A.4 DROUGHT CHECKLISTS

Drought is defined as a naturally occurring phenomenon that exists when precipitation has been significantly below normal recorded levels, causing serious hydrological imbalances that adversely affect land resource production systems *(22)*. IPCC states that there is medium confidence that some regions of the world have experienced more intense and longer droughts; however it also notes that in some regions, droughts are less frequent, less intense or shorter. There is medium confidence that droughts will intensify in the 21st century in some seasons and areas, due to reduced precipitation and/or increased evapotranspiration *(7)*.

CHECKLIST FOR ASSESSING VULNERABILITY TO DROUGHTS

DROUGHTS		Vulnerability level		
High: unprepared; unable to respond (Higher risk) **Medium:** basic or incomplete preparation; low level of response (Medium risk) **Low:** prepared; able to respond (Lower risk)		High	Medium	Low
HEALTH WORKFORCE	**Is the health workforce,**			
	(Human resources)			
	participating in drought, water and climate change adaptation plan and policies?*	☐	☐	☐
	equipped with a plan to identify minimum needs for health workers to ensure operational sufficiency care services?	☐	☐	☐
	equipped with a plan for scheduling outdoor work for cooler time of the day and reducing physical demand during hot days?	☐	☐	☐
	provided with sunscreen, hat and plenty of drinking water for staff carrying out outdoor activities?	☐	☐	☐
	provided with drinking water and stimulated regularly for appropriate water intake?	☐	☐	☐
	(Capacity development)			
	trained to identify health conditions made worse by drought?	☐	☐	☐
	equipped with knowledge, experience, training and resources to manage emergency preparedness plans and response measures to reduce drought risks and impacts at the facility and in the local communities?*	☐	☐	☐
	trained in multihazard assessments?	☐	☐	☐
	trained to manage hazardous chemicals?	☐	☐	☐
	trained on how to treat stored water for human consumption?	☐	☐	☐
	trained or prepared to quantify drought-sensitive diseases taking into account the special drought patterns?	☐	☐	☐
	able to convey protective strategies for public health emergencies, in case of high temperature effects, and water and food contamination to patients, staff and communities?*	☐	☐	☐
	trained to an appropriate standard to maintain the correct level of safety of electrical power supply, in both routine and emergency/disaster situations?*	☐	☐	☐
	(Communication and awareness raising)			
	aware of the different impacts of drought on human health?	☐	☐	☐
	informed of air pollution advisories and warnings?	☐	☐	☐
	prepared with clear messaging about water and food safety during and after a drought?	☐	☐	☐

DROUGHTS		Vulnerability level		
High: unprepared; unable to respond (Higher risk) **Medium:** basic or incomplete preparation; low level of response (Medium risk) **Low:** prepared; able to respond (Lower risk)		High	Medium	Low
HEALTH WORKFORCE	**Is the health workforce,**			
	informed on how to use and follow a surveillance system to track health outcomes?	☐	☐	☐
	following guidance on risk assessments to assist in the identification, planning, monitoring and evaluation of risk reduction and adaptation strategies associated with direct and indirect impacts of drought?	☐	☐	☐
	regularly participating in community disaster planning committees to: improve knowledge on how to reduce risks, as well as be prepared and respond to direct and indirect impacts of drought hazard through adaptation measures?*	☐	☐	☐
	following an educational strategy to improve knowledge in the community on the social and economic aspects of drought impacts, and how to reduce health risks and impacts?	☐	☐	☐
	provided with an effective emergency risk communication plan?*	☐	☐	☐
	aware of keeping the facility environment cool (e.g. keep windows that are exposed to the sun closed during the day and open at night when the temperature has dropped; close curtains that receive morning or afternoon sun; turn off nonessential lights and electrical equipment that generate heat; sleeping in a cooler room or use electric fans for some relief if temperatures are below 35°C)?	☐	☐	☐
WASH AND HEALTH CARE WASTE	**Does the health care facility,**			
	(Monitoring and assessment)			
	verify water safety conditions, which include updated risk assessments to map water resources and water supplies for the facility?*	☐	☐	☐
	have an updated plan to map risks to the water and sanitation infrastructure to identify where services could be disrupted from water scarcity?*	☐	☐	☐
	regularly inspect the rainwater harvesting system for damage and contamination?	☐	☐	☐
	have an evaluation system to monitor water drips, leaks and unnecessary flows in bathrooms, laundry facilities, kitchen, etc.; and perform prompt repairs to avoid loss?	☐	☐	☐
	verify safety conditions and proper functioning of all elements of the water distribution system in preparation for drought (e.g. storage tanks, cisterns, valves, pipes and connections, and water disinfection)?*	☐	☐	☐
	have information on the water system installation that ensures lower risk of being contaminated?	☐	☐	☐
	have a water quality monitoring plan for human consumption?	☐	☐	☐
	have a monitoring plan for potable water?*	☐	☐	☐
	(Risk management)			
	have a water management plan to identify water contamination?*	☐	☐	☐
	have a contingency plan for monitoring and reducing contaminant concentrations in the facility water system supplies?	☐	☐	☐
	have a water management system to avoid or reduce vector breeding sites?	☐	☐	☐
	have anti-mosquito breeding measures to avoid vectorborne diseases?	☐	☐	☐
	have a rainwater catchment system with safe water storage?	☐	☐	☐
	have water storage tanks with appropriate covers to prevent contamination?*	☐	☐	☐
	have water storage that is protected from direct sunlight?	☐	☐	☐

