National

Standard Operating Procedure (SOP)

for

Green Healthcare Initiative (GHI)

Prepared By

Climate Change and Health Promotion Unit (CCHPU)

Health Services Division

Ministry of Health and Family Welfare

Table of Contents

1. Background and Introduction

The Green Healthcare Initiative is a concept to accelerate the development and use of environmentally preferable products, practices, and construction methods in healthcare facilities worldwide. This alliance includes hospitals, healthcare leaders, healthcare providers, suppliers, green building vendors, universities, community, and governmental entities. These stakeholders bring valuable resources and expertise in building or converting existing hospitals into sustainable and green facilities.

WHO has defined green hospital "as a hospital, which is responsive to local climate conditions with optimized energy use."

According to Healthcare Without Harm, "A green and healthy hospital is the one that promotes public health by continuously reducing its environmental impact and ultimately eliminating its contribution to the burden of disease. A green and healthy hospital recognizes the connection between human health and the environment and demonstrates that understanding through its governance, strategy and operations. It connects local needs with environmental action and practices primary prevention by actively engaging in efforts to foster community environmental health, health equity and a green economy"

According to the Indian Green Building Council, a green hospital building can be defined as one which enhances patient well-being, aids the curative process, while utilizing natural resources in an efficient, environment-friendly manner.

Green hospitals are designed to be energy-efficient, resource-conserving, environmentally friendly, health-supporting, efficient, and strategically managed. By reducing power consumption, utilizing alternative energy sources, and recycling and conserving resources, hospitals can significantly lower their environmental impact. Many global green hospital initiatives start with energy efficiency measures in both the renovation of existing facilities and the construction of new ones.

Health Care Without Harm was founded in 1996 as the U.S Environmental Protection Agency recognized that the medical waste incineration was the leading source of dioxins. Dioxins are one of the most potent carcinogens. To beat this grave danger, 28 organizations came together in Bolinas, California to form the Health Care Without Harm coalition. Nowadays, this organization has members from all six continents of the world. Global Green and Healthy Hospital (GGHH) is a project of Health Care Without Harm (HCWH). The GGHH community helps with the solutions and best practices, worldwide, for hospitals, health care systems, and organizations. It is dedicated to combat with the prevailing public health crises which includes widespread diseases and death, to care for hospital operations with a view to promote environmental and public health. This Network is based on members' commitment to implement the Global Green and Healthy Hospitals Agenda by developing more sustainable practices and by measuring progress over time (Health Care Without Harm).
Health Care Without Harm is a very strong global network. It has hundreds of member parties. Health Care Without Harm -Asia is a part of this global network. This organization is the center to transform the healthcare sector worldwide but without compromising the patient's safety or care. The members' commitment to implement the Global Green and Healthy Hospitals Agenda by developing more

sustainable practices as well as by measuring progress over time is the base of this Network (Health Care Without Harm).

History and Evolution of the Green Hospital Movement

The green hospital movement began with the U.S. Green Building Council (USGBC)’s release of Leadership in Energy and Environmental Design (LEED) standards for building construction. Although the initial cost to adopt green practices might be higher, they are considered the best long-term investment for facilities. Green hospitals have been shown to reduce long-term energy costs, decrease pollutants generated by medical facilities, and improve patient outcomes and staff retention. Several newly constructed and renovated hospital buildings have aimed for and received LEED certification. The journey towards sustainable building practices has been marked by significant milestones over the decades. The United Nations Conference on the Human Environment in Stockholm in 1972 was the first major global effort to address sustainable building practices. This was followed by the Brundtland Report in 1987, which highlighted the essential link between environment and development, further cementing the need for sustainability. The 1992 Earth Summit in Rio de Janeiro was pivotal, resulting in Agenda 21 and the Rio Declaration on Environment and Development, both of which provided a comprehensive plan for global action in all areas of sustainable development. The establishment of the U.S. Green Building Council (USGBC) in 1993 was a significant step toward promoting sustainability in building design, construction, and operation. Subsequently, various regions around the world introduced green building standards: Hong Kong in 1996, Taiwan in 1999, and Canada in 2000. The formal establishment of the World Green Building Council (World GBC) in 2002 helped unify and amplify global efforts in this arena. Singapore's launch of the "BCA Green Building Mark" in 2005, China's implementation of the "Green Building Evaluation Standards" in 2015, and the Confederation of Indian Industry's (CII) establishment of the Indian Green Building Council (IGBC) in 2021 further emphasized the growing commitment to climate-neutral and sustainable buildings. These milestones reflect a global movement towards sustainability in the built environment, showcasing a collective effort to address climate change and promote responsible development.

