UKRAINE: 2023–2024 WINTER RISK ASSESSMENT

NOVEMBER 2023

World Health Organization
European Region

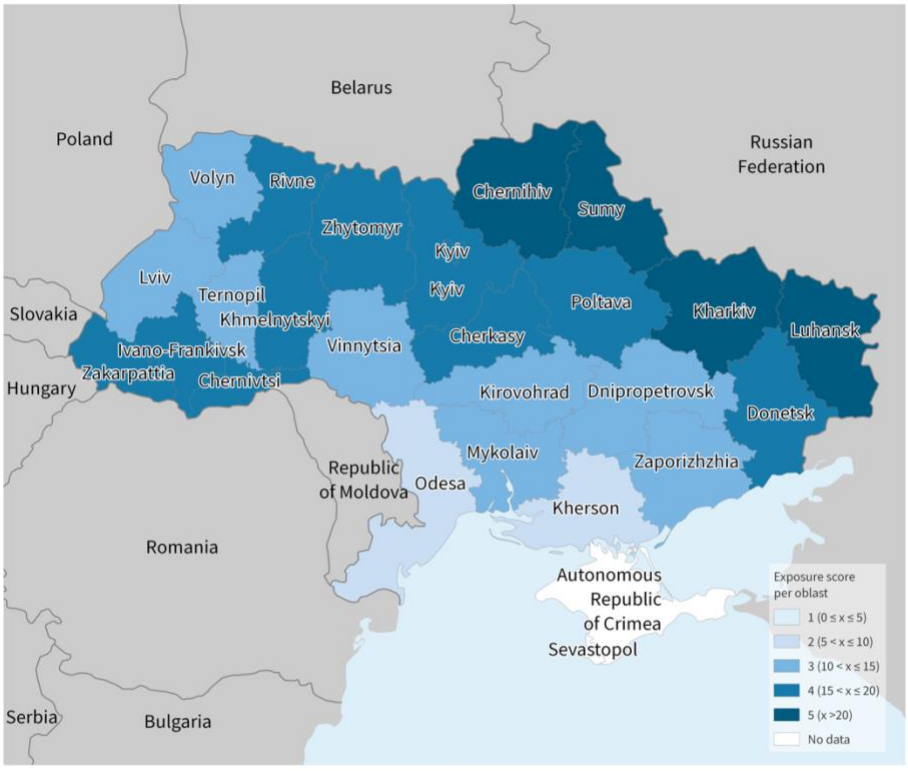
The 2023–2024 winter season in Ukraine will coincide with ongoing complex and challenging factors. Since the full-scale invasion of Ukraine in February 2022, the country has experienced damage to major infrastructure and homes, mass population movement and displacement, socioeconomic impacts, disruption to health systems and access to essential services. These impacts of war compounding with winter can result in increased risk of excess cold-related morbidity and mortality.

This risk assessment focuses on cold temperatures as a hazard based on historical weather data (this risk assessment is not a forecast predicting weather trends for the 2023–2024 winter season), vulnerable populations at high risk of public health impacts, health service access and delivery and the practical actions that could be taken to reduce the risk of adverse health-related outcomes due to severe cold. For a broader and more detailed understanding of the public health situation and threats in Ukraine viewed through an all-hazards lens, see the Ukraine public health situation analysis *(1)*.

HAZARDS AND EXPOSURE

Severe cold weather is a common occurrence in several countries in the European Region. In Ukraine, the cold weather season can be experienced for up to six months (October to March). The coldest months are December to March, where temperatures can drop as low as –20 °C and climb as high as +13 °C. All oblasts in Ukraine experience days with temperatures below -10 °C between October and March, which means that the entire country is exposed to severe cold temperatures. Fig. 1 shows the oblasts categorized by the average number of days of minimum daily temperatures below -10 °C (Category 5 was assigned to oblasts that have seen on average more than 20 days with a minimum daily temperature of less than -10 °C between October and March in the last 20 years). The northeastern part of the country experience prolonged severe cold weather. Although different methodologies were used, the hazard mapping in this risk assessment was similar to the hazard class mapping conducted down to the raion level by REACH *(2)*.

Fig. 1. Average number of days of minimum daily temperatures lower than -10 °C in Ukraine between October and March from 2003 to 2022



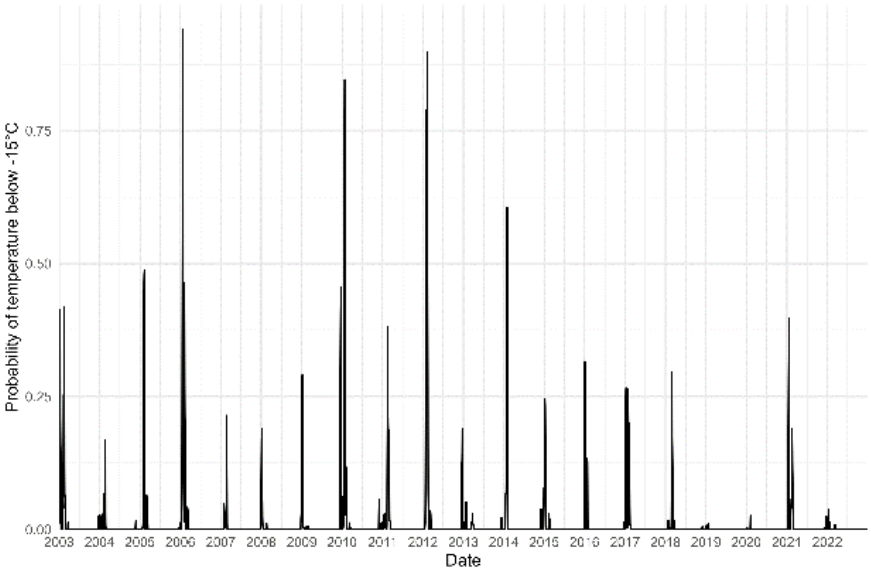
Data Source: World Health Organization
Map Production: WHO Health Emergencies Programme
Map Date: 2 November 2023

Exposure to severe cold can occur in the home (indoors), at work, during general movement or time spent outdoors, during cross-border movement, and by homeless people.

