



International
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Ensuring safety and health at work in a changing climate

Report at a glance

Climate change and occupational safety and health



Climate change has resulted in weather and climate extremes around the globe, as evidenced by the increase in frequency and severity of heatwaves, heavy precipitation, wildfires, droughts and tropical cyclones (IPCC 2021). This is having serious effects on the safety and health of workers, who are frequently the first to be exposed to these hazards, often for longer periods and at greater intensities than the general population (ILO 2023).

Climate change related hazards have been linked to numerous health effects, including injuries, cancer, cardiovascular disease, respiratory conditions, macular degeneration and mental health issues. The financial implications are also considerable, due to lost productivity, business disruptions and damaged infrastructure.

The report “Ensuring safety and health at work in a changing climate” presents critical evidence related to six key impacts of climate change on OSH, which were chosen for their severity and the magnitude of their effects on workers: excessive heat, ultraviolet (UV) radiation, extreme weather events, workplace air pollution, vector-borne diseases and changes in agrochemical use. It includes the most pertinent evidence regarding worker exposures and the main safety and health impacts. It also summarizes examples of existing responses to these hazards, such as policies and strategies, laws, collective agreements, technical guidelines, training and advisory initiatives, awareness raising campaigns and workplace level actions.



The ILO and climate change

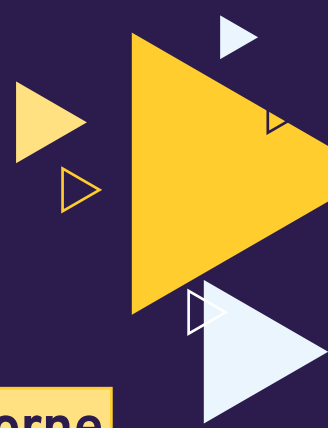
Despite the new focus on climate change concerns, many of the workplace hazards and risks covered here are not themselves new. The ILO has already developed tripartite responses to protect workers from many of these risks, in the form of international labour standards, codes of practice and technical guidelines specifically related to OSH. These instruments can strengthen adaptation frameworks by providing the legal foundation for addressing climate-related risks. The fundamental OSH conventions Nos. 155 and 187 constitute a blueprint for the progressive realization of the fundamental principle and right at work (FPRW) of a safe and healthy working environment, including by protecting workers from workplace hazards and risks associated with climate change.

The recently adopted ILO Global Strategy on Occupational Safety and Health 2024-30 emphasizes that OSH concerns related to climate change should be positioned high on global and national policy agendas, with key partnerships secured at national and international levels.

The ILO 2015 Guidelines for a Just Transition towards Environmentally Sustainable Economies and Societies for All identifies OSH as one of the key policy areas to address the environmental, economic and social sustainability of the transition.

The ILO is involved in a number of initiatives which are linked to climate change and just transition. For example, the Vision Zero Fund, a G-7 initiative that aims to reduce accidents, injuries and diseases in supply chains, is implementing a range of activities to address the impacts of climate change.

Existing international labour standards and codes of practice related to climate change and OSH



General

climate-related

OSH hazards

- **Occupational Safety and Health Convention, 1981 (No. 155)**
- Occupational Safety and Health Recommendation, 1981 (No. 164)
- **Promotional Framework for Occupational Safety and Health Convention, 2006 (No. 187)**
- Promotional Framework for Occupational Safety and Health Recommendation, 2006 (No. 197)
- Occupational Health Services Convention, 1985 (No. 161)
- List of Occupational Diseases Recommendation, 2002 (No. 194)
- Safety and Health in Agriculture Recommendation, 2001 (No. 192)
- Hygiene (Commerce and Office) Recommendation, 1964 (No. 120)
- Workers' Housing Recommendation, 1961 (No. 115)
- Reduction of Hours of Work Recommendation, 1962 (No. 116)
- Protection of Workers' Health Recommendation, 1953 (No. 97)
- Safety and health in construction (revised 2022), Code of Practice
- Safety and health in shipbuilding and ship repair (revised 2019), Code of Practice
- Safety and health in ports (revised 2016), Code of Practice
- Safety and health in forestry (1998), Code of Practice
- Safety and health in opencast mines (1991), Code of Practice



