EXTREME HEAT THREATENING WORKER SAFETY - ENVIRONMENT

The World Health Organization (WHO) and World Meteorological Organization (WMO) report warns that extreme heat is a major occupational hazard, endangering billions of workers worldwide while reducing productivity and threatening livelihoods.

Key Findings of the Report

Productivity & Wet-Bulb Globe Temperature (WBGT)

For every 1 °C rise in WBGT beyond 20 °C, global worker productivity drops by 2–3%, as workers face increased physiological strain and health risks. Sun-exposed work is more dangerous, as WBGT readings in open sunlight are 2–3 °C higher than shaded areas, further intensifying the risk.

Difference Between WBGT and Heat Index

WBGT is a comprehensive measure of heat stress in direct sunlight, accounting for air temperature, humidity, wind speed, sun angle, and cloud cover (solar radiation). Heat Index, on the other hand, considers only air temperature and humidity, and is typically calculated for shady conditions, making WBGT a more realistic metric for outdoor workers.

Worker Safety and Health Impacts

Definition & Physiological Effects

Workplace heat stress is the total body heat load, combining metabolic heat from physical work, environmental heat, and insulation from clothing. Prolonged heat exposure can cause heat strain, fatigue, dehydration, syncope (fainting), kidney dysfunction, neurological disorders, hyperthermia, and even death.According to WHO (1969 guidelines), a worker's core body temperature should not exceed 38 °C to avoid fatal outcomes.

Exposure & Burden

Around 2.4 billion workers worldwide (~71% of global workforce) are exposed to excessive occupational heat stress.This results in 22.85 million occupational injuries, nearly 19,000 fatalities, and 2.09 million Disability-Adjusted Life Years (DALYs) lost every year.As per ILO (2020) estimates, there are 26.2 million cases of chronic kidney disease directly attributable to prolonged heat stress at workplaces.

Sectors at High Risk

Outdoor Work - Agriculture, construction, road-laying, and fisheries are most affected due to direct solar radiation and reflected heat from machinery/ground surfaces.

Indoor Work - Factories, textile looms, brick kilns, and metal workshops often have poor ventilation, turning workplaces into heat chambers that cause chronic fatigue and long-term organ damage.

Climate Context of Heat Stress

Record Temperatures

The year 2024 has been declared the warmest on record, with global mean temperature at +1.45 °C above pre-industrial levels.The decade 2015–2024 is the warmest ever recorded, with sharp increases in extreme heatwaves worldwide.

Rising Heat Levels:

Daytime temperatures reaching 40–50 °C are becoming common, not just in equatorial countries but also in temperate regions.Heat stress is now a global phenomenon, affecting nearly 30% of the world's population either seasonally or on a daily basis.

Urban & Regional Vulnerability:

Densely populated countries in the tropics, such as India, are among the most heat-vulnerable. The Urban Heat Island (UHI) effect and increasing frequency of heatwaves make city-based workers, especially in informal sectors, particularly vulnerable. In India, informal workers in construction sites, brick kilns, textile looms, and small workshops suffer from lost wages, dehydration, kidney strain, and heat-related deaths.

Socio-Economic Dimensions of Heat Stress

Heat stress reduces working hours, leading to a direct loss of wages and productivity. The burden is disproportionately higher for informal and low-income workers, who often lack social protection, healthcare access, or safety measures. This deepens cycles of poverty, inequality, and health-related vulnerabilities, especially in developing countries with weak occupational health frameworks.

Recommendations by WHO–WMO

Occupational Heat Action Plans

Must be tailored to industries, regions, and local climate realities. Should be designed in consultation with workers, employers, unions, and health professionals.

Workplace Adaptations

Introduction of shade structures, cooling shelters, hydration stations, and redesigned work uniforms. Implementation of work–rest cycles based on heat conditions. Improved ventilation in factories and workshops.

Health Safeguards

Training healthcare workers and emergency responders to identify, treat, and prevent heat-related illnesses.Monitoring dehydration through urine color charts, regular body weight checks, and hydration levels.

Legal & Policy Measures:

Governments should enforce maximum allowable workplace temperature limits, suited to regional contexts. Align occupational safety measures with Sustainable Development Goals (SDGs) on health, equity, and decent work.

Technology & Innovation:

Deployment of low-cost cooling technologies and heat monitoring systems. Integration of local weather advisories into work scheduling to minimize heat exposure.

Heat Waves in India

Definition - Heatwaves are **extended periods of excessively high temperatures**, with severe impacts on health, ecosystems, and economies.

IMD Criteria for Heatwave Declaration

Plains - Heatwave if maximum temperature ≥ 40 °C.

Coastal Areas - Heatwave if maximum temperature ≥ 37 °C.

Hilly Areas **-** Heatwave if maximum temperature ≥ 30 °C.

Severity Based on Departure from Normal:

Normal Heatwave - 4.5–6.4 °C above normal.

Severe Heatwave - > 6.4 °C above normal.

Severity Based on Absolute Temperature (Plains only):

Heatwave - ≥ 45 °C.

Severe Heatwave - ≥ 47 °C.

Condition for Declaration - Applied when at least two stations in a meteorological subdivision record such temperatures, or when one station shows such deviations for at least two consecutive days.

Government Initiatives on Heat Waves in India

Climate Hazards and Vulnerability Atlas of India - Maps district-wise vulnerability levels (nil, low, moderate, high, very high) for major climate hazards.

India's Cooling Action Plan (ICAP) - Provides a long-term vision to manage cooling needs sustainably across multiple sectors.

Model Heat Action Plan (NDMA) - Introduces hyper-local early warning systems, vulnerability mapping of cities, and climate-resilient housing policies to prepare communities for extreme heat events.

About WHO (World Health Organization)

Establishment - Formed on April 7, 1948 (World Health Day); operational since 1951 after merging with the Health Organization of the League of Nations.

Headquarters - Geneva, Switzerland.

Functions

1. Sets global health standards and norms.
2. Provides technical assistance and builds capacity in member countries.
3. Helps detect, prevent, and respond to global disease outbreaks.
4. Works with governments, NGOs, civil society, and private sector partners.
5. Strengthens primary health care and health systems.

Funding Structure

1. **Assessed Contributions -** Mandatory dues from member states (cover <20% of WHO budget).
2. **Voluntary Contributions -** Donations from governments, philanthropies, and private organizations (~80% of budget).

About WMO (World Meteorological Organization)

Establishment - Created in 1950, succeeding the International Meteorological Organization (1873); became a UN specialized agency in 1951.

Headquarters - Geneva, Switzerland.

Membership - 193 countries and territories, including India (since 1950).

Functions:

1. Promotes international cooperation in meteorology, climatology, hydrology, and geophysics.
2. Publishes State of the Global Climate Report, Greenhouse Gas Bulletin, and annual climate forecasts.
3. Provides key scientific input to the IPCC and UN climate frameworks.
4. Facilitates data sharing on weather, climate, and water for sustainable development and disaster risk reduction.

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