IOSR Journal of Dental and Medical Sciences (IOSR-JDMS)
e-ISSN: 2279-0853, p-ISSN: 2279-0861.Volume 24, Issue 1 Ser. 3 (January. 2025), PP 57-64
www.iosrjournals.org

Assessment On Green And Climate Resilient Healthcare Facility In Imphal, Manipur: A Cross-Sectional Study

Ranchandra Nandeibam[1], Laishram Jaleshwar Singh[2], IrengbamHomendro Ningthouja[3], KhagembamSonarjit Singh[4], Jalina Laishram[5*], HanjabamSanayaima Devi[6]
[1,3,4,5,6](DepartmentOf Community Medicine, RIMS, Imphal, Manipur,India)
[2](DepartmentOf Surgery, RIMS,Imphal, Manipur, India)
*Corresponding author

Abstract:
Background*: Climate change is a growing threat to human health, and keeping healthcare facilities green and climate resilient is paramount. Climate change has affected all sectors of society, and preparing our healthcare facilities to be resilient and sustainable is prioritized in the National Programme for Climate Change and Human Health. There is limited data on the preparedness of healthcare facilities to mitigate the health hazard of climate change in Manipur. Hence, this study was conducted to assess the preparedness of green and climate-resilient healthcare facilities in Imphal, Manipur*

Materials and Methods*: A cross-sectional study among 17 public health facilities of Imphal, Manipur was conducted from December 2023 to January 2024. Data collection was done by observation, record review and staff interviews in a structured checklist, adapted from guidelines for Green and Climate Resilient Healthcare Facilities, NPCCHH, using a question-to-question guide for scoring. Data were analyzed by using the IBM SPSS version. 26 for Windows (IBM, Armonk, New York, USA).*

Results*: The PHCs and CHCs had medium level of preparedness having a score of 56.7% and 56.06% respectively. HWC had high level of preparedness with a score of 75.9%.*

Conclusion: *HWC had a higher level of preparedness on green and clime resilient as compared with PHCs and CHCs.*

Key Word:_Green and climate resilient; health care facilities; Manipur._

Date of Submission: 06-01-2025 Date of Acceptance: 16-01-2025

I. Introduction

World Health Organization defined 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-sensitive health risks are disproportionately felt by the most vulnerable and disadvantaged group of people, namely poor communities, migrants or displaced persons, older populations, and those with underlying health conditions.[1] Climate change heightens waterborne and foodborne disease risks. Heat-related deaths among those over 65 years have risen by 70% in the last two decades. WHO projects 250,000 yearly deaths by the 2030s due to climate change impacts on diseases like malaria and coastal flooding.[2] The imperative to develop healthcare infrastructures that are both green and climate-resilient has gained unprecedented significance. Healthcare systems are responsible for 4-5% of the emissions of greenhouse gases. The combined toxic and infectious properties of medical waste represent an underestimated environmental and public health threat.[3] WHO Guidance for climate-resilient and environmentally sustainable healthcare facilities, 2020 promotes actions that both reduce carbon emissions and improve health, build better, more climate-resilient and environmentally sustainable health systems and protect health from the wide range of impacts of climate change. WHO defines "climate-resilient and environmentally sustainable healthcare facilities as one that anticipate, respond to, cope with, recover from and adapt to climate-related shocks and stresses, minimize the negative impacts on the environment and leverage opportunities to restore and improve, bring ongoing and sustained health care to their target population and protect the health and well-being of future generations".[4]India's National Programme on Climate Change and Human Health (NPCCHH) was established in 2019. It is a flagship program of the MoHFW to strengthen the country's health system's response to climate change. The program aims to reduce morbidity, mortality, and health vulnerability to climate variability and extreme weather events. NPCCHH guidelines for green and climate-resilient healthcare facilities focus on five domains: Energy conservation, Water conservation, Smart building, Green healthcare facility, and Waste management. Healthcare facilities are the primary defense against climate change impacts, as they provide the necessary services and care to people affected by weather events and other long-term climate hazards.[5] Manipur is a northeastern state of India. Given its geographical location and climatic conditions, it is highly susceptible to the impacts of climate change, including extreme weather events like droughts, intense rainfall, and flooding. Since healthcare facilities are central to mitigating climate-related health risks, assessing their preparedness and resilience is critical. Aligning with WHO's framework for climate-resilient healthcare and NPCCHH, this study was conducted to assess the preparedness of primary healthcare facilities for green and climate resilience in Imphal, Manipur.

