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WAR IN UKRAINE: CHALLENGES FOR PUBLIC HEALTH

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ABSTRACT

Objectives. To analyze the principal public health challenges associated with the war in Ukraine.
Methods. A narrative analytical review of published scientific literature and publicly available institutional reports was conducted using a bibliosemantic approach for identification and thematic synthesis of evidence and an analytical approach for interpretation of findings.
Results. The reviewed evidence indicates a multidimensional impact of the war on public health, including civilian deaths and injuries, population displacement, damage to health-care infrastructure, disruption of access to essential services, increased mental-health needs, risks to continuity of care for chronic diseases, infectious-disease threats, and pressure on health-system resilience.
Conclusions. The war has substantially affected population health and the functioning of Ukraine's health system. Sustained protection of health care, continuity of essential services, mental-health support, surveillance and prevention, workforce support, and long-term health-system recovery remain major public health priorities.
Keywords: war, Ukraine, public health, health system, mental health, health-care infrastructure, resilience, WHO

Introduction

Armed conflict is a major public health threat because its effects extend beyond direct mortality and injury to population displacement, disruption of essential services, damage to health-care infrastructure, deterioration of mental health, and increased vulnerability of people with chronic and infectious diseases. In Ukraine, the full-scale war has placed sustained pressure on the health system and on the social determinants of health. Understanding these interconnected effects is important for defining priorities for health protection, continuity of care, system resilience, and post-war recovery.

Aim of the study. To analyze the principal public health challenges associated with the war in Ukraine.

Materials and methods

This study was designed as a narrative analytical review of published scientific literature and publicly available institutional reports concerning the effects of the war on public health in Ukraine. The search was conducted in PubMed/MEDLINE, Scopus, Web of Science, and Google Scholar, supplemented by searches of official information resources of the World Health Organization (WHO), WHO Regional Office for Europe, International Organization for Migration (IOM), United Nations and other relevant international institutions. The search covered publications and institutional reports available from 2008 to 2026, with particular emphasis on evidence published after the beginning of the full-scale invasion on 24 February 2022.

The principal search terms and their combinations included: "Ukraine", "war in Ukraine", "armed conflict", "hybrid warfare", "public health", "health system", "health-care infrastructure", "attacks on health care", "mental health", "non-communicable diseases", "infectious diseases", "health workforce", "health-system resilience", "internally displaced persons", "refugees", and "health-system recovery". Publications were included when they addressed the effects of armed conflict or the full-scale war in Ukraine on population health, health-care services, health-care infrastructure, mental health, infectious or non-communicable diseases, health workforce, or health-system resilience and recovery. Peer-reviewed publications, official reports, and publicly available documents from recognized institutions were considered. Duplicate records and sources without sufficient relevance to the objectives of the review were excluded.

The evidence was synthesized thematically rather than through a formal systematic-review or meta-analytic procedure. No individual-level, confidential, identifiable,

unpublished, or directly collected participant data were used.

Results and discussion

War, hybrid warfare and public health

Hybrid warfare is a complex form of conflict that combines conventional military operations with irregular, cyber, political, informational and other instruments intended to exploit vulnerabilities across multiple domains [2]. In the context of Ukraine, the public health implications of conflict therefore extend beyond battlefield casualties and include disruption of health systems, displacement, damage to civilian infrastructure and threats to continuity of essential services [3]. From a public health perspective, protection of civilians and health care, preservation of essential services, and strengthening of health-system resilience should remain central elements of the international response.

Population displacement, civilian harm and disruption of essential services

Since the beginning of the full-scale invasion on 24 February 2022, the war has profoundly disrupted lives, livelihoods and essential services throughout Ukraine. By December 2024, more than 12,000 civilian deaths and 28,000 injuries had been reported, while direct damage to infrastructure and buildings was estimated at USD 176 billion. As of April 2025, 6.9 million Ukrainians remained refugees abroad and nearly 3.8 million were internally displaced. The Fourth Rapid Damage and Needs Assessment also documented a substantial increase in poverty and food insecurity [7].

IOM's Human Impact of the War in Ukraine report, based on Round 20 of the General Population Survey conducted from 5 February to 4 April 2025, complements infrastructure and economic assessments by describing household-level effects on access to health care, education, and productive and personal assets [7]. These findings demonstrate that the public health consequences of war are mediated not only by direct violence but also by displacement, economic insecurity and barriers to essential services.

Attacks on health care

WHO has verified more than 3,000 attacks on health care in Ukraine since the beginning of the full-scale invasion through its Surveillance System for Attacks on Health Care [8]. The scale and frequency of these incidents place patients and health workers at constant risk and disrupt the delivery of life-saving services. Under international humanitarian law, wounded and sick people, medical personnel, health-care facilities and medical transport must be respected and protected [8].

