

THE INFLUENCE OF MILITARY ACTIONS ON THE LEVELS OF HEAVY METALS FOR HUMANS AND ENVIRONMENT

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The issue of studying the effects of pollution by toxic substances resulting from military actions is not new, but remains largely understudied in many aspects. Increasingly, scientific data demonstrate that armed conflicts and military activities significantly contribute to the contamination of the environment with toxic substances, including toxic metals. Recently, this problem has become acute for Ukraine as well (Andrusyshyna et al., 2022).

The aim of the study is to conduct an analytical review of the possibilities of the influx of toxic and potentially toxic metals into the environment and human body as a result of active military actions.

The chemicals present in ammunition and explosives comprise a wide array of organic and inorganic substances, which can be categorized into Potentially Toxic Elements (PTE), Energetic Compounds (EC), and Chemical Warfare Agents (CWA). PTEs originating from areas affected by warfare primarily encompass lead (Pb) and its associated contaminants, including antimony (Sb), chromium (Cr), arsenic (As), mercury (Hg), nickel (Ni), zinc (Zn), and cadmium (Cd). Explosives contain significant quantities of Pb and Hg, with mercury (II) fulminate being particularly prevalent. Zinc (Zn), copper (Cu), nickel (Ni), lead (Pb), and chromium (Cr) are used for coating bullets, missiles, gun barrels, and military vehicles (Petrushka et al., 2024).

Military activity has resulted in heavy metal exposure to humans through inhalation or ingestion of metal particles and injuries with embedded metal fragments (Shukla et al., 2023).

Due to the accumulation of toxic metals in the body, latent and persistent consequences for human health can be manifested, which is observed in those who have been affected due to past local hostilities in the world. Some of them may be hidden for decades due to the presence of other pollutants and the corresponding impact on the population. However, the assessment of the special contribution of metal toxicity may be limited due to a number of dangerous factors that persist during military operations and, especially, armed conflicts, which has recently been observed in Ukraine.

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