II. Materials And Methods

Study design: Cross-sectional study

Study Location:This study was conducted in 17 government primary healthcare facilities in two districts of Manipur, namely Imphal East district and Imphal West district. Manipur has four medical colleges, three government and one private. The state has seven district hospitals, two sub-divisional hospitals, and 421 Primary Health Sub-Centres (PHSCs). Imphal East district has 1 CHC and 14 Primary Health Centres (PHCs), while Imphal West district has 3 CHC and 11 PHCs.

Study Duration: December 2023 to January 2024.

Sample size: 17 government primary healthcare facilities.

Sample size calculation: Sample size was not calculated as we intended to cover all primary healthcare facilities in Imphal East and Imphal West districts.

Subjects & selection method: All government primary health facilities in Imphal East and Imphal West were selected for the study. Sampling was not done as we intended to cover all the government primary healthcare facilities.

Exclusion criteria: Those facilities from which we could not obtain approval were excluded.

Procedure methodology:

A checklist adapted from guidelines for Green and Climate Resilient Healthcare Facilities, NPCCHH5, comprising 51 items under five domains, was used to assess green and climate-resilient facilities. The five domains include energy conservation (13 items), water conservation (9 items), smart building (5 items), green health facilities (6 items) and waste management (18 items). Scoring was done by assigning each item a score ranging from 1 to 3 against three action levels classified 1 as (unavailable/unable), 2 as (in progress/incomplete) and 3 as (completed/achieved). The cumulative mean score was assessed for each item and the domains.

Operational definition: Preparedness of green and climate-resilient healthcare facilities was classified as Low (33.3%), Medium (33.4-66.4%), and High (≥ 66.7%).

Operational definition: Preparedness of green and climate-resilient healthcare facilities was classified as Low (33.3%), Medium (33.4-66.4%) and High (≥ 66.7%).

After explaining the purpose of the study, permission was sought from the chief medical officers of the respective districts and medical officers in charge of the healthcare facilities. The survey was completed using observation (OB), reviewing the records (RR), and face-to-face interviews (SI) with the doctor or nurse in a structured checklist using a question-to-question guide for scoring. Any queries or doubts were clarified during data collection.

Ethical approval was sought from the Research Ethics Board, Regional Institute of Medical Sciences (RIMS), Imphal. Verbal informed consent was obtained from the in-charge of the health facility. A unique code number was assigned, and no names were taken. Data collected were kept secure in a locker and were accessible only to the investigators.

Statistical analysis: Data collected were checked for completeness & consistency. Analyses were done using the IBM SPSS version 26 for Windows (IBM, Armonk, New York, USA) and presented as descriptive statistics (frequency, percentage, mean). The overall preparedness of the healthcare facilities was assessed and represented by a radar diagram.

III. Result

A total of 17 primary healthcare facilities participated in the study, including 12 PHCs (6 from Imphal East and 6 from Imphal West), 4 CHCs (3 from Imphal West and 1 from Imphal East) and 1 HWC from Imphal West.

The preparedness of healthcare facilities in green and climate-resilient practices varied across Health and Wellness Centre (HWC), Primary Health Centres (PHCs), and Community Health Centres (CHCs), as assessed by specific items and details are available in the supplementary table.

