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Global health in the network of international research collaborations



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#Foreword

Global health is gaining renewed urgency in an era marked by overlapping crises. The term "global" should not be understood solely in geographical terms. It also describes the comprehensive, interconnected and deeply social nature of health. In this sense, political decisions, economic conditions, climate change, social cohesion, migration, conflict, digital transformation and individual attitudes all shape the determinants of health and disease. Conflicts and climate-related extreme occurrences provide an acute threat to human health, while long-term, equally disruptive environmental, social, and structural changes pose a chronic threat.

Simultaneously, health too often risks losing visibility in public decision-making. 2028 will mark the 50th anniversary of the Alma-Ata Declaration, which affirmed health as a fundamental human right and called for universal basic health care. Since, health coverage for all, health equity and sustainable development have emerged as key objectives in international frameworks, including the WHO's 2010 Universal Health Coverage agenda as well as the 17 United Nations Sustainable Development Goals. Yet progress remains fragile. The COVID-19 pandemic, ongoing humanitarian crises, widening social inequalities and inadequate climate change action have shown how quickly public health achievements can be challenged or reversed.

Therefore, it is essential to create spaces in which young researchers can meet, present their work, question established approaches and develop new ideas for more equitable, resilient, and sustainable health systems. This 8th volume of the Akkon Schriftenreihe embodies this motivation and builds on the precedence set in past editions.

Mirroring these ideals, the International Young Researchers' Symposium on Global Health, organized in the lead-up to the World Health Summit by the Akkon University of Human Sciences and its Institute for Research in International Assistance (IRIA), brings students, early-career researchers and professionals from various countries, disciplines, and partner institutions together.

This year's volume continues to document the perspectives, commitment, and scientific curiosity of IRIA's network of young researchers; showcasing a form of global health research that is both academically rigorous and oriented toward practical impact. The contributions demonstrate that the next generation is not only an audience for global health debates, but also an active force in shaping them. Inviting us to listen closely, collaborate across boundaries and offer them our support – young researchers are actively developing the ideas and partnerships that global health urgently needs.

Our big thanks goes to all contributors, their supervisors, their respective institutions and also sponsors for their wonderful support and collaboration.

Enjoy reading!

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#15 Ukraine
War's carbon footprint and the combined climate-health crisis in Ukraine

Olha Bukareva, Sofiia Omelianchuk, Valentyna Fedorchuk-Moroz

ABSTRACT. This article examines the impact of the carbon footprint and climate change caused by the war on the health of Ukrainians. Significant attention is paid to analyzing the sources of emissions that contribute to the intensification of greenhouse gas emissions in wartime conditions. The article analyzes general trends in the impact of climate change on health risks for Ukrainians. It also highlights the combined impact of climate change and war on the health of our compatriots.

INTRODUCTION. The armed aggression of Russia against Ukraine, which has persisted for nearly four years, has caused a large-scale destabilization of the ecological balance, manifested in a significant intensification of greenhouse gas emissions. The volume of greenhouse gas emissions resulting from military operations, infrastructure destruction, fires, and other war-related factors has reached 311 million tonnes of CO_2 equivalent. This amount is comparable to the annual emissions of France or half of the annual emissions of Germany [1]. Climate change in Ukraine is substantially anthropogenic in nature and constitutes part of the Anthropocene – the geological epoch during which human activity has acquired a dominant influence on the climate and the natural environment.

Numerous domestic and foreign researchers have actively investigated the impact of war on the deterioration of the environmental situation in the country. Notable contributors include Dukhnevych A.V., Karpinska N.V., Pysarenko T.V., Kvasha T.K., Musina L.A., Polukarov Y.O., Kachynska N.F., Polukarov O.I., Stehniy O., and others.

Dukhnevych A.V. and Karpinska N.V. examine the catastrophic consequences of military aggression for Ukraine's ecosystems, focusing on the issue of demolition waste accumulation and its toxic impact on soil and water resources [2].

In their monograph, Pysarenko T.V., Kvasha T.K., and Musina L.A. conduct a comprehensive risk analysis, particularly regarding those factors that have exacerbated the country's climate situation due to combat-related carbon dioxide emissions. They evaluate the implications for the country's scientific and innovative potential and propose post-war recovery strategies through the lens of the Sustainable Development Goals [3].

A quantitative assessment of additional greenhouse gas emissions caused by hostilities, fires, and future reconstruction was addressed in study [4], which underscores their negative contribution to global climate change.

Polukarov Y.O., Kachynska N.F., and Polukarov O.I. analyze the scale of environmental damage resulting from the full-scale invasion, reviewing methodologies for assessing harm to the atmosphere, land, and other natural components [5].