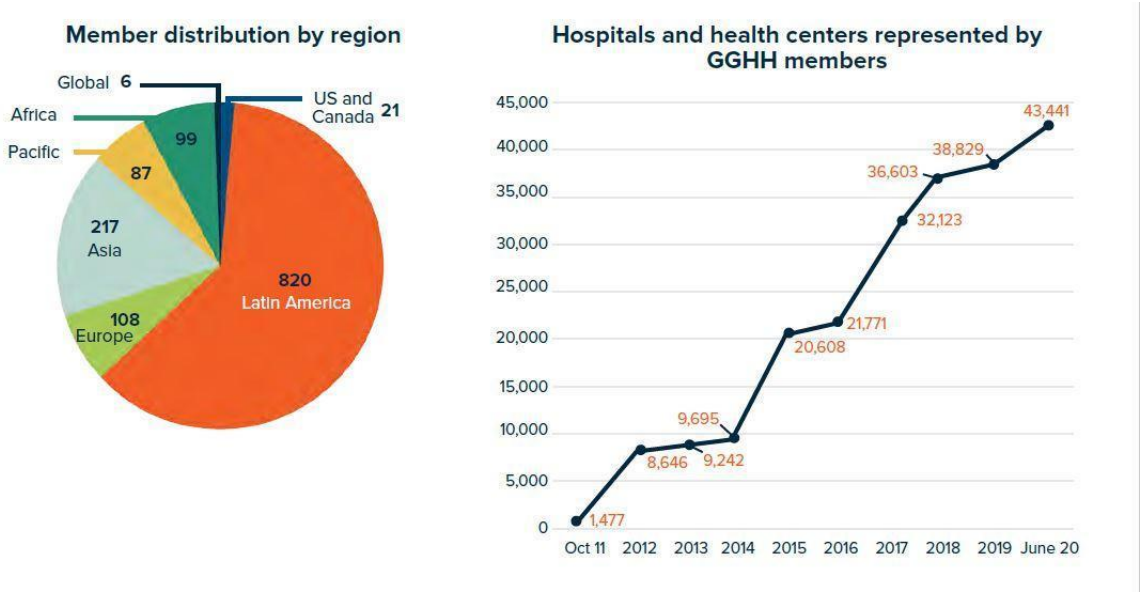

Fig 1: This is figure last annual report published by Health Care Without Harm (HCWH) on June 2020 for the Global Green and Healthy Hospital (GGHH) Members

2. Literature Review

The healthcare industry, responsible for providing vital services to communities, has a significant environmental impact, consuming vast amounts of energy, generating substantial waste, and contributing to greenhouse gas emissions. In response, the global healthcare sector has embraced the concept of "green hospitals," which aim to minimize the environmental footprint of healthcare facilities while enhancing patient and staff well-being.(Huang et al., 2020)

One of the key drivers behind the green hospital movement is the need to address the high energy consumption of healthcare facilities. Hospitals, with their around-the-clock operations, sophisticated medical equipment, and strict hygiene requirements, are among the most energy-intensive buildings.(Sahamir & Zakaria, 2014) To combat this, green hospital initiatives often focus on improving energy efficiency through measures such as upgrading heating, ventilation and air conditioning (HVAC) systems, implementing energy-efficient lighting, and promoting renewable energy sources.(Thomas et al., 2022)

Beyond energy conservation, green hospital strategies also emphasize sustainable waste management, the use of eco-friendly materials, and water conservation. (Thomas et al., 2022). These initiatives not only reduce the environmental impact of healthcare facilities but also contribute to cost savings and improvements in patient and staff well-being.

The adoption of green hospital practices has been observed in various countries around the world, with each region tailoring the approach to its unique environmental, economic, and cultural context. For instance, in Malaysia, the development of green hospital buildings has been driven by the country's commitment to sustainable development, with the government establishing assessment criteria to evaluate the environmental performance of public healthcare facilities. (Sahamir & Zakaria, 2014)

In the United States, the Green Guide for Health Care and the LEED for Healthcare certification program have become influential frameworks for driving green hospital initiatives.(Huang et al., 2020)

"Green hospitals, green healthcare"(Chías & Abad, 2017) explores the evolving concepts of green health and their impact on hospital design. The authors argue that hospitals, as complex systems, have a significant environmental footprint and should adopt sustainable practices.

The paper examines the University Hospital Príncipe de Asturias, suggesting improvements for resource management, waste reduction, and incorporating renewable materials. It emphasizes integrating green design principles from the planning phase through construction and operation. The authors propose using native plants, maximizing open space, and creating gardens to enhance the healing environment and promote sustainability.

"Green hospital design: integrating quality function deployment and end-user demands"(Wood et al., 2016) explores how to incorporate green building principles into hospital design by considering the needs and satisfaction of end-users. The authors used a method called Quality Function Deployment to gather feedback from users in public and private hospitals. They found that safety features were highly valued, and while overall satisfaction with green design elements was average, users emphasized the importance of natural light, ventilation, non-toxic materials, and a healing environment. The study resulted in the development of a tool called the House of Quality Green Design to guide the design of green hospitals based on user priorities

India

In India, several major green hospital projects and initiatives have been implemented to promote environmental sustainability within the healthcare sector. One notable project is the Medanta Medicity Hospital in Gurugram, which has incorporated green building principles, energy-efficient systems, and waste management practices to reduce its environmental impact. Another significant initiative is the Kokilaben Dhirubhai Ambani Hospital in Mumbai, which has adopted sustainable practices such as rainwater harvesting, solar power utilization, and green landscaping to enhance its environmental performance. These projects serve as examples of green hospital practices in India, showcasing the integration of sustainability measures into healthcare infrastructure. Government policies in India play a crucial role in supporting green hospital initiatives by providing regulatory frameworks, incentives, and guidelines to promote sustainable practices in healthcare facilities. The National Health Policy 2017 emphasizes the importance of environmental sustainability in healthcare delivery and encourages the adoption of green practices in hospitals. Additionally, the Bureau of Energy Efficiency (BEE) under the Ministry of Power has introduced the Perform, Achieve, and Trade (PAT) scheme to incentivize energy efficiency improvements in industries, including hospitals. These policy measures aim to drive the transition towards greener healthcare infrastructure by incentivizing energy conservation, waste management, and sustainable building practices. Several case studies in India highlight successful implementations of green initiatives in hospitals. For instance, the All India Institute of Medical Sciences (AIIMS) in New Delhi has implemented energy-efficient lighting systems, water recycling mechanisms, and green landscaping to reduce its environmental footprint. Another case study is the Sir Ganga Ram Hospital in Delhi, which has integrated solar power generation, waste segregation practices, and green procurement policies to enhance its sustainability performance. These case studies demonstrate the feasibility and benefits of incorporating green practices in

healthcare facilities in India, showcasing successful models for environmental sustainability within the healthcare sector.

