



DOI: 10.5281/zenodo.22820057 · UDC: 614.2:614.8:341.24(477)

IMPLEMENTATION OF INTERNATIONAL HEALTH REGULATIONS IN UKRAINE

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ABSTRACT

Objectives. To analyze the results of scientific research conducted at the State Institution “Marzиеv Institute for Public Health of the National Academy of Medical Sciences of Ukraine” in relation to emergencies and public health during 2022–2025.

Methods. An institutional analytical review of 23 research projects conducted during 2022–2025 was performed using bibliosemantic analysis, content analysis, and structural-logical modeling.

Results. During 2022–2025, 23 research projects addressed soil and water safety, ambient air, health impact assessment, radiation protection, food safety, biosafety and biosecurity, antimicrobial resistance, laboratory capacity, children’s health and well-being, urban planning, and health culture. The reported outputs included methodological documents, monitoring tools, regulatory proposals, and evidence intended to support emergency preparedness and public health decision-making.

Conclusions. The Institute’s research during 2022–2025 contributed to emergency preparedness and response across environmental health, laboratory capacity, biosafety, children’s health, and related public health domains. The findings support further development of multisectoral approaches based on One Health and Health in All Policies.

Keywords: international health regulations, emergencies, impact of risk factors on health, prevention

Introduction

Natural disasters and emergencies of different origins require rapid and coordinated public health responses. Armed conflicts, including the ongoing war in Ukraine, add complex environmental, epidemiological, infrastructural, and social risks that may affect population health and emergency-response capacity [1-3].

The International Health Regulations (IHR) (2005) were adopted by the World Health Assembly in 2005 and entered into force in 2007 [4, 5]. Under the IHR, States Parties are required to develop, strengthen, and maintain core capacities for surveillance, assessment, notification, and response to public health risks and events, including capacities at designated points of entry [5, 6]. Contemporary preparedness frameworks also emphasize scientific and methodological support, trained personnel, laboratory capacity, risk assessment, and multisectoral coordination, including under complex emergency and conflict conditions [7-10].

In the national context of Ukraine, this surveillance system operates in tandem with the primary legislation aimed at safeguarding citizens, specifically the Law of Ukraine No. 4004-XII “On Ensuring the Sanitary and Epidemic Welfare of the Population” [11]. However, wartime conditions create unprecedented disruption to these administrative and

epidemiological frameworks [12]. According to data from the Ministry of Environmental Protection and Natural Resources of Ukraine, preliminary estimates gathered via official monitoring platforms such as EcoZagroza indicate that hostilities have caused more than 63 trillion Ukrainian hryvnias (UAH) in environmental damage [13, 14]. Hazardous combustion products—such as those from ammunition, military rocket fuel, fuel and lubricant spills, and other dangerous chemical compounds—enter the atmosphere and soil, subsequently incorporating into the food chains of living organisms and driving global supply instabilities [15-19]. Furthermore, most nitrogen fertilizers produce explosive substances that contribute directly to the formation of greenhouse gases [1], while the physical destruction of sewage pumping stations and water treatment infrastructure results in untreated urban wastewater entering major river basins, causing a critical decline in regional water security [2, 20, 21, 22]. The combined impact of these conflict-related environmental damages presents severe, long-term risks to public health [23-26].

These environmental and infrastructural stressors occur alongside substantial psychosocial stress in the population [27, 28]. Chronic stress can influence neuroendocrine and immune pathways and may modify vulnerability to adverse health outcomes [29, 30]. In this context, environmental

protection, biodiversity assessment, and the development of evidence-based regulatory and methodological measures remain important components of public health preparedness and recovery [31-33].

Objective. To analyze the results of scientific research conducted at the Marzieiev Institute for Public Health during 2022–2025 in relation to emergencies and their impact on public health.

