A.7 COLD WAVE CHECKLISTS

As the climate warms up, with expected increases of up to 4.5°C in some areas and a global temperature increase of 1.5°C, there is a decrease in cold days and nights and cold extremes in general *(4,7)*. Nevertheless, some countries and areas within countries experience unusual cold waves (as recently reported in Nepal *(58)*).

CHECKLIST FOR ASSESSING VULNERABILITY TO COLD WAVES

COLD WAVES		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)			
	equipped with a plan to identify and protect health workers at risk of cold waves impacts?	☐	☐	☐
	provided with appropriate clothes during cold snaps (e.g. warm, windproof and waterproof clothes, thermal underwear, boots)?	☐	☐	☐
	provided with a warm resting place?	☐	☐	☐
	provided with an information system to manage occupational safety and health in the facility during a cold wave?	☐	☐	☐
	equipped with a plan with rescheduled activities regarding outdoor activities?	☐	☐	☐
	(Capacity development)			
	trained on public health and cold wave risk factors?	☐	☐	☐
	trained on risk factors related to heating (e.g. carbon monoxide poisoning from certain heating appliances)?			
	prepared and able to follow up a contingency plan for increasing health workforce cardiovascular stresses and respiratory problems?	☐	☐	☐
	able to implement a contingency plan for public health emergency, in case of exposure to excessive cold temperatures?	☐	☐	☐
	trained on actions to reduce personal levels of cardiac workload risk factors for staff?	☐	☐	☐
	able to manage peak electricity demand?	☐	☐	☐
	(Communication and awareness raising)			
	aware of the risk factors of patients and symptoms expected during a cold wave?	☐	☐	☐
	informed on how to use and follow a surveillance system to track health effects from cold exposure?	☐	☐	☐
	aware of the need to wear appropriate clothing (ensuring that head, nose, mouth, neck, hands and feet are covered properly; wearing appropriate boots that keep feet warm and prevent from slipping and falling; using several layers of clothing and ensuring the top one is windproof and waterproof), specifically for outdoor activities?	☐	☐	☐
	aware of avoiding getting their clothes wet?	☐	☐	☐
	provided with a community health educational programme to improve community health in the face of cold wave risks (including homeless, alcohol and drug addicts and other persons who may spend long periods of time outdoors)?	☐	☐	☐

COLD WAVES	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,**			
aware of the need for an alternative action plan for the health workforce with outdoor responsibilities to reduce or avoid activity during excessive cold?	☐	☐	☐
aware of the need to take breaks in a warm place that is sheltered from wind and snowfall, when needing to stay outdoors for long periods of time?	☐	☐	☐
aware of the factors that can increase impacts on health (e.g. smoking and drinking alcohol may lower the body temperature leading to hypothermia; some medications can make people more sensitive to cold; certain diseases can be aggravated from cold temperatures, such as heart diseases, lung diseases, malnutrition)?	☐	☐	☐
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 evaluation system to monitor its water system or supply before, during and after an event?	☐	☐	☐
have information on water system installation that ensures lower risk of freezing?	☐	☐	☐
(Risk management)			
have a water management plan to identify water contamination?	☐	☐	☐
provide sufficient drinking water to staff, patients and visitors?*	☐	☐	☐
(Health and safety regulation)			
have an alternative source of water supply?*	☐	☐	☐
have a water safety plan in place, in case of freezing waters?	☐	☐	☐
have a contingency plan to ensure effective and timely delivery of safe water during extreme cold temperatures and emergencies over the short- and long-term?*	☐	☐	☐
have a cross-sectoral water management plan to conserve and protect local or alternative water sources?	☐	☐	☐
ENERGY — **Does the health care facility,**			
(Monitoring and assessment)			
regularly assess its energy system to ensure that it can cope with cold wave conditions?	☐	☐	☐
have an emergency backup generator (including fuel, where relevant) that is able to cover at least all critical service areas and equipment during cold wave events?*	☐	☐	☐
check the emergency backup generator (including fuel, where relevant), prior to cold waves to ensure its capacity to work in freezing conditions?	☐	☐	☐
regularly assess whether the heating system can cope with unexpected cold temperatures?	☐	☐	☐
assess whether renewable energy (if available, such as solar) is sufficient to power critical equipment?	☐	☐	☐
monitor the heating system to control the functioning of all critical medical equipment?	☐	☐	☐

