Safe, climate-resilient and environmentally sustainable health care facilities

An overview

World Health Organization

Suggested citation. Safe, climate-resilient and environmentally sustainable health care facilities: an overview. Geneva: World Health Organization; 2024. https://doi.org/10.2471/B09119. Licence: CC BY-NC-SA 3.0 IGO.

Cataloguing-in-Publication (CIP) data. CIP data are available at https://iris.who.int/.

Design and layout by Lushomo.

Safe, climate-resilient and environmentally sustainable health care facilities

An overview

World Health Organization







Anti-clockwise from top left:

Gertrude holds up an insecticide-treated net that she has just received at the Child Welfare Clinic at St Francis Xavier Hospital in Assin Fosu, Central Region, Ghana, August 2023.
© WHO / Fanjan Combrink

Portrait of a grandfather who receives regular home visits from a family nurse based at Rudaki District Primary Health Centre, Tajikistan,September 2023.
© WHO / Mukhsin Abidzhanov

Mr Wong Geok, a patient at Outram Community Hospital,
poses for a portrait in Singapore,4 March 2021.
© WHO / Blink Media - Juliana Tan

Ruby with her son Jehmiel at the Child Welfare Clinic at St Francis Xavier Hospital in Assin Fosu,
Central Region, Ghana, August 2023.
© WHO / Fanjan Combrink

A portrait of a an elder woman, Moscow, Russian Federation, 2014.
© WHO / Sergey Volkov

Umaida holds with her 6-month-old son Muhammad, who has tested positive for malaria, March 2023, Pakistan.
© WHO / Panos Pictures / Saiyna Bashir

Contents

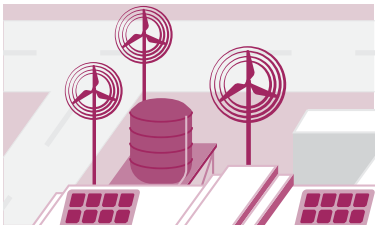
Acknowledgements Page v

Abbreviations Page v

Executive summary Page vi

What are safe, climate resilient and environmentally sustainable health care facilities? Page 01

Global progress towards safe, climate-resilient and environmentally sustainable health care facilities Page 05



How do health care facilities with poor WASH, waste management and electricity threaten health and what are the solutions? Page 07

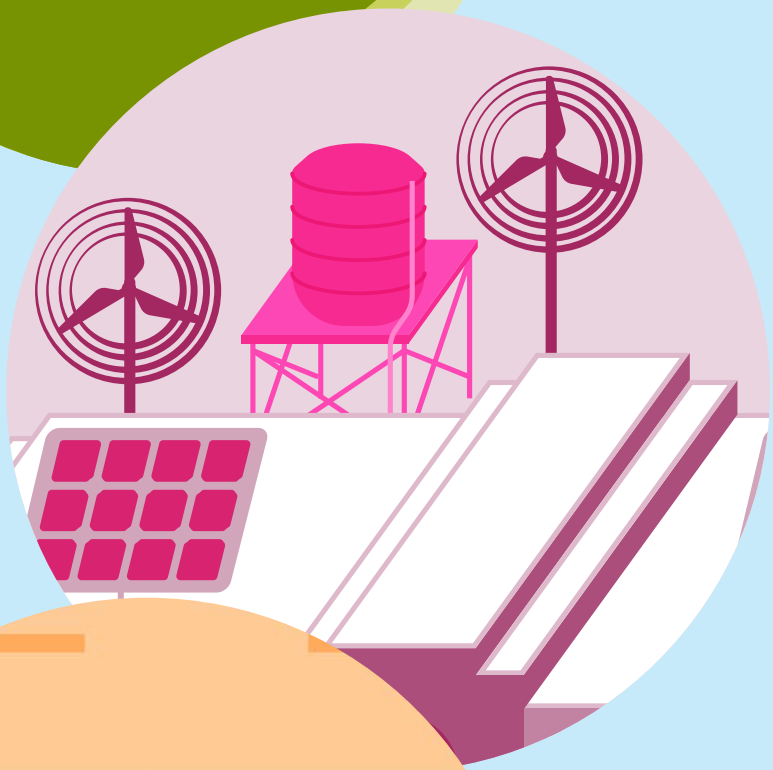
How can health care facilities be protected from climate change to ensure proper functioning and avoid disruptions? Page 12

How can health workers be protected? Page 19

Conclusions Page 24

References Page 27

Annex 1 Page 29



Acknowledgements

This report was written by Alexandra Egorova, Anandita Pattnaik and Jennyfer Wolf from the World Health Organization (WHO) Department of Environment, Climate Change and Health. Annette Prüss coordinated the project, and Maria Neira (Director of the Department) provided overall guidance.

Several staff from the World Health Organization (WHO) Department of Environment, Climate Change and Health provided valuable contributions. These include Diarmid Campbell-Lendrum, Bruce Gordon, Arabella Hayter, Ivan Ivanov, Margaret Montgomery, Dorothy Ngajilo, Lesley Onyon, Amy Savage, Ferid Shannoun, Emilie van Deventer, Cristina Vert, Elena Villalobos Prats and Salvatore Vinci.

Abbreviations

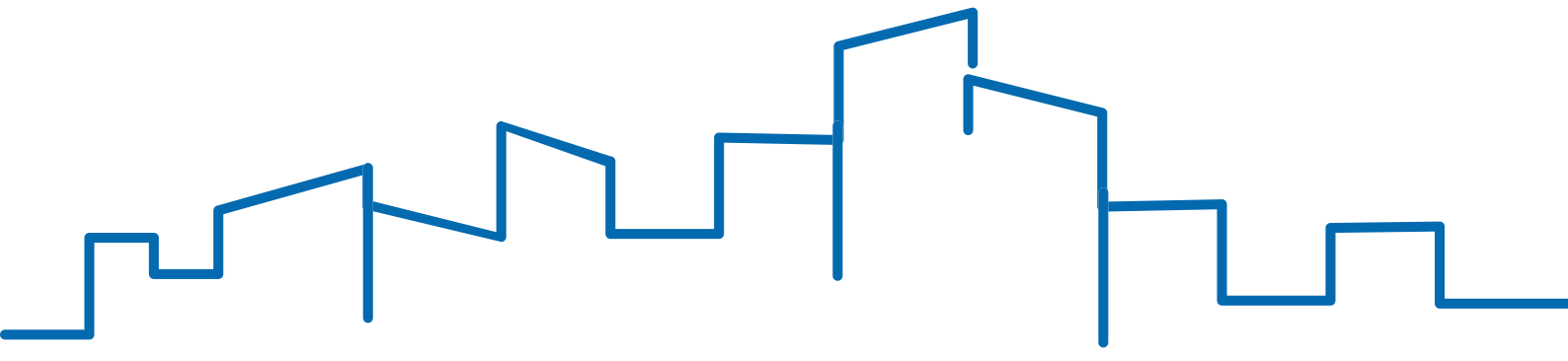
GHG	greenhouse gas
IAEA	International Atomic Energy Agency
ILO	International Labour Organization
UNICEF	United Nations Children's Fund
WASH	water, sanitation and hygiene
WASH FIT	Water and Sanitation for Health Facility Improvement Tool
WHO	World Health Organization

Executive summary

The aim of this overview is to provide thorough yet succinct information about safe, climate-resilient and environmentally sustainable health care facilities along with actionable strategies for implementing them.

The main audience for this overview includes health care facility managers, health practitioners and national authorities, such as ministries of health, water, infrastructure, energy and environment, and other global, national and subnational actors working on and with health care facilities.

This guide (i) provides an overview and definitions of safe, climate-resilient and environmentally sustainable health care facilities; (ii) lists concrete guidance about actions that can be taken to achieve them; and (iii) points to key materials, resources and tools that provide more detailed guidance and actions.




Environmental sustainability
Safe health care waste management
Safe chemical and radiation management
Climate resilience
Reliable electricity
Safe and sustainable WASH
Protection of health workers

What are safe, climate-resilient and environmentally sustainable health care facilities?

Health care facilities encompass all formally recognized facilities that provide health care, including primary or first-level care (such as health posts and clinics), secondary and tertiary care (specialist care provided at district or national hospitals), as well as public and private facilities, and temporary structures designed for use in emergency contexts *(1)*.

Functional basic infrastructure is indispensable to delivering high-quality care and services to patients. This includes **safe** and reliable supplies of electricity and water, sanitation and hygiene (WASH); cleaning and waste management services; sound management of both chemicals and radiation that protects patients, health workers and the general public; and a sufficiently trained, supported and protected health workforce.

Furthermore, health care facilities need to be **resilient** to the changing climate to safeguard and enhance public health, while also ensuring **environmental sustainability** through optimizing resources and reducing waste and pollutants discharged into the environment *(2)*.

The ongoing climate crisis will perpetuate added strain on health systems and health care facilities, exacerbating disease burdens among the populations served by these facilities and intensifying climate-related stressors such as extreme weather events (3). These challenges pose obstacles to pursuing universal health coverage.

Makariv Outpatient Clinic, Ukraine, July 2023.
© WHO / Christopher Black

Important definitions for safe, climate-resilient and environmentally sustainable health care facilities

A basic water service

A basic water service provides water from an improved source on premises.

Improved water sources include piped water, boreholes or tube wells, protected dug wells, protected springs, rainwater and packaged or delivered water *(4)*.

Reliable electricity

Reliable electricity is the stable supply of continuous electricity that meets all the needs of the health care facility *(5)*.

A basic environmental cleaning service

A basic environmental cleaning service means that basic protocols are available, and staff with cleaning responsibilities have all received training.

A basic sanitation service

A basic sanitation service includes improved sanitation facilities that are usable, with at least one toilet dedicated for staff, at least one sex-separated toilet with menstrual hygiene facilities, and at least one toilet accessible for people with limited mobility *(4)*.

Improved sanitation facilities include flush or pour flush toilets connected to piped sewer systems, septic tanks or pit latrines; pit latrines with slabs (including ventilated pit latrines); and composting toilets.

A basic hand hygiene service

A basic hand hygiene service provides functional hand hygiene facilities (with water and soap and/or alcohol-based hand-rub) at points of care and within 5 metres of toilets *(4)*.