Materials and methods

The study was designed as an institutional analytical review of 23 research projects conducted at the Marzieiev Institute for Public Health during 2022–2025. Bibliosemantic analysis was used to review the scientific and regulatory context; content analysis was used to identify and group the principal public health and environmental risk domains addressed by the projects; and structural-logical modeling was used to synthesize the reported findings, implementation outputs, and links between environmental factors and public health responses. The analysis included project documentation, regulatory materials, methodological outputs, and related scientific publications available to the authors. The study included all 23 state-funded research projects officially registered and conducted at the Institute during 2022–2025. The inclusion criteria required that the projects: (1) were officially approved and funded within the institutional framework, and (2) focused directly on environmental factors or public health risk assessment. Projects that did not yield finalized methodological or regulatory outputs within this timeframe were excluded [34-41].

Results and discussion

The Marzieiev Institute for Public Health of the National Academy of Medical Sciences of Ukraine has a long-standing institutional role in research on environmental and public health risk factors.

In 2021, with WHO support, Institute staff participated in activities related to the Joint External Evaluation (JEE) process for assessing national capacities to prevent, detect, and respond to public health emergencies and to implement the IHR (2005).

During 2022–2025, 23 research projects were conducted in the following areas: soil safety, water supply safety, air safety, health impact assessment, radiation protection, food safety, biosafety and biosecurity, antimicrobial resistance, strengthening of laboratory capacity, children's health and well-being, urban planning legislation, and health culture (Table 1).

The methods presented in Fig. 1 were used in the course of this research.

An analysis of the results demonstrated the following.

The reviewed soil studies reported exceedances of maximum permissible concentrations (MPCs) for selected heavy metals and carcinogenic compounds in areas affected

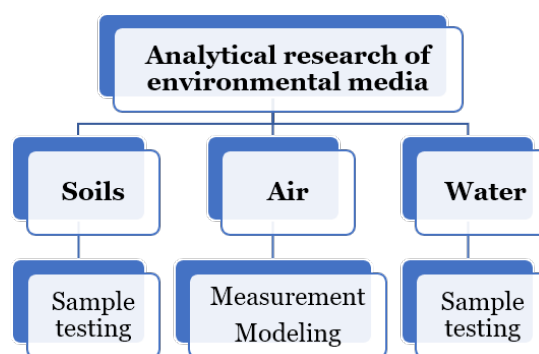


Figure 1. Research methods used in scientific studies

by guided aerial bomb and missile strikes.

The analyzed studies indicated that heavy-metal contamination may persist over time. Reported exceedances of maximum permissible levels in food samples were interpreted by the authors as supporting enhanced monitoring, remediation of contaminated areas, and measures to ensure compliance with applicable food-safety standards.

Studies have been conducted to assess the hazards of waste generated by military operations (shelling) to ensure safe, from an epidemiological standpoint, management of waste resulting from the Russian Federation's armed aggression in the Kyiv region. Based on a cross-sectoral partnership within the "Health in All Policies" policy direction of the Central Committee for Public Health, Hydromet, the departments of ecology, education, urban planning, and architecture of city councils, and local communities have established and organized a system to monitor the concentration of these pollutants in the ambient air, and relevant information has been prepared for submission to local executive authorities.

The composition of emissions from industrial enterprises was studied, and a list of pollutants that may be additionally formed in the surface layer of the atmosphere during military operations was substantiated.

Studies conducted to model pollution in the surface layer of the atmosphere using 1-hour concentrations of pollutants have shown a correlation between these concentrations and the timing of missile and air raid threats. An electronic database has been created to monitor air quality in Kyiv (for hourly concentrations of $PM_{2.5}$, PM_{10} , CO , NO_2 , and SO_2). Corresponding assessments of health risks to the population during emergencies have been conducted.

Given the stagnation of industry due to infrastructure destruction, the "Environmental Protection Program for the Phased Reduction of Pollutant Emissions by Economic Entities in Zaporizhzhia" was developed, based on public health risk assessments.

