guidance framework developed by World Health Organization (WHO)- Climate-Resilient and Environmentally Sustainable Health Care Facility, 2020. This Ready Reckoner represents work and contributions from several experts within and outside the World Health Organization (WHO). WHO South East Asia Region Office (SEARO) appreciates the contribution by WHO country offices from the region, for sharing insights, learnings, and information specific to developing this Ready Reckoner. Through this Ready Reckoner we believe to make health care facilities Climate Resilient and Environmentally Sustainable. WHO extends its gratitude to Urban Management Centre for its technical and design support in developing this Ready Reckoner.

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Abbreviations

CRESHCF	Climate-Resilient and Environmentally Sustainable Health Care Facilities
GDP	Gross Domestic Product
GHG	Green House Gas
HIA	Health Impact Assessment
HNAP	Health National Adaptation Plan
IEC	Information, Education & Communication
INFORM	Index for Risk Management
JRC	Joint Research Centre
SDGs	Sustainable Development Goals
SEAR	South East Asia Region
SEARO	South East Asia Regional Office
UHC	Universal Health Coverage
UNDP	United Nation Development Program
UNEP	United Nations Environment Programme
UNFCCC	United Nations Framework Convention on Climate Change
UNICEF	United Nations Children’s Fund
UNISDR	United Nations Office for Disaster Risk Reduction
VBD	Vector-borne Disease
WASH	Water, Sanitation and Hygiene
WHO	World Health Organization

Glossary

Adaptation	The process of adjustment to actual or expected climate and its effects. In human systems, adaptation seeks to moderate or avoid harm or exploit beneficial opportunities. In some natural systems, human intervention may facilitate adjustment to expected climate and its effects.
Capacity-building	In the context of climate change, the process of developing the technical skills and institutional capability in developing countries and economies in transition to enable them to effectively address the causes and results of climate change.
Community	A group of people with diverse characteristics who are linked by social ties, share common perspectives, and engage in joint action in geographical locations or setting.
Community Health Outreach	Community-based health care includes services delivered by a broadly defined community health workforce, according to their training and capacity, encompassing a range of health workers, lay and professional, formal and informal, paid and unpaid, as well as facility-based personnel who support and supervise them and provide outreach services and campaigns. Where applicable, specific occupational groups and their roles are highlighted. (WHO, 2020)
Catchment	A catchment area is the area from which a location, such as an institution or service, attracts a population that is dependent on its services.
Climate change	Climate change refers to a change in the state of the climate that can be identified (e. g., by using statistical tests) by changes in the mean and / or the variability of its properties, and that persists for an extended period, typically decades or longer. Climate change may be due to natural internal processes or external forcing such as modulations of the solar cycles, volcanic eruptions, and persistent anthropogenic changes in the composition of the atmosphere or in land use. Framework Convention on Climate Change (UNFCCC), in its Article 1, defines climate change as ‘a change of climate which is attributed directly or indirectly to human activity that alters the composition of the global atmosphere and which is in addition to natural climate variability observed over comparable time periods’.
Climate Risk	Climate Risk is a product of the likelihood of exposure and the consequence(s) of that exposure. It arises from the interaction of a physically defined hazard (e.g., floods and other extreme weather events, increasing temperature) with the properties of the exposed system, its vulnerability (UNDP, 2003).

Climate Variability	Describes variations in the mean state and other of the climate on all temporal and spatial scales beyond that of individual weather events. Variability may be due to natural internal processes within the climate system or to variations in natural or anthropogenic external forcing.
Disaster	A serious disruption of the functioning of a community or a society involving widespread human, material, economic or environmental losses and impacts, which exceeds the ability of the affected community or society to cope using its own resources.
Disaster risk management (DRM)	Processes for designing, implementing, and evaluating strategies, policies, and measures to improve the understanding of disaster risk, foster disaster risk reduction and transfer, and promote continuous improvement in disaster preparedness, response, and recovery practices, with the explicit purpose of increasing human security, well-being, quality of life, and sustainable development.
Drought	The phenomenon that exists when precipitation has been significantly below normal recorded levels, causing serious hydrological imbalances.
Emissions	Releases of gases to the atmosphere (e.g., the release of carbon dioxide during fuel combustion). Emissions can be either intended or unintended releases.
Expenditure on health (as % of GDP)	The ratio of total expenditure on health from all sources to the gross domestic product of the country, expressed in percentage.
Expenditure on health per capita (International dollars)	The average amount in international dollars spent per person on health in the country.
Exposure	Amount of a factor to which a group or individual was exposed; sometimes contrasted with dose (the amount that enters or interacts with the organism). Exposures may be either beneficial or harmful.
Extreme weather event	An extreme weather event is an event that is rare within its statistical reference distribution at a particular place. Definitions of “rare” vary, but an extreme weather event would normally be as rare as or rarer than the 10 th or 90 th percentile. By definition, the characteristics of what is called extreme weather may vary from place to place. An extreme climate event is an average of a number of weather events over a certain period of time, an average which is itself extreme (e.g., rainfall over a season).
Facilities management	Companies, organizations, government bodies, individuals or other collectives who offer tools and services that support functions of the built environment including safety, utilities, comfort, efficiency, and sustainability.

Federal/State government	National or Central Governments of SEAR member states including Ministries and Department at the national level involved in delivery of Health.
Flood	Temporary partial or complete inundation of normally dry areas caused by rapid runoff or overflow from lakes, rivers, or tidal waters.
Health impact assessment (HIA)	A combination of procedures, methods and tools by which a policy, project or hazard may be judged as to its potential effects on the health of a population, and the distribution of those effects within the population.
Health Systems	Comprises all the organizations, institutions, and resources that are devoted to producing actions principally aimed at improving, maintaining, or restoring health. (World Health Organization. 2007)
INFORM	Index for risk management is a composite indicator developed by the Joint Research Centre for European Commission (JRC) as a tool for understanding risk of humanitarian crisis and disasters.
Local government	Municipal, County, Village, Province, District or other forms of local governance units or civic authorities engaged / involved in delivering civic services in a country in either rural or urban setting.
Mitigation	A human intervention to reduce the sources or enhance the sinks of greenhouse gases (GHGs).
Primary Health Care	Primary health care includes services such as internal medicine, obstetrics and gynecology, pediatrics, and general surgery, or just general practice with limited laboratory services available for general but not specialized pathological analysis. (Disease Control Priorities in Developing Countries, 2003). Primary health care facility may or may not have in patient facility.
Resilience	The capacity of social, economic, and environmental systems to cope with a hazardous event or trend or disturbance, responding or reorganizing in ways that maintain their essential function, identity, and structure, while also maintaining the capacity for adaptation, learning, and transformation (Arctic Council, 2013).
Secondary Health Care	Secondary health care facility varies from primary health care by functions such as clinical specialties it has with bed occupancy ranging from 200 to 800 beds. (Disease Control Priorities in Developing Countries, 2003)
Sustainable Development Goals (SDGs)	SDGs are a universal call to action to end poverty, protect the planet and ensure all people enjoy peace and prosperity. These 17 goals build on the successes of the Millennium Development Goals, while including new areas such as climate change, economic inequality, innovation, sustainable consumption, peace, and justice, among other priorities.

Tertiary Health Care	A facility with highly specialized staff and technical equipment— for example, cardiology, intensive care unit, and specialized imaging units; clinical services highly differentiated by function with bed capacity ranging from 300 to 1,500 beds is classified as tertiary level facility. It may or may not have teaching facility. (Disease Control Priorities in Developing Countries, 2003)
Vector-borne diseases	Range of infectious diseases that are transmitted between hosts by vectors such as mosquitoes or ticks (e.g., malaria, dengue fever, Lyme disease).
Vulnerability	The degree to which a system is susceptible to, or unable to cope with, adverse effects of climate change, including climate variability and extremes. Vulnerability is a function of the character, magnitude, and rate of climate variation to which a system is exposed, its sensitivity, and its adaptive capacity.
Water-related diseases	Those caused by micro-organisms and chemicals in water people drink; diseases like schistosomiasis which have part of their lifecycle in water; diseases like malaria with water-related vectors; drowning and some injuries; and others such as legionellosis carried by aerosols containing certain micro-organisms.
Zoonotic disease	A disease that can be passed/transmitted between animals and humans. Zoonotic diseases can be caused by viruses, bacteria, parasites, and fungi.

Executive Summary

Climate change and its increasing variability recognizes that weather extremes are and will continue to pose major threats to the countries in the future. With its rising variability, these extremes will be unwarranted and inescapable, and its forecast may provide a limited time for anyone, be it people or government or a health care delivery, to respond to or provide any sort of protection measures. Health care facility, being the first line of response, is highly exposed and impacted by the climate risks and hazards. Health care is also dependent heavily on resources for their operations such as energy, water, medicines, and chemicals, etc. Through their operations, they may produce greenhouse gases, contributing to climate change, and through their emissions and unsustainable practices, they may be contributing to environmental degradation. Health care facilities being the first line of defence in the event of climate extreme or disaster, are required to be climate resilient and environmentally sustainable.

As per the WHO Guidance on Climate-Resilient and Environmentally Sustainable Health Care Facilities (2020), Climate-resilient and environmentally sustainable health care facilities are the ones that are able to anticipate, respond to, cope with, recover from and adapt to climate-related shocks and stresses, while minimizing negative impacts on the environment and leveraging opportunities to restore and improve it, so as to bring ongoing and sustained health care to their target population and protect the health and well-being of future generations.

The Guidance aims to enhance preparedness of health care delivery taking into consideration four basic requirements for their proper and uninterrupted functioning such as:

HEALTH WORKFORCE

Adequate numbers of skilled human resources with decent working conditions, equipped, empowered and informed to respond to the climate and environmental challenges.

WATER, SANITATION, HYGIENE & HEALTH CARE WASTE MANAGEMENT

Sustainable water, sanitation, and health care waste services.

ENERGY

Sustainable energy services.

INFRASTRUCTURE, TECHNOLOGY & PRODUCTS

Appropriate infrastructure and technologies, including all the operations that allow for the efficient and uninterrupted functioning of the health care facility.

The Guidance document provides comprehensive and strategic approach to integrate climate resilience and environmental sustainability in a facility. The Guidance also describes synergy between mitigation measures and climate change resilience interventions. Many countries and health care facilities including South East Asian (SEA) Region member states explore opportunities to address climate change.

To support the WHO SEA Region member states in augmenting existing health care facilities into model climate-resilient and environmentally sustainable health care facilities, WHO South East Asia Regional Office (SEARO) has developed a Ready Reckoner for Climate Resilient and Environmentally Sustainable Health care facilities. This Ready Reckoner is an attempt to simplify the WHO Guidance on Climate-Resilient and Environmentally Sustainable Health Care Facilities (2020) and to encourage its adoption by specific user groups (facility management, local government, and state/ federal government). To do this, the Ready Reckoner categorizes actions for each user group in the context of countries in the WHO SEA Region and defines applicability of each action based on health care facility typology (i.e. primary, secondary, tertiary).

This Ready Reckoner presents:

- Redefined actions for adopting the Guidance framework.
- Presents case studies, references, and samples of tools for adoption of actions.
- Assign user group to each action, defines the frequency of the implementing actions and suggests applicability based on the scale of the health care facility - primary, secondary, or tertiary.

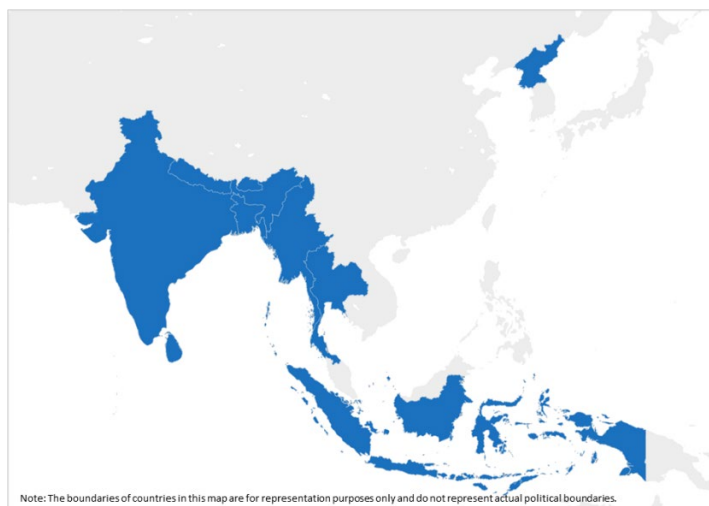
The focus of this Ready Reckoner is to enable countries to take informed decisions towards building climate resilience and environmental sustainability in health care facilities/ delivery. To do this, it focuses on developing capacity of health care workers who will be in the position to apply, influence and encourage climate resilience and adopt environmental sustainability. This document presents actions with respect to four thematic areas- Health Workforce, Water and Sanitation, Energy and Infrastructure and Medical Equipment, as outlined in the WHO Guidance - Climate Resilience and Environmental sustainability in a Health care Facility.



1. Background

The WHO SEA Region comprises of 11 Member States – Bangladesh, Bhutan, DPR Korea, India, Indonesia, Maldives, Myanmar, Nepal, Sri Lanka, Thailand, and Timor-Leste. Figure 1 shows the map of the member countries of the WHO SEA Region. The Region includes about one fourth of the world's population which makes around 1.8 billion people. The variation in population of the countries in the region ranges from 2-100+ million. Countries like Timor-Leste, Bhutan and Maldives have less than 2 million population and countries like India, Indonesia and Bangladesh have more than 100 million population. The WHO SEA Region is one of the most densely populated regions and faces social, economic, climate and environmental vulnerabilities. Figure 2 shows the population of the member states in the region in 2019.

Figure 1 Map of Member Countries of WHO SEA Region



Source: <https://www.who.int/southeastasia>

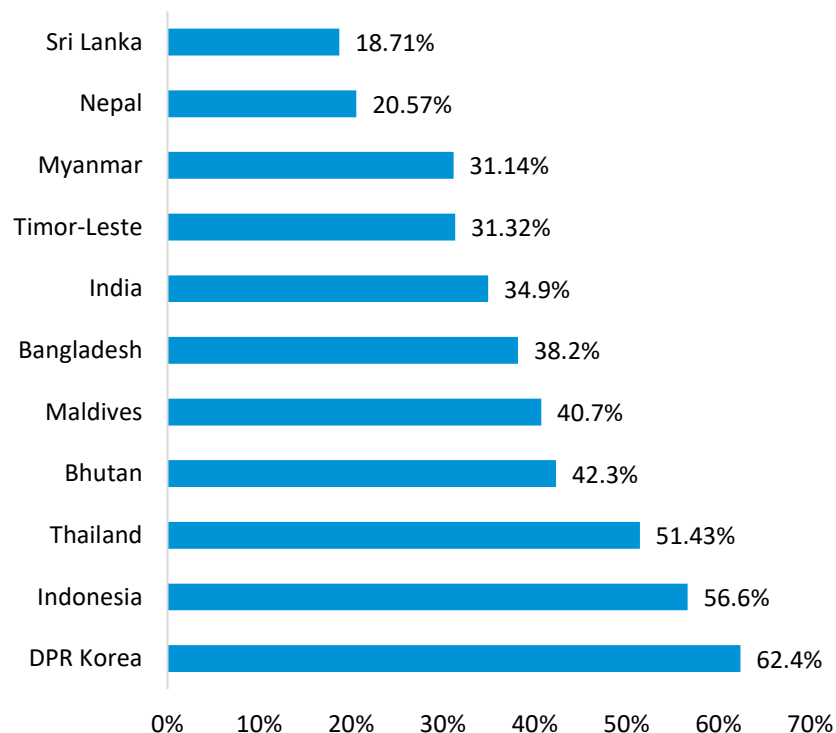
Figure 2 Population of countries in the SEA Region, 2019

SEAR Countries	Population (In Thousand)
Maldives	541
Bhutan	772
Timor-Leste	1,318
Sri Lanka	21,413
DPR Korea	22,779
Nepal	29,137
Myanmar	54,410
Thailand	69,800
Bangladesh	164,689
Indonesia	273,524
India	1,380,004

Source: (World Population Prospect 2019, Department of economic & social affairs, United Nations)

The WHO SEA Region includes developing countries with varying level of urbanization. Around 50% of the region's population is living in urban areas. Share of population living in urban areas is highest in DPR Korea which is 62.4% followed by Indonesia which is 56.6%. While countries like Nepal and Sri Lanka have lesser share of population living in urban areas which is 20.57% and 18.71%, respectively. Figure 3 shows the share of population of the countries living in urban areas. From the aspect of health care delivery, its nature has variations when it comes to urban and rural setting. Access and coverage and type of health care facility further varies in urban and rural setting.

Figure 3 Share of Population Living in Urban Areas, 2020



Source: (World Development Indicator Data Base 2020, The World Bank)

The economic status of the Region is almost as diverse as its physical geography; India and Indonesia are in the top 20 of the global GDP rankings 6 and 16, respectively, While Nepal, Maldives, Bhutan and Timor-Leste are on lower GDP ranking 97, 162, 175 and 179, respectively. Figure 4 shows the global GDP ranking of countries in the region by the World Bank in 2020.

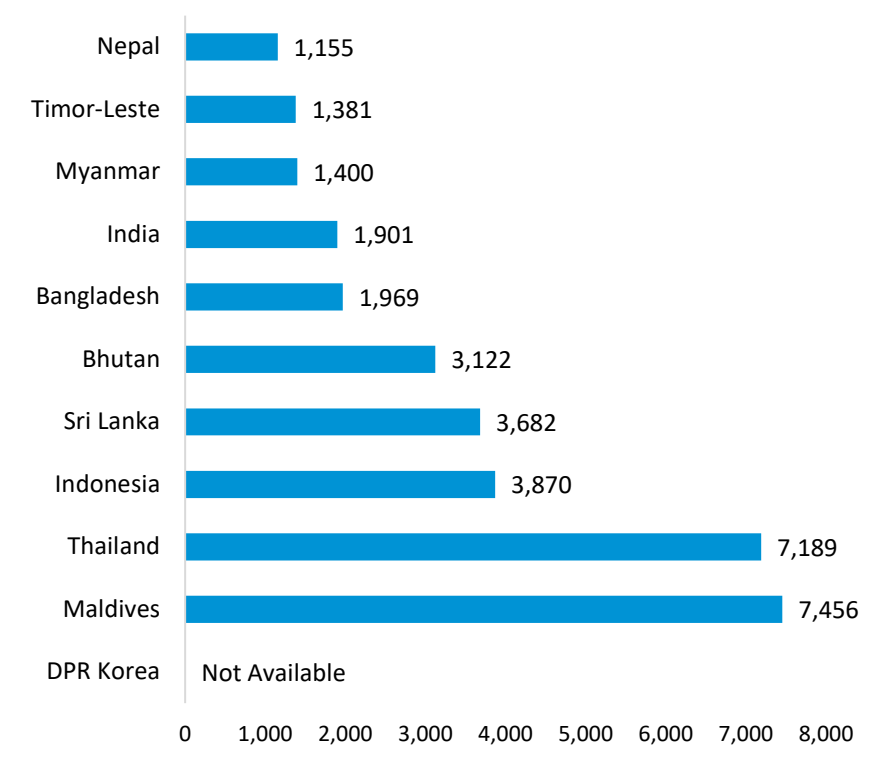
Figure 4 Global GDP Ranking of countries in the WHO SEA Region, 2020

SEAR Countries	Global GDP Ranking
India	6
Indonesia	16
Thailand	24
Bangladesh	38
Sri Lanka	66
Myanmar	70
Nepal	97
Maldives	162
Bhutan	175
Timor-Leste	179
DPR Korea	Not Available

Source: (World Development Indicator Data Base 2020, The World Bank)

Based on the World Development Indicator Database 2020 by The World Bank, Maldives and Thailand have the highest per capita GDP in the region followed by Indonesia, Sri Lanka & Bhutan. Nepal has lowest per capita GDP in the region followed by Timor-Leste, Myanmar, India and Bangladesh. All the countries in the WHO SEA Region are far below the global average per capita GDP of USD 10,925. figure 5 shows country-wise per capita GDP in USD in 2020.

Figure 5 Per Capita GDP of countries in the SEA Region (Current USD), 2020



Source: (World Development Indicator Data Base 2020, The World Bank)

1.2 Climate Risk and Vulnerability

Countries in the region possess diverse land mass, physical geography and natural resources. It has long coastal stretches in India and Thailand, to landlocked mountainous ranges in Bhutan and Nepal to island countries like Maldives, Sri Lanka, and Timor-Leste. Due to diverse geography, this region is exposed to several climatic hazards such as floods, droughts, cyclone, oceanic storm, and heat waves. Majority of the countries in the region are exposed to a range of extreme climate events, making them highly vulnerable to climate risks and disasters. (World Health Organization - Regional Office for South-East Asia, 2017) Additionally, they remain constantly exposed to outbreaks and epidemics of emerging and re-emerging diseases including waterborne, vector-borne, vaccine-preventable, respiratory, and zoonotic infections which are seen as health impacts of climate change.

As disasters continue to rise in frequency and magnitude, climate change is becoming a serious concern for the countries. Disaster risks in the region are further amplified due to increasing vulnerabilities which are because of unplanned urbanization, changing socioeconomic and demographic profile, development in and around high-risk areas, climate change and environmental degradation and poor delivery of health care – accessibility, affordability, quality and safety (World Disasters Report, 2018). Under the business-as-usual scenario, a WHO assessment, estimated that between 2030 and 2050, climate change is expected to cause approximately 250,000 additional deaths per year globally, from malnutrition, malaria, diarrhoea, and heat stress. The 2018 World Disasters Report highlighted that over the past decade, the SEA Region has contributed to 26.8% of global mortality due to disasters.

The potential climate risks for the SEAR countries are as depicted below in Figure 6. Most of the countries in the region remain vulnerable to flooding, drought, and cyclones and of most of the counties have been already witnessed the various climate risks in the past.