Stehniy O. [6] substantiates a sociological model of the correlation between military activity and climate security, studying the impact of war on social resilience and global environmental processes.

RESEARCH OBJECTIVES. The purpose of this study was to investigate the impact of the carbon footprint and war-induced climate change on the health status of the Ukrainian population.

MATERIALS AND METHODS. The following research methods were employed in this study: data collection and synthesis, critical analysis and forecasting, analytical methods (statistical analysis), case studies (analysis of specific instances), and systems analysis (to formulate theoretical and applied generalizations).

RESULTS. The intensification of greenhouse gas emissions during the period of Russia's full-scale invasion of Ukraine is driven by the excessive combustion of fuel by military equipment, emissions from fires at industrial facilities and destroyed buildings, and the destruction of forests and other vegetation. Such damage to flora due to shelling reduces the natural capacity of ecosystems to sequester carbon dioxide [7]. The combustion of fossil fuels and their export by Russia, which serves as a source of war financing, is also an integral part of the global climate change problem. Furthermore, due to intensive hostilities across significant portions of Ukrainian territory, there has been a marked increase in the number of fires caused by shelling, aerial bombardment, and landmines. Arid conditions resulting from climate change create ideal precursors for combat- induced fires (e.g., forest fires) to rapidly escalate into large-scale, uncontrollable blazes, particularly in areas where firefighting operations are hindered by safety risks [4].

Additionally, aviation during wartime significantly increases the carbon footprint due to the necessity of bypassing restricted zones, which extends flight routes and fuel consumption. Beyond changes in civil aviation, military operations – specifically the deployment of fighter jets and bombers – generate intensive carbon dioxide emissions, thereby contributing to global climate change and exacerbating the environmental situation.

Figure 1 illustrates the emission sources that contribute to the intensification of greenhouse gas emissions under wartime conditions [8].

General trends regarding the impact of climate change on health risks for the Ukrainian population include:

#15 Ukraine

War's carbon footprint and the combined climate-health crisis in Ukraine

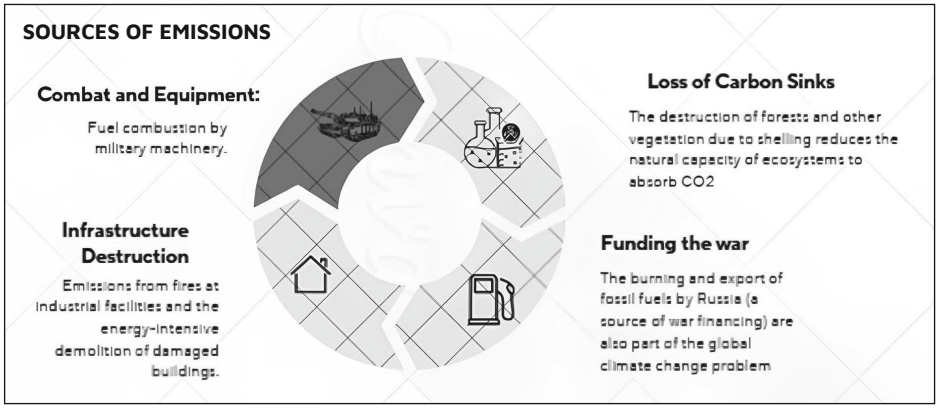


Fig. 1. Emission sources contributing to the intensification of greenhouse gas emissions under wartime conditions.

- An increase in heatstrokes and the exacerbation of chronic diseases (hypertension, angina pectoris, myocardial infarction risk) due to the rising number of abnormally hot days;
- The spread of emerging infectious diseases, including acute enteric infections, resulting from the proliferation of pathogenic microorganisms and shifts in the habitats of insect and rodent vectors;
- Water and food supply challenges, as droughts, floods, and other extreme weather events impede access to clean drinking water and compromise food security due to declining crop yields;

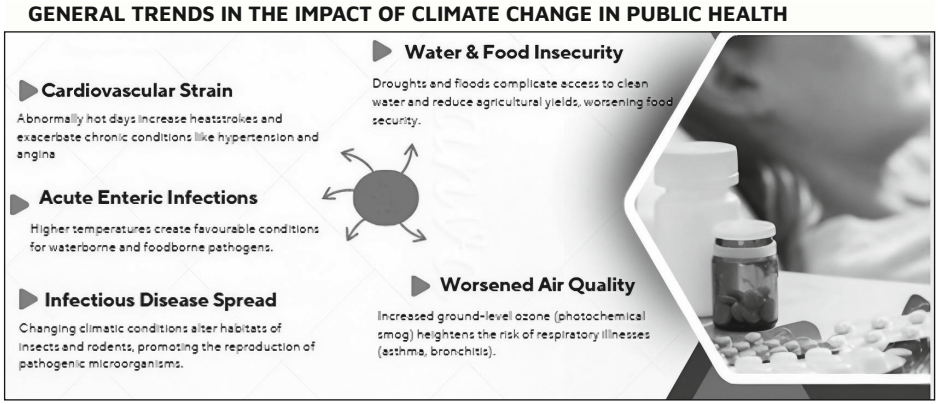


Fig. 2. General trends in the impact of climate change on the public health of Ukrainians.