Health-care facilities have been the most affected component of the system: approximately 80% of verified attacks have affected outpatient clinics, hospitals and other care settings. Such attacks cause immediate casualties and also disrupt service delivery, damage critical infrastructure and erode health-system capacity over time [8].

Medical transport remains particularly vulnerable. Approximately 20% of recorded attacks on health care have involved ambulances and other medical vehicles, and nearly one in three such incidents has resulted in casualties [8]. Since the beginning of 2026, WHO has verified 186 attacks on health care resulting in 15 deaths and at least 81 injuries; compared with the same period in 2025, deaths had increased nearly fourfold and injuries had almost doubled [8].

The consequences of these attacks extend beyond individual incidents. Damage to health infrastructure constrains the ability of medical personnel to provide essential care and requires continual adaptation of humanitarian health operations. According to the United Nations figures cited by WHO, 12.7 million people in Ukraine require humanitarian assistance, including 9.2 million who need health support. The estimated health-sector reconstruction and recovery needs over the next 10 years amount to USD 23.6 billion [8].

Despite these pressures, the Ukrainian health system has demonstrated substantial adaptive capacity. In 2025, with WHO support, 1.9 million people received essential health services, nearly 1,000 health facilities received medicines and equipment, more than 2,500 health workers received training, and more than 6,400 patients were medically evacuated abroad for specialist care [8].

Health workforce and system resilience

For health-care personnel, workforce shortages, migration, mobilization, exposure to attacks and professional stress represent important challenges. The resilience of health-care institutions is therefore a critical component of national health security. A Ukrainian expert study identified material and technical capacity as relatively stronger, while energy, financial and personnel resilience remained more vulnerable in some regions [5]. The findings support an integrated approach that combines infrastructure protection, energy independence, financial stability, human-resources development, psychological support, digitalization and effective management [5].

Mental health

The war has generated substantial psychological and psychiatric needs. WHO has estimated that approximately 9.6 million people in Ukraine may be at risk of or living with a mental health condition, including an estimated 3.9 million with moderate to severe conditions [9]. The ongoing conflict therefore requires sustained development of accessible mental-health and psychosocial-support services, including integration into primary health care and community-based services [9].

The consequences of war-related psychological trauma may extend over many years. Evidence reviewed in the Ukrainian literature indicates increased risks of post-traumatic stress disorder, depression, anxiety, substance-related problems and psychosomatic disorders among affected populations [4]. These risks reinforce the need for long-term mental-health surveillance, early identification, community-based care, rehabilitation and social support.

Non-communicable diseases and continuity of care

Non-communicable diseases constitute a major component of the health burden in Ukraine, and interruption

of prevention, diagnosis, treatment and follow-up may worsen health outcomes among people with chronic conditions. WHO has reported that the war has severely disrupted access to care for people with chronic diseases and has emphasized the importance of maintaining primary health care, medicines and referral services [10]. Ensuring continuity of care should therefore remain a central component of emergency response and recovery planning.

Infectious-disease risks and prevention

Armed conflict can increase vulnerability to infectious diseases through population displacement, disruption of surveillance and laboratory capacity, damage to water and sanitation infrastructure, and reduced access to preventive services. WHO has identified the risk of disease outbreaks and interruptions in access to care as continuing challenges in Ukraine [10]. Maintaining vaccination, surveillance, infection prevention and control, laboratory services, and access to essential medicines is consequently important for reducing preventable infectious-disease risks.

Access to medicines and essential health services

Access to medicines and health services remains an important determinant of health during prolonged conflict. The WHO assessment of the adult population in Ukraine reported that 8% of households continued to experience problems obtaining medicines, mainly because of price and affordability, while preventive-care uptake remained limited [10]. These findings indicate the importance of maintaining affordable medicines, primary health care, preventive services and referral pathways, particularly in frontline and vulnerable communities.

Health-system recovery and adaptation

Health-system recovery should extend beyond reconstruction of damaged buildings. It requires restoration of essential services, rehabilitation, primary health care, public health surveillance, workforce development, mental-health services, digital health, resilient energy and water systems, and mechanisms for rapid adaptation to changing security conditions. WHO has emphasized that health-system recovery and reform are integral to the broader recovery of Ukraine [10].

The scale of humanitarian need also requires sustained international cooperation. In February 2025, WHO announced a 2025 Emergency Appeal for Ukraine seeking USD 68.4 million for the humanitarian response and an additional USD 41.6 million for broader health-system recovery and reform, for a total funding requirement of USD 110 million [11]. This illustrates the dual nature of the health response: immediate humanitarian assistance must be accompanied by longer-term recovery and system strengthening.