Direct exposure to severe cold weather increases the risk of mortality, including by exacerbating chronic disease such as coronary heart disease, cerebral vascular accidents, chronic respiratory illnesses, cold-related injuries and accidents, hypothermia and frostbite *(3,4)*. It poses a high health risk to many, particularly vulnerable groups such as children, elderly people, people experiencing homelessness, internally

displaced people and those with prolonged periods of exposure *(3,4)*. This often presents a challenge for health and social services to provide care for an increased number of patients suffering from various cold-related challenges. Disruptions to municipal services and infrastructure due to severe cold may have indirect public health consequences, including disruptions to health service delivery and access. Indirect impact also includes potential negative consequences. The impacts from indoor heating and epidemic-prone disease outbreaks, particularly in the context of internally displaced people moving to collective centres or movement of people to Points of Invincibility (locations where people can access heat, electricity, water and other basic services during power outages lasting more than 24 hours). Socioeconomic status and sociobehavioural factors such as social isolation, smoking, substance dependencies and mental illness can further increase the risk from exposure to severe cold. More in-depth information on direct and indirect public health consequences, potential impacts and priority actions is provided in Annex 1.

Fig. 2. Probability of temperatures below -15 °C



Meteorological conditions and their effects in the environment, including snowfall, increased wind speed, black ice, and incidents of cold wave increase the risk of adverse public health outcomes among vulnerable groups. In Ukraine, cold wave events have occurred every 5–6 years over the past 23 years (2000, 2006, 2012 and 2017), causing an increase in cold-related mortality. Fig. 2 shows the probability of temperatures dropping below -15 °C on a given day in a given region of Ukraine over the past 20 years. It is worth noting that the likelihood of these conditions in the past 10 years has decreased compared to the prior 10 years.

The harshness of winter in Ukraine has not changed, but the context in which winter takes place – amidst war, population movement, displacement, damaged infrastructure, social and economic factors, disrupted health systems and lack of access to services, puts people at compounded risk of direct and indirect public health consequences of severe cold temperature exposure. If an extreme cold event occurred during the 2023–2024 winter season in Ukraine, it would take a huge toll on the overall population and put massive pressure on the already overstretched health system.

VULNERABILITY

The entire population of Ukraine is exposed to cold weather during winter, and cold-related health effects can affect everyone. However, certain biological, demographic, geographic, security and socioeconomic factors increase the vulnerability of subpopulations and heighten their risk of adverse cold-related outcomes.

People living in homes without adequate winterization and those with reduced mobility are more likely to feel the full impact of severe cold. Groups at higher risk of adverse effects from direct exposure to severe cold temperatures and indirect impact on access and infrastructure and other risks are listed below.

- **Elderly people.** It is estimated that 20% of the population in Ukraine is 60 years and older – the highest proportion of elderly people in a humanitarian setting in the world *(1)*. The elderly (of whom two thirds are women) can be more vulnerable to cold, particularly those who may be socially isolated or living in rural and remote areas and those who are unable to properly winterize their dwellings. Elderly people are more likely to suffer from pre-existing chronic illness, have reduced mobility and, in some instances, limited temperature regulation due to nutrition, medical conditions, or medication side–effects. Those with conditions such as dementia and Alzheimer's

disease are also at risk, as they may be less aware of the need to modify their behaviour to stay warm. The war in Ukraine has particularly impacted older persons in areas under the temporary control of the Russian Federation, areas with ongoing hostilities and recently retaken areas *(5).*

- **Children under five years of age, including newborns.** Children under the age of five are vulnerable to the cold due to underdeveloped thermoregulation skills and a high level of dependency, with increased risk among children under one year, premature and low-birthweight newborns.

- **People with chronic illnesses.** Ukraine has a very high prevalence of noncommunicable diseases (NCDs) and their behavioural and biological risk factors, especially in men *(1)*. Access to essential health services and medications is crucial in the treatment of NCDs, particularly for older people, who have remained in front-line oblasts or people who are internally displaced or have limited mobility. There is a higher risk of aggravation of chronic and severe illnesses, including heart conditions, cardiovascular disease, asthma, chronic obstructive pulmonary disease (COPD), tuberculosis, depression and anxiety, diabetes, and arthritis during winter, compounded by limited access to medicines and health services.[1]

- **People internally displaced.** There has been unprecedent mass movement within the country since February 2022. The International Organization for Migration estimates that, as of 25 September 2023, 3.7 million people are internally displaced within Ukraine *(6)*. Of those, 52% are located in five oblasts, with the highest share of registered internally displaced people aged 60 years and over recorded in the Donetsk and Kharkiv oblasts *(7)*. Those displaced are vulnerable and at higher risk due to their unpredictable shelter situation and, in some cases, difficulties accessing health services and medicines in host communities.