A basic health care waste management service

A basic health care waste management service means that waste is safely segregated into at least three bins (separating sharps and infectious waste from other health care waste), and sharps and infectious waste are treated and disposed of safely *(4)*.

Climate-resilient and environmentally sustainable health care facilities

Climate-resilient and environmentally sustainable health care facilities anticipate, respond to, cope with, recover from and adapt to climate-related shocks and stresses. They do this while minimizing their negative impacts on the environment and by leveraging opportunities to restore and improve it, so as to bring ongoing and sustainable health care to their target population and protect the health and well-being of future generations *(2)*.

Health workers

Health workers include all people engaged in work that has the primary intention of improving health. This definition includes not only health service providers – such as doctors, nurses, midwives, public health professionals, laboratory technicians, health technicians, medical and non-medical technicians, personal care workers, community health workers, healers and practitioners of traditional medicine – but also people working in health management, support workers and members of other occupational groups in health-related activities – such as cleaners, drivers, hospital administrators, district health managers and social workers *(6)*.

Occupational health and safety programmes for health workers

Occupational health and safety programmes for health workers comprise planned and coordinated activities at the national, subnational and health facility levels that include governance, regulations and standards, human resources, financing and services aimed at *(6)*:

- preventing diseases and injuries arising from, linked with or occurring during the course of work;
- building healthier and safer working environments; and
- promoting the health and well-being of health workers.

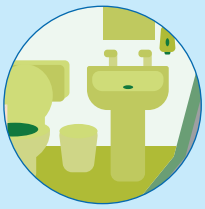
Sound management of chemicals

Sound management of chemicals takes place when chemicals are used and produced in ways that minimize their potentially significant adverse effects on human health and the environment *(7)*.

Radiation protection and safety standards

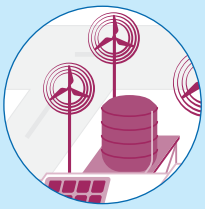
Radiation protection and safety standards provide recommendations and guidance for ensuring balance between utilizing the benefits of radiation and radioactive material in medicine and minimizing potential risks for patients, health workers and the general public *(8)*.

Global progress towards safe, climate-resilient and environmentally sustainable health care facilities – where do we stand in terms of …



… access to basic services?

- **More than 1 billion people** rely on health care facilities with no electricity or with unreliable access to it, and without WASH services or with inadequate WASH *(9)*.
- As of 2021, **22%** of health care facilities had no basic water supply, while **49%** had no basic hygiene service.
- Moreover, **1 in 10** health care facilities worldwide operated without any sanitation services, and many lacked basic practices for health care waste management *(4)*.
- These deficiencies contribute to the stark reality that annually **8 million lives are lost** from poor-quality care, especially in low-income countries *(11)*.



… climate resilience and environmental sustainability?

- Health care facilities are both directly impacted by the effects of **climate change** and at the forefront of managing the **health effects** of climate change on populations.
- Despite this crucial role, many health care facilities remain **ill-equipped** to effectively manage these impacts.
- Concurrently, health care facilities also play a role in **exacerbating climate change** through their emission of greenhouse gases (GHGs) *(2, 12)*.
- Presently, the health sector is responsible for more than **5%** of global GHG emissions *(13, 14)*.

… occupational health and safety and protection for health workers?

- Many frontline health workers have latent **tuberculosis** or suffer from chronic **lower back pain, depression, anxiety or insomnia**.
- Unsafe working conditions contribute to occupational illnesses, injuries and absenteeism, imposing a substantial **financial burden** on the health care sector, estimated to account for up to **2%** of health expenditures.
- Nonetheless, only **26 out of 195** World Health Organization (WHO) Member States have implemented policy instruments and national occupational health and safety programmes for health workers *(15)*.

… safely managing radiation and chemicals?

- Health care facilities are the settings for patient diagnosis and treatment and for clinical research, frequently involving the utilization of products and materials containing **toxic chemicals, plastics and radiation**. If not managed appropriately, these can be **harmful** to patients, staff and people in the community.
- The improper disposal of plastics and of chemical and radiation waste generated in health care settings poses potential **health risks** to both health workers and the general public.
- Reducing the amount of chemical and plastic waste generated and improving procurement and supply-chain management, as well as implementing special radiation protection programmes, are important aspects of **transforming** health care facilities to be safer, more climate-resilient and environmentally sustainable.

How do health care facilities with poor WASH, waste management and electricity threaten health and what are the solutions?

Safe WASH[1] and reliable electricity at health care facilities are crucial foundations for delivering primary health care and ensuring patient safety. These elements are indispensable for implementing fundamental and life-saving infection prevention and control measures, encompassing practices such as hand hygiene, injection safety, wound care, surgical procedures, standard medical protocols including immunizations, and the utilization of essential medical equipment (Fig. 1) (5, 9). Additionally, they are imperative for ensuring safe childbirth: annually, up to 1 million mothers and babies die due to unhygienic birthing conditions, including from preventable cases of sepsis *(16)*.

The provision of safe and inclusive WASH services and reliable electricity promotes the realization of the human right to WASH for health, while also advancing gender equity. Presently, the adverse impact of inadequate access to services disproportionately affects women and children. Furthermore, women constitute the majority of both the health workforce and of those seeking health care.

Safe and sustainable WASH and reliable electricity are indispensable for effectively responding to crises and public health emergencies, including pandemics, extreme weather events and challenges such as antimicrobial resistance. Additionally, these measures serve to safeguard the well-being of health workers, patients and the general public *(9)*. Progress towards achieving universal access to WASH services in health care facilities is far off track. Urgent and substantial scaling up and acceleration of efforts are needed to advance towards global targets.

These targets include ensuring that at least 80% of facilities possess basic WASH services by 2025, and that by 2030, all health care facilities worldwide have access to both WASH services and reliable electricity *(9)*.

Small Island Developing States (SIDS) Dominica, March 2024. © WHO / Daniel Hunt

1 The term "WASH in health care facilities" refers to the provision of water, sanitation, health care waste management, hygiene and environmental cleaning infrastructure and services across all parts of a facility *(1)*.

Kangaroo mother care, Ethiopia.
© WHO / Blink Media - Hilina Abebe

Fig. 1. Essential elements of WASH in health care facilities

Source: Figure adapted with permission from reference *(10)*.

Key actions for safe and sustainable WASH and reliable electricity in health care facilities

Conduct a baseline assessment and regularly monitor WASH, waste and electricity services through existing national monitoring systems and regularly analyse and disseminate data *(9)*.

Establish, implement and update standards for safe and sustainable WASH, health care waste, electricity and infection prevention and control, taking into consideration the impact of extreme events on health care settings and integrating such standards into accreditation and regulation systems *(9)*.

Develop, resource and implement national road maps, so that every health care facility can have and maintain safe and sustainable water and sanitation supplies, hygiene services and practices, waste management and reliable electricity *(9)*.

Improve and maintain infrastructure including through implementation of the WHO and United Nation's Children's Fund's (UNICEF) WASH FIT (Water and Sanitation for Health Facility Improvement Tool) *(10)* to systematically and incrementally improve WASH, waste management and environmental cleaning and electricity services *(9)*.

Empower and support the health workforce, including by providing training on using, performing and maintaining safe and sustainable WASH, health care waste management, and environmental cleaning and energy services, and proper hand hygiene *(9)*.

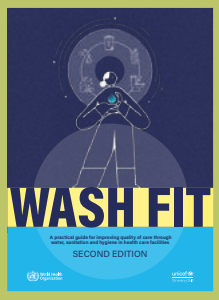
Key Resources

WHO and UNICEF's report about *Progress on WASH in health care facilities 2000–2021: special focus on WASH and infection prevention and control (4)* presents updated national, regional and global estimates of the availability of WASH in health care facilities, with a special focus on the linkages between WASH and infection prevention and control.

Learn more →

WHO and UNICEF's publication *Water, sanitation, hygiene, waste and electricity services in health care facilities: progress on the fundamentals (9)* focuses on global and national efforts and improvements to WASH, cleaning and health care waste management in health care facilities. It includes a list of national actions (i.e. practical steps) that can be taken to implement the key actions described above.

Learn more →



The WHO and UNICEF *Water and Sanitation for Health Facility Improvement Tool (WASH FIT) (10)* is a risk-based improvement guide that covers WASH, cleaning and health care waste management services in health care facilities; provides a framework to develop, monitor and implement a continual improvement plan; and prioritizes specific WASH actions that are climate-resilient, equitable and inclusive.

Learn more →

The publication *Energizing health: accelerating electricity access in health-care facilities (5)*, by WHO, the World Bank, Sustainable Energy for All and the International Renewable Energy Agency, provides a comprehensive update about the electrification status of health care facilities and key actions needed to provide reliable, modern energy services to such facilities in low- and middle-income countries.

Learn more →

WHO's *Overview of technologies for the treatment of infectious and sharp waste from health care facilities (17)* provides a guide to selecting appropriate and more environmentally friendly technologies to improve the management and treatment of health care waste, such as solid infectious waste and sharps waste.

Learn more →

See Annex 1 for additional detailed guidance and resources for action.

How can health care facilities be protected from climate change to ensure proper functioning and avoid disruptions?

Climate change directly affects the operational capacity of health care facilities and also results in increased demand for their services, thereby potentially compromising the delivery of high-quality care (Fig. 2) *(2)*.

Extreme weather events – such as heatwaves, storms, heavy rain and drought – can result in the destruction of infrastructure and medical equipment, alongside causing disruptions to essential services, such as water, electricity, food and the ability to access medical supplies *(2)*.

In addition, climate change can significantly influence disease *(18, 19)*, which may lead to gradual or sudden surges in patient numbers. Among its varied effects, climate change heightens the risks associated with heat-related illnesses, outbreaks of infectious diseases, malnutrition, mental health disorders, migration and displacement.

Health care facilities themselves contribute significantly to climate change, with the health sector currently accounting for an estimated 5% of global GHG emissions.

