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## Correspondence

## Russo-Ukrainian war amid the COVID-19 pandemic: Global impact and containment strategy



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Dear Editor,

Coronavirus disease 2019 (COVID-19) pandemic caused severe damage to humankind not only by affecting the healthcare systems of many countries but all the socio-economic structures of the entire globe. As of May 4, 2022, 512 million cases of COVID-19 have been reported with a mortality of 6.23 million people (World Health Organization, <https://covid19.who.int/>). The epidemiology of COVID-19 in Russia, Ukraine, and refugees-hosting countries during the Russo-Ukraine war has been delineated in [Table 1](#). The COVID-19 pandemic has no definitive treatment other than supportive care, though a vaccine course has been developed but remains elusive. Amid the scarcity of reliable and standard therapeutic regimens, prevention approaches such as social isolation, face mask use, and aggressive hygiene are effective ways to contain the causative agent of COVID-19, i.e., severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) [1,2]. While many countries' serious efforts are underway to contain the COVID-19 pandemic, the Russo-Ukraine conflict has emerged as a severe threat that can change the trajectory of the pandemic. Hence, the aim of this correspondence article is to highlight the global effects of the Russo-Ukraine war during the ongoing COVID-19 pandemic.

Several geopolitical, economic, infrastructural, and health consequences have been associated with the Russo-Ukraine war. Furthermore, the implications of this war, notably in terms of healthcare services both within and beyond Ukraine, will last long even after the physical battle has ended [3,4]. It is essential to notice that the Ukrainian healthcare system is already under extreme strain as a result of the rising number of casualties and negative repercussions on the socio-economic system. Furthermore, the scarcity of water resources and sanitation infrastructure, low vaccine coverage, overcrowding, and lack of access to primary medical treatment are all expected to exacerbate these issues. It is important to remember that all these issues are most likely to increase the other infectious diseases such as measles, typhoid, malaria, polio, tuberculosis (TB), human immunodeficiency virus (HIV), and also gastrointestinal disorders of parasitic origin. The rapid spread of these diseases has been associated with overcrowding in refugee containment

camp. Furthermore, the interruption in the immunization programs in war regions can play an essential role in the spread of other infectious diseases [4]. Additionally, a considerable increase in non-communicable diseases, notably cardiovascular disease, diabetes, and cancer mortality will occur from further disruption of medical supply chains and health services. The absence of access to obstetric care will also raise maternal and newborn morbidity and mortality [5]. Till now, more than six million Ukrainian individuals escape from the fires of the war in their country, which constitutes the fastest-growing refugee crisis in Europe since World War Two. Undoubtedly, the health care and well-being of the Ukrainian people are now at severe risk. UNICEF, the UN children's agency, believes hundreds of thousands of Ukrainian refugees were youngsters. A vital question has been raised in our mind, and it needs an urgent answer; How do the hosted countries enable them to keep their health, social and emotional stability? Community organizations, such as civil society organizations, could develop programs to help them with their economic, social, educational, and health requirements, based on family and individual needs (Bergman et al. 2017 [6]). Schoolwork and college are among the concerns in their mind, and consequently, teachers in schools and physicians in clinics should adopt education of these war crisis-undergoing children resilience-building strategies (Bergman et al. 2017 [6]).

Given the ongoing war in Ukraine and enormous economic penalties faced by Russia, the world economy, which has already been damaged by the COVID-19 pandemic, has been adversely affected. Nations throughout the world are experiencing significant interruptions in the supply of energy and raw materials as well as soaring costs for commodities, oil, and food, as well as one of the greatest interruptions to wheat availability in history. As Ukraine and Russia combined account for a third of worldwide wheat and barley exports and more than seventy percent of sunflower oil exports, the war might have a catastrophic effect on starvation throughout the globe. Large proportions of agricultural imports from Russia and Ukraine are consumed by conflict-affected nations and areas, such as Lebanon, the Democratic Republic of the Congo, Syria, Iraq, Afghanistan, North Africa, and West Africa.

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**Table 1**  
Epidemiology of COVID-19 in Russia, Ukraine, and refugees-hosting countries.

|          | Feb 24, 2022 |        | March 24, 2022 |        | Persons fully vaccinated per 100 population | Vaccinated % March 28, 2022 |
|----------|--------------|--------|----------------|--------|---|-----------------------------|
|          | Cases        | Deaths | Cases          | Deaths |   |                             |
| Russia   | 132998       | 762    | 25387          | 418    | 49.603                                      | 79,914,874 (54.77%)         |
| Ukraine  | 25789        | 276    | 3855           | 55     | 34.65                                       | 15,729,617 (36.19%)         |
| Poland   | 18282        | 341    | 8988           | 146    | 58.85                                       | 22,582,308 (59.75%)         |
| Romania  | 11477        | 119    | 4521           | 40     | 41.88                                       | 8,162,071 (42.67%)          |
| Hungary  | 5512         | 102    | 2651           | 35     | 62.72                                       | 6,401,980 (66.45%)          |
| Belarus  | 6230         | 15     | 1647           | 10     | 58.9  | 5,801,653 (61.44%)          |
| Slovakia | 15183        | 24     | 9649           | 24     | 50.69                                       | 2,819,636 (51.74%)          |
| Moldova  | 1069         | 14     | 431            | 7      | 25.98                                       | 1,081,073 (26.87%)          |

Ritchie, Hannah; Mathieu, Edouard; Rod s-Guirao, Lucas; Appel, Cameron; Giattino, Charlie; Ortiz-Ospina, Esteban; Hasell, Joe; Macdonald, Bobbie; Beltekian, Diana; Dattani, Saloni; Roser, Max (2020–2021). Coronavirus Pandemic 2019 (COVID-19). Our World in Data. Retrieved March 28, 2022 (World Health Organization, <https://covid19.who.int/>).