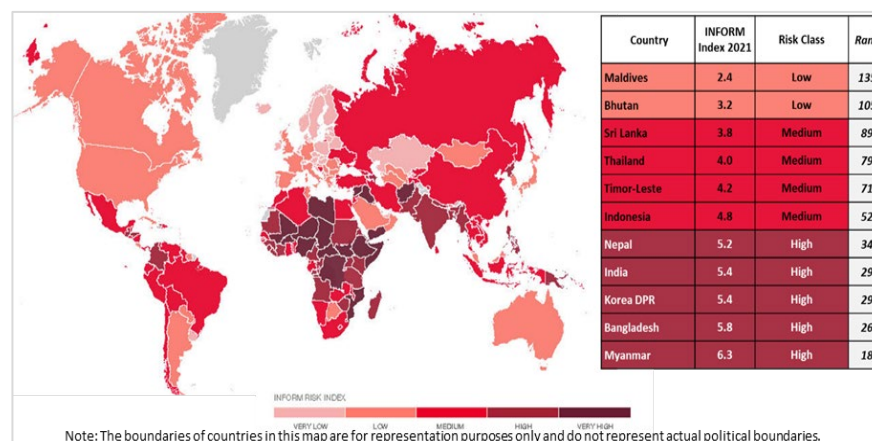
Figure 6 Potential Climate Risks in the WHO SEA Region

Countries	Drought	Flood	Cyclone	Oceanic Storm	Heat Waves	Sea Level Rise	Forest Fire
Bangladesh							
Bhutan							
DPR Korea							
India							
Indonesia							
Maldives							
Myanmar							
Nepal							
Sri Lanka							
Thailand							
Timor-Leste							

Source: (Climate Change and Knowledge Portal)

The conventional approach of the countries has been on the response in case of emergencies and disasters. The present vulnerabilities from climate risks requires countries to broaden their focus from response and recovery in emergency risk management to a more proactive approach of prevention and mitigation and the development of capacities to provide timely and effective response and recovery.

Index for Risk Management (INFORM) is one such tool that can support decisions about prevention, preparedness, and response. It is an open-source tool developed in collaboration of the Inter-Agency Standing Committee Reference Group on Risk, Early Warning and Preparedness and the European Commission which helps disaster risk and peoples' exposure to them by mapping vulnerability to hazard, its exposure dimension and resources availability to cope up with the hazard. It also accounts for the existing burden of vulnerabilities related to health. The index identifies countries of the WHO SEA region like Nepal, India, DPR Korea, Bangladesh and Myanmar as high risk while countries such as Sri Lanka, Thailand, Timor-Leste, and Indonesia under medium risk. It identifies Maldives and Bhutan as low risk, as depicted in the Figure 7 below.

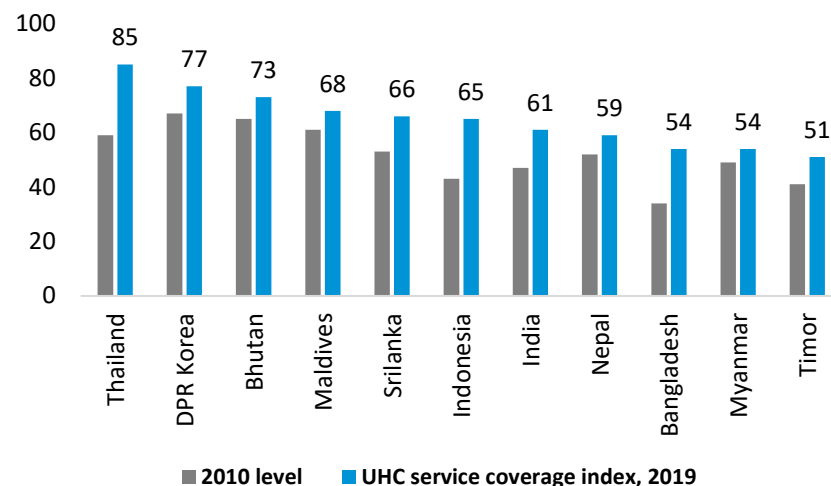
Figure 7 Map depicting Index for Risk Management, 2021

Source: (INFORM REPORT 2021; Shared evidence for managing crises and disasters)

1.3 Health Care Delivery

Health care delivery being the first line of defence, remains at the central focus in terms of climate and disaster response. Under 'Sustainable Development Goal 3: Ensure healthy lives and promoting well-being for all at all ages' many countries are focused towards enhancing health care access, coverage, and quality. Universal Health Coverage (UHC), one of the flagship initiatives of WHO, ensures that all people get access to quality health care without experiencing financial hardship. UHC is central to achieving progress on the Sustainable Development Goals (SDG)³. UHC has two dimensions – access to needed health care, and financial protection. Moving towards UHC is a gradual process, and every country has committed itself to do so. As countries strive to attain universal health coverage, there has been improvement in UHC as shown in Figure 8. The Regional average for the UHC essential health services index was at 61% in 2019 as compared with 46% in 2010.

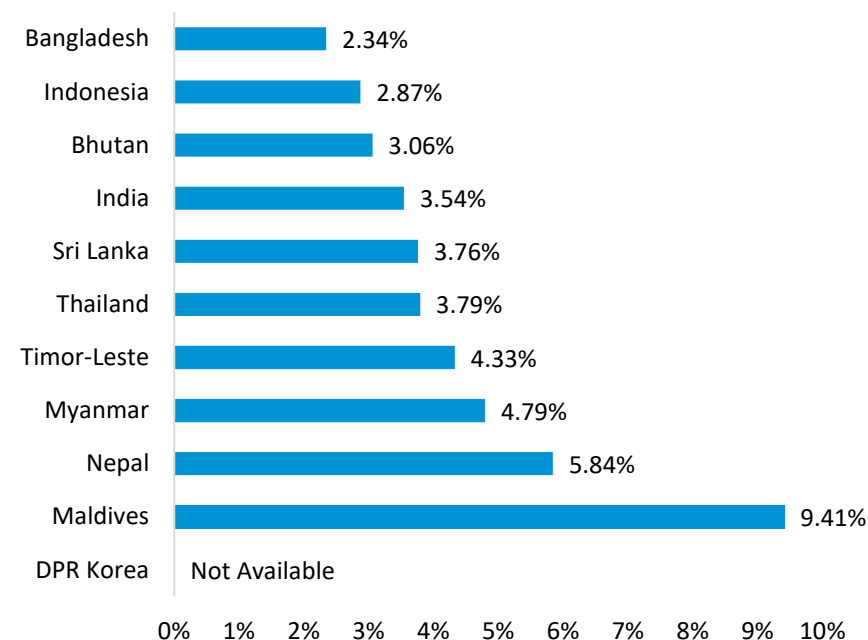
Figure 8 Changes in Coverage of Essential Health Services in countries of the SEA Region, 2010-2019



Source: (Monitoring progress on universal health coverage and the health-related sustainable development goals in the South-East Asia Region: 2019 update)

Health care sector is rapidly growing in the countries of the SEA Region. This includes chain of hospitals, health centres, clinical laboratories, medical devices and equipment, pharmacy and supply value chain associated with its delivery. On an average, countries in the region are spending 2-3% of their GDPs on health and the sector is expected to grow at 16% CAGR between 2020-2030 (Health Employment & Economic Growth, 2017). It is one of the largest sectors in terms of employment and revenue with 7-12% of the share contributed by countries in the region. Figure 9 shows the current health expenditure by the SEA Region member countries as % share of their GDP.

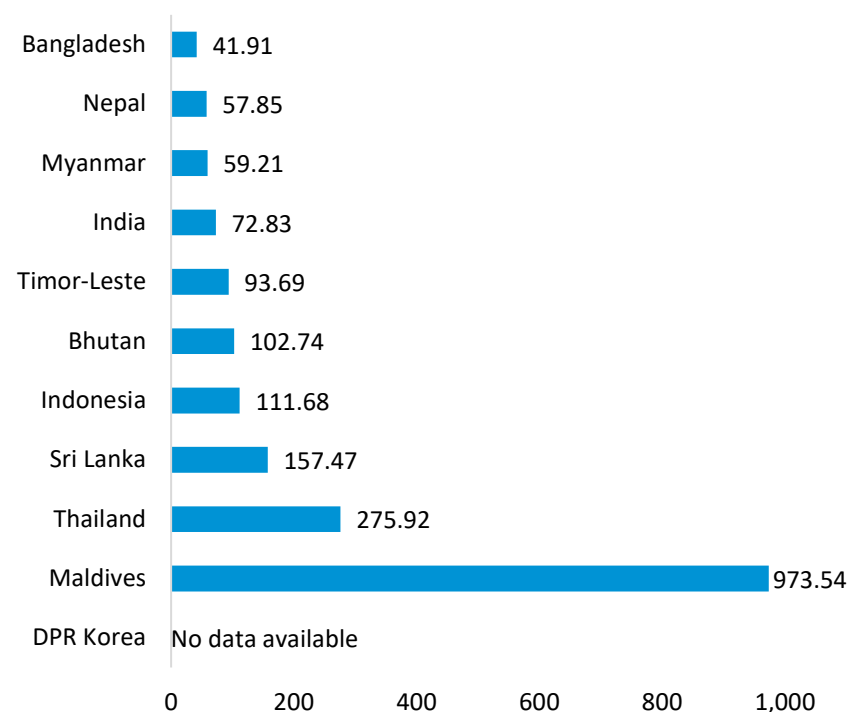
Figure 9 Current Health Expenditure as % share of GDP by countries of the SEA Region, 2018



Source: (World Development Indicator Data Base 2018, The World Bank)

Sound health policies and health financing strategies are essential, to ensure that no one is deprived because of the costs of health care, and that the resources are used efficiently and fairly. The following figure shows countries health expenditure as a percentage share of GDP. All the SEAR countries are far below global average of per capita health expenditure which is USD 1,111. Maldives has highest health expenditure per capita in the region which is USD 973. While countries like Bangladesh, Nepal, Myanmar, India and Timor-Leste spend less than USD 100 per capita. Figure 10 shows countries per capita health expenditure.

Figure 10 Current Health Expenditure Per Capita in USD by countries of the SEA Region, 2018



Source: (The World Bank, 2018)

1.4 WHO Guidance on Climate Resilient and Environmentally Sustainable Health Care Facility

There is increasing need of enhancing the capacity of health care facilities to protect and improve the health of the target communities in an unstable and changing climate; and to empower health care facilities to be environmentally sustainable, by optimizing the use of resources and minimizing the release of waste into the environment. Climate resilient and environmentally sustainable health care facilities contribute to high quality of care and accessibility of services, and by helping reduce facility costs which shall ensure better affordability for its access.

Only 15% of countries in the world have developed plans for climate change which refer to health, and few countries have developed comprehensive multi-sector impact assessments. As more countries plan to develop their strategy on climate action and attract funding in the sector, there is a need of augmenting health care facilities into climate resilient and environmentally sustainable health care facilities.

As countries and health care facilities explore opportunities to address climate change, there is a significant overlap and synergy between mitigation measures and climate change resilience interventions. Many of the impacts of climate change and its drivers are preventable through a range of proven interventions (for both adaptation and mitigation) that can reduce emissions or increase resilience.

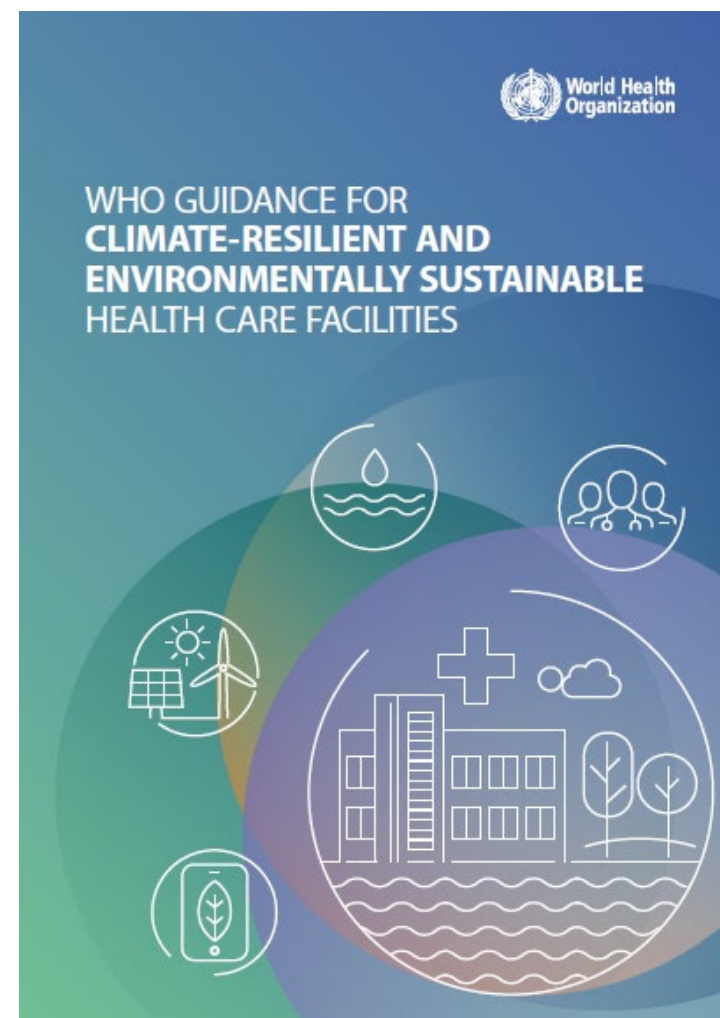
WHO has developed a Guidance framework for health care facilities with an aim to enhance climate resilience and environmental sustainability. The Guidance builds upon WHO's Operational framework for building climate resilient health systems by focusing on health care facilities and specifically on opportunities to enhance their climate resilience while also taking steps towards their environmental sustainability.

This Guidance on Climate Resilient and Environmentally Sustainable Health Care Facilities aims to enhance the capacity of health care facilities to protect and improve the health of their target communities in an unstable and changing

climate; and to empower and equip health care facilities to be environmentally sustainable, by resources pooling, optimizing its use and minimizing the release of waste into the environment. Climate-resilient and environmentally sustainable health care facilities contribute to high quality of care and accessibility of services, and by helping reduce facility costs also ensure better affordability. They are, therefore, an important component of UHC.

The WHO Guidance focuses to:

1. Guide professionals working in health care settings to understand and effectively prepare for the additional health risks posed by climate change.
2. Strengthen capacity to effectively conduct surveillance of climate-related diseases; and monitor, anticipate, manage, and adapt to the health risks associated with climate change.
3. Guide health care facility officials to work with health determining sectors (including water and sanitation, energy, transportation, food, urban planning, environment) to prepare for the additional health risks posed by climate change through a resilience approach and promote environmentally sustainable practices in providing services.
4. Provide tools to assist health care facility officials assess their resilience to climate change threats, and environmental sustainability based on appropriate use of resources (in particular water and energy and sustainable procurement), and release of hazardous materials (biological, chemical, radiological), into their surrounding environment.
5. Promote actions to ensure that health care facilities are constantly and increasingly strengthened and continue to be efficient and responsive to improve health and contribute to reducing inequities and vulnerability within their local settings.



Source Link: <https://www.who.int/publications/i/item/9789240012226>



Photograph Credit: Health worker from Urban Health Centre, Bhubaneswar, 2012, Urban management Centre

2. The Ready Reckoner

The conventional approach of the health sector has been on the response to emergencies caused by disasters. The current challenge is to broaden the focus of health care delivery from response and recovery in emergency risk management to a more proactive approach of prevention and mitigation and the development of capacities to provide timely and effective response and recovery. The WHO Guidance on Climate Resilient and Environmentally Sustainable Healthcare Facilities defines climate resilient and environmentally sustainable health care facility as:

“Climate resilient health care facilities are those that are capable to anticipate, respond to, cope with, recover from and adapt to climate-related shocks and stress, so as to bring ongoing and sustained health care to their target populations, despite an unstable climate.”

“Environmentally sustainable health care facilities are those that improve, maintain or restore health, while minimizing negative impacts on the environment and leveraging opportunities to restore and improve it, for the benefit of the health and well-being of current and future generations.” Adoption of environmentally sustainable building design that enabled reduction in carbon footprint, energy efficient technology options, renewable energy components are some of the efforts towards environmental sustainability.

The Guidance aims to enhance the capacity of health care facilities so that they can continue to provide uninterrupted health care in the event of unstable and extreme climate events, and to empower and equip health care facilities to be environmentally sustainable. Health care facilities need to strengthen four basic requirements to achieve the above objective:

- **SKILLED AND INFORMED WORKFORCE**
- **ADEQUATE WATER, SANITATION, WASTE MANAGEMENT**
- **ENERGY SERVICES**
- **INFRASTRUCTURE AND MEDICAL EQUIPMENT**

2.1 About the Ready Reckoner

The WHO South-East Asia Regional Office (SEARO) has developed a Ready Reckoner to the guidance framework in order to localize the global framework and encourage stakeholders to reinforce climate resilience and environmental sustainability at the health facility level - both for existing and new developments. This Ready Reckoner is based on the understanding that as far as health facilities are concerned climate resilience and environmental sustainability go hand in hand as both these concepts have a common goal of providing benefits to people and the environment under normal as well as extreme operating conditions.

2.2 Target Audience

The document targets health care facility managers, and the health workforce in general from private as well as public sector. In addition, the document targets stakeholders and decision-makers outside the health care facility, like the local, state and federal governments, and therefore, recommends their involvement. This document also targets development professionals and policymakers working in this space who can influence and encourage climate resilience and environmental sustainability in health care delivery.

2.3 Limitation of the Ready Reckoner

It attempts to cover health care facilities of all sizes (from small primary health care units to tertiary hospitals), and level of resources. It identifies actions and provides a reference on leading practices to enable decision making. The actions and interventions proposed in this document may require adaptation based on the local standards/ norms and resources available. For this reason, the sets of interventions can be used ‘as it is’, modified, or supplemented with new interventions. This ready reckoner does not intend to prescribe action but serve as a model reference and may or may not be measurable.

2.4 Approach of Ready Reckoner

The Ready Reckoner's approach is 3-pronged:

1. Classify Actions by its Target Groups/User Groups

The management of health care delivery in all countries in the SEA Region conform to a uniform 3 - tier structure (Federal/State government, Local government, Facility management) in both urban and rural setting. However, the 4th tier was also present in some countries like India (Accredited Social Health Activist ASHA), Bangladesh (Shasthya Sebika), and Myanmar. The following classification explains health care delivery structure in WHO SEA member states.

Figure 11 Health care delivery structure in the SEA Region

Hierarchy/Target group	Level (Urban/Rural)	Role
Federal/State Government	National/Province/State	Health Governance and planning
Local Government	Municipal/District/Village	Facilitation of health delivery and planning
Facility Management	Health care facility	Health Delivery
Community Outreach (In some countries)	Community	Health Outreach

The above classification will be used in subsequent sections of this document to define interventions/actions relevant to each target/user group. This will also enable actors in the ecosystem to reach out to the right target group and influence the implementation of the Guidance framework. Each section is colour coded as shown in table below differently to differentiate expected actions from each user group.

Figure 12 Color code given to each user group in the Ready Reckoner

User Group	Color Code
Federal/State Government	
Local Government	
Facility Management	
Community Outreach	

2. Recategorizing/Defining actions

The WHO Guidance on Climate Resilient and Environmentally Sustainable Healthcare Facilities (2020) provides checklists under 4 broad areas of intervention as shown in the figure 13. Each of them further consists broad objectives as described below into climate resilience and environmental sustainability aspect separately.

Figure 13 Framework of WHO guidance on climate resilient and environmentally sustainable health care facility

Area of Interventions	Climate Resilience	Environmental Sustainability
HEALTH WORKFORCE	Human Resource, Capacity Development and Communication and awareness raising	Human Resource, Capacity Development and Communication and awareness raising
WATER, SANITATION, HYGIENE AND HEALTH CARE WASTE	Monitoring and assessment, Risk management, Health and safety regulations	Monitoring and assessment, Risk management, Health and safety regulations
ENERGY	Monitoring and assessment, Risk management, Health and safety regulations	Monitoring and assessment, Risk management, Health and safety regulations
INFRASTRUCTURE, TECHNOLOGY AND PRODUCTS	Adaptation to current systems, Adoption of new technology, Sustainable operation	Adaptation to current systems, Adoption of new technology, Sustainable operation

The Guidance consists of checklist of interventions under each of the above themes categorised into actions under climate resilience and environmental

sustainability. Each area of intervention consists of a checklist of sub-interventions which aims to assess the existing condition of the health care service delivery in accordance with the following levels of achievement:

- Low, unavailable, unable
- Medium, in progress, incomplete
- High, completed, achieved.

The Ready Reckoner converts the checklist of sub-interventions into a broad set of Actions which includes set of sub activities, tools and references intended to encourage, facilitate, and enable implementation of the actions. The actions defined in this document corresponds to sub-interventions in the Guidance framework. The ready reckoner does not classify actions which separately aim at strengthening climate resilience and environmental sustainability. This Ready Reckoner is based on the understanding that as far as health facilities are concerned climate resilience and environmental sustainability go hand in hand as both these concepts have a common goal of providing benefits to people and the environment under normal as well as extreme operating conditions.

The actions from the guidance document have been reorganized (across thematic areas), recategorized (to suit the themes and user groups) by merging and integrating the actions. The actions in the ready reckoner have been colour coded for simplicity and ease of navigation for the reader and is largely in alignment with the original Guidance document.

Figure 14 Actions in the Ready Reckoner based on WHO Guidance Document

Area of Interventions	No. of sub-interventions in the Guidance	No. of Actions in Ready Reckoner
HEALTH WORKFORCE	64	16
WATER, SANITATION, HYGIENE AND HEALTH CARE WASTE	69	13
ENERGY	50	13
INFRASTRUCTURE, TECHNOLOGY AND PRODUCTS	113	18

3. Identifying suitability of Action based on type of facility

Most countries in the WHO SEA Region follow a three-tier health care service delivery system i.e. they deliver healthcare services through primary, secondary, and tertiary health care facilities. The nature of service delivered, and size of the facility vary across the region along with its coverage. However, for the sake of adopting actions suggested in the Guidance framework, this classification has been assigned into the actions so that target groups can identify/prioritize actions based on the type of facility. This Ready Reckoner attempts to identify suitable actions based on the facility typology as follows:

- Primary
- Secondary
- Tertiary

4. Assigning Frequency to the actions

The Ready Reckoner attempts to suggest a frequency of implementation in each action such as:

- One-time
- Annual
- Regular- Daily/Monthly/Once/Thrice a day

This may be modified depending upon the requirement in the local context of the country and the facility.

5. Do's

A section has been included on Do's referring to the actions that encourage environmentally sustainable practices in a health care facility.

2.5 How to read the Ready Reckoner

This Ready Reckoner is divided into separate sections based on the user groups identified. Depending upon which user group a reader associates themselves with, they may choose to read only relevant section. Each Section is provided with actions including brief description, references, and tools to enable its implementation.

The actions are designed as in the following template and includes the

- Main action (color coded as per the Guidance document for the sector),
- Brief - explaining the importance and intent of performing the action,
- Sub activities – explaining steps towards implementing the main action,

The template also includes attributes like frequency for each activity and applicability based on typology of the health care facility (i.e., primary, secondary, or tertiary size). Along with the action, references are also provided, which includes case studies, tools, facts and information to support decision makers in implementation.

This document needs to be read in conjunction with the WHO's Guidance on Climate Resilience and Environmentally Sustainable Healthcare Facility. The actions in ready reckoner are cross referred with checklist table number and the indicators within each from the Guidance framework.