DROUGHTS	Vulnerability level		
High: unprepared; unable to respond (Higher risk) **Medium:** basic or incomplete preparation; low level of response (Medium risk) **Low:** prepared; able to respond (Lower risk)	High	Medium	Low
WASH AND HEALTH CARE WASTE			
Does the health care facility,			
have chemicals stored away from excessive heat?*	☐	☐	☐
provide sufficient drinking water to staff, patients and visitors?*	☐	☐	☐
have onsite water purification equipment to provide safe drinking water?	☐	☐	☐
have a surveillance system for diseases related to water quality and sanitation?*	☐	☐	☐
(Health and safety regulation)			
have a long-term drought management plan, including the identification of available alternative safe water sources?*	☐	☐	☐
have established procedures for procuring, transporting and safely storing water?*	☐	☐	☐
work with water utility agencies to prevent suspension of services?	☐	☐	☐
have a water safety plan in place, in case of water contamination?	☐	☐	☐
have a plan to conserve and manage water to reduce water usage, specifically in case of prolonged drought?	☐	☐	☐
have a cross-sectoral water management plan to conserve and protect local or alternative water sources?	☐	☐	☐
have a mechanism or regulation to carry out sanitary inspections of alternative forms of water supply (e.g. wells, dams, cisterns, fountains and water trucks), and when necessary, establish a temporary ban on use, until improvements are made to sanitary conditions?	☐	☐	☐
have a contingency plan to ensure effective and timely delivery of safe water during drought and emergencies over the short- and long-term?*	☐	☐	☐
ENERGY			
Does the health care facility,			
(Monitoring and assessment)			
regularly assess its energy system to ensure it can cope with drought conditions?	☐	☐	☐
have an emergency backup generator (including fuel, where relevant) that is able to cover at least all critical service areas and equipment during and after the event?*	☐	☐	☐
periodically check the emergency backup generator (including fuel, where relevant)?*	☐	☐	☐
assess regularly heating, ventilation and air conditioning systems?	☐	☐	☐
assess whether renewable energy (if available, such as solar) is sufficient to power critical equipment?	☐	☐	☐
(Risk management)			
have appliance thermometers in the refrigerator and freezer to determine if food, vaccines and other essential refrigeration-dependent medical supplies are safe?	☐	☐	☐
have adequate daylight to ensure proper visibility during a power outage?	☐	☐	☐
work with energy utility agencies to prevent suspension of electricity services?	☐	☐	☐
have power-operated doors that can be opened manually to permit exit in case of power failure?	☐	☐	☐
have a clear guidance on heat-risk management for the maintenance of critical infrastructure (e.g. air-conditioning, medical devices, computers, diagnostic equipment, boiling water)?*	☐	☐	☐
(Health and safety regulation)			
have an emergency plan for power outages in the short- and long-term?	☐	☐	☐