To reduce energy costs and carbon emissions, Holy Family Hospital invested in installing a state-of-the-art solar array on all 4,000 m^2 of their facility rooftops. At peak output the solar system can create 300 kWh of clean energy that saves the hospital over USD 4,000 in energy costs and reduces their carbon emissions by 25 metric tons of CO_2e each month.

Pakistan

In Pakistan, there have been significant developments in green healthcare infrastructure aimed at promoting environmental sustainability within the healthcare sector. The country is increasingly focusing on integrating green practices such as energy efficiency, waste management, and sustainable building design into healthcare facilities to reduce their environmental impact and enhance public health outcomes [10]. These developments align with the global trend towards sustainable healthcare systems and reflect Pakistan's commitment to addressing environmental challenges while improving healthcare delivery [11]. The policy framework and implementation strategies for green hospitals in Pakistan are guided by initiatives aimed at promoting sustainable practices within the healthcare sector. The government has introduced policies and guidelines that emphasize the importance of environmental sustainability in healthcare infrastructure development [12]. Implementation strategies include incentivizing energy-efficient systems, promoting waste reduction and recycling, and encouraging the adoption of green building standards in hospital construction and operations [13]. These strategies aim to create a regulatory environment that supports and encourages healthcare facilities to adopt green practices, ultimately contributing to a more sustainable healthcare system in Pakistan [11].

Several examples of green hospital initiatives in Pakistan showcase the country's progress towards environmentally sustainable healthcare infrastructure. One notable initiative is the Shaukat Khanum Memorial Cancer Hospital & Research Centre in Lahore, which has implemented energy-efficient systems, waste management practices, and green landscaping to reduce its environmental footprint [10]. Another exemplary project is the Aga Khan University Hospital in Karachi, which has integrated renewable energy sources, water conservation measures, and sustainable procurement policies to enhance its sustainability performance [10]. These initiatives serve as models for green hospital practices in Pakistan, demonstrating the feasibility and benefits of incorporating environmental sustainability into healthcare infrastructure in the country.

Sri Lanka, Nepal, Bhutan, Maldives

In Sri Lanka, Nepal, Bhutan, and the Maldives, green hospital initiatives are emerging to address environmental sustainability within the healthcare sector. In Sri Lanka, sustainable hospital waste management practices have been a focus to mitigate the environmental impact of healthcare facilities Fernando [14]. Efforts to improve waste disposal methods and reduce the spread of diseases associated with hospital waste have been key outcomes of these initiatives. Additionally, in Nepal, green hospital projects have emphasized energy efficiency, waste reduction, and water conservation to promote sustainability within healthcare infrastructure. Specific projects in Nepal have focused on implementing renewable energy sources and green building standards to reduce the carbon footprint of hospitals and enhance environmental performance. In Bhutan, green hospital initiatives have centered on integrating sustainable practices into healthcare facilities to minimize resource consumption and promote environmental health. Projects in Bhutan have

included the adoption of energy-efficient systems, waste management strategies, and green procurement policies to enhance sustainability outcomes. Furthermore, in the Maldives, green hospital efforts have aimed at reducing energy consumption, implementing water conservation measures, and enhancing waste management practices to create environmentally friendly healthcare facilities. Notable outcomes in the Maldives include the successful implementation of solar power systems, rainwater harvesting, and eco-friendly building designs in hospitals to reduce environmental impact and promote sustainability. Overall, these countries are making strides in implementing green hospital initiatives to address environmental challenges and promote sustainable healthcare infrastructure. By focusing on energy efficiency, waste management, and sustainable building practices, Sri Lanka, Nepal, Bhutan, and the Maldives are working towards creating environmentally conscious healthcare facilities that prioritize both patient well-being and environmental stewardship. These initiatives serve as models for integrating green practices into healthcare systems, showcasing the benefits of environmentally sustainable healthcare infrastructure in the region.

Bangladesh

In Bangladesh, green hospital efforts are gaining momentum in response to the country's ecological challenges, including air and water contamination, land degradation, and waste management [9]. Healthcare facilities in Bangladesh are increasingly focusing on implementing sustainable practices such as energy efficiency, waste reduction, and water conservation to mitigate their environmental impact and promote public health. However, these efforts are met with challenges such as limited resources, infrastructure constraints, and the need for capacity building to fully integrate green practices into hospital operations. Non-Governmental Organizations (NGOs) and international organizations play significant roles in supporting Bangladesh's green hospital initiatives by providing technical expertise, funding, and capacity-building programs. NGOs like BRAC and icddr,b work closely with healthcare facilities to implement green practices, conduct training programs, and raise awareness about environmental sustainability in healthcare. International organizations such as the World Health Organization (WHO) and the United Nations Development Programme (UNDP) collaborate with the government and local stakeholders to develop policies, guidelines, and projects that promote green healthcare practices in Bangladesh. Notable green hospital projects in Bangladesh include the Square Hospitals in Dhaka, which has implemented energy-efficient systems, waste management practices, and green building design to reduce its environmental footprint. Another exemplary project is the United Hospital in Dhaka, which has integrated renewable energy sources, water recycling systems, and green procurement policies to enhance its sustainability performance. These projects serve as models for sustainable healthcare infrastructure in Bangladesh, demonstrating the feasibility and benefits of adopting green practices in the country's healthcare sector.