COLD WAVES

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Medium: basic or incomplete preparation; low level of response (Medium risk)
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		Vulnerability level		
		High	Medium	Low
ENERGY	**Does the health care facility,**			
	(Risk management)			
	have a secure place to protect the backup generator (including fuel or battery storage, where relevant) from damage?*	☐	☐	☐
	have power-operated doors that can be opened manually to permit exit in case of power failure?	☐	☐	☐
	have a clear guidance on cold-risk management for the maintenance of critical infrastructures (such as heating systems, medical devices, computers, diagnostic equipment, boiling water)?*	☐	☐	☐
	(Health and safety regulation)			
	have an emergency plan for power outages in the short- and long-term (during and after the event)?	☐	☐	☐
	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 a management plan for intermittent energy supplies or system failure?	☐	☐	☐
	have an emergency plan to ensure availability of adequate lighting, communication and information systems, and refrigeration and sterilization equipment during the event?*	☐	☐	☐
	have a plan to evacuate patients to a heating station or other health care centre if the facility has lost power and has no other source of energy?	☐	☐	☐
	ensure that walls and roofs are insulated?	☐	☐	☐
INFRASTRUCTURE, TECHNOLOGIES, PRODUCTS AND PROCESSES	**Does the health care facility,**			
	(Adaptation of current systems and infrastructures)			
	provide advocacy on health workforce education to cover cold wave risks and responses?	☐	☐	☐
	have preparedness and training for periods of extreme cold exposure?	☐	☐	☐
	assess the performance and vulnerabilities of each critical part of the facility (structural and nonstructural elements) that can be affected by cold temperatures?	☐	☐	☐
	perform necessary and appropriate maintenance work to prepare the facility for winter or severe cold temperatures?	☐	☐	☐
	ensure that the rooms are well ventilated, when using an auxiliary heating system, such as oil-burning furnaces, wood-burning fireplaces, wood-burning stoves, propane heaters generators?	☐	☐	☐
	review building code design baselines against extreme cold temperatures?	☐	☐	☐
	identify vulnerabilities to estimate possible losses and implement actions to reduce impacts from extreme cold or freezing temperatures?	☐	☐	☐
	have caulked windows and doors to prevent cold air from coming in?	☐	☐	☐
	have insulated loft and cavity walls?	☐	☐	☐
	provide sufficient and necessary materials to supporting staff in outdoor activities, when necessary (e.g. in the case of vehicle breakdown having bottled water, food, blankets, cell phone and charger, shovel, snow brush, traction aids and medication)?	☐	☐	☐

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INFRASTRUCTURE, TECHNOLOGIES, PRODUCTS AND PROCESSES			
Does the health care facility,			
have access to extra medical supplies in case of increased demand for treatment of cold effects?	☐	☐	☐
have a plan for arranging extra staff or emergency support services?*	☐	☐	☐
store chemicals away from excessive cold?	☐	☐	☐
have an effective emergency risk communication plan to communicate clear messages of the danger of cold waves, emphasizing health protection as a priority?	☐	☐	☐
(Promotion of new systems and technologies)			
receive meteorological information and warnings on the likelihood of forthcoming extreme cold weather conditions?*	☐	☐	☐
have a syndromic surveillance system for cold-related diseases?	☐	☐	☐
have a long-term strategy for reducing cold effects, such as through building insulation?	☐	☐	☐
perform risk assessments to assist with adaptation measures for cold waves?*	☐	☐	☐
have an information system for tracking and monitoring diseases following cold wave events?	☐	☐	☐
have measures that improve health performance, based on a history of climate variability in the region or locality?	☐	☐	☐
coordinate public broadcasts of information about anticipated timing, severity and duration of cold wave conditions in its surrounding communities?	☐	☐	☐
(Sustainability of health care facility operations)			
have a defined and sustained budget as part of core budgeting for emergency preparedness and response to cold waves?	☐	☐	☐
assess the length of time people can remain in a place without heating systems (or in case of failure), before requiring evacuation to another facility?	☐	☐	☐
explore the relationship between social learning and adaptation measures in the face of cold wave threats to identify and implement the best behavioural responses from successful health facilities?	☐	☐	☐
have adaptive governance capacity regarding evaluation and measures for risk identification, risk reduction and response?	☐	☐	☐
have a coordinated plan with local health department teams to ensure appropriate preparations for ongoing cold wave conditions?*	☐	☐	☐