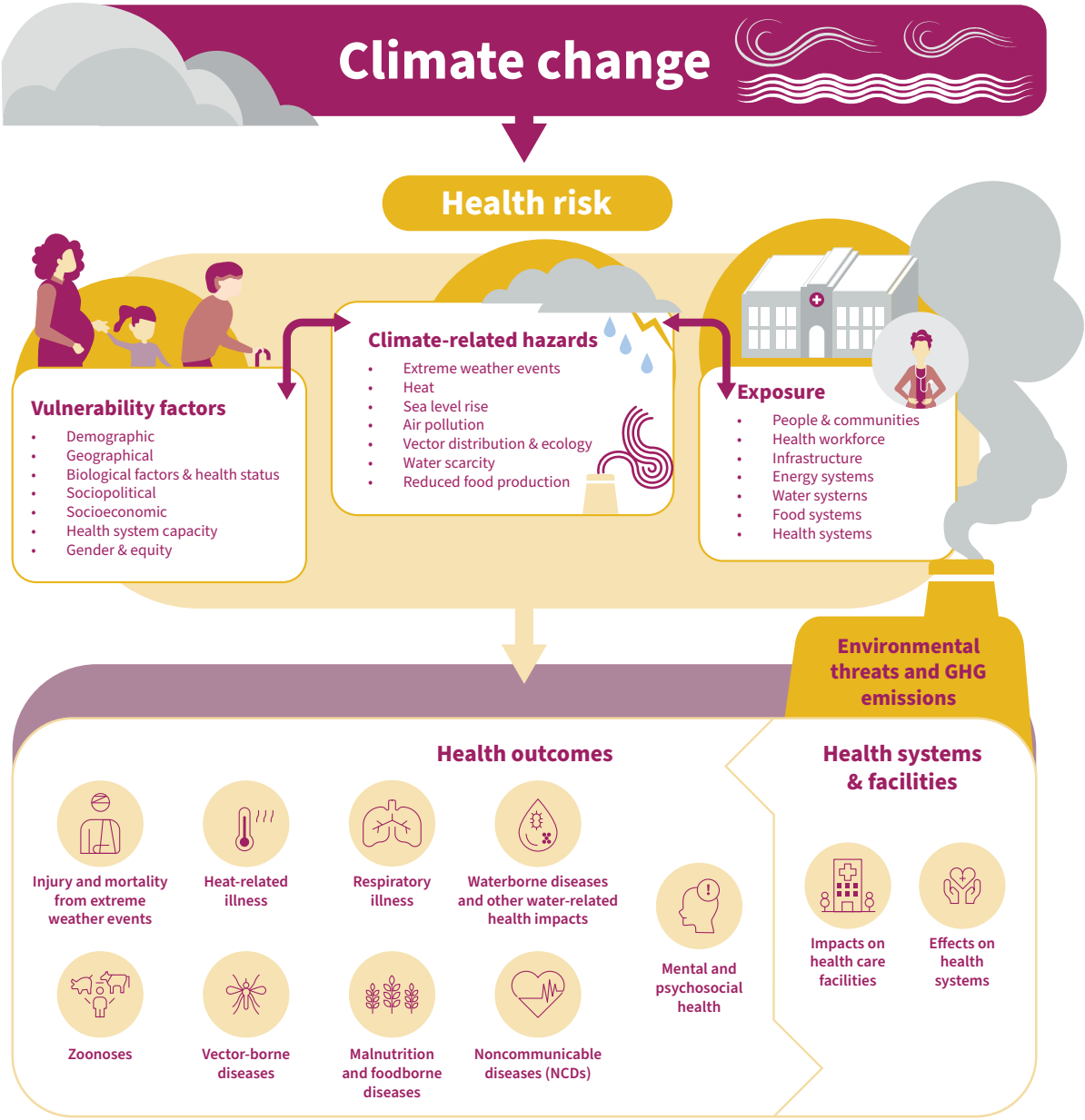
Notably, the adverse impacts of climate change disproportionately affect disadvantaged and vulnerable communities in resource-poor settings, where health care facilities are often inadequately equipped, overwhelmed, understaffed and underfunded *(2)*.

WHO sending urgent health assistance after Cyclone Idai displaces thousands of people in Southern Africa, March 2019.
© WHO / Dalia Lourenço

Mozambique, WHO sending urgent health assistance after Cyclone Idai displaces thousands of people in Southern Africa - March 2019. © WHO / Mark Nieuwenhof

Risks from climate change to health and health systems, and outcomes

Fig. 2. Risks from climate change to health and health systems, and outcomes



GHG: greenhouse gas.
Source: Figure adapted with permission from reference (12).

Key actions for climate-resilient and environmentally sustainable health care facilities

Fig. 3. outlines the framework for building climate-resilient and environmentally sustainable health care facilities.

Conduct assessments to understand:
- the vulnerability of health care facilities to climate hazards,
- the GHG emissions of health care facilities *(2, 20)*.

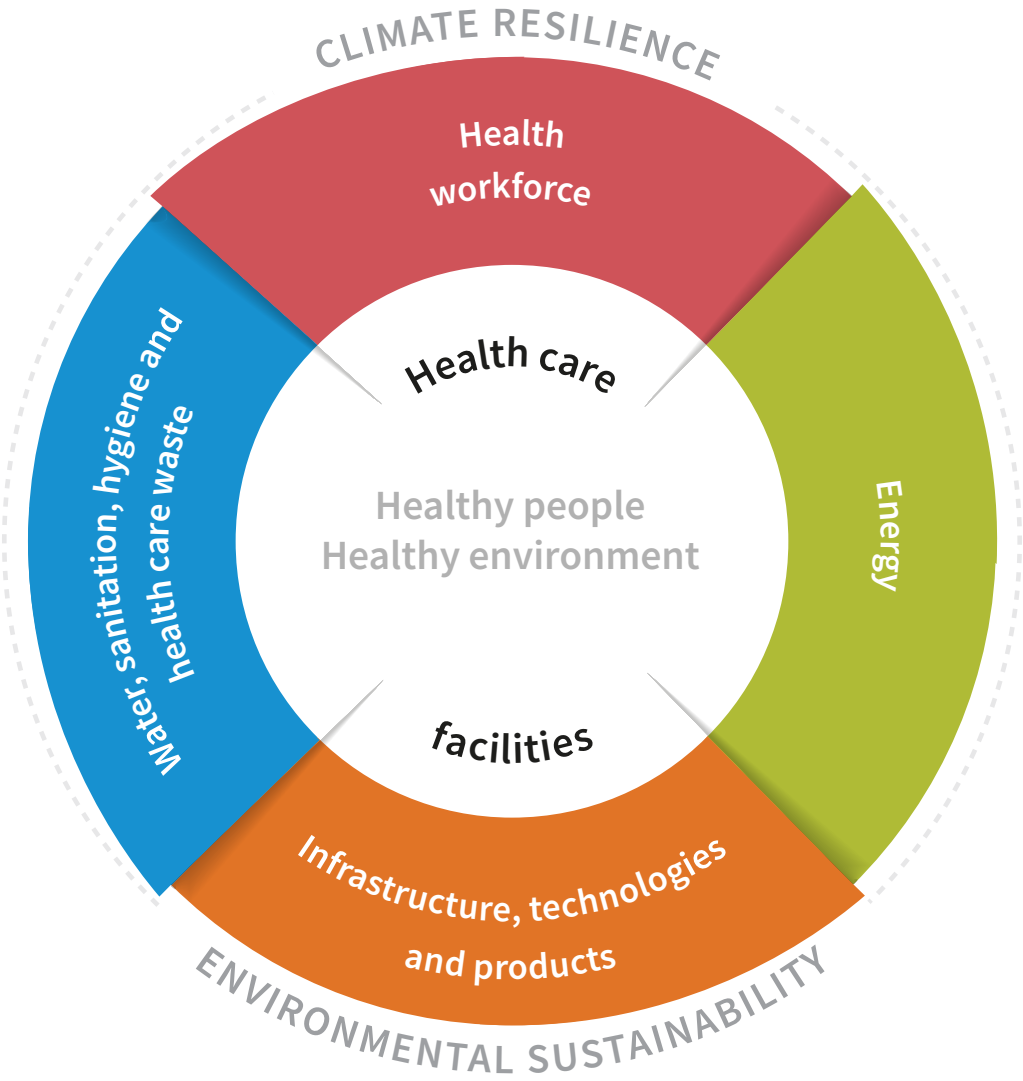
Develop and implement a plan for disaster preparedness, response and recovery management *(2, 20)*.

Develop, implement, monitor and evaluate improvement plans for health care facilities to ensure they are climate resilient, GHG emissions are reduced, and they promote environmental sustainability *(2, 20)*.

Procure and adopt climate-resilient technologies, products and processes with low environmental impact for delivering health care services to enhance the sustainability of health care facility operations *(2, 20)*.

Fig. 3.

Climate-resilience and environmental sustainability in health care facilities



GHG: greenhouse gas.
Source: Figure adapted with permission from reference *(12)*.

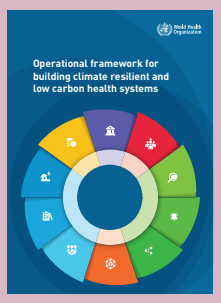
Key Resources

WHO guidance for climate-resilient and environmentally sustainable health care facilities (2) provides information 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 such facilities to become environmentally sustainable by optimizing their use of resources and minimizing the waste released into the environment.

Learn more →

WHO's *Checklists to assess vulnerabilities in health care facilities in the context of climate change (21)* is a practical tool that can be used to establish a baseline for climate resilience in health care facilities, inform the design of interventions to strengthen overall resilience and conduct vulnerability assessments in the facilities.

Learn more →



WHO's *Operational framework for building climate resilient and low carbon health systems (12)* aims to increase the climate resilience of health systems while optimizing the use of resources and implementing strategies to reduce GHG emissions. It aims to contribute to the design of transformative health systems that can provide safe and high-quality care in a changing climate.

Learn more →

See Annex 1 for additional detailed guidance and resources for action.

How can health workers be protected?