DROUGHTS		Vulnerability level		
High: unprepared; unable to respond (Higher risk) **Medium:** basic or incomplete preparation; low level of response (Medium risk) **Low:** prepared; able to respond (Lower risk)		High	Medium	Low
ENERGY	**Does the health care facility,**			
	have a plan or regulation to determine ways to reduce overall energy use?	☐	☐	☐
	work with energy utility agencies to prevent suspension of electricity services?	☐	☐	☐
	have an emergency plan to ensure availability of adequate lighting, communication and information systems, and refrigeration and sterilization equipment during a drought?*	☐	☐	☐
	have a plan to evacuate patients to a cooling station if the facility has lost power and has no other source of energy?	☐	☐	☐
	have a plan to ensure that the walls and roofs of the facility are insulated?	☐	☐	☐
INFRASTRUCTURE, TECHNOLOGIES, PRODUCTS AND PROCESSES	**Does the health care facility,**			
	(Adaptation of current systems and infrastructures)			
	have health workforce preparedness and training for periods of extreme drought in place?	☐	☐	☐
	perform assessments of drought conditions – current, past trends and future changes – to implement preventive actions?	☐	☐	☐
	assess the performance and vulnerabilities of each critical part of the facility (structural and nonstructural elements) that can be affected by hot temperatures?	☐	☐	☐
	have a monitoring and early warning system integrated with other areas to manage risks related to drought impacts on the facility?	☐	☐	☐
	have a mechanism to rapidly supply or restore water services to the facility?*	☐	☐	☐
	conduct ongoing and postdrought evaluations to identify success and weakness to improve preventive measures?	☐	☐	☐
	assess the capacity of heating, ventilation and air-conditioning systems to deal with increasing heat?*	☐	☐	☐
	have exterior shading devices, trees or other architectural features that mitigate heat and dryness?	☐	☐	☐
	have openable windows to provide for ventilation and to maintain habitable conditions?	☐	☐	☐
	install reflective white roofs to reduce heat impacts?	☐	☐	☐
	have pavements and roofs designed to withstand extreme temperatures or solar radiation?	☐	☐	☐
	have a mechanism to filter indoor and ambient air pollutants?	☐	☐	☐
	have a system for cooling the environment?	☐	☐	☐
	identify vulnerabilities to implement actions to reduce impacts?	☐	☐	☐
	stimulate increase of water intake by staff and patients?	☐	☐	☐
	store chemicals away from excessive heat?*	☐	☐	☐
	have a coordinated team across the health sector with a key stakeholder group including different levels of government to manage the risks of public health emergency related to droughts?	☐	☐	☐
	have an effective risk communication plan to communicate clear messages of the danger of heatwaves and dehydration emphasizing health protection as a priority?	☐	☐	☐
	(Promotion of new systems and technologies)			
	have an information system between the health sector and meteorological services to communicate about the climate hazard?*	☐	☐	☐

DROUGHTS

High: unprepared; unable to respond (Higher risk)
Medium: basic or incomplete preparation; low level of response (Medium risk)
Low: prepared; able to respond (Lower risk)

INFRASTRUCTURE, TECHNOLOGIES, PRODUCTS AND PROCESSES	Vulnerability level		
Does the health care facility,	**High**	**Medium**	**Low**
have a syndromic surveillance system for drought-related illnesses?	☐	☐	☐
have an assessment plan for identifying vulnerability conditions considering the degree or extent of potential damage or loss in the event of a drought?	☐	☐	☐
have identified capacities, resources and needs to better cope and manage a drought event?	☐	☐	☐
have an established set of procedures to continually evaluate and implement risk management plans to stay responsive to the needs of the facility in ongoing and postdrought events?	☐	☐	☐
ensure information and communication flow between health workforce and policy makers, particularly, during high stress situations and demands created by emergencies?	☐	☐	☐
have trees and plants which are resilient to drought surrounding the facility?	☐	☐	☐
have an information system for tracking and monitoring diseases following drought events?	☐	☐	☐
have measures that improve health performance, based on a history of climate variability in the region or locality?	☐	☐	☐
(Sustainability of health care facility operations)			
have procedures for procuring, transporting and safely storing water supplies?	☐	☐	☐
have a defined and sustained budget as part of core budgeting for emergency preparedness and response to drought risks?	☐	☐	☐
have established partnerships between the facility, community and local authorities to reduce vulnerabilities in the surrounding areas?	☐	☐	☐
have trees and leafy plants near windows to provide natural cooling?	☐	☐	☐
have a plan to conserve and manage water to reduce water usage, specifically in case of prolonged drought?	☐	☐	☐
have a plan for relocating supplies and services in case of outbreaks and epidemics that may overwhelm the facility or increase demand due to severe drought?	☐	☐	☐
have established requirements or provide incentives to encourage water conservation in the facility and also in the communities?	☐	☐	☐
have a coordinated plan with health municipal department heads to ensure appropriate preparations for ongoing drought conditions?*	☐	☐	☐
explore the relationship between social learning and adaptation measures in the face of drought threats to identify and implement the best behavioural responses from successful health facilities?	☐	☐	☐
undertake risk assessments of the supply chain for essential medical and nonmedical products?	☐	☐	☐
have secure access to essential backup food sources via multiple agreements with different vendors and through cooperative agreements with other health care facilities?*	☐	☐	☐