The sample template of the action is as given below:

HEALTH WORKFORCE

1	Establish mutual aid, contingency and assistance agreements to provide health support in extreme weather events or disaster.		
Brief: Mutual aid can be defined as sharing of supplies, equipment, personnel, and information across political boundaries. Routine public health functions would be more effectively performed by executing mutual aid agreements to share relevant resources with one another.			
Sub Activities			Frequency
1.1 Prepare a plan for emergency evacuation from health care facility and restoration of essential services, including food, medical aid, water and sanitation.			One time
1.2 Collate list and maintain stocks of supplies, equipment, personnel and information to be provided to the health care facilities in the jurisdiction.			
1.3 Enlist civil society/ voluntary organizations, Non-Government organizations (NGO) and Community Based Organizations (CBO) to deliver relief.			
Facility Typology			
Primary		Secondary	Tertiary
✓		✓	✓

This action is derived from Table 4.1.1 A (12) & Table 4.4.1 C (22).

→ **Main Action** - color coded as per the Guidance document for the sector

→ **Brief** - explaining the importance and intent of performing the action

→ **Sub-activities** - explaining steps towards implementing the main action

→ **Frequency** - Ready Reckoner attempts to suggest a frequency of implementation in each sub activity. This may be modified depending upon the requirement in a local context.

→ **Color strip** – Sections are color coded as in [Figure 12](#) to navigate through the Ready Reckoner for the convenience of the user group.

→ **Facility Typology** - provides suitability of actions on facility typology such as Primary, Secondary & Tertiary HCF.

→ Provides the references from the Guidance document. The Guidance documents provides classification according to four sections and it has checklist for climate resilient and environmentally sustainable. Read this ready reckoner in tandem with the checklist provided in the guidance document.

3. Actions in Ready Reckoner

The actions that form part of the WHO Guidance on Climate Resilient and Environmentally Sustainable Healthcare Facilities (2020) have been organized into 4 sections based on the user groups that are the key audience for this Ready Reckoner, along with the actions expected from each. The user groups include-

- Facility management
- Local Government
- Community outreach workers
- Federal and State Government

The expected actions are in the 4 key areas of actions as identified by the WHO guidance. This includes:

- Health workforce
- Water, sanitation, and health care waste
- Energy and
- Infrastructure, technology, and products

This Ready Reckoner understands that health care facilities and health sector officials would need to reach out to decision makers outside of the health sector to collaborate on the implementation of some of the proposed climate resilience and environmental sustainability measures. Actions that may need the support of local or national governments and of other sectors are indicated, where relevant, in the subsequent sections covering expected actions by user groups identified above. It is possible that certain user groups may not possess the required technical knowledge for implementing the action. To facilitate implementation, this Ready Reckoner provides reference information, case studies and tools relevant to the actions where needed.

Moreover, as it may not be possible to implement all of these actions at a time, but it may be better to approach the use of this Ready Reckoner as a supporting document for continuous improvement over time. The proposed actions may require local adaption depending on the size of the facility and resources available. However, this Ready Reckoner has a comprehensive set of actions that

would significantly benefit health care workers in enhancing climate resilience and environmental sustainability in a health care setting.

It is suggested that user groups develop their own action plan for implementation based on the ready reckoner which prioritises the activities in the phased manner and prepare a budgetary plan for its implementation. A pilot level implementation should also be encouraged based on this ready reckoner at the facility management level.

The following sections details out actions based on the Guidance document identified for various user groups. The section is organized in the following order of user groups indicating actions to be undertaken by each:

1. Facility Management
2. Local Government
3. Community Health work force
4. National/ Federal Government



Photograph Credit: Health worker from Urban Health Centre, Pune, 2012, Urban management Centre

3.1 Actions to be taken by Facility Management

This ready reckoner identifies 4 key user groups for strengthening climate resilience and environmental sustainability as described above, primary being facility management. By facility management it includes organizations, companies, government bodies, individuals or other collectives involved in operating and delivering health care services. The scale of delivery and context may vary depending on the country's context in case of SEA region.

The facility management may include allied services that support functions of the built environment including safety, utilities, comfort, efficiency, and sustainability along with health care services. This ready reckoner believes facility management will be able to anchor actions around integrating climate resilience and environmental sustainability in day-to-day operations.

HEALTH WORKFORCE

1	Establish mutual aid, contingency, and assistance agreements to provide health support in extreme weather events or disaster.	
Brief: Mutual aid can be defined as sharing of supplies, equipment, personnel, and information across political boundaries. Routine public health functions would be more effectively performed by executing mutual aid agreements to share relevant resources with one another. Refer Box 1 for case study from Minnesota.		
Sub Activities		Frequency
1.1 Enter into agreements with nearest health care facilities for patients transfers, sharing of personnel and essential supplies in case of disaster and extreme weather events.		One time
Facility Typology		
Primary	Secondary	Tertiary
✓	✓	✓

This action is derived from Table 4.1.1 A (12), & Table 4.4.1 C (16), (17).

Box 1 Case Study from Minnesota, Community- Wide Agreement between Hospitals and related health facilities in the Minnesota Seven County Metropolitan Area

The health facilities located in the seven-county metropolitan area of Minnesota collaborated with each other in community-wide transfer agreement. The purpose of this agreement is to provide health care most suited to the individual needs. This agreement supported hospitals to operate and promote optimum use of the acute care facilities of general hospitals and of the post-acute care services of related health facilities.

Request to Become a Party to the Community-Wide Transfer Agreement of the Minnesota Seven County Metropolitan Area

The following named facility desires to become a party to the seven-county metropolitan area of Minnesota (Anoka, Carver, Dakota, Hennepin, Ramsey, Scott and Washington) community-wide transfer agreement.

In witness whereof, the facility named below has executed this agreement this

_____ of _____
(day) (month and year)

Name of Facility: _____

Address: _____

City/Zip: _____

Signature: _____

Title: _____

Please complete and send to:

Minnesota Department of Health
Health Regulation Division
Licensing and Certification Program
85 East Seventh Place
P.O. Box 64900
St. Paul, Minnesota 55164-0900

Source: (Minnesota Department of Health)



Photograph Credit: Aariz Sadik Markhelkar, 2021 @WHO India

HEALTH WORKFORCE

2	Develop Disaster Management guidelines and plan.
Brief: Disaster preparedness response and recovery management requires a comprehensive approach in four phases- prevention, preparedness, response and recovery to ensure a balance between the reduction of risk and the enhancement of community resilience. These four phases overlap and support each other as and when required. The local governments are responsible to provide assistance to health facilities in the implementation of guidelines/SOPs, assessing the critical data points and mapping the vulnerabilities of each region. The guidance will help facilities to develop a facility level preparedness and recovery plan. Refer Box 2 & 3 for case study on disaster management plans.	
Sub Activities	Frequency
2.1 Deploy Emergency Operational Committee or hospital Incident Command Group to respond to climate related emergencies as per the guidelines.	One time
2.2 Map the catchment area of the health care facility (geographically and population) as per the issued guidelines.	
2.3 Map the exposure of health care facility to all type of hazards and risks of events (such as biological, chemical, geological, hydro meteorological) as per the issued guidelines.	
2.4 Establish an early warning system to address climate related emergencies.	

	2.5 Develop & implement:	- Contingency plan for transportation & security measures for safe and efficient hospital evacuation during/following an extreme weather event. - Disaster Risk Reduction plan for effective response by workforce in times of emergency and extreme weather events. - Plan in place for relocating hospital equipment, medicines and medical devices during floods (or permanent relocation of equipment to higher floors in flood prone areas. - Plan in place for water system supplies (such as chlorine, filter, water treatment technology, rapid water testing kit) during an emergency and disaster response.	One time
	2.6 Update emergency plans as new knowledge on climate risks become available		Quarterly
	2.7 Train health workforce (including exercises, simulations) for:	- Early warning and surveillance system for climate sensitive diseases. - Contingency plan for transportation and safe and efficient hospital evacuation during an extreme weather event. - Disaster preparedness and risk reduction, response and recovery management to address climate change risks and to cope with any emergency from climate related disasters and outbreaks, epidemics and pandemics.	One time (Refresher Training Annually)

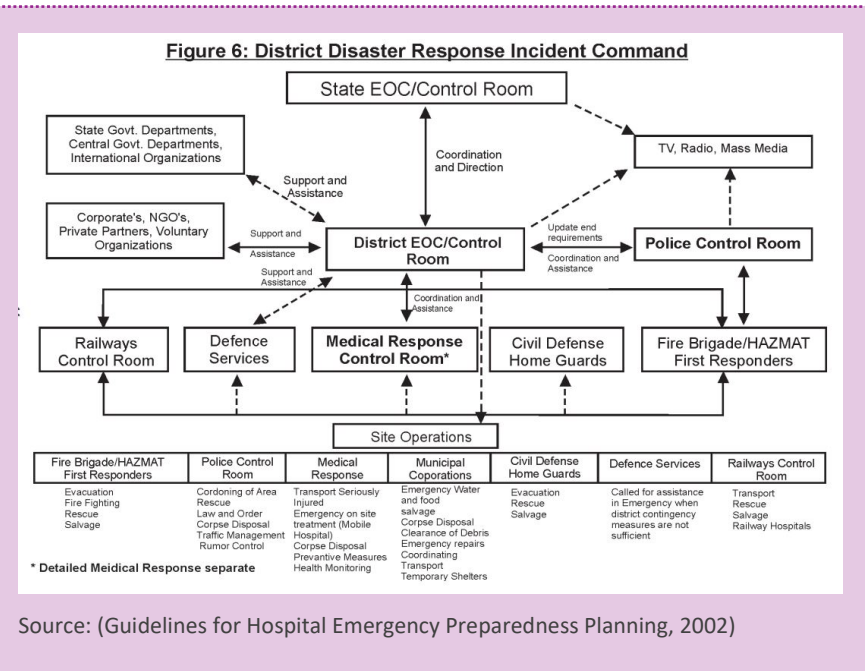
2.8 Conduct health programs in participation with outreach workers to provide information on primary and secondary prevention of diseases resulting from climate change and environmental hazards.			Annually
2.9 Establish systems for monitoring injuries, diseases & health outcomes to health care workers & vulnerable patients.			One time
Facility Typology			
Primary	Secondary	Tertiary	
✓	✓	✓	

This action is derived from Table 4.1.1 A (2), (8), (9), (10), (11), (13), Table 4.1.1 B (2), (4), (5), (6), (7), (10), (14), (18), Table 4.1.1 C (9), Table 4.1.2 A (2) & Table 4.4.1 C (3), (12).

Box 2 Case Study on Guidelines for Hospital Emergency Preparedness Planning, GOI- UNDP DRM Program (2002-2008), India

The GoI-UNDP Disaster Risk Management Programme is a national initiative to reduce vulnerabilities of communities in some of the most hazard prone districts of India (169 districts and 17 states).

The guidelines for Hospital Emergency Preparedness Planning intends to support the hospitals to formulate their own “all hazard” emergency plans in accordance with their manpower and infrastructural resources that will meet the demands of medical care more effectively during disasters/emergencies.



Source: (Guidelines for Hospital Emergency Preparedness Planning, 2002)

Box 3 Case study on preparation of Disaster Management Plans at village level, Odisha, India

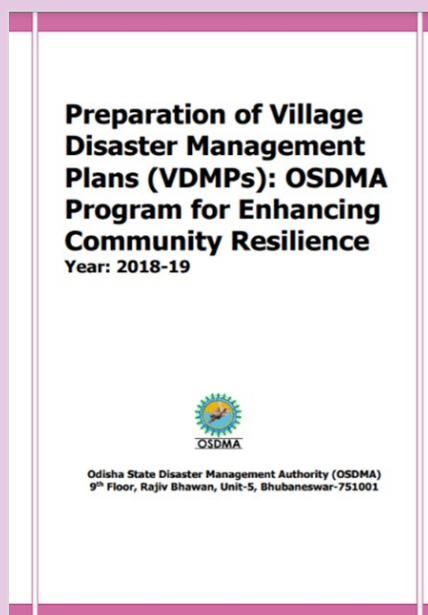
Geographical location of Odisha

Odisha is a coastal state in India that lies on the Bay of Bengal. Being adjacent to the sea, the state has witnessed horrifying floods and cyclones in the past. Cyclonic storms have been causing considerable damage to life and property in the 5700-kilometer-long coastal area of India. Due to high density of population along the coastal areas, the devastation is also on a large scale. The severity of the effect of cyclone on the community, risk potential and vulnerability warrants that a focus on prevention and preparedness for response is laid to reduce loss of lives.

Odisha State Disaster Management Authority (OSDMA)

With support from UNDP have developed a village disaster management plan for enhancing community resilience. It aims at building the capacity and resilience of the community to equip them with skills so that management of various hazards becomes a way of life for them. The specific objectives of the VDMP are to:

1. Involve the local community in the entire planning process.
2. Create a plan that will enable the immediate deployment of resources in an organized manner during an emergency.
3. Create a plan that will allow for quick and immediate response in the event of a disaster by the community.
4. Ensure that there is ownership of the plan within the community
5. Link the VDMP to the long-term development plan of the village.



Source: (Odisha State Disaster Management Authority (OSDMA), 2018)



HEALTH WORKFORCE

3	Implement measures for occupational safety of health care workers.	
Brief: Exposure to needlestick and sharp injuries poses a great risk towards transmission of blood infections amongst health workers. These injuries are usually caused during and after the collection of blood, transferring of samples, post-procedure cleaning and disposal of the health care waste exposing health workers to occupational HIV/AIDS, Hepatitis B & C, Herpes, Tuberculosis, Brucellosis and Malaria, to name a few. Refer Box 4 for guidelines on Personal Protective Equipment's (PPE).		
Sub Activities		Frequency
3.1 Train health workforce on use of PPEs.		Quarterly
3.2 Prioritize protection of health workforce through immunization, provision of PPEs, enhancing mobility during and post disaster.		-
Facility Typology		
Primary	Secondary	Tertiary
✓	✓	✓

This action is derived from Table 4.1.1. A (3) & Table 4.1.2. A (1), (3).

DID YOU KNOW?

Countries in South- East Asia Region need 1.9 million more nurses, midwives to achieve health for all.

Source: (World Health Organization - South East Asia, 2020)

Box 4 Personal Protective Equipment's for handling waste in a health care facility, UNIDO, 2018.



Photograph: WHO/Bangladesh /Tatiana Almeida, 2017 @WHO SEARO

Checklist of PPE use by health workforce during various operations

Procedure	Glove	Gown	Mask	Googles
Taking BP	-	-	-	-
Temperature, Pulse, Counting Respiration	-	-	-	-
IM Injection	-	-	-	-
Starting IV line or taking blood or IV injection	✓	-	-	-
Controlling minor bleeding	✓	-	-	-
Cleaning an incontinent patient with diarrhoea	✓	✓	-	-
Handling soiled laundry	✓	✓	✓	-
Cleaning contaminated instruments	✓	✓	✓	-
Controlling massive bleeding	✓	✓	✓	✓
Irrigating a wound	✓	✓	✓	✓
Conducting delivery	✓	✓	✓	✓
Intubation	✓	✓	✓	✓
Suctioning	✓	✓	✓	✓
Liquid spill management	✓	✓	✓	✓
Mercury spill management	✓	✓	✓	✓
Handling waste (Support staff)	✓	✓	✓	✓
Gum boots – for the waste handler Face shield – during splash of body fluids, chemicals				

Source: (United Nations Industrial Development Organization, 2018)

HEALTH WORKFORCE

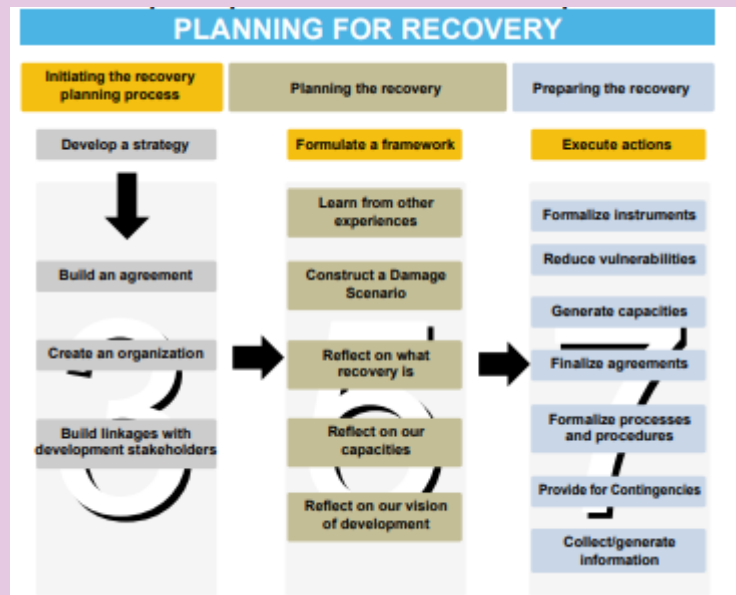
4	Establish partnerships between health care facility, health workforce and local communities to work together and promote a health care facility environment that is safe from climate-related impacts.	
Brief: Regular communication between the health workforce and local communities is required for building institutional and community resilience to disaster and emergency situations. Engage local governments, civil societies, Non-Governmental Organizations (NGOs), local leaders, Community Based Organizations (CBOs), Self-Help Groups (SHGs) and other local stakeholders to reduce vulnerability and increase capacities of vulnerable groups and communities to cope with extreme weather events or disasters and minimize harm.		
Sub Activities		Frequency
4.1 Identify SHGs and local leaders within the catchment and prepare community awareness plans for making health care facilities environmentally sustainable.		Annually
4.2 Monitor health actions undertaken by key stakeholders through prevention and education programmes in communities		Quarterly
Facility Typology		
Primary	Secondary	Tertiary
✓	✓	✓

This action is derived from Table 4.1.1 A (2), Table 4.1.1 B (1) & Table 4.4.1 A (1)

HEALTH WORKFORCE

5	Conduct post disaster employee recovery assistance program.		
Brief: Post- Disaster Employee Recovery Assistance Program is much needed for the health workers working in emergency situations. Facilities can initiate interactive programs with the help of trained counsellors for the mental well-being of health staff. Refer Box 5 for methodological guide to recovery planning process.			
Sub Activities			Frequency
5.1 Train health workforce to detect post- traumatic stress disorder among staff to take prompt action.			Quarterly
5.2 Establish a multi-disciplinary support team for staff, families of staff and patients to support during emergency and disaster situations			One time
Facility Typology			
Primary		Secondary	Tertiary
✓		✓	✓

This action is derived from Table 4.1.1 A (6), (7) & Table 4.1.1 B (11).

Box 5 Methodological guide to recovery planning process, UNDP, 2011

Source: (Methodological guide for post disaster recovery, 2011)

During the event of disaster, the Health care workers (HCW) being at the first line of response, may witness the unrelenting influx of patients, high number of deaths and their grieving family members, endless hours of work, helplessness over lack of resources and mounting fear of contracting the infections to themselves and their family members. As they try to cope with the enormity of the disaster, each of these work conditions are breeding a high risk of experiencing immense psychological distress, burnout, stress, anxieties, and sometimes even a mental health disorder if the stress continues for long, remains unaddressed. This ready reckoner acknowledges the need for recovery program for healthcare workers for their mental well-being.

6

Train health workforce and community outreach workers to address climate risks to health during a disaster or emergency crises and to make the health facility climate resilient and environmentally sustainable.

Brief:

Capacity building is an ongoing process that equips officials, stakeholders, and the community to perform their functions in a better manner during a crisis/disaster. It focuses on furthering a facilities' ability to do new things and improve what they already do.

HEALTH WORKFORCE**Sub Activities****Frequency**

6.1 Train health workforce to:

- Establishing the link between climate change and extreme weather with their associated diseases/vulnerabilities and increasing their awareness on the impacts of sustainable practices and the importance of climate-related disease surveillance.
- Areas of increased clinical demand following a climate related event or outbreak to ensure adequate staff capacity and competency.
- Safe water management, water quality controls, conservation and recycling, safe sanitation, environmentally sustainable interventions for infection prevention and control and limiting antimicrobial resistance in wastewater in both routine and emergency/disaster situations.

Quarterly

• Segregation, processing and management of hazardous and non-hazardous waste, waste stream constituent and health hazards related to pharmaceutical waste, waste conservation and recycling. • Protocols for use of chemicals, environmental impacts of chemicals, awareness on chemicals of concern, safety of persons handling chemicals on a regular basis, and best practices for safe chemical management within health care facility in both routine and emergency/disaster situations. • Early warning systems, setting up a robust disaster management and risk-reduction plan, contingency plan, evacuation plan, water and energy management. • Conducting mock drills, simulation exercises on preparing and responding to any form of disaster. • Community participatory approaches for mitigation of climate induced risks. • Creation and handholding of the Community Disaster Planning Committee. • Occupational safety and health, usage of PPEs while working and ensuring operational sufficiency of the health facility. • Maintaining safety of electrical power supply to prevent hazards and use of alternate source (such as generators) in both routine and emergency/ disaster situations. • Benefits associated with the correct equipment and systems operation to save energy.	Quarterly
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• Linking childhood development and social outcomes to nutrition and avoidance of stunting and impaired neurological development due to climate change impacts on water supply, food production and infectious diseases. • Scheduling outdoor work for cooler parts of the day and reducing physical demands during hot days. • Respond to new infectious threats emerging from climate related events. • To detect health workforce to detect post-traumatic stress disorder among staff to take prompt action	Quarterly	
Facility Typology		
Primary	Secondary	Tertiary
✓	✓	✓

This action is derived from Table 4.1.1 B (3), (7), (8), (9), (12), (13), (15), (16), (17), (19), (20), (21), Table 4.1.1 C (1), (2), (4), (7), (10), Table 4.1.2 A (4), (5), (7), Table 4.1.2 B (1), (2), (3), (5), (6), Table 4.1.2. C (5), Table 4.2.2 A (3), Table 4.3.2 A (2), Table 4.4.1 B (8) & Table 4.4.1 C (11).

HEALTH WORKFORCE

7	Organize Information Education Communication (IEC) sessions (audio/ visual) and awareness camps to increase community awareness to climate resilience and environmental sustainability in the context of healthcare facilities.	
Brief: Community awareness plays a crucial role in prevention and early execution of disaster management in the initial few hours of the disaster and hence every effort should be taken to make the local community aware of the probable disasters and essential preparedness and management of the same. Community awareness, and preparedness for prudently responding to common disasters requires active IEC and communication which can be anchored by health care workers. Refer Box 6 for case study.		
Sub Activities		Frequency
7.1 Spread awareness among patients, visitors and community on risk from climate related hazards and effective health protection measures.		Quarterly
7.2 Increase community awareness about: • Water conservation, • Safe management of wastewater to combat antimicrobial resistance, • Recycling non-hazardous waste, • Environmental impact of improper disposal of pharmaceuticals, • Reducing energy use.		
Facility Typology		
Primary	Secondary	Tertiary
✓	✓	✓

This action is derived from Table 4.1.1 C (3), (8), Table 4.1.2 C (1), (2), (3), (4) & Table 4.3.2 C (1).