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

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

IMPACTS CHECKLIST FOR COLD WAVES

HEALTH WORKFORCE		
LEVEL OF IMPACT		
MAJOR	**MODERATE**	**MINOR**
☐ Life-threatening risks from exposure to excessive cold ☐ Cold exposure resulting in hypothermia ☐ Increased likelihood of cardiac workload (heart diseases), respiratory infections (influenza) and respiratory chronic conditions (asthma) ☐ Loss of work capacity and reduced productivity affecting the health of patients ☐ Increased workforce absenteeism ☐ Increased hospital admissions and emergency services overwhelming health workers	☐ Increased likelihood of diseases to the health workforce through exposure to outdoor activities ☐ Diseases requiring medical treatment, specifically for those with pre-existing chronic health conditions such as heart diseases, respiratory diseases (asthma, chronic bronchitis, emphysema), diabetes and certain neurological disorders ☐ Significantly reduced performance capacity ☐ Increased difficulty in accessing the health care facility due to freezing conditions	☐ Increased threat to the health workforce due to individual-level risk factors (age, pre-existing chronic health conditions, smoking, body acclimatization, reduced mobility) ☐ Reduction of health workforce functions

WASH AND HEALTH CARE WASTE		
LEVEL OF IMPACT		
MAJOR	**MODERATE**	**MINOR**
☐ Increased likelihood of water pipes bursting ☐ Increased likelihood of water freezing ☐ Loss of water pressure ☐ No access to drinking water in the premises ☐ Defaulting delivery care services due to lack of water access ☐ Disruption of water pumping and treatment systems	☐ Increased likelihood of water shortage ☐ Reduced capacity to provide sanitation and hygiene services ☐ Reduced capacity to provide sterilization, laundry and dishwashing services ☐ Reduced effectiveness of water treatment chemicals ☐ Reduced capacity for waste collection, storage and transport	☐ Reduced capacity to provide water for drinking and cooking ☐ Reduced functioning of sanitation systems and hygiene practices (flush toilets, showers, sewerage, treatment, hand washing, medical procedures)

ENERGY		
LEVEL OF IMPACT		
MAJOR	**MODERATE**	**MINOR**
☐ Increased demand for energy consumption ☐ Power outages ☐ Increased likelihood of disruption of medical equipment and storage of medicines, vaccines and other essential refrigeration-dependent medical supplies ☐ Increased likelihood of disruption of the fuel supply chain ☐ Disruption of energy-dependent water pumping and treatment systems ☐ Disruption of internal heating systems ☐ Disruption of communication and information systems	☐ Power shortages ☐ Difficulty in providing health care services ☐ Patients have to be transported to other health care facilities ☐ Reduced capacity to use critical facility equipment (medical devices) ☐ Reduced capacity to provide cleaning and disinfection services that require electricity (sterilization, laundry, dishwashing machines) ☐ Increased likelihood of loss of vaccines, laboratorial supplies, drugs, pharmaceuticals and other essential refrigeration-dependent medical supplies	☐ Difficulty in keeping food refrigerated ☐ Difficulty in providing thermal comfort, affecting health workers and patients ☐ Unable to follow boil water alerts

INFRASTRUCTURE, TECHNOLOGIES, PRODUCTS AND PROCESSES		
LEVEL OF IMPACT		
MAJOR	**MODERATE**	**MINOR**
☐ Damage to medical and laboratorial equipment and devices ☐ Interruption of complex and emergency health care services (surgery, complex treatments, urgent care) ☐ Increased likelihood of disruption of communication and information systems ☐ Increased number of patients presenting with cardiovascular and respiratory diseases, frostbite and hypothermia ☐ Increased demand for emergency health care services ☐ Increased electricity demand ☐ Damage to water pipes from cold exposure ☐ Disruption of health care facility access ☐ Difficult to transport patients and staff due to disabled transportation systems (ambulance, home assistance care, patient transportation)	☐ Increased hospitalization rates requiring extra medical supplies and health workforce ☐ Increased demand for heating devices ☐ Difficult transportation access interrupting supply chain ☐ Increased demand for adaptation measures and plans to reduce cold effects on health workers and the health care facility ☐ Disruption of supplies including that of heating units ☐ Breakdown of routine health care services such as ambulatory, immunization, maternity room, pharmacy, medication for chronic diseases, dental, and other primary services ☐ Interruption of diagnosis due to equipment damage	☐ Increased demand for conducting coordinated strategies to ensure the implementation of measures with other sectors ☐ Overwhelmed health services ☐ Increased costs for providing all necessary measures to keep staff, patients and technologies safe

Sources for tables of vulnerabilities and impacts: (2,3,8,35,37,40,44–46,55).

COLD WAVES: PROPOSED ACTIONS TO RESPOND TO THE IDENTIFIED IMPACTS

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