Note: For WASH and health care waste details see WASH FIT (3).

**For further details see Hospital Safety Index (2).*

IMPACTS CHECKLIST FOR DROUGHTS

HEALTH WORKFORCE		
LEVEL OF IMPACT		
MAJOR	**MODERATE**	**MINOR**
☐ Increased threat to the health workforce from infectious disease from water contamination and vector breeding sites ☐ Increased threat to the health workforce resulting in impacts to noncommunicable diseases (cardiovascular, respiratory diseases), from poor air quality and higher temperatures ☐ Drought-related illness to health workers requiring hospitalization ☐ Effects on mental health of staff leading to psychological stress ☐ Interruption of critical programmes or services availability with possible relocation to another facility (municipality or capital) ☐ Reduced performance capacity of health workforce ☐ Increased demand for health care due to drought-related infectious diseases (water-, food- and vector-borne diseases), cardiovascular, kidney and respiratory diseases, cancer (skin, bladder, lung), malnutrition and mental health issues	☐ Increased threat to the health workforce resulting in impacts related to high temperature, low air humidity and less water ingestion ☐ Possible illness to health workers requiring medical treatment ☐ Reduction of health workforce functions ☐ Reduced capacity of the health workforce to deliver health care due to lack of conditions to perform hygiene procedures and services (personal and work-related hygiene) ☐ Reduced productivity ☐ Possible increased risk of dustborne diseases (valley fever, meningococcal meningitis), leading to hospital admissions ☐ Increased risk of mortality associated with drought impacts (cardiopulmonary and respiratory diseases), and increasing demand for services from staff	☐ Drought-related illness among health workers not requiring immediate medical treatment ☐ Service delivery and programme delays ☐ Restrictions to provide health care services and programmes ☐ Reduced capacity for health workforce to performs hygiene procedures compromising safety ☐ Possible reduced capacity and health workforce performance in case of outbreaks

WASH AND HEALTH CARE WASTE		
LEVEL OF IMPACT		
MAJOR	**MODERATE**	**MINOR**
☐ Disruption of the water system supply	☐ Insufficient water availability to provide health care services	☐ Reduced water availability to provide health care services
☐ Shortage or lack of water	☐ Low water quality	☐ Reduced capacity to maintain hygiene of toilets, showers, etc.
☐ Increased water pollution due to pollutant concentration resulting from low flows and reduced water levels (arsenic, iron, manganese, fluoride)	☐ Reduced function of sanitation systems and hygiene practices (flush toilets, showers, sewerage, hand washing, medical procedures)	☐ Reduced capacity to access local agricultural produce
☐ Increased water pollution due to nutrient concentration (phosphorus) resulting from reduced dissolved oxygen levels caused by higher temperatures, and reduced flows that increase phytoplankton activity	☐ Reduced capacity to provide cleaning services (floor, toilets, patient rooms, and other health care facility rooms)	☐ Possible increase in vector breeding sites due to inadequate water storage in the facility or surrounding areas
☐ Increased water contamination by cyanobacterial blooms due to increased temperature	☐ Reduced capacity to provide water for laundry and dishwashing machines	☐ Unable to follow boil water advisories
☐ Water contamination from metals	☐ Reduced capacity to deliver health care services due to water shortage	
☐ Increased water salinity in groundwater resources due to decreased recharge	☐ Reduced capacity to access drinking water for health workforce and patients	
☐ No access to potable water for drinking and cooking	☐ Reduced capacity to provide disinfection or sterilization	
☐ Lack of water availability for washing, cooking and hygiene compromising health service deliveries	☐ Increased dependence on less secure alternative water sources	
☐ Likelihood of contamination of medical devices, instruments and equipment	☐ Lack of safe water to provide complex health care services	
☐ Compromised complex and emergency health care services (surgery, urgent care)	☐ Reduced efficacy of chemicals to treat water	
☐ Compromised routine health care services such as ambulatory, immunization, maternity room, dentistry, and other primary services		
☐ Inadequate wastewater elimination		
☐ Increased rate of broken pipes		