- **Social and economic status.** The economic and social implications of war are evident in compromised housing standards, heightened costs, and social isolation, especially during the cold months. Inability to maintain ambient indoor temperatures due to infrastructure damage (water, electricity, and heat, damaged or destroyed dwellings, intermittent or no power supply, limited access to fuel, and living conditions in alternate shelters may pose a risk to the health and safety of many people in Ukraine this winter. The social and economic status of individuals and families plays a significant role in vulnerability to cold due to quality of housing and access to clean, affordable electricity and heating systems. Lower incomes affect people's ability to afford warm clothes and regular hot nutritious meals. Those internally displaced with loss of livelihood and people who are socially isolated and homeless are particularly vulnerable. People's financial situation can affect their ability to access health facilities and afford medicines. With greater reliance on government support and humanitarian aid, the national winterization plan highlights a significant shortfall in funding for winterization activities to support people at risk and the functionality and accessibility of public health facilities and programmes that service communities in need.

COPING CAPACITY

Security and safety impacts

Since the full-scale invasion of Ukraine by the Russian Federation in February 2022, 17.6 million people have been affected *(8)*. The war triggered an unprecedented humanitarian crisis, with mass movements internally and to refugee-receiving countries. Ukraine has instituted martial law and military conscription. In line with Government guidance, oblasts were classified as those with ongoing hostilities, those with previous hostilities, Kyiv, and the rest of the country.

Critical infrastructure

Major infrastructure in Ukraine remains extremely vulnerable. Targeted attacks across the country since the start of the conflict have caused extensive damage and led to disruptions in gas, heat, electricity and interrupted water supply and telecommunications, affecting large sections of the population. Intensified targeted attacks on the energy infrastructure in the 2022–2023 winter season resulted in a severe energy crisis during the coldest months *(9)*. While the Government has restored power generation and stockpiled for the coming winter, additional targeted attacks could put a strain on the

[1] Preventing the health effects of cold weather and cold waves [internal technical guidance]. Copenhagen: WHO Regional Office for Europe; 2013.

system and the people, leaving many of the most vulnerable groups in Ukraine at risk of adverse outcomes from cold-related exposure. Energy usage has decreased across the country, with marked reductions in front-line oblasts *(9)*, and as the winter season approaches, demand for solid fuels (such as firewood, coal, briquettes, peat briquettes, wood pellets and petrol) will increase along with cost.

The collapse of the Kakhovka dam on 6 June 2023 caused flooding of 80 settlements in Kherson and Mykolayiv, direct disruptions to up to 200 power substations, impacted 100 000 residents and triggered mass internal displacement both within the affected oblast and into neighbouring oblasts. In terms of climate, Kherson is situated in the south and experiences a milder winter than oblasts in the northern and eastern parts of the country. Due to destruction and damage to housing, disruption to major infrastructure and population displacement, the coming winter is expected to have a greater impact. Kherson will need additional humanitarian assistance, particularly during the cold months, in which subzero temperatures could be life-threatening.

Health service access and delivery

The health-care sector in Ukraine has been severely impacted by the war. As of November 2023, there have been 1322 attacks on health-care in Ukraine *(10)*. They have impacted infrastructure, causing damage or destruction of health facilities and transport, affecting patients, health personnel, and disrupting supply. Disrupted service delivery coupled with staff shortages poses a serious challenge. As a result of the conflict, Donetsk, Kharkiv and Kherson are the most affected oblasts in terms of functionality and accessibility of health services *(11)*. The situation is aggravated by broken supply chains, reduced access to health care, and impaired health surveillance systems. Winter conditions are expected to further hinder health-care access. As health facilities mostly rely on the public grid for energy, cold chain, heat and water supply *(11)*, areas with damaged or destroyed public infrastructure can be strained during the cold months and winterization of health facilities is required to secure and heat facilities.