Health workers, comprising both clinical and non-clinical staff – such as cleaners, janitors and waste management technicians – constitute the backbone of any functioning health system. However, they frequently encounter numerous health hazards within the workplace (Fig. 4). This leads not only to occupational illness and injuries but can also cause health workforce shortages, poor quality care and negative patient outcomes, and have financial costs. Health workers have the right to healthy and safe working conditions that ultimately enable them to deliver continual high-quality services and care.

Occupational health risks and hazards within health care facilities encompass, among other factors, exposure to chemicals, radiation, health care waste and infectious diseases. Implementing the sound management of chemicals, radiation and health care waste protects not only health workers but also patients and the general public.

Health needs in Northern Ethiopia, Ethiopia.
© WHO / Nitsebiho Asrat

Primary health care, Tajikistan. September/October, 2023.
© WHO / Lindsay Mackenzie

Fig. 4.

Health workers are subject to multiple health threats at health care facilities

Source: Figure adapted with permission from reference (6).

Key actions for healthy and safe work environments in health care facilities

Develop and implement a programme for occupational health and safety for workers at the health care facility that *(6)*:

- includes a written policy on safety, health and working conditions at the facility;
- identifies a responsible person for occupational health at the facility;
- creates joint labour-management health and safety committees with appropriate representation of workers and management;
- provides ongoing (or periodic) education and training for health workers, including about managing chemicals and health care waste and protection from radiation;
- identifies hazards and hazardous working conditions in order to prevent and control them;
- implements action plans for work improvement and a policy for necessary vaccinations to be provided at no cost to all health workers;
- establishes standard operating procedures for reporting accidental exposures to occupational hazards and incidents, and arrangements for recording and notification of occupational accidents and diseases;
- provides services for the early detection, diagnosis, treatment, care, notification of and support for occupational diseases and injuries, including potential occupational infections and diseases, such as HIV, tuberculosis, and hepatitis B and C;
- utilizes appropriate information systems to assist in collecting, tracking, analysing, reporting and acting on data to promote health and safety in the health care workplace and among the health workforce; and
- ensures adequate provisions for water, accessible sanitation facilities, facilities for personal hygiene, clothing, rest, dining, safe handling and management of health care waste, and safety protocols for the use of hazardous chemicals.

Establish safe procedures for correctly handling chemicals, including pharmaceuticals; phase out toxic and environmentally harmful substances from medical devices, such as mercury; and reduce plastic pollution *(7, 22)*.

Ensure that radiation protection measures are implemented to prevent medical radiation incidents through training, as well as ensuring there are independent safety surveillance and quality and safety assessments *(23, 24)*.

Institute procedures involving due diligence to implement environmentally sustainable supply chains *(25)*.

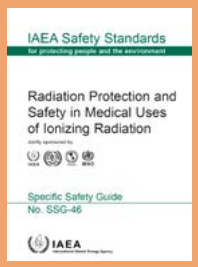
Key Resources

Caring for those who care: guide for the development and implementation of occupational health and safety programmes for health workers (6), published by WHO and the International Labour Organization (ILO), provides an overview of the key elements of occupational health and safety programmes for health workers at the national, subnational and facility levels, as well as advice about how to develop and implement such programmes.

Learn more →

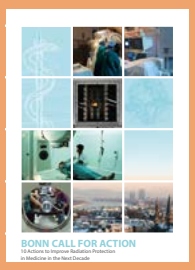
WHO's e-tool about occupational hazards in the health sector *(26)* describes the most common occupational hazards, recommendations from WHO and the ILO, and good practices for managing these hazards.

Learn more →



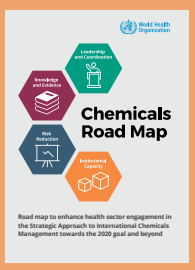
The International Atomic Energy Agency's (IAEA) safety guide to *Radiation protection and safety in medical uses of ionizing radiation (24)* provides recommendations and guidance for ensuring a balance between being able to utilize the medical benefits of ionizing radiation while minimizing the risks of radiation to people.

Learn more →



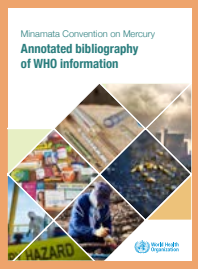
The IAEA and WHO's *Bonn Call for Action (23)* lists 10 priority actions that can be taken to improve protection from radiation in health care.

Learn more →



WHO's *Chemicals Road Map: road map to enhance health sector engagement in the Strategic Approach to International Chemicals Management towards the 2020 goal and beyond (7)* identifies concrete actions in which the health sector has either a lead or important supporting role to play in the sound management of chemicals, while also recognizing the need for multisectoral cooperation.[2]

Learn more →



WHO's *Minamata Convention on Mercury: annotated bibliography of WHO information (22)* facilitates access to key information relevant to the Convention and the associated World Health Assembly Resolution WHA67.11. The phasing out of medical devices (i.e. thermometers and sphygmomanometers) under Article 4 of the Convention is a key priority for WHO Member States and an obligation for the health sector.

Learn more →

See Annex 1 for additional detailed guidance and resources for action.

2 In September 2023, the Global Framework on Chemicals: for a planet free of harm from chemicals and waste was adopted (https://www.chemicalsframework.org/), and it supersedes the Strategic Approach to International Chemicals Management. An update to WHO's Chemicals Road Map will be published to account for this new international instrument. An additional emphasis on improved chemicals management in key sectors, such as health care, is expected with the implementation of this new instrument.

Conclusions

Safe, climate-resilient and environmentally sustainable health care facilities are essential for high-quality care and achieving universal health coverage.

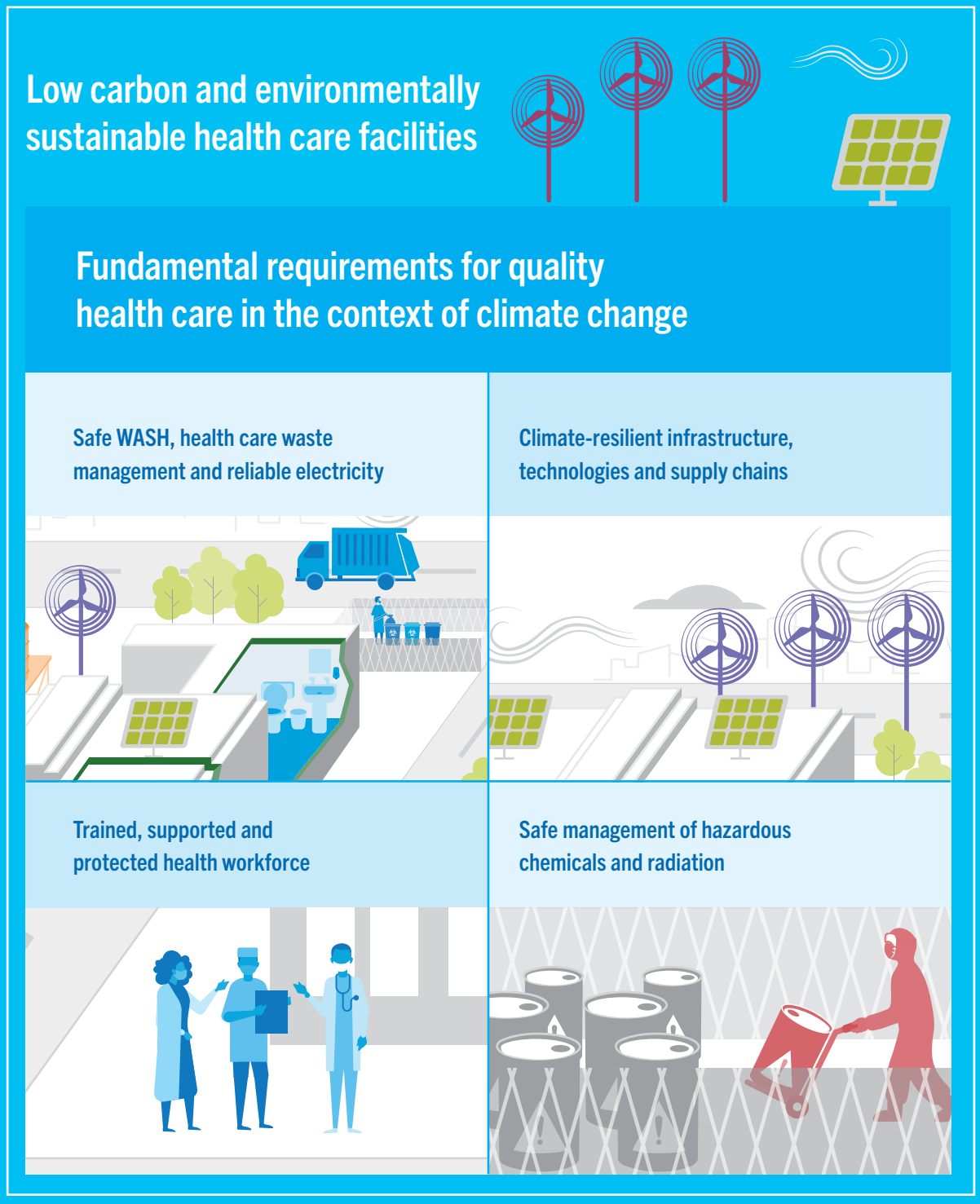
A safe, climate-resilient and environmentally sustainable health care facility should:

- ensure the provision of safe **WASH**, waste management, environmental cleaning and reliable electricity;
- be **resilient** to the impacts of climate change while maintaining **environmental sustainability** and **keeping carbon emissions low**;
- **minimize** the use of **harmful chemicals**, while adopting proper management practices for their use, production and disposal, to **mitigate their effects** on health and environment;
- **manage radiation** used in health care to ensure health workers and patients are protected;
- provide a **safe and healthy environment for health workers**, patients and the general public, **protecting** them from **health care-related risks**.

Given the pressing challenges in the least-developed countries, where only 21% of health care facilities have basic sanitation and only 32% have basic hygiene services *(9)*, an incremental approach may be taken in the advance towards ensuring safe, climate-resilient and environmentally sustainable health care facilities. Initially, facilities should prioritize delivering the most essential basic services (Fig. 5) and include routine maintenance of the facility in their plans, gradually advancing in other aspects as resources allow.