Box 6 Case Study on the Shasthya Shebika community health worker (CHW) in Bangladesh, 2014

Community-based programming with CHWs has been widespread in Bangladesh, especially through the national implementation of Bangladesh's well-known and highly successful national family program which reached out to 110 million people. The Shasthya Shebika (SS) Program is rooted in a gendered perspective, focusing on the need for female health workers in Bangladesh to address socio-cultural barriers to access to health care services. In 2014 there were about 100,000 SS.

The role of SS is to hold monthly household visits, provide health promotion sessions and educate families on nutrition, safe delivery, FP, immunizations, hygiene, and water and sanitation. They also use this time to sell health products, such as basic medicine, sanitary napkins, and soap which is supported by government. The SS are engaged through a formal national framework where in they are provided financial incentives and have had an important contribution to Bangladesh's remarkable progress in reducing under-5 mortality and to its national TB control program.

Source: (Case Studies of Large-Scale Community Health programs, 2014)



Photograph: WHO/Bangladesh /Tatiana Almeida, 2017 @WHO SEARO

WATER, SANITATION, HYGIENE AND HEALTH CARE WASTE	8	Assess and map climate change risks (current as well as historic) to healthcare facility with respect to water and sanitation and waste management systems using participatory tools with the community in the catchment area.	
	Brief: The health care facility should be last in line to face the disruption in its operation due to extreme climate events. Assessing and mapping climate related risks will enable health care workers to prepare and build institutional capacity to respond to the extreme situation, making health care facilities climate Resilient. This assessment can be initiated using participatory tools in collaboration with community representatives and other health workers. The steps will involve mapping of catchment area of the health care facility, developing a historic time of climate related events and risk mapping and priority mapping. Refer suggested tools in Box 7,8,9 & 10 to implement this action.		
	Frequency		
	One time		
	Facility Typology		
	Primary	Secondary	Tertiary
	✓	✓	✓

This action is derived from Table 4.2.1 A (7) & Table 4.2.1 B (17), (20), (21)

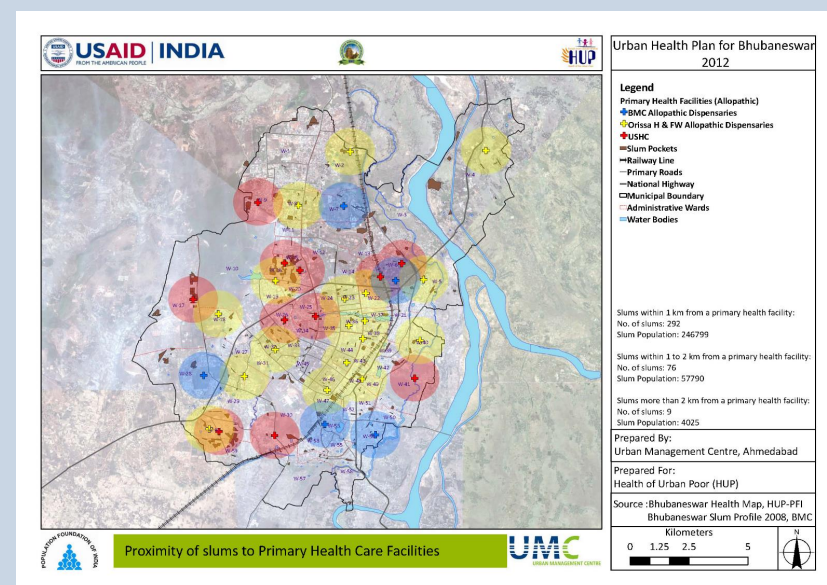
Box 7 Tool for developing health care facility catchment map

The goal of the exercise is to develop a catchment map of a health care facility along with the ecological setting around it in terms of population outreach, resources it is dependent on and impacts of its operation in the surrounding catchment.

This activity can be done in participation with community outreach workers, community, facility management, local or government stakeholders. The representatives from health care facility will convene this exercise and probe participants to deliberate within the group and identify the following:

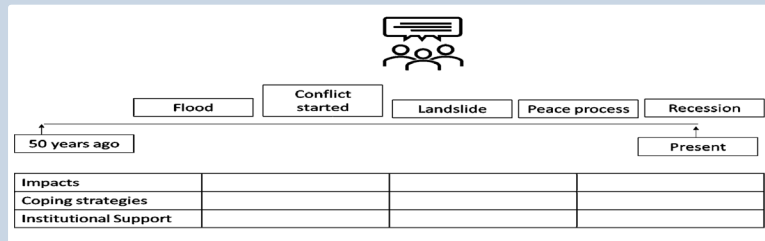
- On a sheet of paper, locate the health care facility along with surrounding facilities to help establish any interdependency.
- Mark the surrounding resources such as access roads, waterbodies, energy supplies, houses, commercials activities, schools etc. which will help in understanding the surrounding area, its geographical context and its dependency on the health care facility.
- Mark the cluster of population dependent on the services of the health care facility.

Figure 15 Catchment Map of Health Facilities, Bhubaneswar Urban Health Plan, 2012 (Developed by Urban Management Centre)



Box 8 Tool for developing timeline of climate risks for the health facility catchment using participatory approach

Based on the catchment map developed for a health care facility, the facility management may further convene a participatory exercise on assessing the climate vulnerabilities to the facility. To start with, a timeline of climate related events may be mapped through a consultative process. The following timeline tool will help map the major events, its impacts and help arrive future strategies.



Source: (Building Climate Resilience: A training manual for community based climate change adaptation, 2014)

Box 9 Tool for climate vulnerability and risk assessment for a health care facility

Based on the climate vulnerabilities identified in the timeline mapping, the group through a consultative process will then develop a matrix for climate vulnerability and risk assessment for a health care facility into low, medium & high.

Climate Vulnerabilities	High	Medium	Low
Flood	✓		
Drought			✓
Cyclone			✓
Storm	✓		
Rise in Seal level			✓
Heat waves	✓		
Extreme Cold		✓	

Source: (Building Climate Resilience: A training manual for community based climate change adaptation, 2014)

Box 10 Tool for Climate risk priority mapping for a health care facility

Once the climate vulnerability assessment is done, a ranking tool may be used through the similar consultative process. This tool will help in prioritizing climate risks in a local context.

Climate Risks	Flood	Drought	Cyclone	Storm	Sea level rise	Heat waves	Extreme Cold	Ranking
Flood		Drought	Cyclone	Flood	Storm	Heat waves	Extreme Cold	1
Drought			Flood	Cyclone	Cyclone	Drought		3
Cyclone				Sea level rise	Flood			2
Storm					Flood			4
Seal level rise								4
Heat waves								6
Extreme Cold								5

Source: (Building Climate Resilience: A training manual for community based climate change adaptation, 2014)

WATER, SANITATION, HYGIENE AND HEALTH CARE WASTE

9	Develop Climate Resilient Water Management plan of a health care facility.		
Brief: Much of the health care delivery in developing countries still takes place in settings with inadequate or non-existent municipal water supply or water and wastewater treatment facilities, and in drought-prone areas made worse by climate change. Health care facilities need sufficient quantities of water to provide quality health care services for maintaining hygiene and cleanliness, drinking and cooking, showering, and bathing, and a variety of general and specialized medical procedures. Refer Box 11 for WHO standards on Water in Health care facility.			
Sub Activities			Frequency
9.1 Plan access to water supply within the premises either through local government support or by constructing on-site water source such as Borewell (Ground water).			One time
9.2 Plan water storage with covered openings adequate to suffice for at least 3 days, at a location not susceptible to flooding or becoming mosquito breeding sites.			
9.3 Develop a long-term drought management plan including identification of alternative safe water sources.			
Facility Typology			
Primary		Secondary	Tertiary
✓		✓	✓

This action is derived from Table 4.2.1 B (1), (3), (6), (8), (9), (11), (14).

Box 11 WHO standards on water for a health care facility

Item	Recommendation	Explanation
Water quantity	5–400 liters/person/day.	Outpatient services require less water, while operating theatres and delivery rooms require more water. The upper limit is for viral hemorrhagic fever (e.g., Ebola) isolation centers.
Water access	On-site supplies.	Water should be available within all treatment wards and in waiting areas.
Water quality	Less than 1 Escherichia coli/ thermotolerant total coliforms per 100 ml. Presence of residual disinfectant. Water safety plans in place.	Drinking-water should comply with WHO Guidelines for Drinking water Quality for microbial, chemical and physical aspects. Facilities should adopt a risk management approach to ensure drinking water is safe.

Source: (WHO standards on water in health care facilities , 2008)

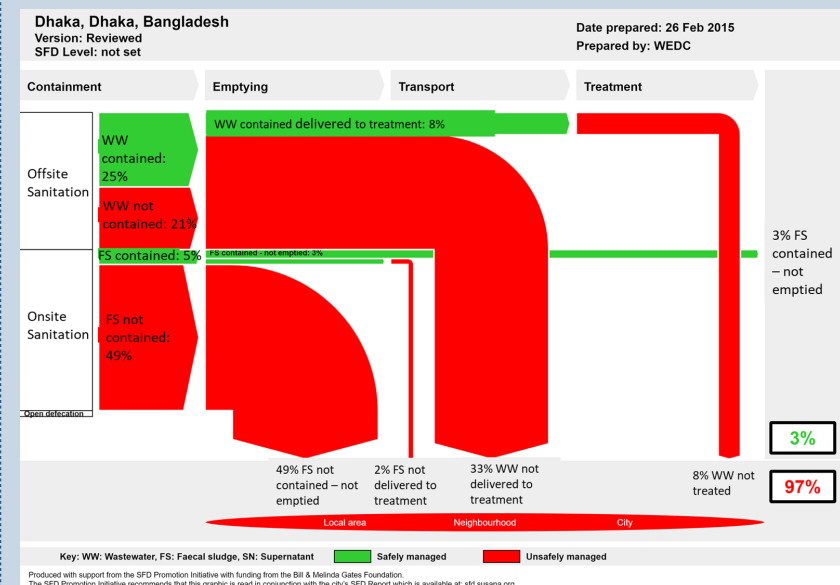
WATER, SANITATION, HYGIENE AND HEALTH CARE WASTE

10	Develop Climate Resilient Sanitation management plan of a health care facility.	
Brief: Basic sanitation in health care facilities is fundamental to providing quality care and for ensuring that primary health commitments are achieved. The lack of adequate sanitation increases the spread of health care-acquired enteric infections and contributes to disease as well as antibiotic resistance. Sanitation is key to preventing infections critical for outbreak control and other epidemic diseases such as cholera. Failure to provide good sanitation services may lead health care facilities to become the loci of infections in outbreaks. Managing sanitation appropriately will also improve health outcomes at the community level. Refer Box 12 for Shit Flow Diagram Tool (SFD Tool).		
Sub Activities		Frequency
10.1 Design sanitation systems that are resistant to climate hazards and able to operate under a range of climate conditions, ensuring that failure in one part of the service chain does not cause the entire service to fail.		One time
10.2 Wastewater is safely managed through use of on-site treatment (such as septic tank followed by drainage pit) or sent to a functioning sewer system.		
10.3 Plan safe disposal of hazardous wastewater and liquid waste into the sanitation system through pre-treatment (such as oils and fats, corrosive waste and other wastes, depending on the level of concentration).		
Facility Typology		
Primary	Secondary	Tertiary
✓	✓	✓

This action is derived from Table 4.2.1 C (4), (12) & Table 4.2.2 C (6), (7).

Box 12 Shit Flow Diagram Tool (SFD Tool)

An excreta flow diagram (or shit flow diagram, SFD) is a tool to readily understand and communicate how excreta 'flow' through a city or town. It shows how all excreta generated in a city is or is not contained as it moves from defecation to disposal or end-use. SFDs are a useful tool to inform urban sanitation programming, by visualizing the status of urban sanitation services in terms of the fate of excreta. A similar diagram at the facility level may be generated by adopting the principle of SFD to ensure that all the waste is safely captured, contained, transferred/transported and treated.



How to Make an SFD : <https://sfd.susana.org/knowledge/how-to-make-a-sfd>

SFD Manual: <https://sfd.susana.org/knowledge/the-sfd-manual>

WATER, SANITATION, HYGIENE AND HEALTH CARE WASTE

11	Develop Climate Resilient waste management plan for a health care facility.	
Brief: Over half of the world’s population is estimated to be at risk from environmental, occupational or public health threats resulting from improperly treated health care waste. Improper health care waste management can occur for several reasons, such as lack of awareness about the health hazards related to health care waste, inadequate training in proper waste management, lack of infrastructure or energy, lack of appropriate regulations or enforcement of existing regulations. Segregation of waste into appropriate categories thus remains a simpler method to manage waste. Refer Box 13 for categories of health-care waste. Refer Box 14 for template of waste generation register to be maintained at the health care facility.		
Sub Activities		Frequency
11.1 Categorize waste for segregation, place bins for each category and label containers/bags for identification. The categories may include infectious waste, sharps, chemicals, pharmaceuticals, non-hazardous wastes, and place bins for each category at points of generation. Refer Figure below on classification of waste for segregation.		One time
11.2 Collect waste as per above categorisation in to properly labelled bags (color coded) and packaged to avoid spills or human contact with chemical waste & radioactive waste.		Regularly

11.3 Construct storage areas for storing extra waste generated through higher demands on health care facilities like in outbreaks, epidemics, pandemics, or climate related events and safely transport (including health care facility hazardous waste) from the point of generation to the storage.	One time	
11.4 Process non-hazardous waste on site to the extent possible.	Daily	
11.5 Partner with local recyclers or hand it over to municipal waste collection system.	One time	
11.6 Monitor daily waste generation, collection, storage, treatment/processing, disposal and/or handling over to local authorities. Refer Box 14 for guidance in this reference.	Regularly	
11.7 Train all the staff and visitors to minimize waste generation.		
11.8 Eliminate use of plastic within the facility such as bottled water, packaging, eating cutleries.		
Facility Typology		
Primary	Secondary	Tertiary
✓	✓	✓

This action is derived from Table 4.2.1 B (22), Table 4.2.1 C (9), (11) & Table 4.2.2 A (4), (5), Table 4.2.2 B (6), (7), (9), (12), (13), (14).

Box 13 Categories of health-care waste, WHO

Waste category	Descriptions and examples
Hazardous health-care waste	
Sharp waste	Used or unused sharps (e.g., hypodermic, intravenous or other needles; auto-disable syringes; syringes with attached needles; infusion sets; scalpels; pipettes; knives; blades; broken glass)
Infectious waste	Waste suspected to contain pathogens and that poses a risk of disease transmission (see section 2.1.2) (e.g., waste contaminated with blood and other body fluids; laboratory cultures and microbiological stocks; waste including excreta and other materials that have been in contact with patients infected with highly infectious diseases in isolation wards)
Pathological waste	Human tissues, organs or fluids; body parts; fetuses; unused blood products
Pharmaceutical waste	Pharmaceuticals that are expired or no longer needed; items contaminated by or containing pharmaceuticals
Cytotoxic waste	Cytotoxic waste containing substances with genotoxic properties (e.g., waste containing cytostatic drugs – often used in cancer therapy; genotoxic chemicals)

Waste category	Descriptions and examples
Hazardous health-care waste	
Chemical waste	Waste containing chemical substances (e.g., laboratory reagents; film developer; disinfectants that are expired or no longer needed; solvents; waste with high content of heavy metals, e.g., batteries; broken thermometers and blood-pressure gauges)
Radioactive waste	Waste containing radioactive substances (e.g., unused liquids from radiotherapy or laboratory research; contaminated glassware, packages or absorbent paper; urine and excreta from patients treated or tested with unsealed radionuclides; sealed sources)
Non-Hazardous health-care waste	
Non-hazardous or general health-care waste	Waste that does not pose any particular biological, chemical, radioactive or physical hazard

Source: (Safe management of wastes from health-care activities, 2014)

Box 14 Template of a waste generation register to be maintained in a healthcare facility.

Name of Healthcare facility:												Week:					
Waste collection point: Department /Location	Waste Category (Add waste category as shown in Box above)	Quantity of waste generated per day (Weight & Volume)															
		Monday		Tuesday		Wednesday		Thursday		Friday		Saturday		Sunday			
		kg	litre	kg	litre	kg	litre	kg	litre	kg	litre	kg	litre	kg	litre		

Source: (Safe management of wastes from health-care activities, 2014)

DID YOU KNOW?

Of the total amount of waste generated by health-care activities, about 85% is general, non-hazardous waste and only 15% of the remaining waste is hazardous material that may be infectious, toxic, or radioactive.

High-income countries generate on average up to 0.5 kg of hazardous waste per hospital bed per day, while low-income countries generate on average 0.2 kg. However, health-care waste is often not separated into hazardous or non-hazardous wastes in low-income countries making the real quantity of hazardous waste much higher.

Source: (WHO-Factsheet - Health Care Waste, 2018)

12

Prepare a monitoring mechanism for regular operation and maintenance (O&M) of water, sanitation, and waste management for the health care facility.

Brief:

Maintenance of WASH infrastructure within the facility will ensure that the service is up to date with little or no disruption to daily operations in the health care facility along with ascertaining preparedness for climate extreme events.

Sub Activities		Frequency
12.1 Develop a monitoring mechanism to verify compliance with national standards, including the operation and maintenance of water and sanitation facilities.		One time
12.2 Measure where and how water is used, and areas of potential savings and reuse examined in both routine and emergency/disaster situations.		
12.3 Ration water usage in non-critical functions in case of water supply interruptions during and post extreme weather event.		
12.4 Prepare and display contact details of local government/public health department representatives responsible for O&M of WASH infrastructure.		
Facility Typology		
Primary	Secondary	Tertiary
✓	✓	✓

This action is derived from Table 4.2.1 A (3), (6) & Table 4.2.2 A (1).

WATER, SANITATION, HYGIENE AND HEALTH CARE WASTE	13	Regularly check elements of water and sanitation supply and distribution systems for any deterioration, leaks, and contamination.
	Brief: Maintenance of WASH infrastructure within the facility will ensure that the service is up to date with little or no disruption to daily operations in the health care facility along with ascertaining preparedness for climate extreme events. Regular O&M will also reduce the maintenance cost of the facility and increase its operational life.	
	Sub Activities	Frequency
	13.1 Prepare a layout plan for water supply and sanitation distribution systems.	One time
	13.2 Conduct a regular check as per the checklist given in Box 15.	
	13.3 Procure pumps in advance of flood season and deploy in case of sewer overflows within the facility.	
	13.4 Install non-return valves (NRVs) in the water and wastewater distribution system to prevent back flows.	
	13.5 Anchor plastic water storage tanks against strong winds.	Regularly
	13.6 Desludge septic tanks regularly and prior to every monsoon/rainy season.	

Facility Typology		
Primary	Secondary	Tertiary
✓	✓	✓

This action is derived from Table 4.2.1 A (1), (2), (8) & Table 4.2.1 B (10), (15), (19), (20).

Box 15 Health facility inspection checklist for reference

Health facility Inspection Checklist			
Name of Inspector:		Date of Inspection:	
S. No.	Inspection Items- for signs of deterioration, leaks, or other issues	Approved	Not Approved
1	Water storage tanks		
2	Covers of the storage tanks		
3	Main/Distribution water supply pipes		
4	Valves and joints of water supply distributions		
5	Fittings and faucets at various points and locations		

Health facility Inspection Checklist			
Name of Inspector:		Date of Inspection:	
S. No.	Inspection Items- for signs of deterioration, leaks, or other issues	Approved	Not Approved
6	Pump sets		
7	Sewer carrying piped network		
8	Wastewater outlets, Maintenance holes Inspection/Sewage chamber/Inspection chamber		
9	Septic tanks with intact covers		
10	Sewer connection		
11	Vents on sewers and septic tanks are above expected flood lines'		

Health facility Inspection Checklist			
Name of Inspector:		Date of Inspection:	
S. No.	Inspection Items- for signs of deterioration, leaks, or other issues	Approved	Not Approved
12	Water treatment filters and tanks		
13	Wastewater treatment systems		
14	Rainwater harvesting systems (for chokes)		
15	Infiltration wells cleaned up (for blockages)		
Notes:			
Suggested Actions for Repairs:			
a.			
b.			
c.			
d.			

WATER, SANITATION, HYGIENE AND HEALTH CARE WASTE

14	Develop climate-resilient water safety plan.	
Brief: Much of the health care delivery in developing countries still takes place in settings with inadequate or non-existent water supply or water and wastewater treatment facilities, and in drought-prone areas made worse by climate change. Health care facilities need sufficient quantities of safe water to provide quality health care services. Apart from drinking, cooking, cleaning and hygiene requirements, a health care facility needs water to suit a variety of general and specialized medical procedures such as dialysis that would require higher quality standards than would be expected from a public water supply. Safe water availability is essential to health care in terms of reducing risks of infection spread and maintaining quality of water becomes crucial in climate events/disasters. Refer Box 16 for key steps involved in developing a water safety plan and refer Box 17 for case study on water safety plan.		
Sub Activities		Frequency
14.1 Develop a climate resilient water safety plan to ensure that water is not contaminated during storage, distribution and handling and water quality is monitored regularly, and to ensure effective and timely delivery of safe water, especially during emergencies.		One time
14.2 Develop a disaster response and recovery plan for the water system and ensure adequate supply of chlorine, filters or other water treatment technology, rapid water testing kit, etc.		
14.3 Supply appropriate water quality for medical activities as well as for vulnerable patients (certain procedures should meet strict criteria and additional treatment or source, concerning microbial and chemical		

contaminants, including cyanobacterial toxins, and chlorine and aluminium which are commonly used in drinking water treatment).		
14.4 Treat drinking water with a residual disinfectant to ensure microbial safety up to the point of consumption or use, especially after a flood related disaster.		Daily
Facility Typology		
Primary	Secondary	Tertiary
✓	✓	✓

This action is derived from Table 4.2.1 A (4), (5), Table 4.2.1 B (7), (13) & Table 4.2.1 C (1), (5), (6), (8).

Box 16 Overview of the key steps in developing a water safety plan (WSP)

Planning for safe water supply in sufficient quantity in the long term needs to be set in the context of growing external uncertainties arising from changes in the climate and environment. The Water Safety Planning (WSP) offers a framework to manage these risks by considering the implications of climate variability and change at various points in the WSP process. The key considerations aligned with the WSP approach are as follows:

1. Document and describe the system
2. Undertake a hazard assessment and risk characterization to identify and understand how hazards can enter into the water supply
3. Assess the existing or proposed system (including a description of the system and a flow diagram)
4. Identify control measures—the means by which risks may be controlled
5. Define monitoring of control measures— what limits define acceptable performance and how these are monitored
6. Establish procedures to verify that the water safety plan is working effectively and will meet the health-based targets.