Climate Change and Health Promotion Unit (CCHPU) of the Ministry of Health and Family Welfare has launched an initiative to implement the green hospital concept across various tiers of hospitals in Bangladesh. This initiative aims to introduce low emission and sustainable eco-friendly practices within healthcare facilities.

Two high-level workshops have been organized as part of this initiative held at Kurmitola General Hospital, a tertiary hospital and Rupganj Upazila Health Complex, a primary health care center.

These workshops explored the feasibility of the green hospital concept with discussions including possible financial instruments and the significance of this concept in climate action.

As a continuation of the process, the Mongla Upazila Health Complex has been selected to initiate the green healthcare initiative concept. Mongla Upazila Health Complex is situated in one of the most climate-vulnerable areas, making it a significant choice for this initiative. The initiative is exploring and implementing various interventions of the green healthcare concept.

The successful implementation of the green healthcare concept at Mongla Upazila Health Complex provided valuable insights and lessons. These insights will help in scaling up the initiative to other hospitals and healthcare centers in Bangladesh. The project aims to create a blueprint for integrating climate resilience and sustainability into the healthcare system

3. Guiding Principles

Guiding Principle

3.1 Environmental Sustainability

For any green hospital, there is a need for optimizing the use of resources by reducing, reusing and recycling materials. This includes minimizing waste at all operational stages and reducing emissions by adopting cleaner technologies and energy-efficient practices; integrating sustainable practices into operations and assessing environmental performance regularly to track progress towards sustainability goals.

3.2 Reduction of Carbon Emission at Health care facilities:

As healthcare facilities consume high energy due to the pattern of service and requirement, hence improvement of sustainable resource practices will reduce the harm to environment while impacting health of the environment which will translate into protection of human health along with an important way of carbon emission mitigation as part of climate actions from the health service sector.

3.3 Advancing Healthcare Quality and Patient Safety

Participating healthcare organizations to monitor and report progress on their efforts to continuously improve quality of care and patient safety. It also provides proven patient safety strategies and best practices to guide healthcare organizations to improve their processes and outcomes of care.

3.4 Providing Hospital Staffing that Meets Patient Needs

The annual plans describe staffing in each hospital clinical unit by shift. The plans also describe the factors that nurse leaders must consider in determining how to care for each patient.

3.5 Making Healthcare Data and Performance Measures

Hospitals and home care agencies are committed to a common framework to assess and report healthcare quality.

3.6 Empowering Patients and Families in their Healthcare Choices

Important healthcare information accessibility in the hands of consumers. It is a transparent resource for staffing, quality and safety data from hospitals, home care agencies, government agencies and other independent sources.

3.7 Promoting Development

Advancement of the Healthcare Workforce in a Safe, Respectful Supportive Work Environment.

3.8 Public Health

Improve health outcomes by creating a healthy and safe environment for patients, staff, and the community.

3.9 Climate Resilience

Enhance the ability of healthcare facilities to withstand and adapt to the impacts of climate change.

3.11 Social Equity

Ensure that the benefits of the GHI are accessible to all, regardless of socioeconomic status or location.

3.12 Collaboration

Foster partnerships and collaboration among government agencies, healthcare providers, NGOs, and communities.

4. Guidelines for Green Healthcare Initiative

OBJECTIVE

Green Healthcare Initiative are designed to reduce the overall impact of the built environment on human health and the natural environment by:

- Efficiently using energy, water, and other resources.
- Protecting occupant health and improving employee productivity.
- Reducing waste, pollution, and environment degradation

Health administrators are increasingly looking to introduce green initiatives and environment-friendly practices into the design, building and management of healthcare facilities.

Energy efficiency:
To reduce operating energy use, high-efficiency windows and insulation in walls, ceilings, and floors increase the efficiency of the Hospital envelope, (the barrier between conditioned and unconditioned space). Another strategy, passive solar Hospital design, is often implemented in low-energy homes.

Solar water heating further reduces energy costs. Onsite generation of renewable energy through solar power, wind power, hydro power, or biomass can significantly reduce the environmental impact of the Hospital. Power generation is generally the most expensive feature to add to a hospital.

Water efficiency

Reducing water consumption and protecting water quality are key objectives in sustainable Hospital. One critical issue of water consumption is that in many areas, the demands on the supplying aquifer exceed its ability to replenish itself.

Wastewater may be minimized by utilizing water conserving fixtures such as ultra-low flush toilets and low- flow shower heads.

The use of non-sewage and greywater for on-site use such as site-irrigation will minimize demands on the local aquifer.

Materials efficiency

Green Hospital materials are composed of renewable, rather than nonrenewable resources. Green materials are environmentally responsible because impacts are considered over the life of the product.

Resource Efficiency, Recycled Content:

Resource efficient manufacturing process: Products manufactured with resource-efficient processes including reducing energy consumption, minimizing waste (recycled, recyclable and or source reduced product packaging), and reducing greenhouse gases.

Indoor Air Quality seeks to reduce volatile organic compounds, or VOCs, and other air impurities such as microbial contaminants. Hospitals rely on a properly designed ventilation system

(passively/naturally- or mechanically powered) to provide adequate ventilation of cleaner air from outdoors or recirculated,

Waste reduction:

Green architecture also seeks to reduce waste of energy, water and materials used during construction. During the construction phase, one goal should be to reduce the amount of material going to landfills. Well-designed Hospitals also help reduce the amount of waste generated by the occupants as well, by providing on-site solutions such as compost bins to reduce matter going to landfills.