For energy conservation, HWCs demonstrated strong performance in areas like replacing incandescent bulbs with LED lights and using 3-star or higher-rated appliances, which were achieved entirely. However, advanced measures like occupancy sensors and energy audits were unavailable, scoring one across all facilities. PHCs and CHCs showed moderate progress in LED replacement, achieving average scores of 2.92±0.29 and 2.75±0.50, respectively. Installation of solar panels was completed and functional in all the CHCs, whereas PHCs showed incomplete progress with an average score of 2.17±0.58.

In water conservation, HWCs and PHCs made partial progress in implementing low flow plumbing fixtures, scoring two and 1.83±0.72, respectively. Rainwater harvesting systems were achieved in HWC, while PHCs and CHCs showed incomplete progress with average scores of 2.67±0.78 and 2±1.16, respectively. Water audits and staff training on water conservation strategies remained unavailable in all facilities.

Regarding smart building features, HWC fully implemented separate male and female toilets and achieved updated fire safety systems. PHCs and CHCs made partial progress, scoring 2.67±0.78 and 2.5±1.00, respectively, in having separate toilets. Basic infrastructure features, such as illuminated exit routes and disabled-friendly facilities, were unavailable in most facilities, scoring 1.

For green healthcare facility initiatives, HWC achieved excellent implementation in the development of herbal gardens, scoring 3, and showed moderate progress in building insulation, scoring 2. PHCs and CHCs moderately implemented herbal gardens, with average scores of 2.5±0.80 and 2.5±0.58, respectively. However, advanced infrastructure solutions, such as high-performance glass, were unavailable in all facilities.

In waste management, HWC performed strongly, achieving full implementation of waste segregation with a score of 3 and compliance with Biomedical Waste (BMW) guidelines, also scoring 3. PHCs and CHCs showed partial progress in waste segregation, with average scores of 2.58±0.79 and 2.0±1.16, respectively, and in the use of PPE for waste handling, scoring 2.5±0.91 and 2.5±1.00. Advanced waste reduction programs, such as food waste management, were unavailable in all facilities.

Table 1 shows the domain-wiseGreen & Climate Resilient preparedness level in Health and wellness centre (HWC) and among the five domains highest score was observed in waste management with a score of 84.62%. The level of preparedness was found to be high as the score was 75.93%.

Table 1: Domain-wise Green & Climate Resilient preparedness level of HWC (n=1)

Domain	Score range	Obtained score	Score (%)	Level of preparedness
Waste Management	13-39	33	84.62	High
Green Healthcare facility	2-6	5	83.33	High
Smart building	5-15	11	73.33	High
Energy conservation	11-33	24	72.73	High
Water conservation	5-15	9	60.0	Medium
Total	**36-108**	**82**	**75.93**	**High**

Table 2 shows the domain-wise Green & Climate Resilient preparedness level in Primary Health Centres (PHCs), and the green health care facility domain obtained the highest score of 61.11% in comparison to the remaining four domains. The level of preparedness among primary health centres was medium as the score was 56.70%.

Table 2: Domain-wise Green & Climate Resilient preparedness level of PHCs (n=12)

Domain	Score range	Obtained score	Score (%)	Level of preparedness
Waste Management	17-51	29.42	57.69	Medium
Green Healthcare facility	3-9	5.5	61.11	Medium
Smart building	5-15	8.5	56.67	Medium
Energy conservation	13-39	21.85	56.03	Medium
Water conservation	6-18	9.58	53.22	Medium
Total	**44-132**	**74.85**	**56.70**	**Medium**

Table 3 shows the domain-wiseGreen & Climate Resilient preparedness level in Community Health Centres (CHCs) and energy conservation was in the best preparedness level with a score of 62.82% compared with the remaining domains. The level of preparedness among community health centres was medium as the score was 56.06%.

