

II Міжнародна наукова конференція «ВОЄННІ КОНФЛІКТИ ТА ТЕХНОГЕННІ КАТАСТРОФИ: історичні та психологічні наслідки»

8. «Україна є місцем злочину»: головний прокурор Гааги відвідав Бучу. URL: <https://tsn.ua/ato/ukrayina-ye-miscem-zlochynu-golovniy-prokuror-gaagi-vidvidav-buchu-foto-2036416.html>.

9. «Ми повинні зробити все, щоб настала відповідальність». Прокурор МКС – про розслідування злочинів РФ. URL: <https://suspilne.media/228779-mi-povinni-zrobiti-vse-sob-nastala-vidpovidalnist-prokuror-mks-pro-rozsliduvanna-zlociniv-rf/>.

## **Секція 4-5. ВПЛИВ ВОЄННИХ КОНФЛІКТІВ ТА ТЕХНОГЕННИХ КАТАСТРОФ НА ЛОКАЛЬНІ ТА ГЛОБАЛЬНІ ЕКОСИСТЕМИ**

### **НОВІТНІ ПІДХОДИ ДО МІНІМІЗАЦІЇ ЕКОНОМІЧНИХ, ЕКОЛОГІЧНИХ ТА СОЦІАЛЬНИХ НАСЛІДКІВ ВІЙСЬКОВИХ КОНФЛІКТІВ**

**УДК 504.05**

**Jadav H.**

Ternopil Ivan Puluj National Technical University, Ukraine-India

**Shchyhelska H., Ph.D., Assoc. Prof.**

Ternopil Ivan Puluj National Technical University, Ukraine

#### **RISKS AND LONG-TERM EFFECTS OF CHEMICAL DISASTERS: BHOPAL AND COVID-19**

**Джадав Х.**

**Щигельська Г., канд. істор. н., доц.**

#### **РИЗИКИ ТА ДОВГОТРИВАЛІ НАСЛІДКИ ХІМІЧНИХ КАТАСТРОФ: БХОПАЛ І COVID-19**

Thirty-eight years after its occurrence (3 December 1986) the Bhopal gas tragedy is still considered as unparalleled in the annals of history of chemical disasters. An explosion at the Union Carbide India Limited (UCIL) pesticide plant resulted in the release of 40 tons of a toxic gas, methyl isocyanate (MIC) spreading over approximately 77 square miles, killing thousands of people and injuring hundreds of thousands [1]. Responsible estimates suggest that as many as 10,000 may have died immediately [2]. A large number of the inhabitants in the township of Bhopal were exposed to different degrees, depending on their proximity to the plant and atmospheric factors. The COVID-19 pandemic shed some light on the long-term effects.

Currently, the number of registered survivors of the Bhopal tragedy with varying degrees of damage reaches more than 500,000 [1]. Many people still suffer from various complications such as increased rate of cancers, chronic illness like tuberculosis, respiratory diseases, birth defects, nerve injury, growth retardations, gynecological illness and many others. In addition, analysis of coronavirus (SARS-CoV-2) statistics in India showed that among all COVID-19 patients, the majority of deaths were in Bhopal gas disaster victims [3]. Various studies have proved that MIC had long term effects on exposed population due to pulmonary, reproductive, immunogenic, neurological, hematological toxicity and genetic alterations. Due to all these toxic effects of MIC, the survivors of the Bhopal Gas tragedy are at increased risk of developing complications related to COVID-19 [3].

The scientific evidence emphasizes that the MIC-affected, especially the survivors with chronic obstructive pulmonary disease (COPD), are highly susceptible to COVID-19 owing to their existing pulmonary complications. Therefore, it is of utmost importance that the affected people become aware of their risk to COVID-19 and its timely prophylactic measures. Health policy-makers need to strengthen the action plans to protect the Bhopal MIC-affected population from COVID-19. Raising awareness about good respiratory hygiene, proper caring for co-morbid illnesses, counseling on smoking and smokeless tobacco cessation, alcohol avoidance, and intake of immune-boosting diets may effectively minimize the COVID-19 risk among the vulnerable subjects. Regular health monitoring, preventive hygiene and healthy lifestyle practices are mandatory prophylactic measures that help to protect the vulnerable from COVID-19 [4].

Various lessons have been learned since the accident and some of them have been incorporated into international regulations regarding industrial activities and environmental safety. The disaster not only provides lessons for preventing other industrial disasters in the future, but also has lessons for protecting sustainable human development from the system's negligence. Furthermore, it also underlines the fact that developments that require the production of nuclear and chemical materials can never be fully safe for humanity. Despite that, while seeing the demand of modern times and modern production, if these industries need to be developed, extreme safety measures should be taken by the system in the interest of humanity and the environment. As the appalling and rapidly regulated growth of industry continues to pose a serious threat to the sustainable development of mankind and has adverse consequences for the physical and emotional health of people in India. Positive changes and security measures are therefore important, as only these approaches can save humanity and lead to undeniable sustainable development in the coming times from disasters and environmental degradation.

#### References

1. Mishra, P., Samarth, R., Pathak, N., Jain, S., Banerjee, S., & Maudar, K. (2009). Bhopal Gas Tragedy: review of clinical and experimental findings after 25 years. *International Journal of Occupational Medicine and Environmental Health*, 22(3). doi:10.2478/v10001-009-0028-1.
2. Sriramachari, S. (2004), The Bhopal gas tragedy: An environmental disaster. *Current Science*, 86(7), 905-920. Retrieved April 19, 2021, <http://www.jstor.org/stable/24109273>.
3. Malviya, A., Ahirwar, A. K., Chandra Tripathi, S., Asia, P., Gopal, N., & Kaim, K. (2021). COVID-19: a review on SARS-CoV-2 origin, epidemiology, virology, clinical manifestations and complications with special emphasis on adverse outcome in Bhopal Gas Tragedy survivor. *Hormone Molecular Biology and Clinical Investigation*, 42(1), 63–68. doi:10.1515/hmbci-2020-0070
4. Senthilkumar CS, Malla TM, Akhter S, Sah NK, Ganesh N. Susceptibility of the Bhopal-methyl isocyanate (MIC)-gas-tragedy survivors and their offspring to COVID-19: What we know, what we don't and what we should? *Cien Saude Colet*. 2020 Oct;25(suppl 2):4225-4230. doi: 10.1590/1413-812320202510.2.28682020. Epub 2020 Aug 6. PMID: 33027359.
5. Mandal, M.; Rahman, M. M. Bhopal Disaster Gas Victims: Trauma Before & During the COVID-19 Pandemic *Problemy Ekorozwoju*; 16(2):51-57, 2021.

**УДК 338.2**

**Provalna Y.**

FH Schmalkalden University of Applied Sciences, Germany

**Shchyhelska H., Ph.D., Assoc. Prof.**

Ternopil Ivan Puluj National Technical University, Ukraine