7. Develop supporting programmes (e.g., training, hygiene practices, standard operating procedures, research and development, etc.)
8. Prepare management procedures (including corrective actions) for normal and incident conditions
9. Establish documentation and communication procedures

The above approach for WSP planning can be adapted at the facility level to have climate resilient water safety plan.

Source: (Water safety plans)

Box 17 Case Study: Water safety plans (WSP) to manage risks in Nepal

Nepal, generally faces climate extreme events in from increased precipitation intensity and variability, decreased water flows, and increased temperature variability impacting the availability and quality of water supply. This results in increase in pathogen release, turbidity, chemicals and nutrient loads from catchment areas, and floods are causing short-term contamination in surface water sources that is often beyond the control of treatment capacity of treatment plant.

To address above challenges, a climate change perspective was integrated in the WSP which included climatic hazard identification and risk assessment like heavy rain, floods and drought, and control measures that are sensitive to climate change.

Nepal demonstrated climate resilient WSP pilot in Barchour Ranipani (Tanahu) which initially had the usual control measure of a diversion channel above the intake to protect against contamination of the source water through the upstream irrigation channel during the rainy season. However, considering the risks of landslides and floods related to extreme weather conditions, the critical part of the open channel has now been replaced by a pipeline and has therefore been made more climate resilient. This pilot provided an effective framework for considering and addressing risks to water supply systems brought about by climate change. The existing national WSP implementation guidelines and associated training manuals for both urban and rural systems have been revised to accommodate climate change issues and Nepal has replaced existing guidelines with climate resilient WSP.

Source: (WHO, Climate-resilient water safety plans, 2017)

Climate Resilient Water Safety Plans Guideline

Rural Water Supply System

October 2017



Government of Nepal
Ministry of Water Supply & Sanitation
Department of Water Supply & Sanitation
Puripokhari, Kathmandu, Nepal

WATER, SANITATION, HYGIENE AND HEALTH CARE WASTE	15	Ensure sustainable and reliable water availability within the facility.
	Brief: Health care facilities are required to take effective measures to withstand the impacts of increasing extreme weather events and other climate-related hazards such as increasing precipitation over long periods of time (causing increased flooding), intense but short-lived rainfall (causing flash flooding), decreasing precipitation and droughts. Health care facilities need to develop and ensure long-term water availability based on reliable and sustainable water sources. Refer Box 18 for case study.	
	Sub Activities	Frequency
	15.1 Draft a water conservation policy covering efficient use and reuse of water.	One time
	15.2 Implement treated wastewater reuse water for non-human consumption purposes (flush toilets, clean outdoor pavement areas, water plants when possible).	
	15.3 Implement rainwater harvesting including storage for reuse or ground water recharge to ensure water access during extreme climate events.	
	15.4 Train staff on water conservation measures including washing utensils immediately after use and on how and when to deliver water messaging.	Regularly
	15.5 Increased patient and visitor awareness about water conservation including signs and notices in patient rooms and visitor restrooms.	
	15.6 Storm water safely managed and natural flood water infiltration to be put in place to reduce the risk of facility flooding.	One time

Facility Typology		
Primary	Secondary	Tertiary
✓	✓	✓

This action is derived from Table 4.2.1 B (2), (12), (16), Table 4.2.1 C (1), (2), (7), Table 4.2.2 A (2), Table 4.2.2 B (1), (2), (4) & Table 4.2.2 C (1), (2).

Box 18 Case study on rainwater harvesting at District Six Clinic, Cape Town, South Africa

The new District Six Clinic was built in 2018 for the Western Cape Department of Health. The clinic is situated in the intense drought area of Cape town, South Africa. Only source of the water for the clinic was municipal water. Hence, to reduce the dependency on municipal water and to build water resilience in order to maintain clinical operation amidst an intense drought, the clinic was fitted with a rainwater harvesting system.

Not only the quantity of rainwater but quality of harvested rainwater was considered as it is very essential for health care facility. For this purpose, a two-tier filtering system was installed. 1. Rooftop Filtering - At the collection point to the downpipes, inside the gutters, is an external siphoning filter, preventing leaves from entering the system. 2. Centrifugal filtering - At the assembly of the downpipes, prior to entering the reservoir tanks is a mechanical centrifugal filter. This flushes all remaining debris down the storm-water system and allows clean water to the tanks.

Rain harvesting translates an average of 4.1-millimetre rainfall into 1 kilolitre of usable water. Using average rainfall statistics of 700mm per year, the facility is harvesting approximately 175 cubic meter water per year. As a result of the rainwater harvesting, harvested water contributed to 21% of the facility's total water consumption.

Source: (Global Green and Healthy Hospitals & Health Care without Harm)

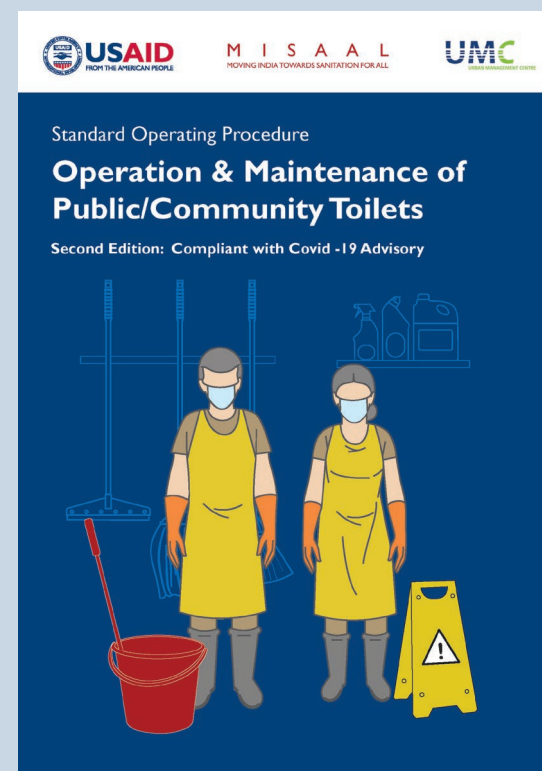
WATER, SANITATION, HYGIENE AND HEALTH CARE WASTE

16	Develop Standard operating procedure for operation and maintenance of sanitation facility to improve its environmental sustainability.		
Brief: The biggest determinant to ensure the sanitation facilities are usable is through the level of cleanliness which will enable its sustained use and infection control in a health care facility. Cleaning of a facility is a regular operational process for ensuring functionality/ usability and quality of health service delivery. Typically, health care facility management appoint staff and often assume that the staff is aware of the standard toilet cleaning process. It is not the case mostly. Every health care facility must develop standard operating protocols to ensure cleanliness and safety of sanitation facilities. Refer Box 19 for SOP on operation & maintenance of sanitation facility.			
Sub Activities			Frequency
16.1 Procure and use environment friendly cleaning materials and wherever necessary label cleaning products that contain hazardous chemicals such as those found in some soaps, disinfectants and pesticides following the Globally Harmonized Classification System.			Regularly
16.2 Provide appropriate PPEs, cleaning equipment's and agents to the cleaners and train them to use it effectively.			
16.3 Planned schedule for emptying latrines in advance of flood seasons to avoid overflows.			Annually
Facility Typology			
Primary	Secondary	Tertiary	
✓	✓	✓	

This action is derived from Table 4.2.1 B (18) & Table 4.2.2 B (10).

Box 19 Standard Operating Procedure (SOP) for O&M of sanitation facility

The standard operating procedure (SOP) for operation & maintenance of Public/Community Toilet details out step by step procedure for cleaning and maintaining a sanitation facility. Along with the procedure it also details out maintenance activities, do's and don'ts and list of supplies and equipment for the caretakers and cleaners of the facilities. The health care facilities are required to develop their own SOPs for upkeep and maintenance of the sanitation facility to ensure they are always usable.



Source: (Standard Operating Procedure - Operation & Maintenance of Public/Community Toilets (Second Edition), 2020)

WATER, SANITATION, HYGIENE AND HEALTH CARE WASTE

17	Develop safe chemical management within the health care facility.		
Brief: Chemicals are ubiquitous in health care facilities and used for unique purposes, such as in chemotherapy to treat cancer, or as disinfectants for cleaning and sterilization. By addressing chemicals in use, potential exposure and related environmental and health risks in health care facilities have an opportunity to significantly reduce global GHG emissions. Health care facilities can not only protect patient and worker health and the health of surrounding communities, but also actively help demonstrate management of chemicals.			
Sub Activities			Frequency
17.1 Develop facility level SOPs for • Safe handling of chemical waste. • Safe handling of low-level radioactive waste. • Safe handling of health care waste. • Safe handling of mercury spills and mercury contaminated waste and substitute mercury-containing medical devices (such as thermometers, blood pressure measuring etc.) by procuring affordable non-mercury containing devices.			One time
17.2 Phase out incineration and use a variety of non-burn technologies (such as autoclaving) to safely disinfect, neutralize or contain hazardous waste.			
17.3 Build waste pits within the facility to withstand load during climate events and emergencies.			
Facility Typology			
Primary	Secondary	Tertiary	
✓	✓	✓	

This action is derived from Table 4.2.1 C (10) & Table 4.2.2 B (8), (11), (13).

Box 20 Examples of practices that encourage waste minimization

The preferred management solution is quite simply not to produce the waste, by avoiding wasteful ways of working. To achieve lasting waste reduction (or minimization), the focus should be on working with medical staff to change clinical practices to ones that use less materials. Although waste minimization is most commonly applied at the point of its generation, health-care managers can also take measures to reduce the production of waste through adapting their purchasing and stock control strategies. Examples of policies and practices found to minimize quantities of waste are summarized below:

Source reduction

- Purchasing reductions: selecting supplies that are less wasteful where smaller quantities can be used, or that produce a less hazardous waste product.
- Use of physical rather than chemical cleaning methods (e.g., steam disinfection instead of chemical disinfection).
- Prevention of wastage of products (e.g., in nursing and cleaning activities).

Management and control measures at hospital level

- Centralized purchasing of hazardous chemicals.
- Monitor the use of chemicals within the health center from delivery to disposal as per the chemical management protocols.

Stock management of chemical and pharmaceutical products

- More frequent ordering of relatively small quantities of these products rather than large amounts at one time, to reduce the quantities used (applicable to unstable products).
- Use of the oldest batch of a product first.
- Use of all the contents of each container.
- Checking of the expiry date of all products at the time of delivery, and refusal to accept short-dated items from a supplier.

Source: (WHO, Safe management of wastes from health-care activities, 2014)



WATER, SANITATION, HYGIENE AND HEALTH CARE WASTE

18	Ensure access to hygiene and hand washing in a health care facility.	
Brief: Practicing hand hygiene can prevent the spread of germs, including those that are resistant to antibiotics. It is important for health workers, patients, and visitors to practice hand hygiene for infection prevention and control. Health care facilities must ensure that hand hygiene facilities are made available at different points of care during outbreaks, epidemics, and pandemics. Menstrual hygiene is also an essential aspect and health care facilities must ensure adequate provisions to encourage Menstrual Hygiene Management (MHM) access in their health workers, visitors and patients.		
Sub Activities		Frequency
18.1 Provide handwashing facility (with water and soap) within 5 meters distance to toilets, at the entry and exit of the facility, at different points of care and other places such as in cafeterias, visitor's area, etc.		One time
18.2 Install hand sanitizer (alcohol base rubs) dispensers at entry & exit points and at points of large public inflow.		Regularly
18.3 Provide adequate menstrual hygiene products and disposal mechanisms within the facility.		
18.4 Reinforce awareness messaging around hand hygiene and menstrual hygiene, at appropriate places, within the facility.		As and when needed
Facility Typology		
Primary	Secondary	Tertiary
✓	✓	✓

This action is derived from Table 4.2.2 C (4), (5).

ENERGY

19	Develop an energy management plan of a health care facility.
Brief: Health care facility must capture information of energy use behaviour, overview of energy consumption and understanding of steps to move towards alternative energy sources thereby becoming climate resilient and environmentally sustainable. By developing energy management plan, facility managers will be able to assess their energy consumption, its variation in demand throughout the year and be able to map various sources of energy that the facility is dependent on. The annual assessment will enable the facility management to identify consumption patterns, actions for energy inefficiency and suitable alternatives of sustainable energy to replace traditional energy sources.	
Sub Activities	Frequency
19.1 Assess annual energy consumption by a facility from various sources such as electricity from grid and off-grid, fuel oil, liquid gas and renewable sources such as Photovoltaic (PV) cells, wind energy, hydro power energy, etc. and develop/establish: • Energy management plan to measure energy consumption. • Plans to manage intermittent energy supplies or system failure and maintenance plan to fix easily preventable energy problems. Refer Box 22 for details on suggested method to carry out the assessment.	Annually
19.2 Establish strategies to lower energy use and prioritize energy sources that are cost saving.	One time

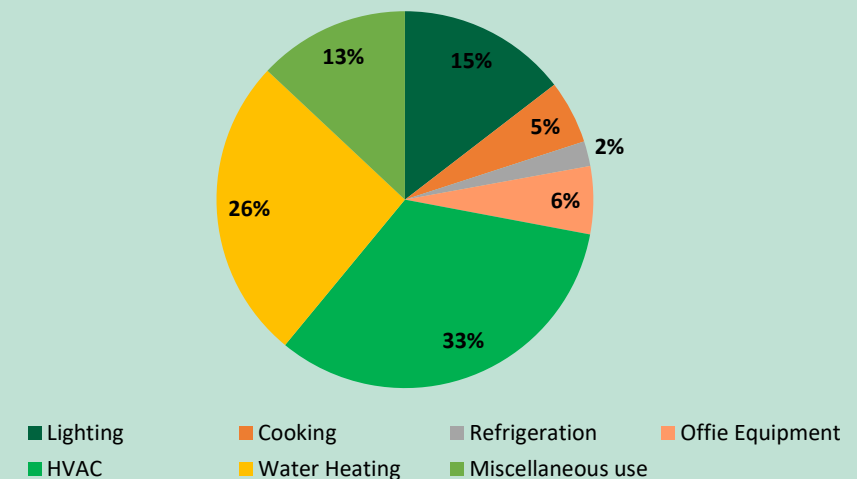
Facility Typology		
Primary	Secondary	Tertiary
✓	✓	✓

This action is derived from Table 4.3.1 A (1), Table 4.3.1 B (1), (2), Table 4.3.2 A (1), (3), Table 4.3.2 B (1), (8), (9), Table 4.3.2 C (4), (6), (7), (8), (10) & Table 4.2.2 B (1), (6), (7), (8), (9).

Box 21 Content of Energy Management Plan

1. Initiate an Energy Management Program,
2. Determine Efficiency,
3. Targets,
4. Conduct Energy Assessments,
5. Identify Energy Savings Opportunities,
6. Implement Measures,
7. Calculate Costs & Paybacks,
8. Monitor Performance

Typical Energy consumption in a health care facility



Source: (Energy Management in Healthcare facility, ICF International, 2009)

Box 22 Sample Data Collection Form

Building Location (City)	
Number of heating degree days	
Number of cooling degree days	
Building completion year	
Building Statistics	
Building Area	
Total Site Area	
Air-Conditioned area (Sq. Mt)	
Number of permanent staff	
Number of Beds	
Occupancy	
Average	
Peak	
Fuel Used	
Heating	
Cooling	
Water Heating	
Cooking	
Laundry	
Mechanical Systems	
Primary heating source	
Size of heating system	
Primary cooling source	
Size of cooling system	
Primary type of air-conditioning system	

Energy Use

Monthly energy use for last year	
Electricity - Consumption in kWh (INR/kWh)	
Demand in kW (INR/kW/month)	
Natural Gas units* (INR/unit)	
Heating Oil in gallons (INR/gallon)	
LPG Gas – Cylinders (INR/cylinder)	
Other units (INR/unit)	
TOTAL Cost	
Energy Cost	
Utility bill by Month (Indicating any time of use incentives etc.)	

Source: (Energy Management in Healthcare facility, ICF International, 2009)

DID YOU KNOW?

To reduce carbon emissions, the health facilities in Lao People's Democratic Republic have installed low-temperature incinerators with autoclaves. Two autoclaves were installed in Savannakhet District Hospital and another two in Seokong Provincial Hospital in Q2 2020. This initiative has been scaled up with the Coronavirus disease 2019 (COVID-19) response plan and funding support to over 70 district hospitals.

Source: (WHO - Feature Stories (Building climate-resilient health systems in Lao People's Democratic Republic))

ENERGY	20	Install energy saving appliances.
	Brief: Facilities can initiate the basic steps towards energy efficiency through use of energy saving appliances and simple monitoring activities to inculcate long term changes in the overall energy consumption trends. Refer Box 23 & 24 for case study.	
	Sub Activities	Frequency
	20.1 Install energy-efficient lighting (such as light emitting diode (LED)).	One Time (Until time for Replacement)
	20.2 Install smart materials and applications e.g. sensor/timer-based lighting systems for areas of facility that are not often occupied to prevent over consumption of electricity. (e.g., storage rooms, utility closets, etc.), low power electronics, and similar health care appropriate technology (such as tele medicine, remote sensing systems)	
	20.3 Install energy efficient air conditioners, refrigerators, computers and other medical equipment.	
	20.4 Install energy efficient ceiling fans.	
	20.5 Install energy efficient (as well as water saving) washing appliances such as dish washers and laundry machines, where applicable.	
	20.6 Install solar water heaters for hot water needs	
	20.7 Install solar powered lighting where possible in the health care facility.	

20.8 Procure technological devices (such as chest radiography and Magnetic Resonance Imaging machines) according to energy availability and power.		
Facility Typology		
Primary	Secondary	Tertiary
✓	✓	✓

This action is derived from Table 4.3.1 C (4), Table 4.3.2 B (2), (5), (6), (10), Table 4.4.1 B (15), Table 4.2.2 A (7), (8), Table 4.2.2 B (2), (3), (4), (10), (11), (12) & Table 4.4.2 C (6).

Box 23 Case study of Batra Hospital & Medical Research Centre, New Delhi, India

An energy assessment carried out in 1999 by Batra Hospital and Medical research centre in New Delhi, India showed that the hospital had managed to save nearly INR 12 Lakh per month in electricity bills by implementing simple energy saving methods such as:

- Installing energy efficient lighting,
- Use of boiler gas steam to heat water,
- Recovery of flue gas waste heat by installing an economizer,
- Replacing old AHU systems with new ones.

Source: (Internation Resource Group, USAID, Bureau of Energy Efficiency (BEE))

Box 24 Case study of Jehangir Hospital, Pune, India

Similarly, in 2004, the Jehangir hospital in Pune, India realised that they had saved nearly INR 47 lakh per annum in energy bills by implementing energy saving methods such as:

- Installing energy efficient ACs in the facility,
- Setting up a bio-gas plant to heat water,
- Installing solar panels,
- Installing power monitoring panels.

Source: (Internation Resource Group, USAID, Bureau of Energy Efficiency (BEE))

ENERGY

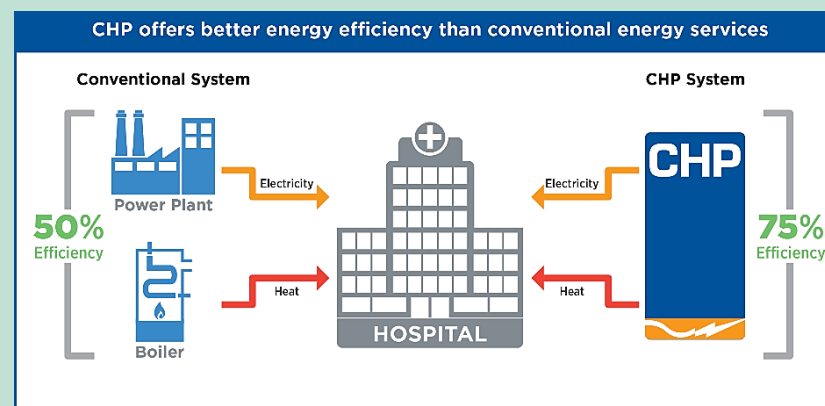
21	Enhance energy efficacy of a health care facility.	
Brief: Combined Heat and Power (CHP) systems is a superior energy resource for hospitals which can provide all of a hospital’s energy services efficiently and indefinitely during grid outages. For hospitals, losing electricity—even for short periods—can disrupt critical life support systems. When the power goes out, lives may be at risk. As weather-related events are becoming more frequent and severe, grid outages will become frequent. CHP, an onsite generation resource, can enable hospitals to continue to provide all services during grid outages. In addition to providing reliable energy and making hospitals more resilient, CHP can help hospitals reduce costs and meet their sustainability and emissions reduction goals. (CHP in Hospitals, 2021). Refer Box 25 for case study.		
Sub Activities		Frequency
21.1 Combined heat and power systems in place to obtain energy efficiency.		One time (Until time for Replacement)
21.2 Install hybrid systems (which include renewable energy, batteries and backup generators).		
Facility Typology		
Primary	Secondary	Tertiary
✓	✓	✓

This action is derived from Table 4.3.1 B (4) & Table 4.4.2 A (9).

Box 25 Case study of Montefiore Medical Centre, New York, United States.

The United States of America including New York City faced the most catastrophic grid outage, the Northeast blackout of 2003 affecting 50 million people and Hurricane Sandy in 2012 which impacted about 7.5 million people rendering them without electricity.

In 1993, Montefiore Medical Centre (MMC) was the first hospital in New York City to install a CHP system, providing it with reliable, year-round energy services, even when the electricity goes out. In 2001, MMC increased its commitment to CHP, expanding the system from 5 to 9.5 megawatts. As a result, during the catastrophic events of 2003 and 2012, MMC continued to operate with full electricity service and was the only hospital in New York City that was able to do so. The CHP system also continued to supply MMC with cooling during the heat wave at the time, further protecting patient safety. MMC notes that its investment in CHP allowed them to provide safe, reliable, resilient and environment friendly source of power through which they were able to provide uninterrupted service to its patients and community. MMC estimates that with the CHP system they are able to save over \$2 million annually in energy costs.



Source: (CHP in Hospitals, 2021)

ENERGY

22	Assess Heating, Ventilation, and Air Conditioning (HVAC) ductwork pipes, ensuring they are in good working condition without structural damage.	
Brief: All HVAC and other infrastructure equipment should be routinely monitored not only for functionality but also for structural integrity to avoid any mishap. Refer sample images shown in the Box 26 indicating observations to make during physical verification.		
Sub Activities		Frequency
22.1 Carry out physical check to ensure that the fixtures are not weakened/rusted/etc and all other physical and structural integrity is maintained.		Monthly (or any other pre-defined schedule as may be specified by local building norms)
22.2 Prepare a maintenance plan to fix easily preventable energy problems and carry out regular O&M of appliances and fixtures.		
22.3 Regularly inspect and replace old faulty electrical wiring.		Annually
22.4 Develop a maintenance plan to quickly rectify easily preventable problems.		
Facility Typology		
Primary	Secondary	Tertiary
✓	✓	✓

This action is derived from Table 4.3.1 A (5) & Table 4.3.2 B (11).