Purpose of SOP

Standard Operating Procedure (SOP) for the Green Healthcare Initiative outlines a comprehensive framework to guide the implementation of sustainable practices in healthcare facilities. The SOP begins with a detailed assessment phase, where current environmental impacts and resource usage of the hospital are analyzed. This includes energy consumption, waste management, water usage, and carbon footprint assessment. Based on this assessment, specific short-term, mid-term, and long-term goals are established to reduce the environmental impact.

In the short-term, the SOP mandates immediate actions such as implementing energy-efficient lighting, optimizing water usage, and initiating waste segregation and recycling programs. Mid-term actions focus on infrastructure improvements, such as installing renewable energy systems (e.g., solar panels), enhancing building insulation to reduce energy loss. Long-term actions involve strategic planning and investment in sustainable technologies and practices, such as developing green building standards for future expansions or renovations, integrating telemedicine to reduce patient travel emissions, and promoting the use of eco-friendly medical supplies.

Training and capacity building are crucial components of the SOP. Regular training sessions are conducted for hospital staff to ensure they understand and adhere to sustainable practices. Additionally, the SOP emphasizes continuous monitoring and evaluation. Key performance indicators (KPIs) related to energy savings, waste reduction, and water conservation are tracked, and regular audits are performed to ensure compliance with sustainability goals.

The SOP also includes guidelines for stakeholder engagement, encouraging collaboration with local communities, government agencies, and environmental organizations. This collaborative approach aims to foster a culture of sustainability within the hospital and the broader community. The SOP is designed to be a living document, regularly updated based on new technologies, best practices, and feedback from ongoing implementation.

8. Ten Components of Green Healthcare

The ten components critical to green Healthcare are:

1. **Leadership and Governance:** Establish a Green Healthcare Initiative Team, develop policies and guidelines, and allocate resources.

2. **Water and Sanitation:** Improve water efficiency, sanitation facilities, and drainage systems, and implement rainwater harvesting.

3. **Waste Management:** Develop a waste management plan, segregate and reduce waste, and promote recycling and composting.

4. **Energy Efficiency:** Conduct energy audits, implement energy-saving measures, and promote renewable energy sources.

5. **Green Building Design:** Incorporate sustainable design principles in new and existing healthcare facilities.

6. **Sustainable Transportation:** Encourage the use of public transportation, cycling, and walking, and promote the use of electric vehicles.

7. **Green Procurement:** Develop and implement a green procurement policy that prioritizes environmentally friendly products and services.

8. **Pharmaceuticals and Chemicals:** Reduce the use of harmful chemicals, promote the use of eco-friendly alternatives, and ensure proper disposal of pharmaceutical waste.

9. **Food Management:** Promote the use of local and organic food, reduce food waste, and ensure food safety.

10. **Community Engagement:** Involve the community in the planning and implementation of the GHI and raise awareness about environmental sustainability and health.

9. Green Healthcare Initiative Component-Wise Action Plan

Component-1: Leadership and Governance	**Activities** 1. "Formation of Green Health Initiative Team" through participation of different health service providers, local government, administration and community. 2. Training for health service providers (particularly for green health initiative team) on climate change impact on health, preparedness for emergency response and GHI 3. Participate in periodic meeting (at least 3 events) to share updates on GHI 4. Participate in periodic meetings (at least 2 events) to share updates and mobilize local resources for green hospital initiative 5. Regular meetings for community engagement regarding green Healthcare initiatives	**Outcome Indicators** * Green Healthcare Initiative team formation * SOP on climate change impact on health, preparedness for emergency response and GHI * Summary meeting report addressing GHI updates and community engagement

Component-2: Water & Sanitation	1.Infrastructural improvement of Toilets at the Premises; as necessary-(assessment, listing, vendor enlistment and procurement, accomplishment & reporting) to make the toilets women, children and disable friendly 2. Establishment of appropriate system for safe water 3. Explore opportunities for Rainwater Harvesting System implementation along with other NGO in the areas 4. Develop guideline on water efficiency and rainwater harvesting through meeting with DPHE, HED and other working NGOs 5. Ensure provision of hand-washing device (system) for the staffs and patients at OPD/In-door 6. Improvement / maintenance of existing drainage system (need based)	* Line listing of necessary infrastructural improvements of Water and Sanitation (WATSAN) * Local level guideline on efficient water management * Handwashing arrangement at healthcare facilities * Improved drainage system
Component-3: Waste Management	1.Develop a roadmap for Waste Management including improved waste management practice guideline 2. Orientation of staff regarding waste management practices 3. Employ waste management supervisor to co-ordinate the workers	* Waste Management Roadmap *Deployment of Supervisor-waste management process * Skilled development of staffs on eco-friendly waste management

Component-4: Pharmaceuticals and Harmful Chemicals	1.Develop guideline for pharmaceuticals storage and distribution 2. Take initiative to make Mercury free Health Facilities (ensure minimum supply) 3. Train the staff involved in pharmaceuticals product storage & distribution to reduce wastage 4. Train the health workers regarding Chemical storage and disposal	* Guideline for pharmaceuticals storage and distribution * Supply of Mercury free logistics * Skilled staff and health workforce on harmless pharmaceuticals and chemical practice
Component-5: Food Management	1. Develop guideline for Food Safety Management including the use of echo-friendly cook stove 2. Arrange safer food preparation and management training for the personnel involved in food storage, preparation and distribution 3. Supply of necessary food safety equipment 4. Train the responsible staff to ensure food hygiene and safety	* Guideline for Food Safety Management * Trained staff on healthy food management *Supply of necessary food safety equipment
Component-6: Building/ Green Infrastructure	1. Develop guideline for green infrastructure covering energy efficiency, use of natural lighting and durable construction using climate resilient materials 2. Adding greenery through tree plantation including beautification and medicinal plants 3. Ensure safety of the patient from the ongoing construction 4. Arrange consultation with HED and UDCC to ensure sustainable and eco-friendly expansion of 100 bed is being completed.	* Guideline for green infrastructure with necessary recommendation * Tree plantation