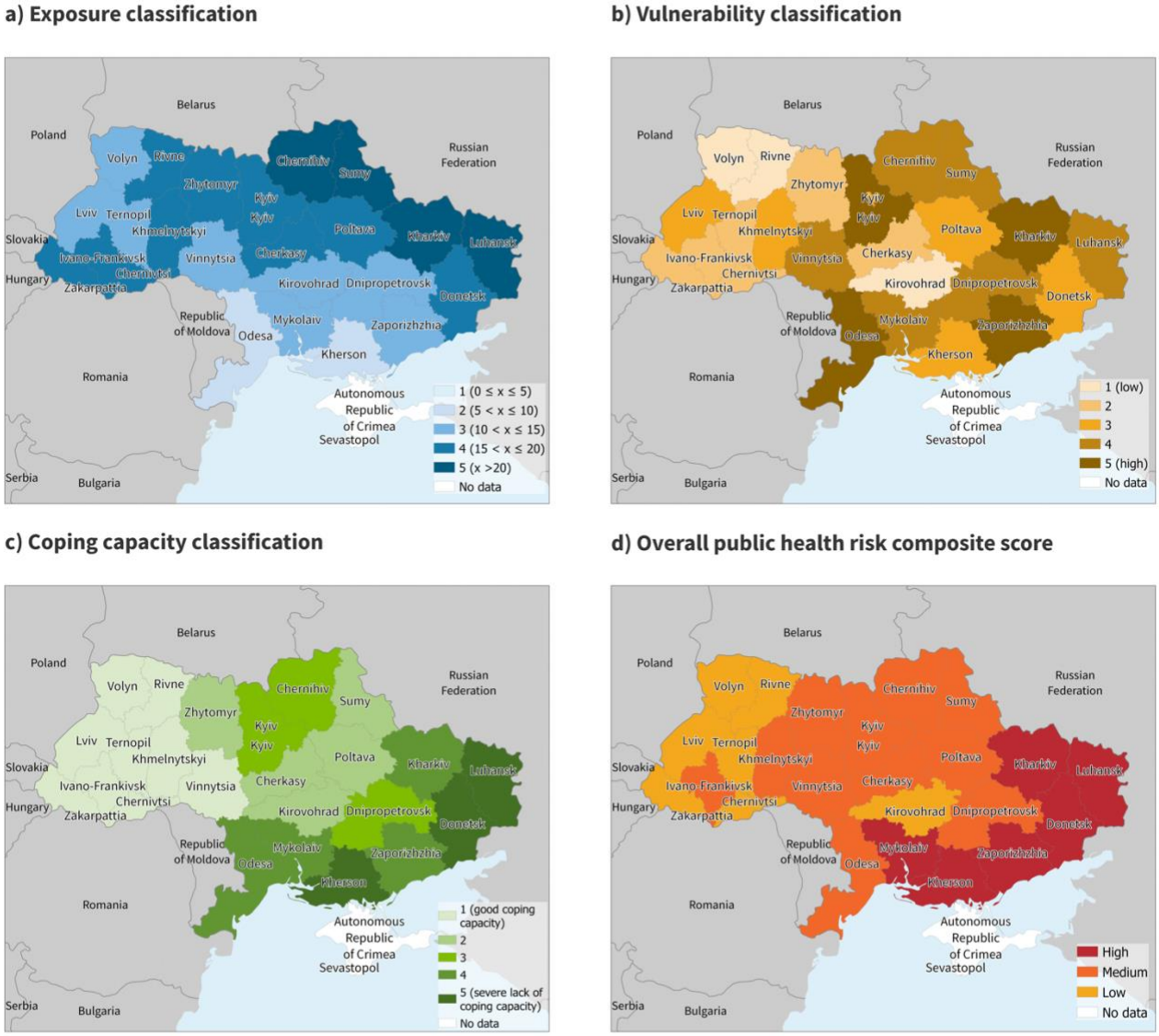
Early preparation and coordination

Ukraine is familiar with lengthy winters, severe cold, cold wave events and with infrastructure preparation and population readiness. The demographic, geographic, security and socioeconomic factors mentioned above affect the authorities and people's ability to adequately prepare for winter, amongst ongoing hostilities and the impact of a protracted emergency. Winterization for communities and infrastructure is a priority. Essential to the United Nations multisectoral winterization plan *(12)* is access to basic services and protection, enhancing resilience, strengthening coordination and advocacy, and supporting the COVID-19 response. Each sector has specific activities, targets, indicators, and budget requirements. The plan also identifies the main challenges and risks that may affect the implementation, such as insecurity, access constraints, funding gaps, and COVID-19 outbreaks. The plan emphasizes the need for a flexible and adaptive approach that can respond to the changing needs and context. The Health Cluster support for winterization demonstrates the importance of coordination and collaboration among humanitarian actors, as well as with national and local authorities, donors, and development partners, to reduce the risk to the most vulnerable populations. Humanitarian assistance for winterization has been crucial prior to February 2022 to support communities in conflict areas, and with the current ongoing hostilities affecting even more people, winterization support efforts are more important than ever, particularly for people who have been displaced and people living in front-line areas.

PUBLIC HEALTH RISK

Public health risk from severe cold was determined based on exposure to hazard severity (average number of severe cold days from October to March per oblast), vulnerability (population demographics) and coping capacity (functionality and access to health services, infrastructure, and security). While the oblasts in the north-east of Ukraine experience prolonged exposure to temperatures of -10 °C from December to March (Fig. 3a), when vulnerability (Fig. 3b) and coping capacity (Fig. 3c) are considered, oblasts at higher public health risk due to severe cold weather included Luhansk, Kharkiv, Donetsk, Zaporizhzhya, Kherson and Mykolayiv (Fig. 3d).

Fig. 3. Ukraine winter risk assessment: exposure, vulnerability, coping capacity classification and overall risk assessment composite score per oblast as of 30 September 2023



Data Source: World Health Organization
Map Production: WHO Health Emergencies Programme
Map Date: 2 November 2023

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World Health Organization

Front-line areas are more at risk of adverse public health outcomes of severe cold weather due to ongoing uncertainty affecting the functioning and accessibility of health services and infrastructure, as well as the vulnerability of people living in areas with ongoing hostilities. These findings also correspond to the severity of humanitarian conditions and the number of people in need by oblast in the OCHA Humanitarian Needs Overview 2023 *(13)*.

The cold temperatures experienced during the 2023–2024 winter season are expected to be no different in severity than those in previous years. However, in the context of people in need and reduced coping capacity in oblasts, vulnerable groups across the country need support to make it through a second winter with ongoing conflict. Those groups living in areas temporarily under the control of the Russian Federation and in oblasts with ongoing hostilities are at particular risk. If further stress is put on the system through severe cold wave events and/or if there are attacks on critical infrastructure, there will be extreme pressure on people and health facilities.

METHODOLOGY

To determine the public health risk from severe cold in Ukraine, a risk model was developed to create a composite indicator, using 15 key indicators aggregated across three risk pillars: exposure, vulnerability, and coping capacity. Indicators were taken from a wide variety of health- and non-health-related data sources to capture environmental hazard and demographics, as well as drivers that impact exposure, access, service delivery, safety, and security. Weighting was applied across indicators, with special focus on five key indicators that highly impact severe cold outcomes. These indicators are (i) oblast security situation, (ii) oblast change in power consumption, (iii) people's access to medicines and health services, (iv) household income, and (v) people who have been internally displaced.

Exposure + Vulnerability + Coping capacity = Public health risk composite indicator

Pillar: Exposure (weight: 0.20)

High-resolution temperature data were downloaded from the European Centre for Medium-Range Weather Forecasts/Copernicus Climate Change Service[2] at a spatial resolution of a regular latitude-longitude grid of 0.25 degrees and a temporal resolution of every 4 hours over the last 20 complete years (2003–2022). The hazard metric per grid point was determined as the average number of days the minimum daily temperature was lower than -10 °C between October and March over the last 20 years. The hazard metric per oblast was then calculated as the mean hazard classification of all grid points falling within a given oblast. These metrics were converted to risk classifications given the following cut-off points: 1 ($0 \leq x \leq 5$), 2 ($5 < x \leq 10$), 3 ($10 < x \leq 15$), 4 ($15 < x \leq 20$) and 5 ($x > 20$).