Table 3: Domain-wise Green & Climate Resilient preparedness level of CHCs (n=4)

Domain	Score range	Obtained score	Score (%)	Level of preparedness
Waste Management	18-54	29.5	54.63	Medium
Green Healthcare facility	6-18	8.75	48.61	Medium
Smart building	5-15	8.75	58.33	Medium
Energy conservation	13-39	24.5	62.82	Medium
Water conservation	9-27	12.75	47.22	Medium
Total	**51-153**	**84.25**	**56.06**	**Medium**

Figure 1 shows theoverall preparedness level of Green and climate-resilient healthcare facility in domain-wise. The health and wellness Centre had the highest overall score as shown in green colour. Primary health Centre and community health Centre obtained almost a similar overall score as they were depicted in green and dark blue colours, respectively.

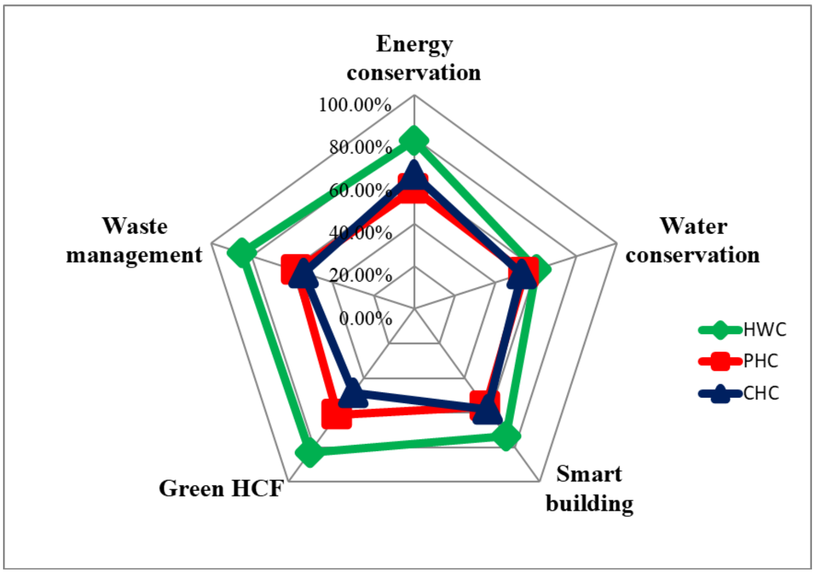

Figure 1: Overall preparedness level on Green and Climate Resilient Heath care facility domain wise

IV. Discussion

This study comes at a critical time when climate change is no longer a distant threat but an undeniable reality. Manipur has experienced increasing climate variability, including erratic rainfall patterns, rising temperatures, and frequent extreme weather events such as floods, droughts, and landslides. These challenges disrupt essential healthcare services, underscoring the need for resilient and sustainable systems.

The assessment was guided by the National Programme on Climate Change and Human Health (NPCCHH) guidelines and WHO's framework for climate-resilient and environmentally sustainable health systems (WHO, 2020).5 The study categorized the preparedness of healthcare facilities into three action levels—low (unavailable/unable), medium (in progress/incomplete), and high (completed/achieved)—to evaluate five key domains: energy conservation, water conservation, waste management, smart building, and green healthcare facility. Despite time and resource constraints limiting the sample size, this study provides valuable baseline insights into the region's current state of healthcare resilience.

The findings revealed that Health and Wellness Centres (HWC) demonstrated higher preparedness, achieving a score of 75.9%, compared to Primary Health Centres (PHCs) and Community Health Centres (CHCs), which scored 56.7% and 56.06%, respectively. The smaller operational scale and targeted initiatives at HWCs likely contributed to this higher compliance.

Healthcare facilities faced significant challenges in adopting renewable energy solutions, conducting energy audits, and implementing advanced conservation strategies. For instance, the HWC entirely replaced LED lights, but energy audits remained unavailable. CHCs achieved the adoption of solar panels, while PHCs lagged. While replacing incandescent bulbs with LED lights and using energy-efficient appliances showed progress, occupancy sensors and renewable energy systems were largely absent. For instance, a study in Sri

Lanka by Farley et al.6 revealed that only 12.9% of healthcare facilities utilized solar photovoltaic systems, reflecting a global trend of slow adoption of clean energy solutions. Findings from international studies, including work by Borg et al.7, combine passive energy strategies with renewable energy systems and offer significant benefits, such as high-performance glass for windows, doors, and roofs that enhance energy efficiency and thermal comfort by reducing heat retention while allowing natural light. This is crucial in areas like Manipur, where rising temperatures and extreme weather demand resilient infrastructure. However, the assessment indicated low-to-medium compliance in energy conservation at Primary Health Centres (PHCs) and Community Health Centres (CHCs).