ENERGY		
LEVEL OF IMPACT		
MAJOR	**MODERATE**	**MINOR**
☐ Power failure ☐ Disruption in use of medical equipments that require electricity ☐ Shutdown of cold storage systems ☐ Interruption of health care services which require electricity such as dialysis, oxygen supplies, diagnosis equipment ☐ Loss of vaccines, laboratorial supplies, drugs, pharmaceuticals and other essential refrigeration-dependent medical supplies ☐ Unable to follow boil water advisories ☐ Disruption of the fuel supply chain ☐ Disruption of energy-dependent water pumping and treatment	☐ Intermittent power delivery ☐ Temporary power supply interruption ☐ Reduced capacity to use medical and diagnostic equipment that require electricity ☐ Disruption of cooling system for medicines, vaccines, and medical and laboratorial supplies ☐ Difficulty to provide critical health care service deliveries such as dialysis, oxygen supplies, diagnostic equipment, causing patient transfers to other health care facilities (municipal or regional) ☐ Reduced capacity to provide cleaning services that need electricity (laundry, dishwashing machines) ☐ Reduced capacity to provide disinfection services that need electricity (autoclave, microwave) ☐ Reduced capacity to boil water	☐ No ongoing compromise of energy supply ☐ No ambient cooling ☐ Loss of food or difficulty in keeping food refrigerated ☐ Interruption of internal access systems (elevators, automatic doors)

INFRASTRUCTURE, TECHNOLOGIES, PRODUCTS AND PROCESSES		
LEVEL OF IMPACT		
MAJOR	**MODERATE**	**MINOR**
☐ Damage to vital equipment from power outages ☐ Interruption of health care services delivery and operation ☐ Disruption of internal communication and information systems ☐ Reduced capacity of routine health care services such as ambulatory, immunization, maternity room, dental service, and other primary services (from reduced water supply) ☐ Interruption of diagnostics due to equipment damage ☐ Interruption of water and food supply chains ☐ Increased complex and emergency health care services (dialysis, complex treatments, outbreaks, cardiovascular and respiratory hospitalizations, etc.) ☐ Increased health care costs for attending to all drought-related impacts ☐ Decreased local food security ☐ Disruption of local food supply	☐ Reduced capacity to deliver critical health care services due to water shortage ☐ Reduced capacity to deliver basic health care services ☐ Temporary suspension of service deliveries due to water shortage ☐ Increase in temperature and reduction in air quality within the health care facility ☐ No functioning air conditioning system or electric fans or appropriate window position ☐ Possibility of reduced food supply due to lower access to food production ☐ Increased hospitalization rates requiring extra medical supplies and health workforce ☐ Possibility of higher costs to health care facilities due to lower/reduced food supply and higher prices	☐ Minimal impact on local operations equipment, with no impact on health care service deliveries ☐ Minimal impact on the supply chain ☐ Reduced capacity to provide local food access ☐ Minor impact from high temperatures and reduction in air quality within the facility due to lack of air conditioning or electric fans or appropriate window position

Sources for tables of vulnerabilities and impacts: (1–3,8,21,28,31,42,45–48,51,52).

DROUGHTS: PROPOSED ACTIONS TO RESPOND TO THE IDENTIFIED IMPACTS

Health workforce
WASH and health care waste
Energy
Infrastructure, technologies, products and processes