Pillar: Vulnerability (weight: 0.35)

The proportion of vulnerable populations per oblast was calculated using population data from both Population in Need and the United Nations Population Fund (UNFPA). Populations included in the model were scored based on factors that contribute to the impact of adverse outcomes from severe cold temperatures. These factors included statistics on the proportion of people over 70 years of age, under five years of age, and those aged 18–69 years with hypertension, as well as the number of internally displaced people recorded in the oblast. Higher weighting was assigned to internally displaced people due to their varying access to shelter, potential interruption to regular employment and income, and disruption of their regular medical habits.

Pillar: Coping capacity (weight: 0.45)

Key indicators in this pillar include health facility accessibility and access to medicines, health facility function, power, heating availability, Health Cluster support per oblast, power consumption changes, and security status. Security status includes the number of attacks on health care in oblasts since the start of the conflict, as well as the overall oblast conflict classification (based on the government classification of oblasts and those used in the health needs assessment: ongoing hostilities, previous hostilities, Kyiv and the rest of the country).

[2] ERA5: Fifth generation of ECMWF atmospheric reanalyses of the global climate. Copernicus Climate Change Service Climate Data Store; 2017 (https://cds.climate.copernicus.eu/cdsapp#!/home; accessed on 25 September 2023).

For certain indicators, data were not available for the Donetsk, Kherson, Luhansk and Zaporizhzhya oblasts, and for the Autonomous Republic of Crimea. Where data were not available for areas with ongoing hostilities, the weighting was adjusted to exclude missing values. The humanitarian needs of people in conflict zones, and the dire state in which health facilities were found in the Kherson oblast when first reclaimed by the Government of Ukraine, paint a concerning picture of the strain on communities in areas currently not under the control of the Government of Ukraine, which is reflected in the composite indicator.

Limitations

There are limitations to the datasets used within the risk matrix. Data used in this model are obtained from indicators that originate from various sources. Indicators were identified and included due to impact on the public health outcomes related to severe cold exposure. When finalizing the selection of risk matrix indicators, the accessibility of datasets, completeness, appropriateness, and methodological rigour were taken into consideration. Data were collected at different time periods, using different methods. Overall risk scores should be interpreted with care and in consultation with local authorities and communities to understand the local context and unique needs within populations for more targeted preparedness and intervention activities.

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Annex 1. Public health consequences of severe cold exposure, potential impacts, and priority actions

Public health consequences	Potential impacts	Priority actions Note that this is a non-exhaustive list, meant to highlight some overarching activities that might reduce the impact of winter on the health of the population and/or health service delivery or infrastructure.
Direct		
Cold-related injuries	Cold temperatures, ice and snow exposure can lead to cold-related injuries and disrupt access to health services[i] for staff and patients due to impacts on transport, human resources and functioning of health services. Cold-related injuries can occur locally in Ukraine, in transit to a border and when crossing the border to other countries. • **Cold-associated accidents** – ice and snow increase the risk of slipping and falling, and traffic accidents. Cooling of the body can decrease performance and lead to injuries, and accidents occurring outdoors can further increase the risk of hypothermia and frostbite. • **Road accidents –** ice and snow increase the risk of motor vehicle accidents. Attacks on Ukraine's public infrastructure, including the destruction of roads, has disrupted power supply, causing unsafe conditions. In addition, lack of road maintenance can increase the risk of accidents. • **Hypothermia and frostbite –** lowering of the core body temperature below 35 °C. Hypothermia occurs not only in extreme cold, but also in temperate climate conditions. Frostbite is tissue injury resulting from cooling and subsequent freezing of tissue that may involve only superficial tissues or may extend to the bone. • **Dermatological conditions –** cold urticaria (hives), pernio (chilblains), psoriasis, atopic dermatitis.	• **Identify vulnerable groups** (the elderly), children (including preterm/low-birthweight newborns), people with chronic diseases (such as cardiovascular and pulmonary disease, diabetes and arthritis), increased risk of exposure (homelessness, occupational, prolonged indoor or outdoor cold exposure) and excessive alcohol/drug use. Identify sites/locations that are more vulnerable (in transit for long periods, long queues, for example at pharmacies, grocery shops, places more vulnerable to heating problems such as hospitals, collective centres, prisons, public housing, schools, barracks, etc.). • **Identify referral services** for severe cases. • **Provide basic information and communicate the risk** on cold-related injuries, ways to protect yourself and others to prevent them (reduction of outdoor physical activity, adequate clothing, shortening or avoiding exposure, indoor heating options, thermometers to monitor indoor/outdoor temperature, etc.), warning signals, what to do in the home and when to seek care. Information on road safety and preparing for travel during the cold months should be provided to the public to reduce the risk of accidents. Prepare information materials such as flyers, the home pages of health-care providers' websites, social media, TV, radio, etc. Decide on the appropriate alternative information channel for various types of cold risk communication, confirm its usability and test it (e.g., hotline for quick advice). • **Train health workers at all levels**, particularly at primary health-care level, as well as paediatric clinics, and other areas identified as being at risk, including at border crossings, on case management of cold-related injuries and how to provide advice to patients and the public. Develop job aids for health workers to manage cold-related injuries. • **Prepare health facilities** (including paediatric, maternity and neonatal clinics) to receive patients with cold-related injuries, including by ensuring adequate medical supplies. • **Monitor the health impacts from the cold and the effectiveness of interventions** in a timely manner through a surveillance system, such as EBS. Areas to monitor include (i) excess mortality, (ii) cold-related morbidity, and (iii) health service demand.