Currently, health care facilities worldwide often fall short of being safe, climate-resilient or environmentally sustainable. Major barriers stem from a lack of knowledge and inadequate resources, further compounded by armed conflict and political instability. However, concerted steps can be taken to progressively enhance health care facilities' safety, climate resilience and environmental sustainability.

Fig. 5. Safe, climate-resilient and environmentally sustainable health care facilities with a focus on ensuring quality health care



While low carbon and environmentally sustainable health care facilities significantly reduce their adverse impact on climate change, fulfillment of the fundamental requirements for quality health care in the context of climate change is indispensable to deliver high quality care and services to patients. These fundamental requirements include safe WASH, health care waste management and reliable electricity; climate-resilient infrastructure, technologies and supply chain; trained, supported and protected health workforce; and safe management of hazardous chemicals and radiation.


H
EMERGENCY

References

1. Water, sanitation and health: WASH in health care facilities. Geneva: World Health Organization; 2024 (https://www.who.int/teams/environment-climate-change-and-health/water-sanitation-and-health-(wash)/health-care-facilities/wash-in-health-care-facilities, accessed 10 April 2024).
2. WHO guidance for climate-resilient and environmentally sustainable health care facilities. Geneva: World Health Organization; 2020 (https://apps.who.int/iris/handle/10665/335909, accessed 10 April 2024).
3. Environment, climate change and health in relation to universal health coverage. Geneva: World Health Organization; 2022 (https://www.who.int/publications/m/item/environment--climate-change-and-health-in-relation-to-universal-health-coverage, accessed 10 April 2024).
4. Progress on WASH in health care facilities 2000–2021: special focus on WASH and infection prevention and control. Geneva: World Health Organization, United Nations Children's Fund; 2023 (https://apps.who.int/iris/handle/10665/366657, accessed 10 April 2024).
5. Energizing health: accelerating electricity access in health-care facilities. Geneva: World Health Organization, the World Bank, Sustainable Energy for All, International Renewable Energy Agency; 2023 (https://iris.who.int/handle/10665/365657, accessed 10 April 2024).
6. Caring for those who care: guide for the development and implementation of occupational health and safety programmes for health workers. Geneva: World Health Organization, International Labour Organization; 2022 (https://iris.who.int/handle/10665/351436, accessed 10 April 2024).
7. Chemicals Road Map: road map to enhance health sector engagement in the Strategic Approach to International Chemicals Management towards the 2020 goal and beyond. Geneva: World Health Organization; 2017 (https://iris.who.int/handle/10665/273137, accessed 10 April 2024).
8. Radiation protection and safety of radiation sources: international basic safety standards. Vienna: International Atomic Energy Agency; 2014 (https://www-pub.iaea.org/MTCD/Publications/PDF/Pub1578_web-57265295.pdf, accessed 10 April 2024).
9. Water, sanitation, hygiene, waste and electricity services in health care facilities: progress on the fundamentals. 2023 report. Geneva: World Health Organization, United Nations Children's Fund; 2023 (https://iris.who.int/handle/10665/368975, accessed 10 April 2024).
10. Water and Sanitation for Health Facility Improvement Tool (WASH FIT): a practical guide for improving quality of care through water, sanitation and hygiene in health care facilities, second edition. Geneva: World Health Organization; 2022 (https://iris.who.int/handle/10665/353411, accessed 10 April 2024).
11. Quality health services: key facts [website]. Geneva: World Health Organization; 2020 (https://www.who.int/news-room/fact-sheets/detail/quality-health-services, accessed 10 April 2024).
12. Operational framework for building climate resilient and low carbon health systems. Geneva: World Health Organization; 2023 (https://iris.who.int/handle/10665/373837, accessed 10 April 2024).
13. Climate change: key facts [website]. Geneva: World Health Organization; 2023 (https://www.who.int/news-room/fact-sheets/detail/climate-change-and-health, accessed 10 April 2024).
14. Romanello M, Di Napoli C, Drummond P, Green C, Kennard H, Lampard P, et al. The 2022 report of the Lancet Countdown on health and climate change: health at the mercy of fossil fuels. Lancet. 2022;400:1619–54. doi:10.1016/S0140-6736(22)01540-9.
15. Occupational health: health workers. Key facts [website]. Geneva: World Health Organization; 2022 (https://www.who.int/news-room/fact-sheets/detail/occupational-health--health-workers, accessed 10 April 2024).
16. Gon G, Restrepo-Méndez MC, Campbell OMR, Barros AJD, Woodd S, Benova L, et al. Who delivers without water? A multi country analysis of water and sanitation in the childbirth environment. PloS One. 2016;11(8):e0160572. doi:10.1371/journal.pone.0160572.
17. Overview of technologies for the treatment of infectious and sharp waste from health care facilities. Geneva: World Health Organization; 2019 (https://apps.who.int/iris/handle/10665/328146, accessed 10 April 2024).
18. World Health Organization. (2014). Quantitative risk assessment of the effects of climate change on selected causes of death, 2030s and 2050s. World Health Organization; 2014 (https://iris.who.int/handle/10665/134014, accessed 10 April 2024).
19. Pörtner HO, Roberts DC, Adams H, Adelekan I, Adler C, Adrian R, et al., editors. Technical summary. In: Pörtner HO, Roberts DC, Tignor ES, Poloczanska ES, Mintenbeck K, Alegría A, et al, editors. Climate change 2022: impacts, adaptation, and vulnerability. Contribution of Working Group II to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change. Cambridge: Cambridge University Press; 2022:37-118 (https://www.ipcc.ch/report/ar6/wg2/chapter/technical-summary/, accessed 10 April 2024).
20. Building climate-resilient health systems. Component 3: Assessments of climate & health risks and GHG emissions [website]. Geneva: World Health Organization; 2024 (https://www.who.int/teams/environment-

climate-change-and-health/climate-change-and-health/country-support/building-climate-resilient-health-systems/vulnerability-capacity-and-adaptation-assessment, accessed 9 April 2024).
21. Checklists to assess vulnerabilities in health care facilities in the context of climate change. Geneva: World Health Organization; 2021 (https://apps.who.int/iris/handle/10665/340656, accessed 10 April 2024).
22. Minamata Convention on Mercury: annotated bibliography of WHO information. Geneva: World Health Organization; 2021 (https://iris.who.int/handle/10665/341198, accessed 9 April 2024).
23. Bonn Call for Action: 10 actions to improve radiation protection in medicine in the next decade. Geneva, Vienna: World Health Organization, International Atomic Energy Agency; 2014 (https://www.who.int/publications/m/item/bonn-call-for-action, accessed 10 April 2024).
24. Radiation protection and safety in medical uses of ionizing radiation. Vienna: International Atomic Energy Agency, International Labour Office, Pan American Health Organization, World Health Organization; 2018 (https://www.who.int/publications/m/item/radiation-protection-and-safety-in-medical-uses-ionizing-radiation, accessed 10 April 2024).
25. Lindstrom A, Coronado-Garcia L. Sustainable health procurement guidance note. New York: United Nations Development Programme; 2020 (https://www.undp.org/publications/guidelines-sustainable-procurement-healthcare-commodities-and-services, accessed 9 April 2024).
26. Occupational hazards in the health sector [online tool]. Geneva: World Health Organization; 2024 (https://www.who.int/tools/occupational-hazards-in-health-sector, accessed 8 April 2024).

Annex 1:
Detailed guidance for action to achieve safe, climate-resilient and environmentally sustainable health care facilities

This guidance table provides concrete actions for achieving safe, climate-resilient and environmentally sustainable health care facilities. It is extracted from the 2024 update of the Compendium of WHO and other UN guidance on health and environment *(1)*. The guidance is classified according to principally involved sectors, level of implementation, instruments and evidence category to facilitate selection and prioritization.

Guidance	Sector principally involved in planning/ implementation	Level of implementation	Instruments	Category of evidence
General guidance for health care facilities				
1. Ensure the whole population has access to safe, climate-resilient and environmentally sustainable health care facilities that provide high-quality care *(2–5)*. This includes ensuring that facilities: • provide access to at least basic WASH services that meet the needs of women and children, people with disabilities and other vulnerable groups; • manage health care waste adequately using environmentally sustainable methods; • have access to reliable electricity; • use chemicals and radiation safely; • provide a safe and healthy work environment for all staff; • are climate resilient; • are environmentally sustainable and have low carbon emissions.	Multiple sectors	National, health care Universal health coverage	Governance; regulation; infrastructure, technology and built environment	A, B
2. Integrate WASH, waste and electricity services; the health and safety of health workers; and climate resilience and environmental sustainability into health planning, programming, financing and monitoring at all levels *(2–5)*.	Multiple sectors	National, health care Universal health coverage	Governance; regulation; infrastructure, technology and built environment	A, B
3. Use globally harmonized indicators to monitor and review improvements within the health care facility access to WASH, waste management and electricity; the health and safety of health workers; and climate resilience and environmental sustainability *(2–7)*.	Multiple sectors	National, health care Universal health coverage	Assessment and surveillance	A, B
4. Build the capacity of the health workforce to care for their own health and safety; practise good hygiene; manage the health risks of climate change; manage WASH, waste and electricity services; and ensure the environmental sustainability of health care facilities *(2–5)*.	Multiple sectors	National, health care Universal health coverage	Information, education and communication	A, B