Excessive heat

- Plantations Convention, 1958 (No. 110)
- Ambient factors in the workplace (2001), Code of practice

Ultraviolet (UV)

radiation

- Ambient factors in the workplace (2001), Code of practice

Vector-borne

diseases

- Workers' Housing Recommendation, 1961 (No. 115)
- Technical guidelines on biological hazards in the working environment (2022)



Air

pollution

- Working Environment (Air Pollution, Noise and Vibration) Convention, 1977 (No. 148)
- Working Environment (Air Pollution, Noise and Vibration) Recommendation, 1977 (No. 156)



Agrochemicals

- Chemicals Convention, 1990 (No. 170)
- Chemicals Recommendation, 1990 (No. 177)
- Safety and Health in Agriculture Convention, 2001 (No. 184)
- Safety and health in agriculture (2010), Code of practice
- Safety in the use of chemicals at work (1993), Code of practice



Extreme

weather events

- Prevention of Major Industrial Accidents Convention, 1993 (No. 174)
- Prevention of Major Industrial Accidents Recommendation, 1993 (No. 181)
- Employment and Decent Work for Peace and Resilience Recommendation, 2017 (No. 205)



1. Excessive heat

Examples of workers at high-risk

Workers in agriculture, environmental goods and services (natural resource management), construction, refuse collection, emergency repair work, transport, tourism and sports.

Global burden of occupational exposures

At least 2.41 billion workers exposed annually to excessive heat at work.

Primary health impacts

Heat stress, heat stroke, heat exhaustion, rhabdomyolysis, heat syncope, heat cramps, heat rash, cardiovascular disease, acute kidney injury, chronic kidney disease, physical injury.

Work-related health impact

Every year, 22.85 million occupational injuries, 18,970 work-related deaths, and 2.09 million DALYs attributable to excessive heat.

ILO guidance for managing heat-related risks at the workplace level:

- ▶ Code of practice on ambient factors in the workplace – Chapter 8 Heat and cold.

Rising global temperatures due to climate change will result in more frequent and severe heatwaves, causing increased mortality, reduced productivity and damage to infrastructure (Mora et al. 2017). The impact of excessive heat varies across sectors, but those most at risk include outdoor workers in physically demanding jobs, and indoor workers in poor ventilated workplaces where temperature is not regulated. Heat-related risks are influenced by environmental conditions, physical exertion and clothing or equipment.

2. Ultraviolet radiation

Examples of workers at high-risk

Outdoor workers, including construction, agriculture, lifeguards, power utility workers, gardeners, postal workers and dock workers.

Global burden of occupational exposures

1.6 billion workers exposed annually to solar UV radiation at work (Pega et al. 2023).

Primary health impacts

Sunburn, skin blistering, acute eye damage, weakened immune systems, pterygium, cataracts, skin cancers, macular degeneration.

Work-related health impact

Every year, over 18,960 work-related deaths due to non-melanoma skin cancer alone (Pega et al. 2023).

ILO guidance for managing solar UV radiation at the workplace level:

- ▶ Code of practice on ambient factors in the workplace – Chapter 7 Optical radiation.

Solar UV radiation is a form of non-ionizing radiation. The quantity of solar UV radiation reaching earth is reduced by ozone molecules in the upper atmosphere. The gradual thinning of the ozone layer, caused by the release of ozone-depleting substances (ODS) from industry and other human activities, is therefore a major cause for concern. Solar UV radiation is a particular problem for outdoor workers, who are exposed to UV radiation doses at least two to three times higher than indoor workers and often to daily doses five times above internationally recommended limits (John et al. 2021). UV radiation can be especially hazardous for workers, as they may be unaware that they are being exposed to dangerously high levels.