Box 26 Sample images for observations to make during physical verification.



Source: (Powering Health - Energy Management in your Health Facility)

ENERGY

23	Install emergency energy backup source to supply power to all identified critical/ essential service areas, functions, and equipment (for eventualities of power failure in any event)		
Brief: The intent of the emergency back-up units is to ensure that all critical services of a health care facility remain functional during a power failure. For this the facility should be able to prioritize areas and equipment that are important and those that are not.			
Sub Activities			Frequency
23.1 Ensure critical back-up power supplies available for lighting, communications, refrigeration, and sterilization equipment of the facility. For other possible critical services, refer Box 27.			One time (Until time for Replacement)
23.2 Convert diesel powered generators if available, to use biofuels.			
Facility Typology			
Primary		Secondary	Tertiary
✓		✓	✓

This action is derived from Table 4.3.1 A (4), (7) & Table 4.3.1. C (2), (3), (6), (7) & Table 4.4.1 C (26).

Box 27 Classification of device priority

A	B	C	D	E (B*C*D)	F
Energy-consuming Device	No. of Device	Power Device consumption (watts)	Hours used per Day	Energy consumed per Day (watt hours)	Device priority
Blood bank refrigerator	1	70	24	1,680	Important

A	B	C	D	E (B*C*D)	F
Energy-consuming Device	No. of Device	Power Device consumption (watts)	Hours used per Day	Energy consumed per Day (watt hours)	Device priority
Blood chemistry analyzer	1	50	2	100	Important
CFL bulbs, clinic (Indoor lights)	8	18	8	1,152	Important
CFL bulbs, staff quarters (Indoor lights)	5	18	4	360	Non-Critical
CFL bulbs (Outdoor lights)	4	26	8	832	Important
Clothes iron for bedding, sheets, towels, clothes, etc.	1	1,000	1	1,000	Non-Critical
Examination lamp (CFL)	1	18	4	72	Important
Laptop computer	1	35	8	280	Important
Microscope	1	30	3	90	Important
Operating table lights	2	100	3	600	Important
Phone charger	1	20	6	120	Non-Critical
Radio/cassette player	1	60	18	1,080	Non-Critical
Vaccine refrigerator/freezer	1	60	24	1,440	Critical
Total LOAD (in watt hours consumed per day)				8,806 or 8.8 kwh	
Future Loads					
Electronic centrifuge machine	1	575	2	1,150	Important

Source: (Powering Health - Energy Management in your Health Facility)

ENERGY

24	Identify a safe location of energy backup or renewable energy infrastructure that can withstand extreme weather events (such as strong winds, hail, floods) and remain functional.	
Brief: The installation and placement on site of the emergency/back up units must be done keeping in mind the weather and environment related effects of the local context to ensure that their services are not affected during emergencies. There should be a plan of action developed to address possible concerns of intermittent energy supply or system failure.		
Sub Activities		Frequency
24.1 In flood prone areas, ensure that backup energy equipment are located on high ground and are covered with waterproof roofing.		One time (Until time for Replacement)
24.2 In areas of high winds ensure that the backup energy equipment are anchored firmly to the ground.		
Facility Typology		
Primary	Secondary	Tertiary
✓	✓	✓

This action is derived from Table 4.3.1 A (6), Table 4.3.1 B (5), Table 4.3.1 C (5) & Table 4.4.1 C (25).

ENERGY

25	Periodically check functionality of backup and alternate energy sources (if any) as per manufacturer's manuals/instructions.		
Brief: The intent of the activity is to ensure that all energy generation sources, and equipment are functional and in working condition to be able to meet the needs of the facility as and when required.			
Sub Activities			Frequency
25.1 Emergency backup generators periodically checked (as per the instructions mentioned in the manufacturers' manual/ instructions, even if rarely used).			As per manufacturer's instructions
25.2 Alternate source of energy installed at facility and provided proper maintenance and repair (as per the instructions mentioned in the manufacturers' manual/ instructions, even if rarely used).			
Facility Typology			
Primary		Secondary	Tertiary
✓		✓	✓

This action is derived from Table 4.3.1 A (3) & Table 4.3.2 C (11).



ENERGY	26	Install voltage stabilizers to protect equipment from electrical damage that may be caused by voltage frequency fluctuations (when using a generator or in weather events), or voltage surges (such as due to power transmission problems in the grid).	
	Brief: With conditions of power fluctuations and intermittent energy supplies, the instances of appliances drawing in high voltages each time there is a fluctuation, increases which in turn can cause a short-circuit resulting in the appliance breaking down or even the possibility of a fire starting. To prevent this and stabilize the situation of power supply during fluctuations, it is essential to install voltage stabilizers.		
	Frequency		
	One Time (Until time for Replacement)		
	Facility Typology		
	Primary	Secondary	Tertiary
✓	✓	✓	

This action is derived from Table 4.3.1 B (6).

ENERGY	27	Assess points of greatest heat loss in buildings (such as roofs, especially flat ones) including added or upgraded insulation and draught proofing materials.
	Brief: The thermal properties of the Building envelope are very important to maintain the internal temperature requirements of the health care facility. Several countries provide regulations for maintaining maximum values of thermal transmittance or U-values for the entire building envelope, including walls, foundations, roofs and windows. To do that the activity suggests facility operators to ensure that heat losses in the building do not affect the appliances working towards maintaining ambient temperature and air quality are able to deliver as per requirement to avoid inadvertent loss from energy. Refer Box 28 & 29 for case study.	
	Sub Activities	Frequency
	27.1 Assess heat loss in a HCF using temperature-sensing equipment (IR or thermal scanning).	Annually
	27.2 Avoid heat producing equipment's inside the room keep away UPS Battery, ovens and other power systems.	
	27.3 Develop a roof management program to trace the age and condition of each roof and to schedule when to refurbish and replace. Perform annual roof inspections to detect moisture infiltration and caulking inspections to determine breaches in the building envelope.	

27.4 Detect and plug air leakages near the openings.		
Facility Typology		
Primary	Secondary	Tertiary
✓	✓	✓

This action is derived from Table 4.3.1 A (2).

Box 28 Case study on resilient passive energy, Sudan

Salam Centre for Cardiac Surgery reduces mechanical cooling demands through passive technologies, such as thick masonry walls with extensive insulation, deep overhangs, and high-performance windows. To alleviate the significant dust infiltration from dust storms, a thermal labyrinth filters and pre-cools outdoor air, reducing the demand on the solar-powered water heating and chilling equipment.

Source: (Climate Smart Healthcare - Low Carbon and Resilience Strategies for the Health Sector, 2017)

Box 29 Case study on energy efficiency and health co-benefits, Mexico

Torre de Especialidades in Mexico City reduces pollution by removing smog from the surrounding air. The hospital is surrounded by a giant, honeycomb-like screen that is coated with titanium dioxide, which converts smog into benign chemicals upon contact. The screen also blocks sunlight, which reduces the amount of energy it takes to cool the air within the hospital.

Source: (Climate Smart Healthcare - Low Carbon and Resilience Strategies for the Health Sector, 2017)

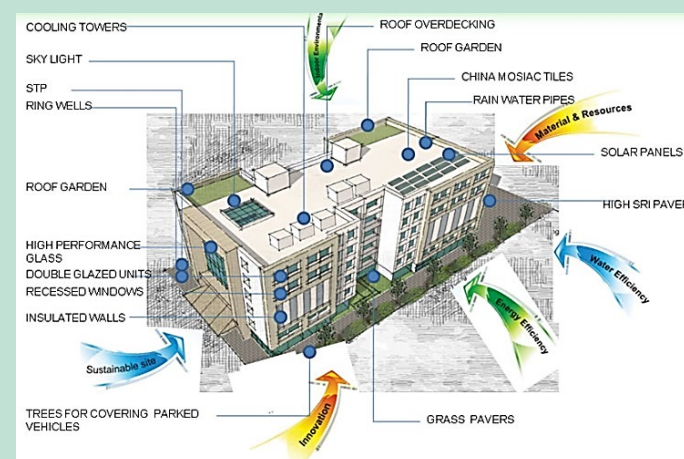
ENERGY

28	Use thermal insulation methods for energy efficacy of buildings.	
Brief: In addition to increasing use of natural light and ventilation, facilities can also improve energy efficiency and ambient internal conditions through use of simple methods that can be brought in as add-ons to the existing structure and elements. These steps can help reduce consumption of energy which can be checked in the annual energy assessment that the facilities can carry out to adhere to local energy codes and guidelines. Refer Box 30 for case study.		
Sub Activities		Frequency
28.1 Carry out thermal insulation of windows using lamination, frosted glass, double paned glass, adjustable louvres, etc. (including wind speeds of 200–250 kph) to comply with energy codes.		Annually
28.2 Install sun protection devices over windows, doors and other openings (e.g., eaves and overhangs).		
28.3 Install elevation/facade elements such as external skins using any preferred material.		
28.4 Carry out white topping of roofs and other large external surfaces to reflect sunlight.		
28.5 Install vertical gardens for localized cooling where possible.		
Facility Typology		
Primary	Secondary	Tertiary
	✓	✓

This action is derived from Table 4.3.1 C (1) & Table 4.3.2 B (13) & Table 4.4.1 A (23).

Box 30 Case study of Kohinoor Hospital, Mumbai, India.

The Kohinoor hospital in Mumbai follows an environmentally sensitive design and is a climate conscious building that has aimed to reduce its overall carbon footprint. The building makes use of materials that promote high solar reflective index (SRI). At present nearly 80% of the entire surface area of the building is covered in such material to mitigate impact of heat island effect. The glass facades used in the building have a high reflective value of nearly 1.2 U value to ensure that the interiors remain cool even on the hottest of days while allowing unrestricted inflow of natural light. Nearly 80% of the facility is well lit with natural light during the day thus reducing dependency on artificial lighting. The facility has been installed with low wattage CFL lights along with LEDs to ensure power saving. The facility has installed solar panels and a windmill to generate clean energy. Together the systems help meet nearly 90% of the total energy requirement of the building. To maintain indoor air quality, the facility has installed MERV13 filters and CO2 sensors resulting in an increased delivery of fresh air by up to 30%.



Source: (Kohinoor Hospital – 1st LEED Platinum rated Project in Asia & 2nd in the world) & (CHP in Hospitals, 2021)

INFRASTRUCTURE, TECHNOLOGY AND PRODUCTS	29	Assess and evaluate structural and non-structural risks to the facility in case of a climate-related hazards (considering previous exposures to natural and other hazards as well).
	Brief: The health care facility should be last in line to face the disruption in its operation due to extreme climate events. Assessing and mapping climate related risks will enable health care workers to prepare and build institutional capacity to respond to the extreme situation, making health care facilities climate Resilient. This assessment can be initiated using participatory tools in collaboration with community representatives and other health workers. Refer suggested tools in Box 31 & 32 to implement this action.	
	Sub Activities	Frequency
	29.1 Map the intensity and probability of extreme climate events (present and future).	One time (Revisit annually)
	29.2 Identify and prepare health care facility vulnerabilities and risk to climate related impacts, emergencies, and disasters.	
	29.3 Appoint an authorized consultant/agency to conduct structural audit periodically.	
	29.4 Repair/refurbish building components based on the structural report of the building.	
	29.5 Establish adequate supply chain (cold chain for essential items requiring refrigeration) and stocks for non-structural elements in case of a climate related event. - Install power generators, - Ensure that water supply system has sufficient reserves with backup arrangement for at least 3 days, at all times.	

Secure heating, ventilation, and air conditioning (HVAC) systems and other electrical systems with power backup for at least 3 days at all times.		
29.6 Repair roofing elements by fastening, riveting, welding, cementing, water proofing and insulating to withstand high wind velocity and heavy rains.		
Facility Typology		
Primary	Secondary	Tertiary
✓	✓	✓

This action is derived from Table 4.4.1 A (2), (5), (9), (20), (22), (24), (25), (26), (27), (28), Table 4.4.1 B (4), (5), (6), (14) & Table 4.4.1 C (1), (13), (27), (28).

Box 31 Tool for climate vulnerability and risk assessment for a healthcare facility

Develop a matrix for climate vulnerability and risk assessment for a health care facility by identifying risks as low, medium & high category based on perception through a consultative process.

Climate Vulnerabilities	High	Medium	Low
Flood	✓		
Drought			✓
Cyclone			✓
Storm	✓		
Rise in Sea level			✓
Heat waves	✓		
Extreme Cold		✓	

Source: (Building Climate Resilience: A training manual for community based climate change adaptation, 2014)

Box 32 Tool for climate risk priority mapping for a healthcare facility

Develop a ranking matrix of climate vulnerabilities through a consultative process for a health care facility. This tool will help in prioritizing climate risks in a local context. The reference can be derived from the historical mapping.

Climate Risks	Flood	Drought	Cyclone	Storm	Sea level rise	Heat waves	Extreme Cold	Ranking
Flood		Drought	Cyclone	Flood	Storm	Heat waves	Extreme Cold	1
Drought			Flood	Cyclone	Cyclone	Drought		3
Cyclone				Sea level rise	Flood			2
Storm					Flood			4
Sea level rise								4
Heat waves								6
Extreme Cold								5

Source: (Building Climate Resilience: A training manual for community based climate change adaptation, 2014)

INFRASTRUCTURE, TECHNOLOGY AND PRODUCTS	30	Undertake construction or retrofitting of health care facilities to maximize the use of daylight and natural ventilation without compromising the structural integrity of the building.		
	Brief: Natural daylight inside the health care facility helps in reducing energy consumption and circulation of fresh air provides protection against disease vectors.			
	Sub Activities		Frequency	
	30.1 Create double floor height/ open to sky spaces, high ceilings, large windows, appropriate door openings and skylights wherever possible. (without compromising structural integrity of the building)		-	
	30.2 Use light paint on the interior walls of the health care facilities to maximize the natural lights.			
	Facility Typology			
Primary		Secondary	Tertiary	
✓		✓	✓	

This action is derived from Table 4.3.2 B (4), Table 4.3.2 C (5), Table 4.4.1 A (6) & Table 4.4.2 A(6).

DID YOU KNOW?

According to a February 2015 article in *Designing Buildings*, the natural light for hospitals offers significant benefits to patients and health care staff. It was found that patients admitted to brighter rooms spent up to 41% less time in the hospital than those in dimmer or windowless rooms. In a study involving cardiac patients in an intensive care unit, patients in darker rooms stayed a day longer on average than those in brighter rooms. Similarly, mortality rates were higher among patients in darker rooms.

Source: (Benefits of Natural Light for Hospitals, 2019)

FRAS

31	Identify new locations for installing/ relocating critical equipment and supplies to prevent damage in case of flood or any climate related emergencies.														
Brief: In some climate related emergencies like flood, it may be the need to shift critical equipment of the health care facility to other safe location to prevent damage to the equipment which may result in dysfunction of the same. Shifting of critical equipment within the facility may help in smooth functioning of health care facility during climate related emergencies.															
<table><tr><th>Sub Activities</th><th>Frequency</th></tr><tr><td>31.1 Mark space(s) within the facility which are safe in case of flood considering the size and quantity of critical equipment to be shifted.</td><td rowspan="3">One time</td></tr><tr><td>31.2 Keep medicines/food and other essential supplies at the places which do not get affected during extreme weather events.</td></tr><tr><td>31.3 Deploy a dedicated team and assign responsibility for shifting critical equipment during extreme climatic events.</td></tr><tr><td colspan="2">Facility Typology</td></tr><tr><td>Primary</td><td>Secondary</td><td>Tertiary</td></tr><tr><td>✓</td><td>✓</td><td>✓</td></tr></table>		Sub Activities	Frequency	31.1 Mark space(s) within the facility which are safe in case of flood considering the size and quantity of critical equipment to be shifted.	One time	31.2 Keep medicines/food and other essential supplies at the places which do not get affected during extreme weather events.	31.3 Deploy a dedicated team and assign responsibility for shifting critical equipment during extreme climatic events.	Facility Typology		Primary	Secondary	Tertiary	✓	✓	✓
Sub Activities	Frequency														
31.1 Mark space(s) within the facility which are safe in case of flood considering the size and quantity of critical equipment to be shifted.	One time														
31.2 Keep medicines/food and other essential supplies at the places which do not get affected during extreme weather events.															
31.3 Deploy a dedicated team and assign responsibility for shifting critical equipment during extreme climatic events.															
Facility Typology															
Primary	Secondary	Tertiary													
✓	✓	✓													

This action is derived from Table 4.4.1 A (15.)

INFRASTRUCTURE, TECHNOLOGY AND PRODUCTS	32	Ensure power-operated doors can be operated manually in the event of power failure.		
	Brief: It is essential to adopt the practice of installing doors and other exits which can be operated manually along with power operated function. This will be an added advantage in case there is disruption in power supply or damaged sensors during climate related emergencies.			
	Frequency			
	One time			
	Facility Typology			
	Primary		Secondary	Tertiary
	✓		✓	✓

This action is derived from Table 4.4.1 A (19).

INFRASTRUCTURE, TECHNOLOGY AND PRODUCTS

33	Secure all the critical and essential medical information systems with backup arrangement.		
Brief: Health care facilities need to function in order to be able to respond to extreme climate related emergencies. Uninterrupted supply of the essential services and utilities with the support of backup arrangements will ensure functioning of facilities even during extreme weather events or a disaster.			
Sub Activities			Frequency
33.1 Digitize patients' records to prevent damage during extreme weather events.			Daily
33.2 Ensure safe access to critical backup supplies and resources e.g., medical equipment, laboratory and treatment supplies, personal protective equipment etc.			One time
33.3 Appropriate backup arrangements available for essential lifelines, including water, power and oxygen.			
Facility Typology			
Primary		Secondary	Tertiary
✓		✓	✓

This action is derived from Table 4.4.1 A (30) & Table 4.4.1 C (15), (21), (23), (24).

INFRASTRUCTURE, TECHNOLOGY AND PRODUCTS

34	Prepare emergency response plans for operations and maintenance of critical systems, essential services and equipment during climate related emergencies and disasters.		
Brief: Prompt maintenance of medical equipment and machineries damaged during climate related emergencies is essential to ensuring that health care facilities are functional and able to quickly respond to these emergencies			
Sub Activities			Frequency
34.1 List out all the critical equipment and services within the facility.			One time
34.2 Prepare emergency response plan to operate and maintain critical systems and equipment of the facility during extreme weather events or disasters.			
34.3 Prepare a list of vendors and enter agreements providing services for prompt maintenance of equipment as per manufacturer's specifications.			
34.4 Assign specific budget for prompt maintenance of critical services and equipment.			
34.5 Train inhouse team to conduct minor repairs and maintenance of critical equipment as per manufacturer's specifications.			One time (Refresher Training Annually)
Facility Typology			
Primary	Secondary	Tertiary	
✓	✓	✓	

This action is derived from Table 4.4.1 B (3), (10), & Table 4.4.1 C (4), (22).

INFRASTRUCTURE, TECHNOLOGY AND PRODUCTS

35	Maintain indoor temperature of the health care facility.		
Brief: Preventive measures are required to lower the climate related impacts. Installing devices for reducing heat from direct sun will help maintain the temperature within the facility.			
Sub Activities			Frequency
35.1 Install energy efficient coolers/ air conditioners for maintaining indoor temperature.			One time
35.2 Install thermostats/sensors along with cooling/heating devices to maintain the indoor temperatures and to increase air flow in case of extreme heat.			
35.3 Maintain ambient indoor air quality (by periodically replacing/cleaning air filters as per manufacturer's specifications) and install display screen indicating air quality.			
35.4 Install devices such as canopies, louvers, laminated shatterproof glass etc. to diffuse direct sunlight.			
35.5 Notify staff, patients and visitors of air pollution advisories and warnings.			As and when needed
Facility Typology			
Primary		Secondary	Tertiary
✓		✓	✓

This action is derived from Table 4.3.1 B (3), Table 4.4.1 A (18), Table 4.4.1 B (12), Table 4.4.1 C (31) & Table 4.4.2 A (5).

INFRASTRUCTURE, TECHNOLOGY AND PRODUCTS	36	Ensure availability of reliable primary and backup communication systems within the health care facility.	
	Brief: Communication systems are important during extreme climate related events to manage the support required to run health care facilities during a disaster.		
	Sub Activities		Frequency
	36.1 Procure primary telecommunication systems (such as satellite phones, mobile devices, landlines, two-way radio communication devices etc.), information system, internet connection and secure safely with back up arrangements at all times.		One time
	36.2 Keep such communication devices at an identified safe and accessible place.		
	36.3 Keep a copy of updated contact list of emergency operations at reception and at all the floors within the facility.		One time (Revisit annually)
	36.4 Establish mechanisms for tele-consultation and tele-medicine services.		One time
	Facility Typology		
	Primary	Secondary	Tertiary
	✓	✓	✓

This action is derived from Table 4.4.1 A (21) & Table 4.4.1 B (13).

INFRASTRUCTURE, TECHNOLOGY AND PRODUCTS

37	Take steps to ensure sufficient emergency room surge capacity available to manage climate-related emergencies and disasters.		
Brief: Climate related emergencies may increase the inflow of patients in health care facilities. The geography in which a health care facility is located may act as a deterrent in its ability to respond. Hence, additional capacities for accommodating more patients will be needed to ensure that health care is accessible to all those who need emergency care during a climate related event.			
Sub Activities			Frequency
37.1 Earmark spaces with necessary services (including water, sanitation, HVAC etc.) that can be converted into an emergency care facility when needed.			One time
37.2 Stock medicines, essential supplies, pharmaceuticals and lifesaving medical equipment during surge demand to ensure that the health care facilities can sustain the provision of essential and specialized services in an emergency or disaster. This should be in accordance with national guidelines so as to ensure timely use to avoid loss due to expiration.			As and when needed
37.3 Ensure access to antibiotics, antiparasitic and antiviral drugs for use in acute outbreaks of vector or water borne diseases made worse by climate change.			
Facility Typology			
Primary		Secondary	Tertiary
✓		✓	✓

This action is derived from Table 4.4.1 C (2), (6), (7), (8), (20).