		• **Advocate for other sectors** such as housing, transport, or social services, to provide prevention and protection measures (blankets, heating, nutrition supplies), including centres where vulnerable people can stay during extreme cold weather.
Acute respiratory infection (ARI)	During winter, and particularly in the current context of the Ukraine crisis, there is an increased risk of spread and morbidity and mortality of various causes of ARI,[i] including: • COVID-19 • seasonal influenza • respiratory syncytial virus (RSV) • other respiratory illnesses. Increased risk due to: • current circulating seasonal pathogens and strains (e.g., RSV, seasonal influenza, COVID-19); • population movements (e.g., internal to Ukraine and cross-border) and people who have been internally displaced or refugees in collective centres; • increased social mixing in closed spaces with less ventilation; • reduced capacity of surveillance, early detection and response systems; • lack of sufficient prevention interventions such as vaccination, use of public health and social measures, and water, sanitation and hygiene (WASH); and • lack of access to early testing, diagnosis and treatment.	Actions to mitigate the spread and impact of ARI should build on existing programmes and communicate the change in context due to winter and the current situation in Ukraine, with the additional burden of cold-related injuries and illnesses that could increase pressure on the health system and reduce the capacity to respond (due to lack of staff, supplies, usable health facility space, etc.). • **Identify people at highest risk**, including the elderly, people with chronic diseases, children, pregnant women, people who are immunocompromised, as well as highest-risk locations, such as places that are crowded, with inadequate prevention measures. Identify vulnerable people who cannot access health care or who are on the move, and provide tailored health services. • **Enhance current programmes for risk communication and community engagement (RCCE)**, highlighting the current risks and prevention actions, early testing, vaccination, instructing people how to care for themselves in the home and when to seek care; particularly for those identified as most at risk of the health impacts of winter in the current situation in Ukraine. • **Increase access to prevention** interventions such as vaccination and measures to reduce spread, as well as personal protection, particularly for those at highest risk. • **Increase surveillance** and early reporting and response actions in areas identified as high-risk (such as group homes, collective centres, newborn and maternity wards, health centres). • **Prepare health facilities** and referral mechanisms for a potential increase in health-care provision for respiratory illnesses, including considerations for transport, staffing, space, infection prevention and control (IPC) measures and supplies in the context of the constraints of winter and the current situation in Ukraine. • **Develop a contingency plan for disrupted transport** links, including disrupted access to patients' homes and care facilities, referral services and possible delays in pharmaceutical and other supplies. • **Put in place procedures to back up critical resources** (such as health workforce, power, oxygen, water). • **Prepare** (staffing, space, training, and supplies) **for a potential influx of weather-related injuries and illnesses** at health facilities that can strain existing services.

		• **Monitor to anticipate problems** such as shortages or overuse of critical supplies.
Exacerbation of chronic disease	There are seasonal increases in chronic disease morbidity and mortality during cold months, particularly those listed below.[i] The risk increases with age and acute events may be aggravated by physical exercise. The risk is further increased in the current context of the Ukraine crisis. • **Cardiovascular disease –** hypertension, coronary and other heart disease, myocardial infarction, cerebrovascular accidents and stroke. Exposure to cold increases blood pressure (0.19 mm Hg per each one-degree decrease in temperature) contributing to the 0–2% increase in cardiovascular disease per each one-degree decrease in temperature. • **Respiratory diseases** such as COPD and asthma. Breathing of cold air results in cooling and drying of the respiratory tract, which causes narrowing and structural changes of the airways, hypothermia on the respiratory system involves increased secretions and decreased ciliary motility, which can impair the ability to clear secretions. • **Endocrine disorders.** Because thermoregulatory mechanisms are supported by hormones, endocrine disorders (like diabetes mellitus and age-related disorders) can affect thermogenic responsiveness, increasing the risk of cold-related morbidity and mortality. • **Musculoskeletal disorders.** Cold temperature exposure indoors and outdoors can exacerbate musculoskeletal conditions, such as carpal tunnel syndrome, tension neck syndrome, tenosynovitis and peritendinitis, particularly affecting mobility.	• **Identify vulnerable groups** (elderly), chronic diseases, and increased risk of exposure (homelessness, occupational). • **Provide basic information and communicate the risk** for exacerbation of chronic diseases, ways to protect yourself and others and prevent it, warning signals, what to do in the home and when to seek care. • **Train health workers at all levels**, particularly at primary health-care level, on how to be aware of the risks, expect increases in cases, adjust medications and provide advice to patients and the public. Develop job aids for health workers to manage the specifics of cold-related illnesses. If there is no time to train health workers, prepare and distribute an information pack on what they need to know and what to do, including a reminder about how specific drugs are adversely affected or altered by cold weather. • **Prepare health facilities** to receive additional patients experiencing exacerbation of their chronic diseases, including by ensuring adequate medical supplies. Identify referral services for severe cases. • **Monitor the health impacts from the cold and the effectiveness of interventions** in a timely manner through a surveillance system such as event-based surveillance (EBS). Areas to monitor include (i) excess mortality; (ii) cold-related morbidity; and (iii) health service demand. • **Advocate for other sectors** (e.g., housing, transport, social services) to provide prevention and protection measures.
Indirect		
Disruptions in health service	Cold weather can impact the health system and services through direct weather-related damage or via reductions in access for the	• **Continue essential and emergency health care** and accommodate additional activities associated with cold weather (increase in cold-related injuries and illnesses).