Proposals were submitted for the "State Monitoring Program for Air Quality Protection in the 'Ternopil' Zone for 2022–2025." For the first time, a methodology has been developed for calculating the extent of damage caused to the atmosphere by uncontrolled emissions of pollutants or mixtures of such substances resulting from military operations, emergencies, or hazardous incidents at industrial

Table 1. *Main Areas of Scientific Work and Implementation Results*

Research Areas	Number of R&D Projects	Implementation / Results
Soil safety	2	Methodological guidelines on heavy metal content and waste hazards
Water supply safety	1	Proposals for changing national standards for chlorites and chlorates in drinking water
Air safety	1	"Environmental Protection Program for the Phased Reduction of Pollutant Emissions", proposals for the "State Environmental Air Quality Monitoring Program"
Health impact assessment	10	Methodological guidelines on health-enhancing physical activity for school-age children with a focus on mental health
Radiation protection	2	New data obtained on radiation safety regarding additional radon exposure
Food safety	2	Methodological guidelines: "Hygienic recommendations for the education and leisure of school-age children under quarantine conditions"
Biosecurity and biosafety	1	Determination of antibiotic resistance, and evaluation of the specific activity, safety, and quality (efficacy) of disinfectants and their practical testing
Strengthening laboratory capabilities	1	Participation in the Global Laboratory Leadership Programme (GLLP)
Children's life activity and well-being	1	Methodological guidelines on mental health and eating behavior
Urban planning legislation	1	Medico-sanitary requirements for draft Amendments to the regulatory documents of urban planning legislation
Medical culture	1	Self-assessment programs and shaping the primacy of health, awareness of self-sustained physical and mental health support

**Note: The distribution of projects by research area reflects the structure of the overarching state research programs and institutional frameworks under which they were funded. This accounts for the integration of multidimensional guidance documents (including those on school-age physical activity, mental health, education, and leisure) within the broader "Health impact assessment" and "Food safety" domains.*

or other facilities, based on a probabilistic approach.

Within the framework of European integration, it has been demonstrated that the size (width) of a sanitary protection zone depends on the nature and capacity of production, the characteristics of technological processes, the physical and geographical conditions of the location, and the impact of adverse factors and risks to human health, on the basis of which a new version of State Sanitary Norm 173 "Planning and Development of Settlements" has been developed, which complies with the Laws of Ukraine "On the Public Health System" and "On Ensuring the Sanitary and Epidemic Well-being of the Population."

The reviewed radiation-safety work evaluated potential additional radon exposure associated with time spent in bomb shelters. The manuscript reports a maximum radon concentration value of 137 Bq/m³. Under a conservative scenario of 7,200 hours of air-raid alerts, such conditions contribute to a potential additional radiation burden on the general population, with children being particularly vulnerable to this prolonged exposure.

In the context of harmonization with international

drinking-water guidance, the reviewed work substantiated consideration of changing the chlorite limit from 0.2 mg/dm³ to 0.7 mg/dm³ and proposed further optimization of chlorine-dioxide-based water treatment.

Proposals have been developed for amendments to the current DSanPiN (State Sanitary Norms and Rules) 2.2.4-171-10 "Hygienic Requirements for Drinking Water Intended for Human Consumption" (Order of the MoH of Ukraine No. 341 dated February 18, 2022). Proposals were prepared and taken into account regarding the change of national standards for chlorites and chlorates in drinking water to a limit of 0.7 mg/dm³. These were included in the State Sanitary Norms and Rules "Safety Indicators and Selected Quality Indicators for Drinking Water under Martial Law and Other Emergency Situations." Proposals were prepared for an order of the Ministry of Health of Ukraine: On the Approval of Amendments to the State Sanitary Norms and Rules "Hygienic Requirements for Drinking Water Intended for Human Consumption."

In the field of biosafety and biosecurity, the projects addressed antimicrobial resistance and evaluated the activity,

safety, quality, and practical use of disinfectants. The work also incorporated the One Health approach and multidisciplinary collaboration involving epidemiology, veterinary medicine, and hygiene, while supporting laboratory-capacity development.