Guidance	Sector principally involved in planning/ implementation	Level of implementation	Instruments	Category of evidence
5. Implement effective IPC programmes *(8, 9)*. The minimum requirements for these programmes include ensuring, among others: • there are national IPC guidelines and facility-adapted standard operating procedures; • there is a national IPC training policy and training for all front-line clinical staff and cleaners; • IPC monitoring and surveillance include surveillance for health care–associated infections at the facility level; • there are multimodal strategies for priority IPC interventions, such as to improve hand hygiene, safely deliver injections, decontaminate medical instruments and devices, and for environmental cleaning; • there are sufficient WASH, health care waste management and reliable electricity to perform all basic IPC measures.	Health	National, health care Universal health coverage	Regulation, other management and control	A, B
WASH, waste management and environmental cleaning in health care facilities While point 6 provides guidance about the whole of WASH, waste management and environmental cleaning, points 7–18 offer specific guidance for each topic separately.				
6. Implement at least basic WASH, waste management and environmental cleaning services in all health care facilities, ensuring services are climate resilient, sustainable, safe and accessible to all users *(2, 5, 10)*. Eight practical steps for achieving this include: • conducting a country-wide situation analysis and baseline assessment of WASH systems and services, including an assessment of climate risks and environmental sustainability (3); • developing a time-bound national road map with associated budgets and financing for improving WASH services through multisectoral coordination; • establishing and implementing national WASH and waste management standards; • improving and then maintaining WASH and waste infrastructure to meet national standards; • monitoring progress using integrated WASH indicators in national health monitoring information systems and regularly collecting, analysing, reviewing and disseminating data; • providing preservice and in-service training about current WASH and IPC practices to the health workforce; • engaging with communities to gather their input during the development and implementation of WASH policies and quality improvement processes in health care facilities; • generating and disseminating evidence about WASH in health care facilities through operational research, and sharing it at the local, national and global levels.	Health Water/sanitation Waste	National, health care Universal health coverage	Infrastructure, technology and built environment; regulation	A, B

Guidance	Sector principally involved in planning/ implementation	Level of implementation	Instruments	Category of evidence
WASH in health care facilities				
7. Ensure the availability of and access to safe and sufficient water for drinking, cooking, personal hygiene, medical activities, cleaning and laundry in health care settings *(5)*. A few concrete examples include ensuring that: • drinking water complies with WHO's Guidelines for drinking-water quality *(11)* ; • a drinking-water station with safe drinking-water is available and accessible to staff, patients and carers at all times and in main waiting areas or entrances to each ward, or both, and in all rooms where patients stay overnight or receive specialized care; • non-potable water is used only for cleaning, laundry and sanitation and is appropriately labelled; • functional hand hygiene stations (with water and soap or alcohol-based hand-rub) are available at all points of care and in service areas; • handwashing facilities (with water and soap) are available within 5 m of all toilets or latrines, and there is at least one shower or bathing area per 40 inpatients or per ward (whichever has fewer patients) and it is functioning and accessible; • sanitary inspection forms are used to ensure that water poses no risk to public health *(12)*; • a WASH climate risk management plan is implemented *(3)*; • climate hazards are considered during the siting and construction of water and sanitation infrastructure *(3)*.	Health Water/sanitation	National, health care Universal health coverage	Infrastructure, technology and built environment; regulation	A, B
Note: Sufficient water refers to the minimum quantities of water required in the health care setting. Required amounts are available for planning and designing water supply systems. The actual quantities required depend on a number of factors, such as the size of the facility, services offered and number of patients accessing services, the climate, level of care provided and local water use practices.				
8. Provide adequate, accessible and appropriate toilets for patients, staff and caregivers *(2, 5, 13)*. Concrete examples include ensuring: • a sufficient number of usable toilets are available, separated by sex and with separate facilities for staff and patients; • toilets are easily accessible, safe to use and are appropriate for local technical, financial, cultural and social conditions; • a functional handwashing facility with soap and water is available within 5 m of the toilets; • toilets are cleaned at least once daily and are adequately maintained and repaired if problems arise; • at least one usable toilet meets menstrual hygiene needs; • at least one toilet can be accessed by those with limited mobility; • excreta and wastewater are safely managed and treated according to WHO's guidelines *(13)*; • toilet siting considers climate hazards to avoid the disruption of services, for example in the case of floods, water scarcity or sea level rise *(3)*.	Health Water/sanitation	National, health care Universal health coverage	Infrastructure, technology and built environment; regulation	A, B

Guidance	Sector principally involved in planning/ implementation	Level of implementation	Instruments	Category of evidence
9. Ensure rapid and safe disposal of wastewater, ideally through a safely managed piped sewer system *(2, 13, 14)*. Important aspects to consider include ensuring that: • wastewater is safely conveyed from the health care facility to treatment, with minimal leaks and overflows; • wastewater drainage is built and managed to avoid contaminating the health care setting and the broader environment; • a stormwater (i.e. rainwater) and greywater drainage system is in place that diverts water away from the facility into a safe drainage or leach field and does not carry contamination from the health care setting to the surrounding environment; • hazardous chemical and radioactive waste and pharmaceuticals are not discharged into wastewater; • latrines are emptied before flood seasons to avoid overflows *(3)*; • vents on sewers and septic tanks are above expected flood lines *(3)*.	Water/sanitation	National, health care Universal health coverage	Infrastructure, technology and built environment; regulation	A, B
10. Educate and train health care facility staff about the crucial moments for performing hand hygiene and the appropriate techniques for handwashing and using an alcohol-based hand-rub *(15, 16)*. Involve other facility staff, patients and visitors in hand hygiene promotion activities. The five moments when hand hygiene should be performed in health care include: • before touching a patient • before a clean, or aseptic, procedure • after risk of exposure to body fluid and after glove removal • after touching a patient • after touching a patient's surroundings. More detailed guidance is available in *WHO guidelines on hand hygiene in health care (16)*.	Health	Health care Universal health coverage	Information, education and communication	A, B

Guidance	Sector principally involved in planning/ implementation	Level of implementation	Instruments	Category of evidence
11. Implement WASH FIT to systematically improve the water, sanitation, hygiene and health care waste practices and electricity services in a health care facility, and to focus on climate resilience *(12)*. WASH FIT is a risk-based improvement tool for health care facilities that covers key aspects of WASH services: water, sanitation, hand hygiene, environmental cleaning, the management of health care waste, as well as selected aspects of energy use, and building and facility management. WASH FIT provides a framework to develop and monitor the implementation of an improvement plan for infrastructure, behaviours, and operations and maintenance, and to prioritize specific WASH actions that are climate resilient, equitable and inclusive. Climate-resilient water safety plans and sanitation safety plans may be used together with WASH FIT to ensure the safety of drinking-water and sanitation services at the health care facility level *(11, 12, 17, 18)*	Health Water/sanitation	National, health care Universal health coverage	Infrastructure, technology and built environment; regulation	B
12. Assess climate change risks and map them to the existing water, sanitation and waste infrastructure of health care facilities to identify where services could be disrupted by climate-related hazards, such as floods, droughts, landslides and sea-level rise *(3)*.	Health Water/sanitation	Health care Universal health coverage	Assessment and surveillance	B
13. Conserve water and reduce water usage, and serve healthy and sustainable menu options in health care facilities *(3)*.	Health Environment Water/sanitation Food	Health care Universal health coverage	Infrastructure, technology and built environment; other management and control	B
14. Assess the climate vulnerability and environmental sustainability of health care facilities to inform management of climate-related risks to staff, patients and communities from water and sanitation services, chemicals and health care waste *(3)*. Concrete examples include the following: • identifying climate-related hazardous events that could lead to significant health risks in terms of the collection, treatment, reuse and disposal of sanitation waste, such as overflowing pit latrines and contaminated water sources; • ensuring sufficient water is stored in the health care facility to meet extra demand in case of an extreme weather event; • using harvested rainwater or greywater to flush toilets, clean outdoor pavements and water plants, when possible.	Health Water/sanitation Waste	Health care Universal health coverage	Assessment and surveillance	B

Guidance	Sector principally involved in planning/ implementation	Level of implementation	Instruments	Category of evidence
Waste management in health care facilities				
15. Ensure safe segregation, collection, transportation, storage, treatment and disposal of health care waste *(3, 14, 19)*. Concrete examples include ensuring that; • trained waste handlers are available and have sufficient PPE to carry out their duties safely; • there are national waste segregation standards that rely on a uniform colour-coding or labelling system and that sharps, infectious and non-infectious waste are separated; • general waste and infectious or hazardous waste are collected, transported and stored separately; • collection and internal transportation happen at fixed times, and there are fixed waste routes, from the most hygienically sensitive area to the least sensitive area; • internal waste storage locations are totally enclosed and well separated from other areas; the storage location for infectious and sharps waste is clearly identifiable, with floors and walls sealed or tiled; • external waste storage sites should be fenced, at a minimum; • only authorized staff have access to waste storage areas, and waste is not stored for longer than the maximum storage times for infectious waste, which depend on the temperature; • in general, health care waste is treated using techniques that minimize the formation and release of chemicals or hazardous emissions, in line with the Stockholm Convention on Persistent Organic Pollutants *(20)*. The management of radioactive waste from nuclear medicine should be in line with the requirements of International Atomic Energy Agency's international basic safety standards *(21)*. Infectious and sharps waste should generally be treated by steam or other non-burn technologies, where these options are locally available and sustainable; • the final disposal of waste happens in designated places outside the premises of the health care facility; a functional burial pit or fenced waste dump or municipal pick-up service should be available for the disposal of non-infectious (i.e. non-hazardous or general) waste, and waste disposal areas should be built to withstand climate events and emergencies; • pharmaceutical waste is treated and disposed of safely by using an offsite, centrally managed safe treatment and disposal facility; sending it back to the manufacturer; or having it industrially incinerated using a high-temperature kiln. Special provisions should be made for the disposal of radiopharmaceuticals *(22)*.	Health Waste	Health care, national Universal health coverage	Governance; regulation; infrastructure, technology and built environment; other management and control	A, B, C

Guidance	Sector principally involved in planning/ implementation	Level of implementation	Instruments	Category of evidence
16. Ensure that the management of health care waste will be safe during climate-related events, including emergencies and disasters *(3)*.	Health Waste	Health care Universal health coverage	Infrastructure, technology and built environment; other management and control	B
17. Implement and monitor a waste reduction programme that includes waste management training for all staff *(3, 14, 19)*. Concrete examples include: • training and supporting all staff to practice appropriate waste segregation at all points of care using a three-bin system (i.e. non-hazardous recyclable, non-recyclable and hazardous waste); • raising awareness about and training medical staff in clinical and general practices to use and waste fewer materials, by using techniques such as the first in, first out principle (i.e. what has been purchased first should be used first); • incrementally improving the environmental sustainability of waste treatment technologies by focusing on non-burn technologies that comply with the Stockholm Convention on Persistent Organic Pollutants and the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal *(20, 23)*; • establishing a recycling programme for all types of non-hazardous waste or sending recyclable waste to municipal recycling facilities.	Health Waste	Health care Universal health coverage	Infrastructure, technology and built environment; other management and control	A, B
Environmental cleaning in health care facilities				
18. Ensure that materials needed for cleaning (e.g. detergents, mops, buckets) are available, appropriate and well-maintained *(2, 5, 10)*.	Health	Health care Universal health coverage	Infrastructure, technology and built environment	A, B
Electricity in health care facilities				
20. Ensure that all health care facilities have access to reliable electricity to ensure essential quality health care services can be delivered *(24, 25)*. This requires strong financial commitments from different actors, such as governments, donors and the private sector.	Energy Health Finance	National, health care Universal health coverage	Governance; infrastructure, technology and built environment	B, C