3. Extreme weather events

Examples of workers at high-risk
Medical personnel, firefighters, other emergency workers, construction workers involved in clean-up, agriculture workers, fishing workers.
Global burden of occupational exposures
Limited data.
Primary health impacts
Various.
Work-related health impact
2.06 million deaths due to weather, climate and water hazards (not just occupational exposures) from 1970 to 2019 (WMO 2021).

ILO guidance for responding to extreme weather events at the workplace level:

- ▶ Prevention of Major Industrial Accidents Convention, 1993 (No. 174) and its accompanying Prevention of Major Industrial Accidents Recommendation, 1993 (No. 181),
- ▶ Guidelines on occupational safety and health management systems (ILO-OSH 2001).

Thousands of people are killed and injured every year in extreme weather events and natural disasters, such as floods, drought, wildfires and hurricanes. Workers may be exposed during the event, in the immediate aftermath or during clean-up operations. Many extreme weather events have also led to major damage to hazardous installations, such as factories or extraction sites, triggering the release of hazardous substances, fires and explosions. The predicted increase in both frequency and severity of weather events under future climate change scenarios poses a threat to the long-term well-being of many workers.

4. Workplace air pollution

Examples of workers at high-risk
All workers, particularly outdoor workers, transport workers and firefighters.
Global burden of occupational exposures
Increased risk of exposure to air pollution for the 1.6 billion outdoor workers.
Primary health impacts
Cancer (lung), respiratory disease, cardiovascular disease.
Work-related health impact
Every year, 860,000 work-related deaths attributable to air pollution (outdoor workers only) (ILO 2021a).

ILO guidance for managing air pollution at the workplace level:

- ▶ Working Environment (Air Pollution, Noise and Vibration) Convention, 1977 (No. 148) and its accompanying Working Environment (Air Pollution, Noise and Vibration) Recommendation, 1977 (No. 156)

Different air pollutants increase global warming, and global warming in turn leads to the formation of air pollutants (ETUI 2023). Modified weather patterns due to climate change have influenced levels of outdoor air pollutants, such as ground-level ozone, fine (PM2.5) and coarse (PM10) particulate matter, nitrogen dioxide (NO2), and sulphur dioxide (SO2). The rising number of wildfires will also increase emissions of particulate matter and ozone precursors. Climate change can also alter concentrations of indoor air pollutants, which may come from indoor sources, for example mould and volatile organic compounds, or may be transported into the building with outdoor air. Greater exposures are observed for outdoor workers in areas with high levels of air pollution generated by heavy traffic or industries.

5. Vector-borne diseases

Examples of workers at high-risk

Outdoor workers, including farmers, foresters, landscapers, groundskeepers, gardeners, painters, roofers, pavers, construction workers, firefighters, among others.

Global burden of occupational exposures

Limited data.

Primary health impacts

Malaria, Lyme disease, dengue, schistosomiasis, leishmaniasis, Chagas disease and African trypanosomiasis, among others.

Work-related health impact

Every year, over 15,170 work-related deaths attributable to parasitic and vector diseases.

ILO guidance for managing vector-borne diseases at the workplace level:

- ▶ Workers' Housing Recommendation, 1961 (No. 115) and the Technical guidelines on biological hazards in the working environment (2022).

Vector-borne diseases are illnesses caused by parasites, viruses and bacteria that are transmitted by vectors, such as mosquitos, ticks and fleas. Climate change has been linked with an increased risk of vector-borne diseases in workers through its effects on vector population sizes, survival rates and reproduction, along with its broader impacts on natural ecosystems and human systems. The greatest burden of these diseases is in tropical and subtropical areas, and they disproportionately affect the poorest populations. However, as climate change worsens, models project a substantial expansion of regions with a suitable climate for many vector-borne diseases.