Research on children's health examined associations between educational conditions, physical activity, anxiety, depressive symptoms, daily routines, and war-related factors. The analyzed studies reported a higher likelihood of post-traumatic stress symptoms among children exposed to adverse war-related conditions and evaluated the RCADS-P-25 scale for screening anxiety and depressive disorders in Ukrainian children and adolescents aged 8–18 years. The projects also assessed psychological tools intended to support prevention of anxiety and depressive symptoms in school settings.

In collaboration with the Department of Nutrition at the University of Helsinki, research examined eating behavior among school-age children exposed to war-related stress. The reported findings distinguished short-term stress-related changes from more persistent eating disturbances and informed methodological guidance concerning education, leisure, and child health under emergency conditions.

Medical and sanitary requirements for draft amendments to regulatory documents in urban planning legislation have been substantiated and developed: “Preschool Educational Institutions,” “Educational Institutions,” “Health Care Facilities,” “Civil Defense Structures,” and “State Sanitary Rules for the Planning and Development of Settlements. State Sanitary Rules No. 173-96.”

Health and safety requirements have been developed in the form of the “Guidelines for the Design of Food Service Facilities in Preschools, General Secondary Schools, and Children's Health and Recreation Centers in Accordance with Food Service Organization Models,” which have been implemented and approved in Code of Practice 4:2024.

In the field of health culture, an assessment of the impact

of social segregation during the pandemic on the population's physical activity and well-being was conducted in collaboration with the University of Surrey (United Kingdom); self-assessment programs were developed to promote the primacy of health and foster awareness of self-management of physical and mental health.

Recently, the Institute has participated in the preparation of 14 documents for the Verkhovna Rada, the Cabinet of Ministers, the National Security and Defense Council, the Security Service of Ukraine, the Ministry of Defense, the Ministry of Health, the National Academy of Medical Sciences of Ukraine, regional and city state administrations, and other ministries and agencies.

Conclusions

1. The institutional analysis identified 23 research projects conducted during 2022–2025 across environmental health, radiation protection, biosafety, laboratory capacity, children's health, urban planning, and health culture, reflecting a broad public health response to emergency conditions.

2. The reviewed projects generated applied outputs including monitoring approaches, methodological guidance, regulatory proposals, laboratory-capacity initiatives, and health-risk assessments intended to support preparedness and response.

3. The findings highlight the importance of continued surveillance and risk assessment for war-related environmental contamination, drinking-water safety, radiation exposure, antimicrobial resistance, and the physical and mental health of children and other population groups.

4. Further implementation of the International Health Regulations in Ukraine may benefit from sustained multisectoral collaboration and integration of the One Health and Health in All Policies approaches into emergency preparedness, recovery, and public health decision-making.

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Received – 01.08.2026, accepted for publication – 17.09.2026

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Conflict of interest: The authors declare no conflicts of interest.

Funding statement: The authors declare that this work received no external funding.

Ethics statement: This study represents an institutional analytical review based exclusively on existing research reports and publicly available secondary sources. Because this project relied on secondary data analysis and did not directly recruit or involve human participants, identifiable personal data, or experimental animals, formal institutional review board (IRB) or research ethics committee approval was not required. Where applicable, ethics approvals and informed consent for the individual underlying studies were granted by the respective institutional review boards of those original studies and are documented in their corresponding primary publications.

Author contributions statement: Igor Shkrobanets – conceptualization, formal analysis, investigation, methodology, project administration, resources, supervision, validation, drafting the original manuscript, and critical revision of the manuscript; Alla Koblianska – conceptualization, data curation, formal analysis, investigation, methodology, software, validation, visualization, drafting the original manuscript, and critical revision of the manuscript; Olena Turos – conceptualization, data curation, investigation, methodology, project administration, resources, supervision, validation, drafting the original manuscript, and critical revision of the manuscript.

All authors approved the final version and take responsibility for the content.

Citation: Shkrobanets I, Koblianska A, Turos O. Implementation of international health regulations in Ukraine. Arta Medica. 2026;100(3):e2026347. doi: 10.5281/zenodo.22820057