Public health education and peacebuilding

War and armed conflict have serious long-term physical, psychological and social consequences. The destruction of social structures, displacement, trauma and normalization of violence can influence health far beyond the period of active hostilities. The literature reviewed by Futornyi et al. [6] highlights the need to strengthen public health education so that specialists are prepared not only for emergencies and disasters but also for prevention, peacebuilding, risk reduction and post-war recovery.

For Ukraine, this experience creates a strong rationale for developing public health education that integrates emergency preparedness, epidemiological and sanitary-hygienic surveillance, mental-health protection, environmental health, health-system resilience and peace-oriented approaches. Such education can contribute to the protection of population health during conflict and to the development of professional capacity for sustainable post-war recovery.

Conclusions

The war in Ukraine has had a multidimensional public health impact, extending beyond direct mortality and injury to displacement, disruption of essential services, damage to health-care infrastructure and deterioration of social determinants of health.

Repeated attacks on health care and medical transport have reduced health-system capacity and threatened continuity of essential services, highlighting the need to protect health facilities, personnel and patients in accordance with international humanitarian law.

Mental-health needs, continuity of care for non-communicable diseases, infectious-disease risks, access to medicines and workforce pressures represent major challenges that may persist beyond the period of active hostilities.

Long-term recovery requires sustained investment in health-system resilience, restoration of infrastructure and services, workforce support, mental-health care, surveillance and prevention, and integration of public health into broader reconstruction and recovery policies.

Bibliography

1. Hendry K. Public health in the 21st century: challenges, strategies and innovations. Health Sci J. 2025;19(2):1230. doi:10.36648/1791-809X.19.2.1230.
2. Hitti EA, Fadlallah H. Weaponizing health in modern hybrid warfare. Disaster Med Public Health Prep. 2026;20:e69. doi:10.1017/dmp.2026.10330.
3. Kricorian K, Khoshnood K, Chekijian S. Hybrid warfare and public health: Conflicts in Ukraine and Nagorno-Karabakh raise the alarm. Public Health Pract (Oxf). 2022;4:100342. doi:10.1016/j.puhip.2022.100342.
4. Myronyuk I, Slabkyi G, Shcherbinska O, Bilak-Luk'yanchuk V. The impact of the war on the state of public health and the health care system of Ukraine. In: Slabkyi GO, Savchuk RM, eds. The Impact of the War Against Russian Military

Aggression on the Sanitary and Epidemiological Situation and the Incidence Rate of Infectious Diseases in the Civilian Population of Ukraine. Uzhhorod: Publishing House of UzhNU "Hoverla"; 2025. p. 8–18. [in Ukrainian].
5. Guskov BV, Kniazieva OV. Resilience of the healthcare system of Ukraine under conditions of war: Institutional and managerial aspects (based on the results of an expert study). State Formation. 2025;2(38):265–285. doi:10.26565/1992-2337-2025-2-17. [in Ukrainian].
6. Futornyi SM, Maslova OV, Pyzhov OM, Shakhlina LG, Rigan MM. Global experience of the impact of war and post-war recovery on the system of public health education: Literature review. Sports Med Phys Ther Occup Ther. 2025;(1):116–123. doi:10.32782/spmed.2025.1.17. [in Ukrainian].
7. International Organization for Migration. Human Impact of the War in Ukraine. May 2025. Available from: https://dtm.iom.int/reports/ukraine-human-impact-war-ukraine (accessed 2 September 2026).
8. World Health Organization Regional Office for Europe. 3000 attacks on health care in Ukraine verified by WHO since full-scale invasion. 8 May 2026. Available from: https://www.who.int/europe/news/item/08-05-2026-3000-attacks-on-health-care-in-ukraine-verified-by-who-since-full-scale-invasion (accessed 2 September 2026).
9. World Health Organization Regional Office for Europe. Amid a year of relentless war, WHO Regional Director for Europe strengthens commitment for mental health services during visit to Ukraine. 16 February 2023. Available from: https://www.who.int/europe/news/item/16-02-2023-amid-a-year-of-relentless-war--who-regional-director-for-europe-strengthens-commitment-for-mental-health-services-during-visit-to-ukraine (accessed 3 September 2026).
10. World Health Organization Regional Office for Europe. Health needs assessment of the adult population in Ukraine: survey report: October 2024. 21 February 2025. Available from: https://www.who.int/europe/publications/i/item/WHO-EURO-2025-6904-46670-77785 (accessed 2 September 2026).
11. World Health Organization Regional Office for Europe. WHO sets out to assist 3 million Ukrainians with critical health needs this year. 4 February 2025. Available from: https://www.who.int/europe/news-room/04-02-2025-who-sets-out-to-assist-3-million-ukrainians-with-critical-health-needs-this-year (accessed 2 September 2026).

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