Significant gaps were identified in the implementation of water conservation strategies. Primary Health Centres (PHCs) and Community Health Centres (CHCs) showed incomplete progress in areas such as rainwater harvesting, greywater recycling, conducting water audits, and providing staff training on water conservation methods. Health and Wellness Centre (HWC) made moderate progress by adopting basic measures like low-flow plumbing fixtures. However, there was a complete lack of sewage and effluent treatment infrastructure in all healthcare facilities. A study in drought-prone Sri Lanka (Wijesekara et al.8) found only 25% of hospitals had actionable water management plans, highlighting a global issue in water sustainability, particularly in vulnerable regions. For Manipur, with its droughts and intense rainfall, systematic strategies are critical.

Healthcare waste management in facilities exhibited significant shortcomings, particularly in waste segregation and standardized disposal practices. Most facilities lacked basic infrastructure, such as color-coded bins, and relied on outdated methods, increasing environmental and health risks. A study conducted in Kurdistan by Yari et al.9 reported similar challenges, with healthcare facilities scoring 42.3% in waste management due to infrastructural and operational limitations. This highlights a widespread issue where inadequate waste management stems from systemic gaps, including insufficient training, limited resources, and a lack of oversight mechanisms. The NPCCHH guidelines stress the importance of waste segregation at the source, periodic waste audits, and adopting eco-friendly technologies like autoclaving and incineration. However, compliance remains partial in Manipur's healthcare facilities. While there has been moderate adherence to basic waste segregation practices aligned with BMW (Biomedical Waste) guidelines, gaps in waste minimization programs and audits persist. In addition, the absence of advanced solutions, such as biodigesters for sewage treatment and food waste reduction initiatives, limits the potential for sustainable waste management. Addressing these deficiencies is essential for reducing the environmental footprint of healthcare operations and ensuring safer, cleaner healthcare environments.

Workforce capacity and training were other key gaps identified, with most healthcare staff lacking training on climate resilience and disaster preparedness. Sambath et al.10 revealed similar workforce challenges in India, where healthcare workers had limited awareness of delayed climate impacts such as malnutrition and long-term health risks. Additionally, a study by Phalkey et al.11 in Orissa following the 2008 floods highlighted how the absence of standard operating procedures and disaster-specific training limited healthcare facilities' ability to respond effectively to emergencies. These observations align with the findings in this study, emphasizing the need for regular capacity-building workshops and simulation exercises to enhance the preparedness of healthcare staff in Manipur.

The healthcare facilities in this study showed low compliance regarding smart building features, particularly in the availability of fire safety systems, disabled-friendly infrastructure, and properly marked exit routes. While facilities demonstrated moderate progress in installing essential fire safety equipment, significant gaps were noted in ensuring inclusivity through accessible toilets and maintaining updated floor layouts with clearly marked exit routes.

The green healthcare domain reflected low levels of implementation, with most facilities failing to incorporate advanced solutions like high-performance glass or insulated panels to enhance energy efficiency and patient comfort. However, initiatives such as developing herbal gardens were more common, reflecting some efforts toward creating environmentally sustainable facilities.

One of the strengths of this study is its relevance, especially as climate change increasingly threatens healthcare systems. By utilizing well-established frameworks, such as the NPCCHH guidelines and the WHO framework, the study offers actionable insights for stakeholders, policymakers, and healthcare administrators. It serves as an evidence-based foundation for identifying areas that need intervention and promoting future research on green and climate-resilient healthcare systems.