6. Agrochemicals

Examples of workers at high-risk

Agriculture, plantations, chemical industries, forestry, pesticide sales, greenspace, vector control.

Global burden of occupational exposures

Increased risk of exposure to agrochemicals for a significant number of the 873 million workers employed in agriculture.

Primary health impacts

Poisoning, cancer, neurotoxicity, endocrine disruption, reproductive disorders, cardiovascular disease, chronic obstructive pulmonary disease, endocrine disruption, immune suppression.

Work-related health impact

Over 300,000 deaths annually due to pesticide poisoning (Jørs et al. 2018).

ILO guidance for managing agrochemicals at the workplace level:

- ▶ Chemicals Convention, 1990 (No. 170) and Chemicals Recommendation, 1990 (No. 177).
- ▶ Codes of practice: Safety in the use of chemicals at work (1993), Safety and health in agriculture (2011) and Safety and health in forestry work (1998).

An increase in pesticide use has been identified as an important impact of climate change on worker safety and health. Pesticide use is directly impacted by pesticide efficacy, crop characteristics and pest occurrence, all of which are influenced by climate change (Delcour et al. 2015). Fertilizer use can also be impacted by climate change, as increased precipitation can cause soil erosion and thus decrease essential soil nutrients such as nitrogen and phosphorus, which are essential for plant growth. Highly hazardous pesticides (HHPs) are a major concern, as their widespread use has caused serious health problems and fatalities in many areas of the world (WHO 2019).

Examples of responses to OSH hazards and risks related to climate change

National policies and strategies.

Sometimes, OSH concerns related to climate change have been integrated into public health and environmental policies and strategies, by explicitly referring to workplace action and to the protection of the health of workers. In other cases, hazards and risks related to climate change have been identified as priorities in national OSH policies and strategies, defining actions and initiatives to be implemented in the coming years.

Laws and regulations.

OSH legislations have historically addressed the protection of workers against extreme temperature, non-ionizing radiation (including solar UV radiation), air pollution, biological hazards (including vector-borne diseases) and hazardous chemicals (including agrochemicals). Some OSH laws also refer to the protection of workers during extreme weather events and natural disasters, requiring workplace emergency response plans.

Sometimes, legislation may require the employer to perform risk assessment and to adopt some specific measures (for example, ensuring adequate ventilation, establishing breaks, providing information and training, supplying PPE and safety equipment, among others).

While occupational exposure limits have been adopted in some countries for exposure to heat and to air pollutants, they are very rare for other hazards, such as solar UV radiation or agrochemicals.

In some cases, OSH legislation provides for regular medical surveillance for prevention or early recognition of the diseases associated with heat, solar UV radiation, air pollution, vector-borne diseases and agrochemicals. Some countries also include in the national list of occupational diseases heat-related diseases, diseases caused by solar UV radiation, diseases caused by biological hazards and/or pesticide-related disorders.

Collective agreements.

In some countries, collective agreements have defined additional measures to address some of the hazards and risks related to climate change, such as excessive heat, extreme weather events, air pollution and agrochemicals. These agreements have resulted in improved OSH protection for workers in different types of industries, such as construction, food and beverage supply chains, agriculture and transportation.

Technical guidelines.

Numerous technical guidelines have been produced by international and national OSH bodies and authorities, addressing workplace hazards related to climate change.

Guidelines cover topics such as heat stress prevention and sun safety, preparedness for and response to extreme weather events, air pollution, vector-borne diseases and use of pesticides. Sometimes, such guidelines are focused on specific groups of workers or situations, such as protecting workers exposed to wildfire smoke.

Training programmes and awareness raising initiatives.

Some OSH bodies and authorities, employers' and workers' organizations, NGOs and other bodies have developed training programmes, campaigns and advisory initiatives to spread information on the increased risks associated to climate change and measures to prevent them.

Awareness raising campaigns and community engagement strategies often involve targeting worker populations that are most at risk, such as in those in agricultural areas.