[i] Preventing the health effects of cold weather and cold waves [internal technical guidance]. Copenhagen: WHO Regional Office for Europe; 2013.

delivery and access	population and health workers, particularly in the current context of the Ukraine crisis, with ongoing damage to infrastructure and impact of continued disruptions on health service delivery and access. Lack of adequate heating in health facilities can worsen the patients' condition. • **Reduced population access** due to ice, snow and extreme cold. • **Potential for population movement** due to extreme cold. • **Health workforce impacted** from all the cold-related risks listed above; workers are overburdened and overworked, at increased risk of making errors. The government has created teams to replace surgeons and trauma specialists to reduce the risk of medical errors. Health-care workers are working in a challenging environment, and winter will further compound this, with health-care infrastructure damage, appropriate heating of health facilities will be challenging. Health-care workers are witnessing and experiencing traumatizing events at work and in their country, which can take a mental toll. • **Direct damage and impact to infrastructure** (such as water, electricity and heating outages) – there have been 1149 attacks on health care in Ukraine since the escalation of the conflict in February 2022. The attacks on infrastructure have put thousands of health facilities at risk and disrupted health service provision. In November 2022, at the onset of the coldest months in Ukraine, there was an escalation of targeted attacks on essential infrastructure. These and other, more sustained attacks affect the functioning of the health facilities targeted and overburden others. There is a critical need for electricity, alternate power sources such as generators, and heating devices at health facilities. • **Reduced transport and delivery services** due to ice and snow (including delivery of medical supplies and laboratory samples). Disruptions in the supply of medical	• **Develop contingency and business continuity plans** for health systems and services to continue critical services, including prioritization of health services according to the current context. • **Develop a contingency plan for disrupted transport** links, including disrupted access to patients' homes and care facilities, referral services and possible delays in pharmaceutical and other supplies. • **Put in place procedures to back up critical resources** (such as health workforce, power, oxygen or water). • **Identify vulnerable people** (such as pregnant and lactating women, elderly and disabled people) who cannot access health care or who are on the move, and provide tailored health services. Identify pregnant women who may need antenatal or delivery care during the winter months and develop targeted plans for accessing skilled birth attendants and care. • **Prepare** (staffing, space, training and supplies) **for a potential influx of weather-related injuries and illnesses** at health facilities. • **Monitor to anticipate problems** such as shortages or overuse of critical supplies.

	equipment, including personal protective equipment, expose health-care workers to infectious disease, while disruptions in medicine supplies have an impact on the patients' outcomes. • **A potential large increase in additional patients and care needed** for cold-related injuries and illnesses. Prolonged exposure indoors to low temperatures can lead to an increase in cardiovascular events, respiratory disease, mental health problems, and many more. Therefore, the current lack of heating in many parts of Ukraine (regardless of cold waves) can put a significant strain on Ukrainian people (particularly those with chronic diseases, the elderly and children) and lead to increased hospital admissions, independent of any cold injuries.	
Public health impacts from indoor heating	During cold weather, and particularly in the current situation in Ukraine, people are more likely to use alternate heating sources that may pose health risks, particularly if the boilers, cooking, and heating appliances used are unsuitable, poorly maintained or malfunctioning.[i] Additionally, closed windows will lead to reduced ventilation and alternate sources of heating may cause fire and burns or toxic emissions. • **Carbon monoxide poisoning –** combustion of gas or solid fuels is used for heating. Carbon monoxide (CO) is a colourless, odourless gas produced by burning material containing carbon. • **Risk of burns** from indoor fires, malfunctioning/poorly managed fires, heating appliances and scalding from hot water increases during cold temperatures. • **Exacerbation of respiratory disease** through reduced ventilation and inhalation of toxic substances and exposure to ambient particulate matter from fire and heating appliances. Increased risk due to: • unsafe or inappropriate use of appliances to heat houses;	• **Identify vulnerable people** (elderly people, children, people with respiratory illnesses), and locations where people are crowded and may use alternate or unsafe heating (such as hospitals, prisons, long-term care facilities, collective centres for displaced people and refugees, public housing, and housing in deprived areas). • **Provide basic information and communicate the risk** of indoor heating, how to protect yourself and others and how to prevent accidents (e.g., proper ventilation, CO detectors, what to do during a power failure), warning signals, what to do in the home and when to seek care. • **Train health workers at all levels** on case management of the health impact of indoor heating and how to provide advice to patients and the public. Develop job aids for health workers to manage the prevention and health consequences of indoor heating. • **Prepare health facilities** to receive patients with health impacts from indoor heating, including by ensuring adequate medical supplies. Identify referral services for severe cases. • **Monitor the health impacts from the cold and the effectiveness of interventions** in a timely manner through a surveillance system such as EBS. Areas to monitor include (i) excess winter mortality, (ii) cold-related morbidity, and (iii) health service demand. • **Advocate for other sectors** (e.g., housing, energy, social services, fire services), including specific actions for local communities to provide prevention and protection measures.

[i] Preventing the health effects of cold weather and cold waves [internal technical guidance]. Copenhagen: WHO Regional Office for Europe, 2013.