Guidance	Sector principally involved in planning/ implementation	Level of implementation	Instruments	Category of evidence
21. Assess the energy needs of each individual health care facility and, when needed, enable the installation of a suitable energy system that is climate resilient and low carbon *(3, 24)*. Electricity is required in health care facilities for key areas, including for: • basic medical equipment; • vaccines and cold chain storage; • maternal and newborn care; • communication, lighting, information technology (or IT), telemedicine; • facility operations; • administration and staff facilities; • access to hot and cold water.	Energy Health	Health care Universal health coverage	Assessment and surveillance	B
22. Follow an "install and maintain" approach to the facility's energy system to ensure the long-term operation and maintenance of the system *(24)*. Points to consider include: • ensuring there is a dedicated allocation of funds for long-term operation and maintenance of the facility's energy system, including to replace components, such as batteries, and for monitoring, as needed; • building the capacity of local energy technicians and health care staff to sustainably use and maintain the facility's energy system.	Energy Health Finance	Health care Universal health coverage	Infrastructure, technology and built environment; other management and control	B
23. Invest in efficient and suitable medical devices and equipment as per the needs of the health care facility and ensure their proper long-term operation and maintenance *(3, 24)*. Points to consider include: • whether the devices installed or used are energy efficient, compatible with the available energy supply and suitable for harsh conditions, if needed, such as high temperatures and dusty environments; • how to ensure staff have appropriate training.	Energy Health	Health care Universal health coverage	Infrastructure, technology and built environment	B
24. Consider using decentralized, renewable energy, such as solar photovoltaic systems coupled with batteries, to power health care facilities, build climate resilience and reduce GHG emissions *(24)*. This solution may be especially helpful in areas not reached by a central power grid or when used as a backup for unreliable or expensive electricity supply.	Energy Health	National, health care Universal health coverage	Infrastructure, technology and built environment; taxes and subsidies	B
25. Manage risks associated with the energy supply *(3)*. Concrete examples include the following. • Ensure that energy systems can withstand extreme weather events. • Develop a plan for managing intermittent energy supplies or energy system failures, including ensuring there is an adequate backup energy source (e.g. through solar systems coupled with batteries) if the main source fails during an extreme weather event.	Energy Health	Health care Universal health coverage	Infrastructure, technology and built environment	B

Guidance	Sector principally involved in planning/ implementation	Level of implementation	Instruments	Category of evidence
Climate change: climate resilience and the environmental sustainability of health care facilities Several guidance points in the sections on WASH, waste and electricity also address climate resilience and environmental sustainability; please refer to those sections for additional guidance.				
26. Ensure health care facilities are climate resilient and environmentally sustainable, including by reducing GHG emissions *(3)*; this can be done by following these five steps. • Assemble and train a multisectoral operations team. • Establish a baseline for the current burden of climate-sensitive health outcomes and vulnerabilities to climate change, for instance by conducting a climate change and health vulnerability and adaptation assessment *(26)* (known as a V&A) to understand the health risks faced by the local population; assess the climate vulnerability of health care facilities; and assess the carbon emissions and the environmental footprint of health care facilities. • Define and prioritize short- and long-term interventions. • Develop and implement an improvement plan. • Monitor and evaluate improvements in climate resilience and environmental sustainability.	Health	National, health care Universal health coverage	Governance; infrastructure, technology and built environment; other management and control	B
27. Ensure climate resilience and environmental sustainability during construction and retrofitting of health care facilities. This can be achieved by adopting new technologies, products and processes with low environmental impact that enhance the sustainability of health care facility operations *(3)*. Concrete examples include the following. • When constructing new infrastructure, consider a range of climate-related risk scenarios, such as flood, drought, prolonged rainfall, strong winds and heatwaves. • Ensure that the health care facility is sufficiently ventilated while being protected against disease vectors. • Ensure that the windows are resistant to winds of at least 200–250 km/h, protected from the sun and leak-proof. Install reflective white roofs to reduce heat impact. • Conduct and regularly update assessments of climate hazard vulnerability including, for example, evaluations of the potential impact of extreme weather events on health care infrastructure.	Construction Health	Health care Universal health coverage	Infrastructure, technology and built environment; other management and control; regulation	B

Guidance	Sector principally involved in planning/ implementation	Level of implementation	Instruments	Category of evidence
28. Procure new technologies and adopt new processes that can provide climate resilience, environmental sustainability and enhanced health service delivery *(3)*. Concrete examples include the following. • Establish climate-informed health surveillance and early warning systems to facilitate early responses to climate hazards. In case of extreme heat, install equipment for monitoring indoor temperatures, cooling buildings and spaces, blocking direct sun and increasing air flow. • Prioritize purchasing equipment and supplies that are sustainable, such as those associated with lower emissions during transport and production, and those that have minimal packaging and are reusable and recyclable; and avoid those containing hazardous chemicals and nondegradable plastics. • Avoid procuring products that are not used *(27)*.	Health Industry	Health care Universal health coverage	Infrastructure, technology and built environment; other management and control; regulation	B
Chemicals The subsection on Waste management may include guidance relevant to Chemicals that is not included in this section.				
29. Establish safe procedures for procuring, storing, dispensing and properly disposing of pharmaceuticals *(14, 28)*.	Health	Health care Universal health coverage	Regulation, other management and control	B
30. Phase out or replace items that contain mercury, complying with the Minamata Convention on Mercury *(14, 29)*.	Health	Health care Universal health coverage	Regulation	A, B
31. Phase out or replace substances with a high potential for ozone depletion or global warming *(28)*. Concrete examples include the following. • Buy equipment that uses minimally polluting refrigerants and has a reduced refrigerant charge. • Ensure regular maintenance of equipment containing refrigerants to avoid leakage or release into the atmosphere. • Phase out ozone-depleting substances in fire-suppression systems.	Environment Health	Health care Universal health coverage	Regulation	A, B
32. Train health care facility staff to correctly manage chemicals and health care waste *(3, 30)*.	Health	Health care Universal health coverage	Information, education and communication	B
Radiation				
33. Implement procedures and guidelines to ensure that justifying the use of radiological imaging becomes an effective, transparent and accountable part of normal radiological practice *(22, 31)*.	Health	Health care Universal health coverage	Regulation	B, C

Guidance	Sector principally involved in planning/ implementation	Level of implementation	Instruments	Category of evidence
34. Ensure that all relevant staff understand and adhere to the principle of the optimization of protection and safety from radiation *(22, 31)*. Concrete examples include the following. • Develop and regularly update evidence-based guidelines for imaging referrals, and make them available at the point of care as decision-support tools to enhance the justification for radiological procedures *(32, 33)*. • Establish and use up-to-date diagnostic reference levels for radiological procedures for adult and paediatric patients, and ensure that quality assurance programmes are also up to date *(31)*. • Implement harmonized criteria and develop detailed guidance for the discharge of patients after radionuclide therapy *(34)*. • Apply technological solutions, such as electronic health records, to harmonize the monitoring of exposure to radiation. • Consider the availability of electricity services when selecting imaging devices (e.g. consider portable battery-operated equipment, if necessary) *(35)*.	Health	Health care Universal health coverage	Regulation	B, C
35. Ensure that heath care staff are appropriately trained in radiation protection. Pay particular attention to training health professionals in the use of new technologies (e.g. digital radiography, artificial intelligence) *(22)*.	Health	Health care Universal health coverage	Information, education and communication	C
36. Prevent medical radiation incidents and accidents *(22, 31)*. Points to consider include: • integrating content about radiation protection into the curricula of medical and dental schools, and into continuing medical education for health professionals using radiation in health care; • creating reporting and learning systems for medical radiation incidents, accidents and near misses; performing root cause analyses and prospective risk assessments to inform preventive actions and enhance safety culture *(32)*; • implementing independent safety surveillance and verification, and performing periodic quality and safety assessments in health facilities that use radiation for diagnostic or therapeutic purposes.	Health	Health care Universal health coverage	Assessment and surveillance, other management and control	B, C
37. Increase awareness about the benefits and risks of radiation among health care staff and patients. Train health care staff how to communicate radiation risks. Establish an active and informed decision-making process for patients *(22, 31, 33)*.	Health	Health care Universal health coverage	Information, education and communication	B, C

Guidance	Sector principally involved in planning/ implementation	Level of implementation	Instruments	Category of evidence
Health workers Health workers include not only health service providers but also health management and support workers *(4)*.				
38. Establish occupational health and safety policies and programmes for health workers in all health care facilities *(4, 36)*. Actions for safe and healthy work environments in health care facilities include: • developing policies to ensure health and safety at work; • appointing a facility focal point for occupational health and safety; • conducting regular risk assessments and mitigating occupational hazard; • establishing a joint labour–management committee for health and safety at work; • providing facilities for staff welfare (e.g. personal hygiene, clothing, rest and dining); • developing and implementing a training programme about health and safety at work, including how to protect health and safety during climate-related emergencies; • providing occupational health services for the early detection, diagnosis, treatment, care, notification of and support for occupational diseases and injuries; • providing no-cost immunizations to health workers to prevent work-related infections; • recording, investigating and reporting exposure incidents and cases of occupational injuries and diseases; • collecting, analysing, reporting and acting on data to promote health and safety at work.	Health	Health care Universal health coverage	Regulation	B
39. Provide adequate IPC measures and PPE – such as masks, gloves, goggles, gowns, hand sanitizer, soap and water and cleaning supplies – in sufficient quantities to health care staff and other workers who are at risk, such as cleaners who are in contact with potentially infectious patients or materials *(4, 8, 36)*. Note: The definitions of adequate IPC measures and PPE depend on the procedure performed and the suspected disease.	Health	Health care Universal health coverage	Infrastructure, technology and built environment; regulation	A, B
40. Ensure that syringes and injection devices are used only once, if possible, by procuring syringes with a sharps injury protection feature or with a re-use prevention feature. Provide puncture-resistant sharps containers for safe sharps disposal *(8, 37)*.	Health	Health care Universal health coverage	Infrastructure, technology and built environment	A
41. Provide information, instruction and training about occupational safety and health, including training about IPC, the correct use of PPE, and safe patient handling to prevent back injuries *(8)*.	Health	Health care Universal health coverage	Information, education and communication	A