Due to time and resource constraints, not all healthcare facilities in the state could be included. This restricts the generalizability of the results to the entire state of Manipur. Nevertheless, the study provides essential baseline information highlighting key gaps and priority areas for intervention.

To build upon the findings of this study and address its limitations, future studies should incorporate a more significant number of healthcare facilities to provide more comprehensive and generalizable results. Furthermore, it is essential to include an assessment of the infrastructure domain, which was not a primary focus of this study. Evaluating infrastructure resilience, such as structural design, safety, and disaster-proofing measures, would offer a more holistic understanding of healthcare preparedness for climate change and enable stakeholders to implement more robust, long-term interventions

V. Conclusion

HWC had a higher level of preparedness for green and climate resilience than PHCs and CHCs, which had a medium level of preparedness. Aligning with WHO's framework for climate-resilient healthcare and NPCCHH, this study addresses gaps in energy conservation, water management, smart infrastructure, and waste management

References

[1]. World Health Organisation; Health Topics; Climate Change. [Cited 2024 Jun 18]. Available From: Https://Www.Who.Int/Health-Topics/Climate-Change#Tab=Tab_2 Accessed On November 2, 2023.

[2]. World Health Organization. Climate Change And Health [Internet]. Geneva: World Health Organization; [Cited 2024 Jun 18]. Available From: Https://Www.Who.Int/News-Room/Fact-Sheets/Detail/Climate-Change-And-Health. Accessed On November 2, 2023.

[3]. National Centre For Disease Control. Guidelines For Green And Climate Resilient Healthcare Facilities [Internet]. Available From: Https://Ncdc.Mohfw.Gov.In/Writereaddata/L892s/51399679811682590311.Pdf. Accessed On November 2, 2023.

[4]. World Health Organization. Who Guidance For Climate-Resilient And Environmentally Sustainable Healthcare Facilities [Internet]. Geneva: World Health Organization; 2020. Available From: Https://Iris.Who.Int/Bitstream/Handle/10665/335909/9789240012226-Eng.Pdf?Sequence= 1. Accessed On November 3, 2023.

[5]. Npcchh Guidelines For Green And Climate Resilient Healthcare Facilities. National Centre For Disease Control, Ministry Of Health And Family Welfare, Government Of India. Available From: Https://Ncdc.Mohfw.Gov.In/Index1.Php?Lang=1&Level=2&Sublinkid=877&Lid=660. Accessed On November 2, 2023.

[6]. Farley Jm, Suraweera I, Perera Wl, Hess J, Ebi Kl. Evaluation Of Flood Preparedness In Government Healthcare Facilities In Eastern Province, Sri Lanka. Global Health Action. 2017 Jan 1;10(1):1331539.

[7]. Borg Fh, Greibe Andersen J, Karekezi C, Yonga G, Furu P, Kallestrup P, Kraef C. Climate Change And Health In Urban Informal Settlements In Low-And Middle-Income Countries–A Scoping Review Of Health Impacts And Adaptation Strategies. Global Health Action. 2021 Jan 1;14(1):1908064.

[8]. Wijesekara Nw, Wedamulla A, Perera S, Pesigan A, Ofrin Rh. Assessment Of Drought Resilience Of Hospitals In Sri Lanka: A Cross-Sectional Survey. Who South-East Asia Journal Of Public Health. 2020 Apr 1;9(1):66-72.

[9]. Yari A, Zarezadeh Y, Fatemi F, Ardalan A, Vahedi S, Yousefi-Khoshsabeghe H, Boubakran Ms, Bidarpoor F, Motlagh Me. Disaster Safety Assessment Of Primary Healthcare Facilities: A Cross-Sectional Study In Kurdistan Province Of Iran. Bmc Emergency Medicine. 2021 Dec;21:1-9.

[10]. Sambath V, Narayan S, Kumar P, Kumar P, Pradyumna A. Knowledge, Attitudes And Practices Related To Climate Change And Its Health Aspects Among The Healthcare Workforce In India–A Cross-Sectional Study. The Journal Of Climate Change And Health. 2022 May 1;6:100147.