	• unsafe or inappropriate use of kerosene space heaters, propane heaters, stoves and gasoline- and diesel-powered generators; • unsafe or inappropriate use of heating sources or generators during power outages; • remaining indoors with inadequate ventilation; and • CO emitted by household appliances building up in the absence of proper ventilation.	
Epidemic-prone disease outbreaks	During winter and in the context of the Ukraine crisis, there is an increased risk of spread of epidemic-prone diseases, including: • measles • gastrointestinal, rotavirus, cholera • poliomyelitis • diphtheria • tuberculosis (TB). Increased risk due to: • current circulating pathogens and strains, including seasonality; • population movements, including across and within borders, and refugees in collective centres; • increased social mixing in closed spaces with less ventilation; • reduced capacity of surveillance, early detection and response systems; • lack of sufficient prevention interventions such as vaccination, use of public health and social measures, and WASH; and • lack of access to early testing, diagnosis and treatment.	Actions to mitigate the spread and impact of epidemic-prone diseases should build on existing programmes, communicating the change in context due to winter and the current situation in Ukraine, with the additional burden of cold-related injuries and illnesses that could increase demand on the health system and reduce the capacity to respond (such as lack of staff, supplies or usable health facility space). • **Identify those most at risk**, including children, people who are unvaccinated or immunocompromised, as well as locations, such as places that are crowded, with inadequate prevention measures. • **Enhance current RCCE programmes**, highlighting the current risks for prevention actions, early testing, vaccination, WASH, information on ways to care for yourself in the home and when to seek care; particularly for those identified as most at risk from the health impacts of winter in the current situation in Ukraine. • **Increase access to prevention interventions** such as vaccination, WASH, public health and social measures and personal protection to reduce spread, particularly for those at highest risk. • **Increase surveillance and early reporting** and response actions in areas identified as high-risk (schools, group homes, collective centres, newborn and maternity wards, health centres). • **Prepare health facilities for a potential increase in demand** for care for epidemic-prone diseases, including considerations for staffing, space, IPC measures, supplies in the context of the constraints of winter and the current situation in Ukraine. • **Develop a contingency plan for disrupted transport** links, including disrupted access to patients' homes and care facilities, referral services and possible delays in pharmaceutical and other supplies. • **Put in place procedures to back up critical resources** (such as health workforce, power, oxygen or water).

		• **Identify vulnerable people** who cannot access health care or who are on the move, and provide tailored health services. • **Prepare** (staffing, space, training, supplies etc.) **for a potential influx of weather-related injuries and illnesses** at health facilities that can strain existing services. • **Monitor to anticipate problems** such as shortages or overuse of critical supplies.
Mental health	During winter and in the current situation in Ukraine, both internally and across borders, the following factors can lead to increased risk of mental health concerns. • **Exacerbation of chronic mental health symptoms.** People suffering from chronic depression often experience an exacerbation of symptoms with the arrival of winter, and the number of people presenting with depression increases due to seasonal changes. This can present as sadness, lack of energy, social withdrawal, loss of appetite and changes in sleep patterns. • **Isolation.** During cold winter months, opportunities to stay connected can be severely reduced. As a result, many people may feel alone and cut off from their support networks. People separated from their families, people who have been internally displaced and refugees are particularly vulnerable, especially if they are older or have a disability. • **Compounded stress.** Winter holidays can also trigger strong stress reactions, especially in people who are grieving, separated from their families and/or homes, or unable to observe their traditional holidays for other reasons. For people who are displaced by war, holidays can also be a grim reminder of their present hardships and an uncertain future.	• **Identify people or locations at highest risk** of mental health impacts of winter in the current situation in Ukraine. • **Set up support mechanisms** and disseminate information about support hotlines. Organize check-in calls and/or visits with people who are separated from their support networks. Ensure that mobile outreach service providers are aware of people with mobility issues and can check in with them regularly. • **Provide training to front-line workers** on psychological first aid and suicide risk prevention and response. • **Put in place referral systems** for those requiring more specialized services. • **Raise awareness** about common signs of seasonal depression and teach coping techniques (such as grounding, mindfulness and breathing exercises), and/or offer self-help tools like *Doing What Matters in Times of Stress.* Encourage healthy lifestyle choices (exercise, eating hot nutritious foods, socializing, etc.). • **Provide warm and welcoming safe spaces** where people can get together with others during the holidays.
Sexual and gender-based violence (SGBV) and exploitation	Conflicts increase the exposure of females of all ages to war crimes, including arbitrary killings, rape and trafficking. A 2019 UNFPA/OSCE survey of women from eight Eastern European countries found that approximately 70% of women had experienced some form of violence since the age of 15, and one in three has suffered physical or sexual violence. During winter and in the current context of the war in Ukraine, people moving both internally	Actions to prevent and reduce the risk of violence in crowded living spaces and to ensure that referral pathways are available for survivors, building on existing programmes. • **Enhance RCCE** to provide basic information on gender-based violence (GBV), ways to protect yourself and others and to prevent it, including warning signals, referral services, ways to access help and available services. • **Coordinate** – In coordination with protection cluster/programmes, ensure functionality of referral

	and across the border to other countries are vulnerable to heightened risks. • **Increased risk of SGBV.** Living conditions resulting from winter weather (for example, isolation of domestic violence survivors; crowded living conditions in shelters), coupled with exacerbation of mental health concerns, may increase the risk of SGBV, while disruption in access to and provision of health services (including due to transportation challenges) may decrease access to care for survivors. • **Increased risk of exploitation.** Forcibly displaced women and children are exposed to a higher risk of arbitrary killings, rape and trafficking. As a result of martial law, numerous Ukrainian families have been separated, with many women and children moving within Ukraine and fleeing across the border to other countries. Five per cent of the people crossing into neighbouring countries reported having a non-familial/unrelated child travelling with them. People moving for safety, assistance and shelter during the winter months are likely to be more vulnerable than people who moved in previous waves, which puts them at higher risk of exploitation.	pathways, including provision of essential health services for GBV survivors, such as clinical management of rape. Coordinate mental health and psychosocial support programmes and services. • **Engage with local nongovernmental organizations (NGOs)/civil society organizations** on the design and implementation of these interventions. • **Implement gender-responsive interventions to reduce the risk** of exploitation of women and children in countries receiving refugees from Ukraine.