Guidance	Sector principally involved in planning/ implementation	Level of implementation	Instruments	Category of evidence
42. Ensure that health care facilities have a sufficient number of health workers, healthy and safe working conditions, and the required capacity to deal with health risks from climate change *(3)*.	Health	Health care Universal health coverage	Other management and control	B
43. Build the capacity of the health workforce to respond to climate risks and minimize within the scope of their responsibilities the environmental impacts that occur due to the operation of the health care facility *(3)*. A few concrete examples include: • educating and training health care facility staff and the community about the relationship between environmental health and disease prevention; • creating awareness among health care facility staff and the community about environmental factors that contribute to disease burden; • training health care facility staff and the community about how to assess and select environmentally sustainable products and services; • sensitizing health care facility staff to environmentally sustainable practices and ways to reduce carbon emissions from the health care facility.	Health	Health care Universal health coverage	Information, education and communication; other management and control	B

A – WHO guideline, B – WHO best practice/strategy, C – other UN best practice/strategy
GHG: greenhouse gas; IPC: infection prevention and control; PPE: personal protective equipment; WASH: water, sanitation and hygiene; WASH FIT: Water and Sanitation for Health Facility Improvement Tool.

References for Annex 1

1. Compendium of WHO and other UN guidance on health and environment: 2024 update. Geneva: World Health Organization; 2024 (https://www.who.int/tools/compendium-on-health-and-environment, accessed xx 2024).
2. Water, sanitation, hygiene, waste and electricity services in health care facilities: progress on the fundamentals. 2023 global report. Geneva: World Health Organization, United Nations Children's Fund; 2023 (https://iris.who.int/handle/10665/368975, accessed 7 August 2023).
3. WHO guidance for climate-resilient and environmentally sustainable health care facilities. Geneva: World Health Organization; 2020 (https://apps.who.int/iris/handle/10665/335909, accessed 1 November 2023).
4. Caring for those who care: guide for the development and implementation of occupational health and safety programmes for health workers. Geneva: World Health Organization, International Labour Organization; 2022 (https://iris.who.int/handle/10665/351436, accessed 1 November 2023).
5. Adams J, Bartram J, Chartier Y, editors. Essential environmental health standards in health care. Geneva: World Health Organization; 2008 (https://apps.who.int/iris/handle/10665/43767, accessed 2 November 2023).
6. Operational framework for building climate resilient and low carbon health systems. Geneva: World Health Organization; 2023 (https://iris.who.int/handle/10665/373837, accessed 13 November 2023).

7. Core questions and indicators for monitoring WASH in health care facilities in the Sustainable Development Goals. Geneva: World Health Organization, United Nations Children's Fund; 2018 (https://apps.who.int/iris/handle/10665/275783, accessed 2 November 2023).
8. Guidelines on core components of infection prevention and control programmes at the national and acute health care facility level. Geneva: World Health Organization; 2016 (https://apps.who.int/iris/handle/10665/251730, accessed 2 November 2023).
9. Minimum requirements for infection prevention and control programmes. Geneva: World Health Organization; 2019 (https://www.who.int/publications/i/item/9789241516945, accessed 7 August 2023).
10. Progress on WASH in health care facilities 2000–2021: special focus on WASH and infection prevention and control. Geneva: World Health Organization, United Nations Children's Fund; 2023 (https://apps.who.int/iris/handle/10665/366657, accessed 7 August 2023).
11. Guidelines for drinking-water quality: fourth edition incorporating the first and second addenda. Geneva: World Health Organization; 2022 (https://iris.who.int/handle/10665/352532, accessed 24 May 2024).
12. WASH FIT: a practical guide for improving quality of care through water, sanitation and hygiene in health care facilities, second edition. Geneva: World Health Organization; 2022 (https://iris.who.int/handle/10665/353411, accessed 31 October 2023).
13. Guidelines on sanitation and health. Geneva: World Health Organization; 2018 (https://apps.who.int/iris/handle/10665/274939, accessed 1 November 2023).
14. Safe management of wastes from health-care activities: a summary. Geneva: World Health Organization; 2017 (https://apps.who.int/iris/handle/10665/259491, accessed 1 November 2023).
15. World Hand Hygiene Day. Save lives: clean your hands [website]. Geneva: World Health Organization; 2023 (https://www.who.int/campaigns/world-hand-hygiene-day, accessed 31 October 2023).
16. WHO guidelines on hand hygiene in health care. Geneva: World Health Organization; 2009 (https://apps.who.int/iris/handle/10665/44102, accessed 31 October 2023).
17. Climate-resilient water safety plans: managing health risks associated with climate variability and change. Geneva: World Health Organization; 2017 (https://apps.who.int/iris/handle/10665/258722, accessed 7 august 2023).
18. Sanitation safety planning: manual for safe use and disposal of wastewater, greywater and excreta. Geneva: World Health Organization; 2015 (http://apps.who.int/iris/handle/10665/171753, accessed 2 November 2023).
19. Global analysis of health care waste in the context of COVID-19. Geneva: World Health Organization; 2022 (https://iris.who.int/handle/10665/351189, accessed 7 August 2023).
20. Stockholm Convention on Persistent Organic Pollutants (POPs) [website]. Stockholm: United Nations Environment Programme; 2019 (https://www.pops.int/TheConvention/Overview/TextoftheConvention/tabid/2232/Default.aspx, accessed 26 October 2023).
21. Radiation protection and safety of radiation sources: international basic safety standards. Vienna: International Atomic Energy Agency; 2014 (https://www-pub.iaea.org/MTCD/Publications/PDF/Pub1578_web-57265295.pdf, accessed 22 September 2023).
22. Radiation protection and safety in medical uses of ionizing radiation. Vienna: International Atomic Energy Agency; 2018 (https://www.iaea.org/publications/11102/radiation-protection-and-safety-in-medical-uses-of-ionizing-radiation, accessed 1 November 2023).
23. Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal [website]. Basel: United Nations Environment Programme; 2019 (https://www.basel.int/TheConvention/Overview/TextoftheConvention/tabid/1275/Default.aspx, accessed 31 October 2023).
24. Energizing health: accelerating electricity access in health-care facilities. Geneva: World Health Organization, World Bank, Sustainable Energy for All, International Renewable Energy Agency; 2023 (https://iris.who.int/handle/10665/365657, accessed 7 August 2023)/
25. Action brief 2: global energy and health platform of action. Accelerating SDG 7 achievement. New York: United Nations; 2019 (https://sustainabledevelopment.un.org/content/documents/24066ab2_cover.pdf, accessed 2 November 2023).
26. Climate change and health: vulnerability and adaptation assessment. Geneva: World Health Organization; 2021 (https://apps.who.int/iris/handle/10665/345968, accessed 16 August 2023).
27. Health in the green economy: health care facilities. Geneva: World Health Organization; 2011 (https://www.who.int/publications/m/item/health-in-the-green-economy-health-care-facilities, accessed 2 November 2023).
28. Smart hospitals toolkit. Washington (DC): Pan American Health Organization, World Health Organization; 2017 (https://iris.paho.org/handle/10665.2/34977, accessed 7 August 2023).
29. Minamata Convention on Mercury [website]. Geneva: United Nations Environment Programme; 2013 (http://www.mercuryconvention.org/Convention/Text/tabid/3426/language/en-US/Default.aspx, accessed 1 November 2023).
30. Chemicals road map: road map to enhance health sector engagement in the Strategic Approach to International Chemicals Management towards the 2020 goal and beyond. Geneva: World Health Organization; 2017 (https://iris.who.int/handle/10665/273137, accessed 8 August 2023).
31. Bonn call for action: 10 actions to improve radiation protection in medicine in the next decade. Joint position statement by the IAEA and WHO. Vienna: International Atomic Energy Agency, World Health

Organization; 2012 (https://www.iaea.org/sites/default/files/17/12/bonn-call-for-action.pdf, accessed 1 November 2023).
32. Use of chest imaging in COVID-19: a rapid advice guide, 11 June 2020. Geneva: World Health Organization; 2020 (https://apps.who.int/iris/handle/10665/332336, accessed 2 November 2023).
33. Ethics and medical radiological imaging: a policy brief for health-care providers. Geneva: World Health Organization; 2022 (https://iris.who.int/handle/10665/353046, accessed 22 September 2023).
34. Release of patients after radionuclide therapy. Vienna: International Atomic Energy Agency; 2009 (https://www.iaea.org/publications/8179/release-of-patients-after-radionuclide-therapy, accessed 2 November 2023).
35. Portable digital radiography system: technical specifications [Internet]. Geneva: World Health Organization; 2021 (https://iris.who.int/handle/10665/344514, accessed 22 September 2023).
36. WHO–ILO Global Framework for National Occupational Health Programmes for Health Workers. Geneva: World Health Organization, International Labour Organization; 2020 (https://www.who.int/news-room/detail/10-06-2020-who-ilo-global-framework-for-national-occupational-health-programmes-for-health-workers, accessed 2 November 2023).
37. WHO guideline on the use of safety-engineered syringes for intramuscular, intradermal and subcutaneous injections in health care settings. Geneva: World Health Organization; 2016 (https://iris.who.int/handle/10665/250144, accessed 2 November 2023).

.

World Health Organization
Department of Environment, Climate Change and Health
Division of Universal Health Coverage / Healthier Populations
20, Avenue Appia
CH-1211 Geneva 27
Switzerland

www.who.int/teams/environment-climate-change-and-health