INFRASTRUCTURE, TECHNOLOGY AND PRODUCTS

38	Setup MIS to update inventory of all equipment and supplies to ensure adequate stock in extreme weather events.	
Brief: Tracking of data will support health care facility in taking appropriate and timely actions when faced with an extreme weather event or climate related disaster. Hence, regularly maintaining and updating an MIS system is essential. Refer Box 30 for case study.		
Sub Activities		Frequency
38.1 Estimate the consumption pattern of essential supplies and pharmaceuticals (such as amount used per week) using the most likely extreme weather event and update inventory of all equipment maintained.		Monthly
38.2 Design shortage alert systems.		One time
Facility Typology		
Primary	Secondary	Tertiary
	✓	✓

This action is derived from Table 4.4.1 C (9), (10).

INFRASTRUCTURE, TECHNOLOGY AND PRODUCTS

39	Adopt environmentally sustainable construction and renovation practices to promote low carbon footprint.		
Brief: Green building approach may not specifically address climate resilience but many sustainable building strategies such as energy and water demand reduction to daylighting and reliance on passive systems will enhance the environmental sustainability of health care facilities. Refer Box 33 & 34 for the case study. Refer Box 35 for Low-carbon building interventions and benefits.			
Sub Activities			Frequency
39.1 Use sustainable technologies and low carbon approaches for retrofitting and repairs of building structures and for the design and construction of new healthcare facilities.			-
39.2 Plan retrofitting activities in such a way that it generates minimal construction and demolition waste and encourages its reuse as construction materials.			
Facility Typology			
Primary		Secondary	Tertiary
✓		✓	✓

This action is derived from Table 4.4.2 A (1), (2).

Box 33 Case study on low-carbon building, India

Kohinoor Hospital in Mumbai, India is committed to reducing its environmental impact while reducing costs to patients. The hospital opened in 2009 and is LEED certified, relies on low-energy light bulbs, uses

photovoltaic power to heat its water, harvests rainwater, and treats its own sewage to reduce water use. Kohinoor Hospital also installed high-efficiency wall and window systems and an air-conditioning plant, resulting in an energy use intensity of 166 kwh/m²/year (53 kBTU/ ft²/year).

Source: (Climate Smart Healthcare - Low Carbon and Resilience Strategies for the Health Sector, 2017)

Box 34 Case study on low-carbon building, Rwanda

Butaro Hospital, Rwanda a collaboration amongst Partners in Health, the Rwandan Ministry of Health, and MASS Design, reduces its energy consumption by using narrow floor plates, natural daylight, and natural ventilation, along with high-volume, low-speed fans and germicidal UV lights to provide energy efficient ventilation while controlling the transmission of airborne diseases. Local materials from the nearby Virunga Mountains were also used to decrease carbon footprint and contribute to the local economy. The overall approach reduced the facility's price tag by 1/3, saving US\$2 million while producing over 4,000 jobs.

Source: (Climate Smart Healthcare - Low Carbon and Resilience Strategies for the Health Sector, 2017)

Box 35 Low-carbon building interventions and benefits

Category	Intervention	Benefit
Building Site and Context	Climate zone and biome identification	Energy savings by designing building to be responsive to specific local climate

Low-carbon building interventions and benefits

Category	Intervention	Benefit
Building Site and Context	Site and orient building to maximize solar orientation and wind patterns	Reduces heat load and maximizing passive benefits of natural ventilation
	Site planting and reflective paving	Reduces heat island effect
	Preserve existing vegetation	Maximizes shading from mature trees; stabilizes soil and preserves habitat
	Accommodations for public transportation, bicycles and walking	Encourages active transportation and reduces transportation GHG emissions
	On-site renewable power generation	Reduces GHG emissions and increase resilience to climate change
Building Form	Narrow floor plates	Maximizes daylighting and natural ventilation*
Building Exterior	Enhanced building thermal envelope	Reduces heating and cooling load*
	Reflective roofing	Reduces solar heat load; reduces heat island impacts

Low-carbon building interventions and benefits

Category	Intervention	Benefit
Building Exterior	Renewable power generation	Reduces GHG emissions and increase resilience to climate change
	Shading by overhangs or planting	Reduces solar heat load
	Operable windows	Enables natural ventilation
	Use of local materials	Reduces energy to transport materials; supports local economies
Space Heating and Cooling	Natural ventilation	Energy savings from passive heating and cooling
	Zone temperature control	Reduces heating and cooling energy*
	Mixed mode ventilation	Reduces heating and cooling energy*
	Partial air recirculation	Reduces heating and cooling energy*
	Heat recovery	Reduces heating and cooling energy*
	Variable flow systems	Reduces fan energy
	Ground source heat pumps	Reduces heating and cooling energy

Low-carbon building interventions and benefits

Category	Intervention	Benefit
Space Heating and Cooling	Combined heat and power	Energy savings by using waste heat from power generation for thermal energy; reduces transmission losses for power; improves resilience
	Night or unoccupied setbacks	Reduces heating and cooling energy
	Commissioning building systems	Energy savings through more efficient systems operation
Lighting	Daylighting	Energy savings by using passive illumination*
	Low energy light fixtures	Reduces energy consumption
	Accessible lighting controls	Reduces energy consumption
	Automated lighting controls	Reduces energy consumption
Water Heating	Low-flow water fixtures	Reduces use of hot water
	Cold water detergents in laundry facilities	Reduces use of hot water

Low-carbon building interventions and benefits

Category	Intervention	Benefit
Water Heating	Combined heat and power waste heat used to heat water	Energy savings from using waste heat for hot water
	Solar water heating	Reduces GHGs from heating water; energy savings from solar water heating
Equipment	Include energy efficiency in equipment selection criteria	Reduces energy consumption
	Implement sleep mode on computer equipment	Reduces energy consumption
Operations and Controls	Energy management systems	Reduces energy consumption
	Turning off lighting and equipment when not in use	Reduces energy consumption
*As there is a clinical benefit to providing access to daylight and views in patient rooms (studies have shown that high levels of daylight in patient rooms can lead to shorter patient stays⁶⁷), daylighting gains added significance in a hospital setting. Similarly, healthcare's need for heat create an opportunity for benefits from combined heat and power and solar water heating. These interventions drive design considerations that are especially important in hospitals. Source: Health Care Without Harm.⁶⁸		

Source: (Climate Smart Healthcare - Low Carbon and Resilience Strategies for the Health Sector, 2017)

INFRASTRUCTURE, TECHNOLOGY AND PRODUCTS	40	Use and promote local and sustainable food production.		
	Brief: Producing organic food within the facility should be encouraged to lower the carbon footprint of the health care facility and promote environmental sustainability. Refer Box 36 for case study.			
	Sub Activities			Frequency
	40.1 Use and promote food produced locally.			One time
	40.2 Set up kitchen garden as a means to introduce fresh food in the food service operations			
	Facility Typology			
	Primary	Secondary	Tertiary	
✓	✓	✓		

This action is derived from Table 4.4.2 C (7), (9).

Box 36 Low-Carbon Food, Tzu Chi Hospital, Malaysia

It's a Buddhist hospital that provides vegetarian food only. The hospital's cafeteria is supplied by an organic farm within the compound which is also used as horticultural therapy for patients with mental health challenges. The Hospital is proud to be reducing carbon emissions, promoting a healthy diet, promoting a natural and healing environment as well as encouraging more well-being in staff and patients. The hospital calculates during the period of 2010–2014 they saved over 2,000 tons of carbon emissions through serving over 2 million vegetarian meals in their cafeteria and food court. Cultural differences mean that this approach may be harder to translate to other countries, however in many contexts, steps towards a more balanced and less meat-orientated diet is beneficial.

Source: (Climate Smart Healthcare - Low Carbon and Resilience Strategies for the Health Sector, 2017)

INFRASTRUCTURE, TECHNOLOGY AND PRODUCTS	41	Plant indigenous trees and plants suitable to the local climatic conditions which can also withstand high wind velocity.	
	Brief: Plants not native to the region serve only beautification purpose and can often cave to extreme weather events such as flooding and storms. Native trees and plants help to obtain health co-benefits, provide natural shade to patients, staff and visitors during extreme heat events. Indigenous flora through years of evolution is always best adapted to withstand the local climatic conditions.		
	Frequency		
	One time		
	Facility Typology		
	Primary	Secondary	Tertiary
	✓	✓	✓

This action is derived from Table 4.4.2 C (11), (12).

INFRASTRUCTURE, TECHNOLOGY AND PRODUCTS	42	Implement a clear environmentally sustainable procurement policy or protocol for promoting procurement of medical equipment and other appliances from local sources.	
	Brief: To reduce the carbon footprint created in transporting material and goods over long distances by road, rail, ship and air; it is useful to promote the procurement of as many goods as possible from the local markets. Also, it is advised to purchase only environmentally friendly products (such as minimal packaging, reusable and recyclable products, avoiding hazardous chemicals and non-degradable plastics).		
	Frequency		
	One time		
	Facility Typology		
	Primary	Secondary	Tertiary
	✓	✓	✓

This action is derived from Table 4.4.2 C (1), (4), (5).



3.2 Actions to be taken by Local Government

This ready reckoner identifies Local government as other key user groups for strengthening climate resilience and environmental sustainability in healthcare delivery. By Local government it means Municipal, County, Village, Province, District or other forms of local governance units or civic authorities engaged / involved in delivering civic services including health in a country in either rural or urban setting.

Local government forms the most important part in the healthcare delivery which is either involved directly in health delivery or provides administrative support to facilitate the delivery ensuring the equitable coverage and access to health care. Broadly speaking, the health-related activities of local government are public healthcare which includes monitoring of health, sanitation delivery and disease control; the financing and delivery of personal health services including wellness and mental health through public and private delivery models.

HEALTH WORKFORCE

1	Establish mutual aid, contingency, and assistance agreements to provide health support in extreme weather events or disaster.		
Brief: Mutual aid can be defined as sharing of supplies, equipment, personnel, and information across political boundaries. Routine public health functions would be more effectively performed by executing mutual aid agreements to share relevant resources with one another.			
Sub Activities			Frequency
1.1 Prepare a plan for emergency evacuation from health care facility and restoration of essential services, including food, medical aid, water and sanitation.			One time
1.2 Collate list and maintain stocks of supplies, equipment, personnel and information to be provided to the health care facilities in the jurisdiction.			
1.3 Enlist civil society/ voluntary organizations, Non-Government organizations (NGO) and Community Based Organizations (CBO) to deliver relief.			
Facility Typology			
Primary	Secondary	Tertiary	
✓	✓	✓	

This action is derived from Table 4.1.1 A (12), & Table 4.4.1 C (16), (17).

HEALTH WORKFORCE

2	Develop Disaster Management guidelines and plan.		
Brief: Disaster preparedness response and recovery management requires a comprehensive approach in four phases- prevention, preparedness, response and recovery to ensure a balance between the reduction of risk and the enhancement of community resilience. These four phases overlap and support each other as and when required. The local governments are responsible to provide assistance to health facilities in the implementation of guidelines/SOPs, assessing the critical data points and mapping the vulnerabilities of each region. The guidance will help facilities to develop a facility level preparedness and recovery plan. Refer Box 37 for case study.			
Sub Activities			Frequency
2.1 Monitor data on diseases and injuries generated through the surveillance system.			Monthly
2.2 Establish mechanisms for health care facilities to update data.			Monthly
2.3 Review and update facility wise climate risk assessment of all facilities within the jurisdiction.			Annually
Facility Typology			
Primary	Secondary	Tertiary	
✓	✓	✓	

This action is derived from Table 4.1.1 A (2), (8), (9), (10), (11), (13), Table 4.1.1 B (2), (4), (5), (6), (7), (10), (14), (18), Table 4.1.1 C (9), Table 4.1.2 A (2) & Table 4.4.1 C (3), (12).

Box 37 Case study on California Emergency Medical Services Authority, a sponsor of Hospital Incident Command Centre, USA

Hospital Incident Command System (HICS):

As a commitment to improve hospital response to healthcare needs during disasters and other medical emergencies, the California Emergency Medical Services Authority (EMSA) is expanding the Hospital Incident Command System (HICS), which assists hospitals and healthcare organizations in improving their emergency management planning, response, and recovery capabilities for unplanned and planned events. As a system, HICS is extremely useful; not only does it provide an organizational structure for incident management, but it also guides the process for planning, building, and adapting that structure. Using HICS for every incident or planned event helps hone and maintain skills needed for the large-scale incidents.

Emergency Management Program:

Emergency Management Program Guidebook developed by the U.S. Department of Veterans Affairs outlines a nine-step process for the development, maintenance, and evaluation of a hospital Emergency Management Program. The process includes:

1. Designate an Emergency Program Manager,
2. Establish the Emergency Management Committee,
3. Develop the all-hazards Emergency Operations Plan (EOP);
4. Conduct the Hazard Vulnerability Analysis (HVA),
5. Develop incident-specific guidance,
6. Coordinate with external entities,
7. Train key staff,
8. Exercise the Emergency Operations Plan (EOP) and
9. Conduct program review/evaluation and plan for and execute improvement processes

Source: (California Emergency Medical Services Authority, 2014)

HEALTH WORKFORCE

3	Establish a system of providing necessary credentials to health workers in an emergency situation.		
Brief: In order to meet the demand of health workforce in the facility during emergency situations, it is important to establish a system for identifying additional staff who can assist in managing the crisis and surge capacity needs of the healthcare facility. Credentialling framework in place will smoothen the process for deploying health workforce at places and events of emergency.			
Sub Activities			Frequency
3.1 Quantify health workforce requirements for every health care facility in routine and in case of climate emergency/disaster.			Annually
3.2 Establish a system of rapidly providing health workers (such as voluntary medical personnel) with necessary credentials in an emergency situation in accordance with health care facility and health authority policies			As and when needed
Facility Typology			
Primary		Secondary	Tertiary
✓		✓	✓

This action is derived from Table 4.1.1 A (4), (5).

WATER, SANITATION, HYGIENE AND HEALTH CARE WASTE	4	Enable safe collection and transportation of waste from the health care facility.		
	Brief: The management of health-care waste requires increased attention and diligence to avoid adverse health outcomes associated with poor practice, including exposure to infectious agents and toxic substances.			
	Sub Activities		Frequency	
	4.1 Facilitate collection and transportation of segregated waste from the health care facility during routine and in extreme weather events.		Daily	
	4.2 Monitor transportation of waste from health care facility on regular basis and during extreme weather events and integrate the waste transportation management of the healthcare facilities at the catchment/zonal level.			
	Facility Typology			
	Primary	Secondary	Tertiary	
	✓	✓	✓	

This is a new action proposed.

DID YOU KNOW?

Health-care waste contains potentially harmful microorganisms that can infect hospital patients, health workers and the general public. Other potential hazards may include drug-resistant microorganisms which spread from health facilities into the environment.

Source: (WHO-Factsheet - Health Care Waste, 2018)



INFRASTRUCTURE, TECHNOLOGY AND PRODUCTS	5	Conduct an assessment prior to siting new health care facilities to lower climate related risks such as associated with siting facilities in high-risk coastal areas, areas prone to damage from hurricanes, windstorms, floods, water surges and rising sea-levels.		
	Brief: When identifying a site for constructing a health care facility it is essential to avoid sites that have in the past been affected by extreme climate events or disasters. To ensure this, it is essential to establish a process for site selection with an aim to lower the risk of health care facilities being affected by extreme climatic conditions.			
	Sub Activities		Frequency	
	5.1 Carry out site analysis to understand potential climate related hazards.		One time	
	5.2 Develop local byelaws for siting new health care facility.			
	Facility Typology			
Primary		Secondary	Tertiary	
✓		✓	✓	

This action is derived from Table 4.4.1 A (7).

DID YOU KNOW?

Globally, the number of reported weather-related natural disasters has more than tripled since the 1960s. Every year, these disasters result in over 60 000 deaths, mainly in developing countries.

Source: (WHO-Factsheet - Climate change and health, 2018)

INFRASTRUCTURE, TECHNOLOGY AND PRODUCTS	6	Consider a range of climate related risks following expert advice for construction of new health care facility or retrofitting of existing health care facilities.		
	Brief: Assessing climate related risks will help selecting appropriate construction materials which play a crucial role to make health care facilities climate resilient. Based on the climatic condition a suitable building material is suggested for building construction (new or retrofitting) which will enable energy efficiency, operation of the facility and maintaining natural light and ventilation. Use of locally available material shall also be promoted in the building construction which will help in reduction of overall carbon footprint of the health care facility.			
	Sub Activities			Frequency
	6.1 Use appropriate building materials that can sustain against local climate risks such as drought, flood, prolonged rainfall, storms, strong winds, heat waves and sea-level rise.			At the time of new construction
	6.2 Encourage use of fire- resistant, non-toxic, eco-friendly and other appropriate building materials for construction of health care facilities following local level guidelines and protocols.			
	6.3 Install laminated shatterproof glass for windows, doors, walls, ventilators and any other openings which can withstand wind speeds of 200–250 kph.			
	6.4 Follow local building regulations or codes of practice to encourage climate responsive designs for health care facility.			
	Facility Typology			
	Primary		Secondary	Tertiary
	✓		✓	✓

This action is derived from Table 4.4.1 A (8), (10), (11), (14), (16), (17) & Table 4.4.1 B (11).

INFRASTRUCTURE, TECHNOLOGY AND PRODUCTS	7	Establish an emergency centralized transportation system to shift critically ill patients in case of emergencies or disaster.
	Brief: Critical patients need intensive care and during climate related emergencies, it may require shifting the patients to another safe locations where constant medical care can be made available to them. Local governments should have a reliable centralized transportation system with route plans to take care of critically ill patients while transporting them to other facilities safely and quickly. Refer Box 38 for case study.	
	Sub Activities	Frequency
	7.1 Establish a system where every healthcare facility maintains a list of critically ill patients to prioritize when shifting during evacuation.	One time
	7.2 Procure sufficient number of fully equipped* vehicles for transporting patients. *Vehicles as per standards and equipped with appropriate paramedical staff	
	7.3 Prepare route plans for safe evacuation (free of building structures and trees that could impede traffic if they fell during a climate related emergency or a disaster).	One time (Revisit annually)
	7.4 Keep a copy of these routes within the facility and in the emergency vehicles or ambulances to follow during emergency situations.	
	7.5 Mark emergency exit routes within the facility for safe and fast evacuation of patients as well as health workers.	One time

Facility Typology		
Primary	Secondary	Tertiary
✓	✓	✓

This action is derived from Table 4.4.1 A (12), (13) & Table 4.4.1 C (14).

Box 38 Case study on Collective Critical Care Ambulance (CCCA): an innovative transportation of critical care patients by bus during the COVID-19 pandemic response, France

During the COVID-19 pandemic, as the number of available Intensive Care beds in France did not meet the needs, it appeared necessary to transfer a large number of patients from the most affected areas to the less ones. Mass transportation resources were deemed necessary. To achieve this goal, the concept of a Collective Critical Care Ambulance (CCCA) was proposed in the form of a long-distance bus re-designed and equipped to accommodate up to six intensive care patients and allow Advanced Life Support (ALS) techniques to be performed while enroute. The expected benefit of the CCCA, when compared to ALS ambulances accommodating a single patient, was to reduce the resources requirements, in particular by a lower personnel headcount for several patients being transferred to the same destination. A foreseen prospect, comparing to other collective transportation vectors such as airplanes, was the door-to-door capability, minimalizing patients' handovers for safety concerns and time efficiency.

Four COVID-19 patients were transported over 37 km. All patients were intubated and under controlled ventilation. One of them was under Norepinephrine support. Mean loading time was 1 min 39 s. Transportation time was 29 min. At destination, the mean unloading time was 1 min 15 s. No serious adverse effect, in particular regarding hemodynamic instability or ventilation disorder, has been observed. No harmful incident has occurred.

Source: (Collective Critical Care Ambulance: an innovative transportation of critical care patients by bus in COVID-19 pandemic response, June, 2021)

ENERGY

8	Develop energy efficient mobility practices.
Brief: While it is important for facilities to switch to clean energy sources and energy efficient appliances, it is also important to inculcate a behaviour of sustainable means of travel that helps reduce pollution and carbon footprint. The first step in this direction would be to encourage staff of facilities to gradually switch to other modes such as public transport, car-pooling, etc. To encourage this activity, the local governments can adopt the following steps as a pilot to gauge public interest. Refer Box 39 for case study.	
Sub Activities	Frequency
8.1 Negotiate discounts with local transport authorities for use of public transport by staff of health care facilities.	One Time
8.2 Introduce annual awards for health care facilities that promote sustainable means of travel among their staff.	
8.3 Draft and introduce policies enabling health care facilities to tie up with local transport authorities to provide dedicated public transport systems such as buses and mini vans for use by employees where the facility pays a nominal annual fee for the service.	
8.4 Provide monetary assistance to facilities to switch to energy efficient vehicles such as electric buses.	

Facility Typology		
Primary	Secondary	Tertiary
✓	✓	✓

This action is derived from Table 4.3.2 C (12), (13).

Box 39 Case study on the Green Travel Agreement for Employees of Landspítali, 2018, Iceland.

Landspítali is the leading hospital in Iceland as well as the largest, with around 700 beds. It is the largest workplace for health care employees, around 5100 employees. As a national university hospital, the main role of Landspítali is threefold; service to patients, teaching and training of clinical staff and scientific research. The hospital offers diverse clinical services in outpatient clinics, day patient units, inpatient wards, critical care units, clinical laboratories and other divisions.

Since 2012, Landspítali has aimed at becoming a role model and a driving force in environmental issues in Iceland. The Landspítali environmental policy is the guide to this vision, and an environmental program has been followed since 2012. In 2016, the executive committee adopted an ambitious climate target of a 40% reduction in carbon emissions by 2020. The second largest sources of the hospital carbon footprint are employee travel to and from work (31%). In May 2014, Landspítali made a special effort by offering employees a green travel agreement, improving both the health of its employees and minimize the carbon footprint by giving a tax-free sum for their commitment.

In 2014, a significant change in employee travel was seen after financial incentives were introduced through green travel agreements with 28% employees travelling eco-friendly while in 2016 nearly 40% of Landspítali employees travel mostly eco-friendly.

Source: (Green Travel Agreements Iceland, 2018)



3.3 Actions to be taken by Community Outreach Workers

Community-based health care includes services delivered by a broadly defined community health workforce, according to their training and capacity, encompassing a range of health workers, lay and professional, formal and informal, paid and unpaid, as well as facility-based personnel who support and supervise them and provide outreach services and campaigns. Where applicable, specific occupational groups and their roles are highlighted.

Community outreach workers form the most crucial and important part in the healthcare delivery and the last mile connects between people and health delivery system. Many counties have testified their role and its impact in strengthening the status of public health. This role needs to be further leveraged in climate preparedness and response through involvement of people.