[11]. Phalkey R, Dash S, Mukhopadhyay A, Runge-Ranzinger S, Marx M. Prepared To React? Assessing The Functional Capacity Of The Primary Health Care System In Rural Orissa, India To Respond To The Devastating Flood Of September 2008. Global Health Action. 2012 Dec 1;5(1):10964.

Supplementary table: Description of green and climate-resilient healthcare facility preparedness in Manipur

Energy conservation Domain					
Sl. no	**Items**	**Verification mode**	**HWC (n=1)**	**PHC (n=12)**	**CHC (n=4)**
1	Place suitable stickers above light switches and put posters in the staff and patient areas to make them aware of the energy savings	OB	1	1.17±0.58	2±1.16
2	An assigned person monitors all the departments during the rounds at the end of the day	SI/OB/RR	2	1.92±0.52	2.25±0.50
3	Labelling of the light switches done	OB	3	1.25±0.62	2±1.16
4	Replace all the incandescent bulbs with the LED lights at the facility	OB	3	2.92±0.29	2.75±0.50
5	Occupancy sensors in office areas, toilets, storerooms, and washroom facilities which ensure that light only operates when there is someone to utilize it	OB	1	1±0.00	1±0.00
6	Use of meshwork on windows of rooms, wards, and waiting rooms for natural ventilation of air	OB	2	1.58±0.79	1±0.00
7	Energy audits done periodically to optimize power utilization	RR/SI	N/A	1.17±0.58	1.5±1.00
8	Use 3 and above star rating equipment (ACs, Refrigerator) at the facility	OB	3	2.17±0.94	2.5±1.00
9	Installation of solar panels for optimum utilization of renewable sources of energy	OB	2	2.17±0.58	3±0.00
10	Load-bearing capacity of the solar panel at the facility (calculation is per bed/day)	RR/OB	3	1.5±0.91	1±0.00
11	Training should be given to the staff on energy conservation strategies	RR	1	1±0.00	1.5±1.00
12	Installation of sub-meter in the facility premises to	OB	N/A	1±0.00	1±0.00