Such an invasion, according to the International Monetary Fund, could throw the world's food supply into destruction owing to increase food prices and Ukraine's failure to plant crops, such as wheat, because 70% of the country's land is devoted entirely to agriculture-the so-called breadbasket of Europe-is unable to plant crops, which include wheat [5]. In addition to food and water deprivation, there are several environmental challenges that should be considered seriously. Some of these concerns include chemical wastes, heavy metals, and radioactive materials infiltrating into natural water sources from destroyed industrial sites, water dam damage, gasoline and hydrocarbon leakage from conflict regions, weapons combustion, and leakage in underground coal mines.

Ukraine, wherein Russia has been at war with the country since 2014, is facing a unique double hazard: a catastrophic reaction to conflict and a fatal contagious illness. Increased North Atlantic Treaty Alliance (NATO) integration across Ukraine's disaster response structures within the Ministries of Health, Defense, and Interior, must be augmented and increased to effectively serve biosurveillance, aid in pandemic disaster response, and bolster health security in Europe, across the NATO and Black Sea regions, to mitigate the COVID-19 global crisis [7].

Furthermore, there are critical short- and long-term deleterious repercussions on mental and physical health due to mass migrations. Depression, social withdrawal, and anxiety are just a few of the long-term psychological and physical health repercussions that will afflict subsequent civilizations [4,5,7]. To cope with the deleterious consequences of war, mental health and psychosocial services are critically needed. Additionally, Funding and research focused on populations affected by the ongoing Russia-Ukraine conflict is desperately needed for those who have fled and for those who remain to fight. Besides providing the social and educational sides, the need to vaccinate Ukraine children against COVID-19, particularly since Ukraine had had high vaccine hesitancy before the Russian invasion (Zaprutko et al. 2022 [8]).

Ultimately, vaccination is still critical, and it is essential to vaccinate the maximum number of people, especially the vulnerable groups, as just a third of adult Ukrainians are completely immunized. To augment the resiliency of the Ukrainian population and to contain the associated negative repercussions of the war, worldwide interventions and public health support are required right away.

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#### Author contributions

**Manish Dhawan:** Conceptualization, Data Curation, Writing - Original Draft, Writing - review & editing. **Om Prakash Choudhary:** Conceptualization, Data Curation, Supervision, Writing - Original Draft, Writing - review & editing. **Priyanka:** Writing - Original Draft, Writing - review & editing. **AbdulRahman A. Saied:** Writing - Original Draft, Writing - review & editing. All authors critically reviewed and approved the final version of the manuscript.

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#### Guarantor

**Om Prakash Choudhary**, Assistant Professor (Senior Scale), Department of Veterinary Anatomy and Histology, College of Veterinary Sciences and Animal Husbandry, Central Agricultural University (I), Selesih, Aizawl-796015, Mizoram, India. Tel: +91–9928099090; Email: [dr.om.choudhary@gmail.com](mailto:dr.om.choudhary@gmail.com).

#### Data statement

The data in this correspondence article is not sensitive in nature and is accessible in the public domain. The data is therefore available and not of a confidential nature.

#### Declaration of competing interest

All authors report no conflicts of interest relevant to this article.

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Manish Dhawan

*Department of Microbiology, Punjab Agricultural University, Ludhiana, 141004, India*

*Trafford College, Altrincham, Manchester, WA14 5PQ, UK*

Om Prakash Choudhary\*

*Department of Veterinary Anatomy and Histology, College of Veterinary Sciences and Animal Husbandry, Central Agricultural University (I), Selesih, Aizawl, 796015, Mizoram, India*

Priyanka

*Independent Researcher, 07, Type IV Quarter, College of Veterinary Sciences and Animal Husbandry, Central Agricultural University (I), Selesih, Aizawl, 796015, Mizoram, India*

AbdulRahman A. Saied

*National Food Safety Authority (NFSA), Aswan Branch, Aswan, 81511, Egypt  
Ministry of Tourism and Antiquities, Aswan Office, Aswan, 81511, Egypt*

\* Corresponding author. Department of Veterinary Anatomy and Histology, College of Veterinary Sciences and Animal Husbandry, Central Agricultural University (I), Selesih, Aizawl-796015, Mizoram, India.

*E-mail address: [dr.om.choudhary@gmail.com](mailto:dr.om.choudhary@gmail.com) (O.P. Choudhary).*