Component-7: Energy Efficiency	1. Carbon footprint assessment at Healthcare Facilities by involving specialized vendor 2. Develop SoP for energy efficiency and reduction of carbon footprint with support from the specialized vendor 3. Train health workforce and staff on energy efficiency and reduction of carbon footprint along with standard carbon footprint reporting system with support from the vendor 4. Promote use of renewable energy in the Healthcare Facilities 5. Reinforce implementation of national cooling guideline for air condition 6. Post assessment of Carbon footprint at the Healthcare Facilities by the specialized vendor	* Pre-Post Carbon footprint assessment report * Decarbonization and Emission Removal strategy * Standardization of Emission Reporting mechanism * Trained staff on energy efficiency and reduction of carbon footprint
Component-9: Transportation	1. Pre-post Carbon footprint assessment for transportation by the specialized vendor 2. Develop Green Transport policy 3. Provide Green Transport policy training for the health staff 4. Develop action plan for emergency transportation support for emergency team mobilization upon discussion	* Pre & post Carbon footprint assessment report for transportation * Green Transport policy * Trained staff on green transportation * Action plan on emergency transportation
Component-9: Green Procurement	1. Develop Green procurement policy considering recyclability, biodegradability and eco-friendly logistics use 2. Provide Green procurement policy training for the health staff	* Green procurement policy * Trained staff on Green procurement policy

Component-10: Community Engagement	1. Include local government and community representative in the Green Health Initiative Team 2. raise awareness about environmental sustainability and health	

10. Monitoring and Evaluation Tool with Outcome Indicators

Deliverable	Indicator	Baseline	Means of Verification	Frequency of reporting	Responsible institutions
Component-1: Leadership and Governance					
Training on emergency preparedness and green initiatives	Number of staff trained	0	Training records, attendance sheets		Facility Head, RMO, Statistician, NGOs
Implementation of green hospital intervention	Number of interventions implemented	Current status of interventions	Project reports, site inspections		Facility Head, RMO, Statistician, NGOs
Component-2: Water & Sanitation					
Training on water efficiency	Number of staff trained	0	Training records, attendance sheets		Facility head, RMO, DPHE, NGOs
Improvement of sanitation facilities	Number of improved facilities	Current sanitation facilities	Site inspections, photos		Facility head, RMO, DPHE, NGOs
Improvement of drainage system	Reduced waterlogging incidents	Current drainage status	Inspection reports, site assessments		Facility head, RMO, DPHE, NGOs
Implementation of rainwater harvesting	Percentage of water supply from rainwater	Current water sources	Installation records, water usage reports		Facility head, RMO, DPHE, NGOs

Deliverable	Indicator	Baseline	Means of Verification	Frequency of reporting	Responsible institutions
Component-3: Waste Management					
Training of UHC staff	Number of staff trained		Training records, attendance sheets	Once	Facility head, NGOs
Appointment of waste management supervisor	Supervisor appointed		Appointment letter Monthly Report	Monthly	Facility head, NGOs
Waste segregation and awareness	Percentage of waste segregated	Current waste segregation rate	Waste audit reports	Monthly	Facility head, NGOs
Improved waste management system	Reduction in waste production	Current waste production level	Waste audit reports, monthly reviews	Annually	Facility head, NGOs
Independent and sustainable waste management	Sustainable practices implemented	Current waste management practices	Annual sustainability reports, audits	Annually	Facility head, NGOs
Component-4&5: Pharmaceuticals and Harmful Chemicals :					
Training on storage practices	Number of staff trained	0	Training records, attendance sheets		Facility head, Storekeeper, NGOs
Reduction in harmful chemical usage	Decrease in harmful chemical usage	Current chemical usage	Inventory records, usage reports		Facility head, Storekeeper, NGOs
Promotion of eco-friendly chemicals	Use of eco-friendly chemicals	Current chemical usage	Procurement records, usage reports		Facility head, Storekeeper, NGOs
Component-6: Food Management					
Training on food safety	Number of staff trained	0	Training records, attendance sheets		Facility head, Sanitary Inspector, NGOs

Deliverable	Indicator	Baseline	Means of Verification	Frequency of reporting	Responsible institutions
Implementation of safety measures	Use of safe practices	Current food safety practices	Inspection reports, safety audits		Facility head, Sanitary Inspector, NGOs
Promotion of local, organic food	Percentage of local, organic food used	Current food sourcing practices	Training records, attendance sheets		Facility head, Sanitary Inspector, NGOs
Component 7: Building Green Infrastructure					
Adding greenery in UHC	Number of green spaces added	Current green spaces	Site inspection reports, photos		Facility head, NGOS HED, DPHE
Utilization of natural light and durable materials	Implementation rate	Current infrastructure practices	Project reports, site inspections		Facility head, PHD, HED, DPHE
Component 8: Energy Efficiency					
Training on energy efficiency and emission reduction	Number of staff trained	0	Training records, attendance sheets		Facility head, Future Carbon, NGOs
Reduction in carbon footprint	Decrease in energy-related emissions	Current energy emissions	Energy usage & emissions reports		Facility head, Future Carbon, NGOs
Renewable energy integration	Renewable energy sources installed	Current energy sources	Installation records, energy reports		Facility head, Future Carbon, NGOs
Component 9: Transportation					
Training of UHC staff	Number of staff trained	0	Training records, attendance sheets	Once	Facility head, NGOs Future Carbon
Reduction of carbon footprint from transport	Decrease in carbon emissions	Current transport emissions	Emissions reports, transport logs	Quarterly	Facility head, NGOs
Component 10: Procurement					