While many awareness raising campaigns related to excessive heat and sun safety at work have been organized, less activities addressing climate change and extreme weather events, workplace air pollution, vector-borne diseases and agrochemicals were identified.

Public health initiatives targeting workers.

Climate change is an issue in which the health concerns of workers and the public are clearly connected, thus in some countries OSH initiatives have been integrated into public health programmes and campaigns. For example, skin cancer prevention programmes have been set up to detect changes to skin in high-risk workers particularly exposed to solar UV radiations. Also, public health initiatives aimed at controlling vector-borne diseases have targeted worker populations that are most at risk.

Conclusions

Workers are currently facing serious health impacts from climate change-related hazards

A staggering number of workers are already being exposed to climate change-related hazards in the workplace, and these figures are only likely to get worse. Many of these workers lose their life following such exposures, succumbing to fatal diseases, such as cancers and cardiovascular diseases, or develop debilitating chronic conditions and disabilities. Some worker populations may be especially vulnerable to the effects of climate change and therefore may need extra protective measures, for example, agricultural workers and other outdoor workers carrying out heavy labour in hot climates.

Current OSH policies may need to be adapted and new climate change-specific policies created

As climate change hazards evolve and intensify, it may be necessary to re-evaluate existing legislation or create new regulations and guidance, to ensure that workers are properly protected. OSH considerations should be mainstreamed into climate-related policies, and climate concerns should be integrated into OSH practice. Any new legislation or policies should leverage synergies with existing legislation, such as global normative instruments.

Enhanced research and a stronger evidence base are needed to guide response

At present, the scientific evidence base is extremely limited in many critical areas and what does exist is frequently focused on public health, rather than occupational health. Comprehensive, high-quality research is needed to develop and evaluate the effectiveness of preventive OSH measures in different countries and sectors.

Social dialogue is the foundation for effective OSH responses in a changing world of work

OSH policies and programmes should be coordinated among government departments, including ministries of labour and ministries of health, to ensure policy coherence. Social dialogue between governments and social partners is also needed for the development of climate change mitigation and adaptation policies, as workers and employers are best placed to take appropriate action in the workplace.

Greening practices can also bring new OSH challenges

Enterprises are playing an important role in climate change mitigation strategies, by finding ways to reduce workplace emissions and implementing sustainable work practices. Green industries and technologies are also emerging to respond to this global emergency and could help in mitigation over the long term. However, green technologies may in some cases create or amplify OSH hazards and risks, especially if the appropriate infrastructure and OSH protections have not yet been developed.

The increased political profile of the climate-health nexus

Nevertheless, positive steps are being taken in the right direction. As recognition of the climate-health nexus continues to grow globally, new OSH policies are being implemented to specifically address climate change hazards. Momentum from global initiatives such as COP 28 should be harnessed to continue to raise the political profile of human health, and in particular worker health, in order to negotiate for better protections for workers at the highest levels.