- Deteriorating air quality, as elevated concentrations of ground-level ozone (a key component of photochemical smog) increase the risk of developing asthma, bronchitis, and emphysema.

Figure 2 illustrates the general trends of climate change impact on the public health of Ukrainians.

War exponentially amplifies pre-existing peacetime climate risks and introduces a range of new ones. Specifically, persistent shelling and fires result in significant emissions of toxic substances which, combined with climatic factors, drastically deteriorate air quality and lead to an increase in respiratory diseases. Furthermore, military operations contaminate water resources, while the destruction of critical infrastructure – particularly in the water supply sector – coupled with climatic droughts, results in a significant portion of the population in conflict zones losing access to safe drinking water. This serves as a direct risk factor for the spread of acute enteric infections.

The impact of war on the mental health of Ukrainians is particularly pronounced. Prolonged chronic stress, exacerbated by high ambient temperatures and other climatic factors, can reduce productivity and lead to emotional exhaustion, anxiety, and impaired concentration.

The populations most vulnerable to this combined impact include children, the elderly, and residents of areas with inadequate sanitary conditions and high levels of destruction.

Figure 3 presents the dynamics of circulatory system diseases in Ukraine. According to the Ministry of Health, in recent years the number of patients

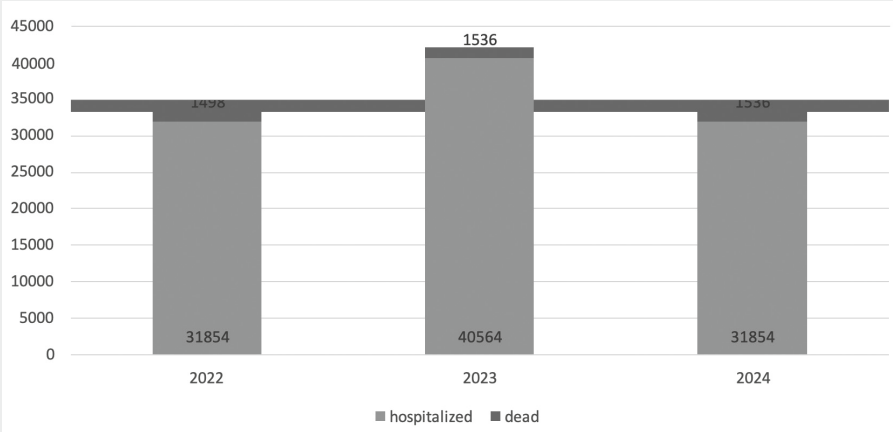


Fig. 3. Dynamics of circulatory system diseases in Ukraine for the period 2022-2024

receiving free care for heart attacks in medical institutions has been growing rapidly and currently amounts to 89%, while in 2022 there were 56% of such patients [9].

The situation regarding infectious diseases in Ukraine has significantly deteriorated during the war. Specifically, the rabies situation is critical: a rapid increase in cases is being documented due to the suspension of aerial vaccination for wild animals, the absence of hunting, and the disruption of ecosystems. The population of foxes, which serve as the primary carriers, is growing uncontrollably, leading to attacks on livestock and humans, particularly in the Dnipropetrovsk and Kharkiv regions. In 2024, the number of medical consultations resulting from rabid animal bites rose to 2,427, exceeding figures from previous periods.

Furthermore, acute enteric infections and viral hepatitis A are spreading due to damaged water supply networks, lack of access to clean water, and challenges in maintaining hygiene, especially in active combat zones.

CONCLUSIONS. The full-scale war has significantly increased greenhouse gas emissions due to the use of military equipment, fires, destruction of infrastructure, and deforestation, reducing ecosystems' capacity to absorb CO_2.

Military operations and aviation intensify the carbon footprint and worsen the environmental situation, contributing to global climate change.

The combined impact of climate change and war increases health risks for the population, including heat-related illnesses, cardiovascular and respiratory diseases, and the spread of infections.

Damage to infrastructure and water contamination limit access to safe drinking water and contribute to the spread of intestinal infections and hepatitis A.

The war has a negative impact on mental health, with children, the elderly, and residents of heavily affected areas being the most vulnerable groups. —

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