Deliverable	Indicator	Baseline	Means of Verification	Frequency of reporting	Responsible institutions
Training of staff on procure sheets	Number of staff trained	0	Training records, attendance		Facility head, Storekeeper, Future Carbon, NGOs
Reduction of carbon footprint from procurement	Decrease in carbon emissions	Current procurement emission	Procurement records, emissions reports	Quarterly	Facility head, Storekeeper, Future Carbon, NGOs
Eco-friendly procurement practices	Implementation of green procurement policies	Current procurement policies	Procurement records, audit reports		Facility head, Storekeeper, Future Carbon, NGOs

11. Green Healthcare Initiative in Mongla Upazila Health Complex- A case study

Road to Green Healthcare Initiative in Mongla UHC

In 2010, the Ministry of Health and Family Welfare (MoHFW) of Bangladesh established the Climate Change and Health Promotion Unit (CCHPU) to bolster the health system's capacity to address the health impacts of climate change. The primary goal of this unit is to integrate climate change considerations into the Government of Bangladesh's policies, focusing on emerging issues that arise due to climate change.

Over the past decade, the CCHPU has actively collaborated with various national and international stakeholders to achieve its objectives. Notably, with technical support from the United Nations Population Fund (UNFPA) and funding from the Foreign, Commonwealth & Development Office (FCDO), the CCHPU launched the project "Addressing Impact of Climate Change on Women and Girls' Health and Wellbeing" in October 2022. This initiative aims to enhance the resilience of women and girls to climate change in selected areas of Bangladesh.

Partners in Health and Development (PHD), a renowned entity in the field of public health in Bangladesh is implementing the project titled "Improving Women and Girls' Resilience to Climate Change (IWGRCC)" and covers twelve unions in the Bhola and Bagerhat Districts. The project is funded by the FCDO, with technical assistance from UNFPA, its purpose is to develop a resilient community capable of addressing climate-related shocks and their impact on women's and girls' health. This includes raising awareness and preparing to respond to climate-induced vulnerabilities and risks, particularly in the area of Sexual and Reproductive Health Services and Rights (SRHR).

As part of this broader effort, PHD, with support from its local partner KMSS and under the technical guidance of the CCHPU, is implementing a Green Hospital initiative at the Mongla Upazila Health Complex in the Bagerhat district. This initiative is designed to serve as a demonstration model, showcasing how health services can be adapted to be more resilient to climate change. The CCHPU provides technical expertise and support to ensure the successful implementation of this project, aligning with the overarching goal of creating a climate-resilient health service infrastructure.

The Green Healthcare initiative at Mongla Health Complex aims to integrate sustainable practices and technologies to reduce the environmental impact of healthcare delivery. This includes optimizing resource use, minimizing waste, and ensuring that the facility can continue to operate effectively during climate-related disruptions. The initiative serves not only as a model for other health facilities in Bangladesh but also contributes to the overall objective of enhancing the resilience of the healthcare system to the effects of climate change

Baseline Situation Report of Mongla UHC

The Mongla Upazila Health Complex (UHC) requires a focused leadership and governance approach to prioritize environmental challenges and implement sustainable practices. Currently, the UHFPO, a public health specialist, demonstrates capability in addressing these challenges, though there is room for improvement with proper technical and financial support. A recommended step is to establish clear environmental policies and allocate resources for their implementation. Forming a 'Green Health Initiative Team' to oversee sustainability efforts, coordinating with the Upazila Development Coordination Committee (UDCC), and conducting regular water maintenance audits are essential. Further, addressing sanitation issues, maintaining the rainwater harvesting system, and improving drainage systems will enhance hygiene and water efficiency at the facility.

The UHC faces significant challenges in waste management, pharmaceutical disposal, food safety, and energy use. Currently, there is no framework for pharmaceutical waste disposal, and kitchen practices involve traditional wood furnaces with inefficient waste disposal methods. To address these, capacity-building activities and SOP formulation for pharmaceutical waste, implementing food safety measures, and training stakeholders on sustainable practices are crucial. Energy consumption can be improved by adopting energy-saving measures like LED lighting, energy-efficient appliances, and renewable sources such as solar power. Conducting energy audits and carbon footprint measurements will also help identify areas for improvement and invest in energy-efficient technologies.

Additionally, the UHC infrastructure is outdated, lacking energy-efficient renovations and sustainable materials, making parts of the facility unusable due to structural fragility. Future construction and renovation should incorporate green building principles such as energy efficiency, natural lighting, and sustainable materials. Waste management practices need enhancement through segregation, proper disposal, recycling, and composting programs, alongside appointing dedicated personnel for waste monitoring. Finally, sustainable transportation options and green procurement policies must be promoted to reduce carbon emissions and environmental impact, ensuring the facility’s operations align with eco-friendly standards.

Carbon footprint measurement of Mongla upazila health complex

This was the first Carbon Footprint Calculation Report for Mongla Upazila Health Complex (MUHC) facilitated by Climate Change and Health Promotion Unit (CCHPU). The Green House Gas (GHG) inventory assessment of MUHC was an undertaking of the Green Healthcare Initiatives (GHI), a continuous endeavor toward its commitment to environmental protection. This report provides insight into GHG- emitting activities within the assessment boundaries of MUHC resulting from fossil fuel combustion, fugitive emissions, purchased electricity, and other hospital activities.