References

- Boedeker, Wolfgang, Meriel Watts, Peter Clausing, and Emily Marquez. 2020. 'The Global Distribution of Acute Unintentional Pesticide Poisoning: Estimations Based on a Systematic Review'. *BMC Public Health* 20 (1): 1875. <https://doi.org/10.1186/s12889-020-09939-0>.
- Cherrie, J W, and M P C Cherrie. 2022. 'Workplace Exposure to UV Radiation and Strategies to Minimize Cancer Risk'. *British Medical Bulletin* 144 (1): 45–56. <https://doi.org/10.1093/bmb/ldac019>.
- Delcour, Ilse, Pieter Spanoghe, and Mieke Uyttendaele. 2015. 'Literature Review: Impact of Climate Change on Pesticide Use'. *Food Research International, Impacts of climate change on food safety*, 68 (February): 7–15. <https://doi.org/10.1016/j.foodres.2014.09.030>.
- ETUI. 2023. 'Workers and the Climate Challenge | Etui'. HesaMag, 2023. <https://www.etui.org/publications/workers-and-climate-challenge>.
- FAO/WHO 2016. 'International Code of Conduct on Pesticide Management. Guidelines on Highly Hazardous Pesticides'. <https://www.fao.org/documents/card/en?details=a5347a39-c961-41bf-86a4-975cdf2fd063/>.
- FAO/WHO 2020. 'Guidelines for Personal Protection When Handling and Applying Pesticides |Policy Support and Governance'. <https://www.fao.org/policy-support/tools-and-publications/resources-details/en/c/1263969/>.
- FAO/WHO. 2014. 'International Code of Conduct on Pesticide Management'.
- ILO 2021a. 'Exposure to Hazardous Chemicals at Work and Resulting Health Impacts: A Global Review'. Publication. http://www.ilo.org/global/topics/safety-and-health-at-work/resources-library/publications/WCMS_811455/lang--en/index.htm.
- ILO 2023. 'Chemicals and Climate Change in the World of Work: Impacts for Occupational Safety and Health - Research Report'.
- IPCC 2021. 'Summary for Policymakers. In: Climate Change 2021: The Physical Science Basis. Contribution of Working Group I to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change.' Cambridge University Press.
- John, S.m., C. Garbe, L.e. French, J. Takala, W. Yared, A. Cardone, R. Gehring, A. Spahn, and A. Stratigos. 2021. 'Improved Protection of Outdoor Workers from Solar Ultraviolet Radiation: Position Statement'. *Journal of the European Academy of Dermatology and Venereology* 35 (6): 1278–84. <https://doi.org/10.1111/jdv.17011>.
- Jørs, Erik, Dinesh Neupane, and Leslie London. 2018. 'Pesticide Poisonings in Low- and Middle-Income Countries'. *Environmental Health Insights* 12. <https://doi.org/10.1177/1178630217750876>.
- Mora, Camilo, Bénédicte Dousset, Iain R. Caldwell, Farrah E. Powell, Rollan C. Geronimo, Coral R. Bielecki, Chelsie W. W. Counsell, et al. 2017. 'Global Risk of Deadly Heat'. *Nature Climate Change* 7 (7): 501–6. <https://doi.org/10.1038/nclimate3322>.
- Pega, Frank, Natalie C. Momen, Kai N. Streicher, Maria Leon-Roux, Subas Neupane, Mary K. Schubauer-Berigan, Joachim Schüz, et al. 2023. 'Global, Regional and National Burdens of Non-Melanoma Skin Cancer Attributable to Occupational Exposure to Solar Ultraviolet Radiation for 183 Countries, 2000–2019: A Systematic Analysis from the WHO/ILO Joint Estimates of the Work-Related Burden of Disease and Injury'. *Environment International* 181 (November): 108226. <https://doi.org/10.1016/j.envint.2023.108226>.
- Takala, Jukka, Alexis Descatha, A. Oppliger, H. Hamzaoui, Catherine Bråkenhielm, and Subas Neupane. 2023. 'Global Estimates on Biological Risks at Work'. *Safety and Health at Work* 14 (4): 390–97. <https://doi.org/10.1016/j.shaw.2023.10.005>.
- WHO 2018b. 'First Global Conference on Air Pollution and Health'. 2018. <https://www.who.int/news-room/events/detail/2018/10/30/default-calendar/air-pollution-conference>.
- WHO 2019. 'Exposure to Highly Hazardous Pesticides: A Major Public Health Concern'. 2019. <https://www.who.int/publications-detail-redirect/WHO-CED-PHE-EPE-19.4.6>.
- WHO 2020. 'Vector-Borne Diseases'. 2020. <https://www.who.int/news-room/fact-sheets/detail/vector-borne-diseases>.
- WMO. 2021. 'WMO ATLAS OF MORTALITY AND ECONOMIC LOSSES FROM WEATHER, CLIMATE AND WATER EXTREMES (1970–2019)'.

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