	understand the energy usage pattern across the healthcare facility				
13	Consider BEE labelled /ISI marked energy efficient equipment and appliances for procurement	OB/RR	3	3±0.00	3±0.00
	Water Conservation Domain				
Sl.no	**Items**		**HWC**	**PHC**	**CHC**
1	Availability of low flow plumbing fixtures like taps with a flow restrictor, dual flush toilets, showers, etc. in the hand-washing area, washroom, and in-service area	OB	2	1.83 ± 0.72	1.5 ± 1.00
2	Sensor-operated urinals available in the washrooms.	OB/RR	1	1 ± 0.00	1 ± 0.00
3	Health facility has provision to promptly fix plumbing fixtures to reduce water wastage.	RR/SI	2	2.08 ± 0.67	2.5 ± 0.58
4	Availability of rainwater harvesting system to conserve water.	OB	3	2.67 ± 0.78	2 ± 1.16
5	Availability of Sewage Treatment Plant to recycle wastewater.	OB	N/A	N/A	1 ± 0.00
6	Availability of effluent treatment plant to treat the sewage.	OB	N/A	N/A	1.75 ± 0.50
7	Combined capacity of the Sewage treatment plant and effluent treatment plant to recycle water.	OB	N/A	N/A	1 ± 0.00
8	Training given to the staff on water conservation strategies.	OB		1 ± 0.00	1 ± 0.00
9	Water audit conducted in the facility to understand the usage pattern.	OB	N/A	1 ± 0.00	1 ± 0.00
	Smart building Domain				
Sl.no	Items		HWC	PHC	CHC
1	Availability of a disable friendly toilet in the facility	OB	1	1 ± 0.00	1.5 ± 1.00
2	Availability of separate male and female toilets in the facility.	OB	3	2.67 ± 0.78	2.5 ± 1.00
3.	Availability of updated floor layouts with clearly marked fire exit routes in it.	OB	3	1.5 ± 0.91	1.5 ± 1.00
4	All the exit, exit routes are properly illuminated.	OB	1	1 ± 0.00	1 ± 0.00
5	All the firefighting equipment, like fire extinguishers, sprinklers, fire detection systems, installed in the facility.	OB	3	2.33 ± 0.78	2.25 ± 0.96
	Green healthcare facility Domain				
SL.no	**Items**		**HWC**	**PHC**	**CHC**
1.	Use of high-performance glass on windows, doors, and roofs to prevent the heat inside and allows sunlight to enter the room.	OB	N/A	N/A	1 ± 0.00
2.	Use double glazing glass on windows; it provides thermal and optical properties to the building and reduce the noise level inside the Healthcare Facility and provide better comfort to the patient.	OB	N/A	N/A	1 ± 0.00
3	Use insulated black panels in the high glazed space area like waiting rooms.	OB	N/A	N/A	1.5 ± 1.00
4	Introduce electronic patient records in the facility to reduce the use of paper.	OB	N/A	1 ± 0.00	1 ± 0.00
5	Availability of herbal garden in the facility.	OB	3	2.5 ± 0.80	2.5 ± 0.58
6	Insulation of building from inside and outside.	OB	2	2 ± 0.43	1.75 ± 0.50
	Waste management				
SL.no	**Items**		**HWC**	**PHC**	**CHC**
1	Waste Management Committee for planning, monitoring, budgeting and training of waste management programme.	RR	3	2 ± 1.04	2 ± 1.16
2	Waste audits conducted in the facility to identify the areas where the maximum waste is generated.	OB	1	1 ± 0.00	1 ± 0.00
3	Implementation of waste minimization programme in the facility for the reduction of waste at the point of its generation.	SI/OB	1	1 ± 0.00	1 ± 0.00
4	Segregation of waste at source as per the BMW guidelines 2018 and initiate recycling.	OB	3	2.58 ± 0.79	2 ± 1.16
5	BMW management training programme conducted in the facility to educate the end-user.	RR	3	2.17 ± 1.03	2 ± 1.16
6	Connectivity with the biomedical waste agency is required for the transportation of waste.	RR	N/A	2.5 ± 0.91	2 ± 1.16
7	Availability of biodigester to treat the sewage in the facility.	OB	N/A	N/A	1.5 ± 1.00
8	Use PPE at the time of handling the waste.	SI/RR	3	2.5 ± 0.91	2.5 ± 1.00

9	Waste transported in the closed container trolley to prevent cross-contamination.	SI/OB	3	2.33 ± 0.99	2 ± 1.16
10	Monitor the treatment process from the facility to recycling plants, treatment centers, and landfill sites.	RR	1	1 ± 0.00	1 ± 0.00
11	Waste disposal as per the BMW guideline 2018	OB	3	2.5 ± 0.91	2 ± 1.16
12	Segregation of biodegradable solid waste and recyclable waste	OB	3	2.17 ± 1.03	2 ± 1.16
13	Hand over Bio-degradable solid waste to Municipal authority if not composted by the facility.	RR	3	2 ± 1.04	2.5 ± 1.00
14	Bulk garden and horticultural waste shall be kept un-mixed and composted at the source.	OB/SI	3	1.5 ± 0.91	2 ± 1.16
15	Implementation of food waste reduction programme in the facility	SI/RR	N/A	1 ± 0.00	1 ± 0.00
16	Food waste audit conducted in the facility to reduce the wastage of food.	RR/SI	N/A	1 ± 0.00	1 ± 0.00
17	Training given to the staff and patient on food waste reduction.	RR/SI	N/A	1 ± 0.00	1 ± 0.00
18	IEC material displayed near the food counter to educate the patient and staff for reducing the food wastage.	OB	3	1.17 ± 0.58	1 ± 0.00