Future Carbon was responsible for measuring MUHC 's carbon footprint during the reporting period. The GHG inventory of MUHC has been calculated and reported in compliance with the GHG Protocol. The report examined the environmental impact of the hospital, focusing on its carbon emissions across various operational activities. Through comprehensive data analysis and assessment, it aims to shed light on the hospital sector's contribution to climate change and identify areas for improvement.

In the report, carbon footprint had been calculated based on three scopes [Scope 1, Scope 2, Scope 3]. Scope 1 is the emission that comes from the hospital’s direct operation and that can be controlled. Scope- 2 emissions are indirect emissions generated from purchased energy. Scope 3 encompasses emissions that are not produced by the hospital itself and are not the result of activities from assets owned or controlled by them, but by those that are indirectly responsible for up and down its value chain. The GHG emission is measured in tonnes of carbon dioxide per equivalent (tCO2e).

Greenhouse gas reporting activities

GHG emissions of Mongla Upazila Health Complex was measured from their operational activities of Fuel Consumption, Owned or Controlled Vehicles, Refrigerants Uses, Purchased Electricity, Material Uses, Waste disposal, Employee Commuting, Freighting Goods, Food Consumption, and Water Supply.

Total reporting GHG emission

The reporting period to measure GHG was May 1 2024 to June 30 2024. The overall total GHG emission of this report was 153.62 tCO2e (tonnes of carbon dioxide per equivalent). From this emission, Scope-1 is 107.61 tCO2e that represents 70.05% of gross emission, Scope-2 is 12.90 tCO2e that represents 8.39% of gross emission, and Scope-3 is 33.11 tCO2e that represents 21.55% of gross emission.

Annexure

SEVEN STEPS TOWARDS GREEN HEALTHCARE IMPLEMENTATION

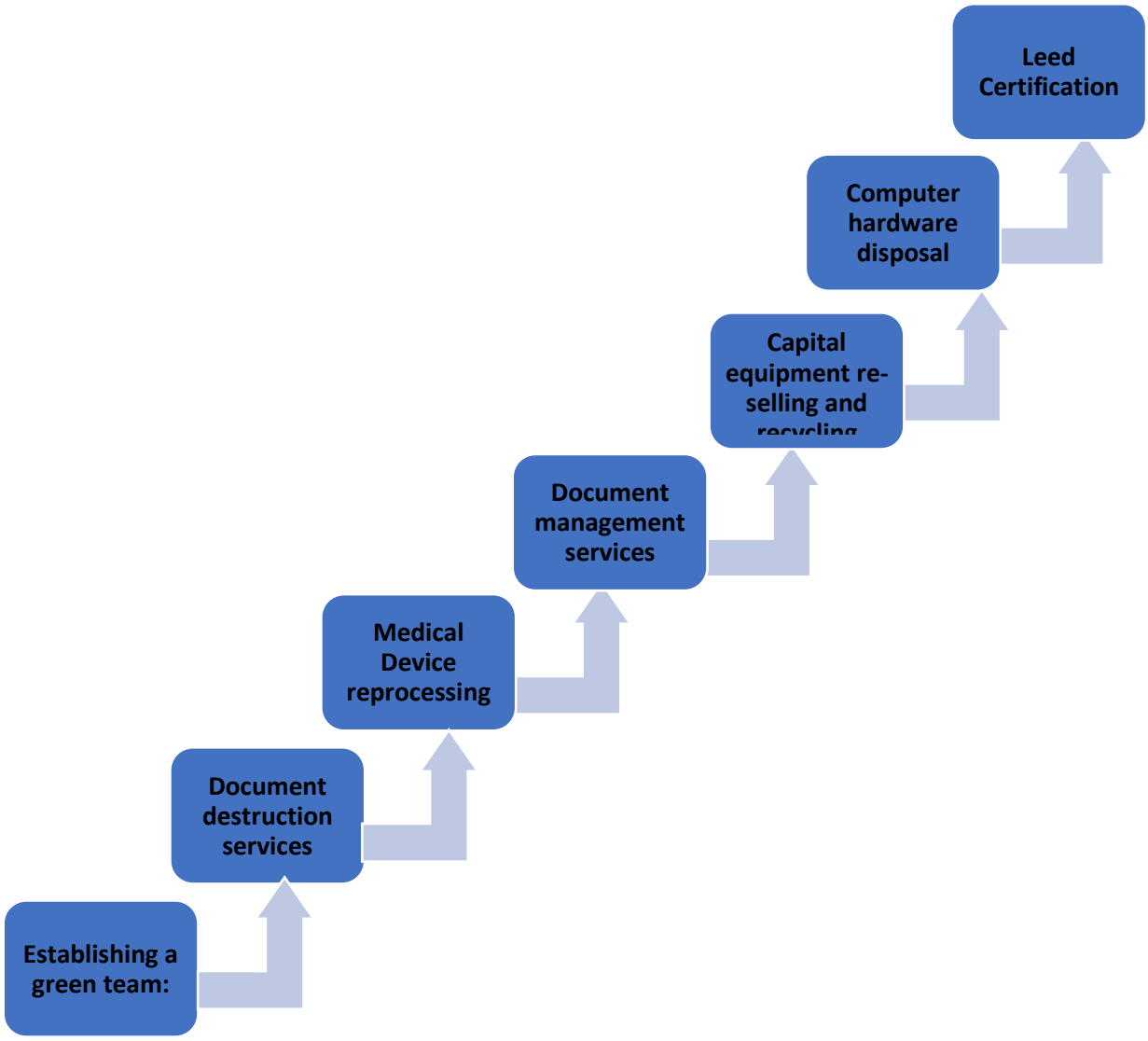

Fig : The step by step process of LEED (Leadership in Energy and Environmental Design) rating for health care services centres