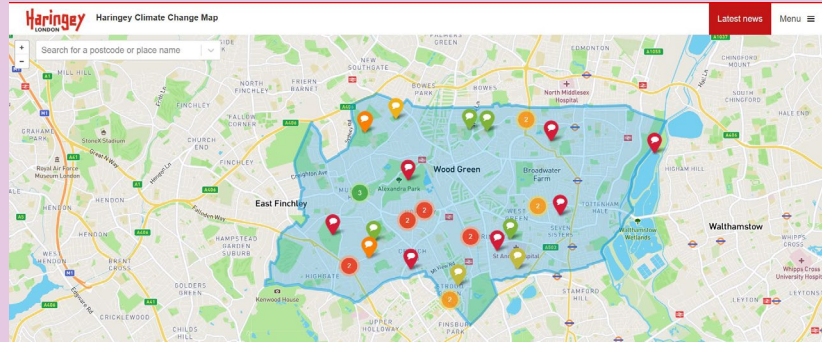
HEALTH WORKFORCE	1	Establish partnerships between health care facility, health workforce and local communities to work together and promote an environmentally safe and climate resilient health care facility.	
	Brief: Regular communication between the health workforce and local communities is required for building institutional and community resilience to disaster and emergency situations. Participatory interactions with government, civil societies, leaders and local communities will help in building resilience and minimizing harm. Refer Box 40 for case study.		
	Sub Activities		Frequency
	1.1 Conduct periodic meetings with communities within the catchment areas to build awareness using participatory tools and techniques for making health care facilities environmentally sustainable.		One time (Revisit annually)
	Facility Typology		
	Primary	Secondary	Tertiary
	✓	✓	✓

This action is derived from Table 4.1.1 A (2), Table 4.1.1 B (1) & Table 4.4.1 A (1)

Box 40 Case study on Haringey Climate Action Plan implemented by Borough of Haringey, United Kingdom

Public participation plays an important role in the effort to achieve net-zero carbon. For interventions to be effective, it is crucial that people are aware of them, and to have the full support of the community.

In March 2019, Haringey Council officially recognised the environmental crisis the world faces, declaring a Climate Emergency. In response, Haringey Climate Change Action Plan for the borough to become net zero carbon by 2041 was developed. It was realised that the implementation cannot be done itself by the Council and need stakeholders' support. The borough council wanted to identify most critical areas crucial to reduce emissions with the support of citizens. The council took consultative approach and presented their action plan with the community, to help surface new insights based on local knowledge and get community buy-in for their proposals. The council hosted their action plan using Commonplace's Design Feedback tool. They were able to break down various elements of the plan into micro plans that were accessible, understandable for every citizen. It also gave residents the opportunity to understand the scope of the plan, and inclusions made and highlight areas which further needed to be considered. By taking this creative bottom-up approach, Haringey has been able to empower the community to support, build and get involved in community low-carbon projects right from the start.



Source: (Haringey London Climate Change Action Plan)

HEALTH WORKFORCE

2	Train health workforce and community outreach workers to make the facility climate resilient and environmentally sustainable.		
Brief: Capacity building is an ongoing process that equips officials, stakeholders and the community to perform their functions in a better manner during a climate related crisis or disaster.			
Sub Activities			Frequency
2.1 Form and train Community Disaster Planning Committee to: • Identify symptoms, prevention and cure of climate sensitive diseases prevalent in the settlement. • Promote safe water, sanitation and hygiene practices • Initiate steps to be undertaken in case of early warnings for climate related events. • Prepare settlement level disaster management and risk-reduction plan. • Conduct mock drills, simulation exercises on preparing and responding to any form of disaster. • Undertake local measures for safe handling of hazardous chemicals and air pollution. • Energy access and performance.			Quarterly
Facility Typology			
Primary		Secondary	Tertiary
✓		✓	✓

This action is derived from Table 4.1.1 B (3), (7), (8), (9), (12), (13), (15), (16), (17), (19), (20), (21), Table 4.1.1 C (1), (2), (4), (7), (10), Table 4.1.2 A (4), (5), (7), Table 4.1.2 B (1), (2), (3), (5), (6), Table 4.1.2. C (5), Table 4.2.2 A (3), Table 4.3.2 A (2), Table 4.4.1 B (8) & Table 4.4.1 C (11).



Photograph Credit: Purvi Paeliwal @WHO SEARO



3.4 Actions to be taken by Federal/State Government

The Federal/State government plays a number of different roles in the public health including public health policy, strengthening health information and research systems, regulation and enforcement in public health, health promotion, human resource development and capacity building.

The government have adopted multimodal approach in health delivery such as regulator; purchaser of care; provider of health care services; and sponsor of applied research, demonstrations, and education and training programs for health care professionals, allocate financial resources for health and much more.

The impacts of climate change on public health are undeniable. The national level governments need to form stronger partnerships with stakeholders involved in public health and create enabling environment to realise the outcomes making public health a shared value across the region. This sections elaborates the actions identified for Federal/State government for enhancing climate resilience in public health delivery.

HEALTH WORKFORCE	1	Establish mutual aid, contingency, and assistance agreements to provide health support in extreme weather events or disaster.		
	Brief: Mutual aid can be defined as sharing of supplies, equipment, personnel, and information across political boundaries. Routine public health functions would be more effectively performed by executing mutual aid agreements to share relevant resources with one another.			
	Sub Activities			Frequency
	1.1 Ensure local disaster management plans includes emergency response and provision of essential supplies to health care facilities.			Annually
	Facility Typology			
	Primary	Secondary	Tertiary	
✓	✓	✓		

This action is derived from Table 4.1.1 A (12), & Table 4.4.1 C (16), (17).

DID YOU KNOW?

Prone to multiple hazards, Member countries of WHO South-East Asia Region have pledged to strengthen emergency preparedness capacities and adopted the 'Delhi Declaration - Emergency Preparedness in the South-East Asia Region' at a Ministerial Round Table in New Delhi. The Delhi declaration calls for four key initiatives – identify risks by mapping and assessing vulnerabilities for evidence-based planning, implement measures for disaster risk reduction; prepare and operationalize readiness. The declaration also calls for implementing, monitoring, testing and adequately funding national action plans on disaster risk management, emergency preparedness and response.

Source: (World Health Organization - South East Asia, 2020)

HEALTH WORKFORCE

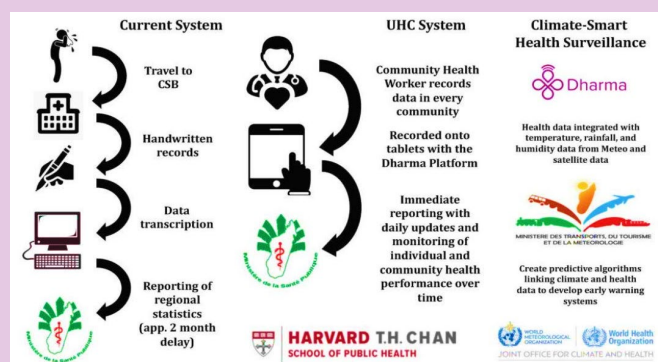
2	Develop Disaster Management guidelines and plan.		
Brief: Disaster preparedness response and recovery management requires a comprehensive approach in four phases- prevention, preparedness, response and recovery to ensure a balance between the reduction of risk and the enhancement of community resilience. These four phases overlap and support each other as and when required. The local governments are responsible to provide assistance to health facilities in the implementation of guidelines/SOPs, assessing the critical data points and mapping the vulnerabilities of each region. The guidance will help facilities to develop a facility level preparedness and recovery plan. Refer Box 41 for case study.			
Sub Activities			Frequency
2.1 Set up a surveillance and early warning system for environmental health hazards and Climate related emergencies.			One time (Revisit annually)
2.2 Develop SOPs for hospital evacuation and emergency transportation.			One time
Facility Typology			
Primary	Secondary	Tertiary	
✓	✓	✓	

This action is derived from Table 4.1.1 A (2), (8), (9), (10), (11), (13), Table 4.1.1 B (2), (4), (5), (6), (7), (10), (14), (18), Table 4.1.1 C (9), Table 4.1.2 A (2) & Table 4.4.1 C (3), (12).

Box 41 Case study on Climate-Smart Health Surveillance (CSHS), Madagascar

Climate-smart health surveillance (CSHS) is a new type of health surveillance that will weave together nationwide epidemiological, climate, agricultural, and environmental information systems. CSHS integrates these disparate data streams to examine the climate-related drivers of ill health. The surveillance system focuses on integrating five important climate-health relationships into a new information platform. These are:

1. Drought-induced crop failures and malnutrition
2. Deforestation and vector-borne disease transmission
3. Natural disasters and mental health
4. Sea temperature-driven harmful algal blooms and diarrheal disease
5. Coral bleaching-induced seafood scarcity and malnutrition.



Source: (Risks and Opportunities for Climate-Smart Health and Nutrition Investment, 2018)

DID YOU KNOW?

Climate change is expected to cause approximately 250 000 additional deaths per year between 2030 and 2050; 38 000 due to heat exposure in elderly people, 48 000 due to diarrhoea, 60 000 due to malaria, and 95 000 due to childhood undernutrition.

Source: (WHO-Factsheet - Climate change and health, 2018)

3**Conduct post disaster employee recovery assistance program.****Brief:**

Post- Disaster Employee Recovery Assistance Program is much needed for the health workers working in emergency situations. Facilities can initiate interactive programs with the help of trained counsellors for the mental well-being of health staff.

Sub Activities		Frequency
3.1	Develop a manual/ guidance to deliver post-disaster employee recovery assistance program for health care workforce and their families	One time
3.2	Provide multidisciplinary psychosocial support for patients.	Regularly
Facility Typology		
Primary	Secondary	Tertiary
✓	✓	✓

HEALTH WORKFORCE

This action is derived from Table 4.1.1 A (6), (7) & Table 4.1.1 B (11).

DID YOU KNOW?

The WHO Hospital Safety Index is used to assess a hospital's capacity to function in the event of a major disaster or emergency. This tool could be applied in the context of an HNP investment in a health facility in an area that is prone to disasters, to determine actions to be taken to strengthen its disaster preparedness.

Source: (Climate-Smart Healthcare Low-Carbon and Resilience Strategies for the Health Sector, 2021)

HEALTH WORKFORCE

4	Establish a system of providing necessary credentials to health workers in climate related emergency.		
Brief: In order to meet the demand of health workforce in the facility during emergency situations, it is important to establish a system for identifying additional staff who can assist in managing the crisis and surge capacity needs of the healthcare facility. Refer Box 42 for hospital emergency response toolkit developed by WHO Regional Office for Europe.			
Sub Activities			Frequency
4.1 Document the credentialing and privileging policy and protocols.			One time (Revisit Annually)
Facility Typology			
Primary	Secondary	Tertiary	
✓	✓	✓	

This action is derived from Table 4.1.1 A (4), (5).

Box 42 Toolkit for hospital emergency response developed by WHO Europe

Hospitals play a critical role in providing communities with essential medical care during all types of disaster. Depending on their scope and nature, disasters can lead to a rapidly increasing service demand that can overwhelm the functional capacity and safety of hospitals and the health-care system at large. The World Health Organization Regional Office for Europe has developed the Hospital emergency response checklist to assist hospital administrators and emergency managers in responding effectively to the most likely disaster scenarios.

To enhance the readiness of health facilities to cope with the challenges of a disaster, hospitals need to be prepared to initiate fundamental priority action. The tool provides an all-hazards list of key actions to be considered by hospitals in responding to any disaster event.

This tool comprises current hospital-based emergency management principles and best practices and integrates priority action required for rapid, effective response to a critical event based on an all-hazards approach.

The tool is structured according to nine key components, each with a list of priority actions. The 9 key components are:

1. Command and control
2. Communication
3. Safety and security
4. Triage
5. Surge capacity
6. Continuity of essential services
7. Human resources
8. Logistics and supply management
9. Post-disaster recovery

Each component is given with a list of priority action to support hospital managers and emergency planners in achieving:

- (1) continuity of essential services;
- (2) well-coordinated implementation of hospital operations at every level;
- (3) clear and accurate internal and external communication;
- (4) swift adaptation to increased demands;
- (5) the effective use of scarce resources; and
- (6) a safe environment for health-care workers.

Hospitals experiencing an excessive demand for health services due to a critical event are strongly encouraged to be prepared to implement each action effectively and as soon as it is required.

Source: (World Health Organization - Regional Office for Europe, 2011)

WATER, SANITATION, HYGIENE AND HEALTH CARE WASTE

5	Safe handling and management of waste from the health care facility.	
Brief: Of the total amount of waste generated by health-care activities, about 85% is general, non-hazardous waste. The remaining 15% is considered hazardous material that may be infectious, toxic or radioactive that can infect hospital patients, health workers and the general public and may deteriorate the environment. The management of health-care waste requires increased attention and diligence to avoid adverse health outcomes associated with poor practice, including exposure to infectious agents and toxic substances. Refer Box 43 for case study.		
Sub Activities		Frequency
5.1 Develop National level policies and guidelines or health care waste management.		One time
5.2 Develop Health care waste management rules and SOP to enable its implementation depending on the local context.		
5.3 Identify or deploy a government department to regulate and enforce the safe management of waste by HCF.		
Facility Typology		
Primary	Secondary	Tertiary
✓	✓	✓

This is a new action proposed.

Box 43 Case study of Bio Medical Waste Management Rules, 2016, India

Waste Management rules in India are founded on the principles of sustainable development and are preventive and ensures that polluters pay for the damage under Environment Protection Act (1986). Bio-Medical Waste Management Rules, 2016, came into force along with Solid waste management rules, 2016. As per WHO's healthcare waste factsheet in 2018, nearly 85% of the waste generated by healthcare facilities is non-hazardous while only the rest 15% is hazardous. Biomedical waste comprises human & animal anatomical waste, treatment apparatus like needles, syringes and other materials used in health care facilities in the process of treatment and research. This waste is generated during diagnosis, treatment or immunisation in hospitals, nursing homes, pathological laboratories etc.

Salient features of the Bio Medical Waste Management Rules are:

1. The ambit of the rules has been expanded to include vaccine centers, blood donation camps, surgical camps and any other healthcare activity.
2. Stresses on phasing out chlorinated plastic bags, gloves, etc.
3. Stresses on on-site sterilization or disinfection as pretreatment for laboratory, microbial waste or blood sample waste.
4. Establish proper packing of waste using barcode methods for disposal.
5. Report Major accidents that occur out of handling of waste.
6. Classification of Hazardous waste into 4 categories to encourage segregation at source:
 - a. Infectious waste (Yellow Color)
 - b. Recyclable contaminated waste (Red Color)
 - c. Glassware and Metallic Body Implants (Blue Color)
 - d. Waste sharps including metal sharps (Transparent color)
7. Process of automatic authorization of healthcare facilities.
8. More stringent rules to control treatment using incinerators to reduce emissions through pollutants.
9. No requirement of on-site treatment facility if common treatment facility is within the range of 75km.

Source: (Bio-medical Waste Management Rules 2016)

ENERGY

6	Introduce incentives for adoption of renewable energy sources.		
Brief: To generate interest among the citizens/facility managers as well as local governments, the central governments should formulate national level policies and schemes through respective departments of energy that provide some type of incentives to facilities that make a switch to renewable and alternative sources of energy. This will help boost interest and encourage the people to take the first steps in the desired direction. Refer Box 44 for case study.			
Sub Activities			Frequency
6.1 Offer monetary assistance/subsidy for capital costs of procuring and installing renewable energy infrastructure.			One time
6.2 Offer incentives including property tax rebates and increase in building Floor Area Ratio (FAR) to facilities that adopt renewable energy sources.			
6.3 Implement buy-back of energy produced from renewable sources.			
Facility Typology			
Primary		Secondary	Tertiary
✓		✓	✓

This is a new action proposed.

Box 44 Government incentives for IGBC certified healthcare buildings

Indian Green Building Council (IGBC) has launched 'IGBC Green Healthcare rating system to address National priorities. This rating programme is a tool which enables the designer to apply green concepts and reduce environmental impacts that are measurable. Green Hospitals can have tremendous benefits, both tangible as well as intangible. The most tangible benefits are the reduction in water and energy consumption right from day one of occupancy. The energy savings could range from 30 - 40 % and water savings around 20 - 30%. The intangible benefits are improved health and hygiene, enhanced daylight, connectivity with the nature, improved health & hygiene for better infection control, faster recovery of patients by 15%, Reduction in patient stay by 41%.

The IGBC analysis for healthcare facilities involves studying the following parameters:

- Indoor Environmental Quality
- Sanitization & Hygiene
- Water Conservation
- Energy Efficiency
- Building Materials and Resources
- Site Selection & Planning

Based on the assessment, a rating of either, certified, silver, gold or platinum is given to buildings. Different States offer different incentives for IGBC certified buildings such as:

- "The Urban Development Department of Maharashtra State Government offers an additional FAR of 3%, 5% and 7% for Green Buildings rated by IGBC as Silver, Gold and Platinum respectively.
- The Industries Department of the Government of Tamil Nadu instituted a policy in 2021 under which a subsidy of 25% of cost of environmental and climate sensitive infrastructure up to a limit of INR 1 is provided.

Source: (Indian Green Building Council, 2020)

ENERGY	7	Empanel energy assessment/audit agencies.	
	Brief: A list of agencies who are empaneled by the government to carry out energy assessment/audit of facilities will help health care facilities to take informed decisions for corrective measures that may be required based on the findings of such agencies when compared to facility managers attempting to perform a self-assessment. Engaging services of an empaneled agency also gives legitimacy to the actions taken by the facility to avail benefits or incentives from the government.		
	Frequency		
	One time		
	Facility Typology		
	Primary	Secondary	Tertiary
✓	✓	✓	

This is a new action proposed.

DID YOU KNOW?

An energy audit highlights the building systems that consume the most energy and can identify system deficiencies, such as leaks, that can generate energy savings and cost savings through routine maintenance and repairs. Improving the controls of building systems through recommissioning, adding building energy management systems, occupancy sensors, and hospital staff initiatives to turn off lights and equipment can fine-tune existing systems and reduce energy use.

Source: (Climate Smart Healthcare - Low Carbon and Resilience Strategies for the Health Sector, 2017)

INFRASTRUCTURE, TECHNOLOGY AND PRODUCTS	8	Develop National and local early warning system protocols to respond to extreme weather events.	
	Brief: Early warning systems can address specific disease burdens (malaria, dengue, cholera, etc.), specific hazards or multi-hazard frameworks (heat waves, floods, cyclones, hurricanes, droughts, fires, pollution, etc.) or specific lead times (e.g., from short-term planning around extreme weather events to medium term planning around seasonal or decadal forecasts). Early warning systems will be useful for existing funding for health systems strengthening and overall emergency response preparedness. (World Bank Group, 2021) Refer Box 45 for case study.		
	Frequency		
	One time		
	Facility Typology		
	Primary	Secondary	Tertiary
✓	✓	✓	

This action is derived from Table 4.4.1 B (1), (2), (9).

DID YOU KNOW?

Extreme high air temperatures contribute directly to deaths from cardiovascular and respiratory disease, particularly among elderly people. In the heat wave of summer 2003 in Europe for example, more than 70 000 excess deaths were recorded.

Source: (World Health Organization, 2018)

Box 45 Case study on innovative heat wave early warning system and action plan, India

Ahmedabad is a growing urban center of 7 million people in Gujarat state, western India. During an extreme heat wave in 2010, the city registered 1,344 additional deaths. Following this event, the Ahmedabad Municipal Corporation and a coalition of national and international experts came together in 2013 to develop and implement an early warning system and the first Heat Action Plan (HAP) for a city in India.

Updated in 2016, the Ahmedabad HAP utilizes best practices on early warning systems and heat adaptation by focusing on four key strategies:

- Building public awareness and community outreach (communication) using traditional (pamphlets, advertisements, radio, etc.) and new media tools (SMS, WhatsApp, etc.) to communicate the risks of heat waves as well as what to do to avoid heat-related illness and death.
- Initiating an early warning system and interagency coordination that put in place formal communication channels to alert government agencies, hospitals, community groups and the public about predicted extreme temperatures.
- Capacity building among healthcare professionals based upon training to recognize and respond to heat-related illnesses.
- Reducing heat exposure and promoting adaptive measures by mapping high-risk areas to increase outreach and prevention activities, such as providing cooling spaces and drinking water on extreme heat days.

Based on positive initial results that show reductions in heat related morbidity and mortality in the city, several other cities and regions in India are developing HAPs based on the Ahmedabad model.

Source: (Climate Smart Healthcare - Low Carbon and Resilience Strategies for the Health Sector, 2017)



4. Do's

Some of the actions have been highlighted below for encouraging sustainable behavior in healthcare facility.

4.1.1. C (5) Schedule outdoor work during the cooler part of the day and reduce physical demands during hot days.
4.1.1. C (6) Consider indoor and outdoor temperatures when planning group activities in hot days or heat waves.
4.1.2 A (6) Health care facility staff and patients drink filtered tap water when safe.
4.1.2 C (6) Use stairs and ramps, whenever possible, to reduce elevator usage and promote physical activity.
4.2.1 C (3) Reduce/eliminate vector breeding sites (such as pools of water) on facility property and surrounding areas.
4.2.2 B (3) Plastic bottled water eliminated where drinking tap water is available.
4.3.2 A (4) Monitor the use of air conditioning and reduce the use depending upon the weather conditions.
4.3.2 B (4) Open windows (with installed mosquito nets here required) and make use of natural air flow and light.

4.3.2 B (7) Encourage facility staff to walk, use bicycles/ carpools, public transport to minimize carbon emission.
4.3.2 B (12) Defrost freezers and refrigerators regularly.
4.3.2 C (2) Develop system of good practices of energy use conservation with incentives.
4.3.2 C (3) Save energy by turning off office lights, computers and other equipment, and unplug electronic devices when not in use.
4.4.1 A (25) Conduct regular maintenance of roof drainage system to prevent choke ups.
4.4.1 C (18), (19) Monitor food resources and maintain proper sanitary food handling & storage.

5. The Way Forward

This Ready Reckoner aims to ensure that actors involved in health care delivery are sensitized and enabled to take necessary steps in building climate resilience and environmental sustainability in a health care facility. It builds on the premise that health care facilities need to satisfy as a minimum of four requirements to provide safe and quality care – (i) a skilled and informed workforce, (ii) adequate water, sanitation and waste services, (iii) energy services, and (iv) safe, functional and sustainable infrastructure, including technologies and products.

It is important to note that this Ready Reckoner should be adapted to local context and needs. New advances in knowledge, experiences and lessons from several health care facilities and changed circumstances (such as those brought about by public health emergencies like the COVID-19 pandemic), imply that the Ready Reckoner must be used with flexibility, and more as a model on how to improve operations, than as a prescription with expected actions. Whether large or small, all health care facilities can improve their operations while addressing key environmental concerns.

Based on the Ready Reckoner, it will be useful if health care facilities develop their facility level operating procedures to integrate climate resilience and environmental sustainability in the regular day to day operations and functions.

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