


The risk of an epidemic outbreak in southern Ukraine

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ABSTRACT

The humanitarian crisis that followed the military aggression against Ukraine is getting worse. The war which has continued since February 2022 has already caused irreparable health damage in the local community, which is affected by such acts of Russian terror as the destruction of the Kakhovka dam on the Dnieper River. As a result of the explosion and destruction of the dam, which occurred on 6 June 2023, over 2,500 square kilometres of land were flooded and around 17,000 residents had to be evacuated.

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on 6 June 2023, over 2,500 square kilometres of land were flooded (Fig. 1) and around 17,000 residents had to be evacuated (Fig. 2). Not everyone, however, was able to escape the flood. The exact number of casualties is not yet known. The damage to the local infrastructure and the ongoing combat operations prevent the provision of quick and effective aid to those who suffered from the flood [1].



Figure 1. The bottom of the Kakhovka reservoir on the way to the Kherson region. Source: Andriy Dubchak, Donbas Frontliner. June 2023



Figure 2. Locals on the on the central street of Kherson. Source: Andriy Dubchak, Donbas Frontliner. June 2023

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One may expect that the number of infectious diseases in the region will increase substantially. Contaminated water has the potential to spread infectious diseases as it can become a source of transmission to large groups of people within a relatively short time [2]. Contaminated water contains bacteria (*Vibrio* spp., *Salmonella* spp., *Shigella* spp., *Escherichia coli*), viruses (HAV, HEV, rotaviruses), and intestinal parasites (*Giardia intestinalis*, *Cryptosporidium parvum*) which are pathogenic to humans [3–5]. All of the above-named infections may be associated with increased morbidity and mortality, especially among children, the elderly, the immunocompromised or malnourished patients [6].

Currently, the epidemiological situation in the region is not clear. However, the analysis of the available environmental data from areas routinely affected by severe floods or from areas where floods had caused severe human and material losses suggests that an epidemic is likely to break out in Ukraine. The latest data published on the website of the Ukrainian sanitary services demonstrated that almost 35% of the water samples collected for inspection in the Kherson, Odesa and Mykolaiv Oblasts did not comply with the sanitary requirements. The region which is most at risk of an epidemic outbreak is the Odesa Oblast. The examination of water samples collected in this region revealed that all water quality parameters (physical, chemical, microbiological and toxicological) were much below the acceptable standards at all times the tests were carried out [7].

Special attention must be given to those pathogenic organisms which have a high potential to cause increased morbidity, especially *Vibrio*, *Salmonella*, *Shigella* bacteria and hepatitis A virus. Cholera outbreaks were reported in southern Ukraine as early as in the 19th century. In the Kherson region, cholera cases were recorded in 1994 and in 1995. In total, there were 525 recorded cholera cases in the Kherson, Odesa and Mykolaiv Oblasts [8]. Between May and July 2011 another 33 cholera cases were reported in Mariupol [9]. The analysis of the available epidemiological data covering the period from 2011 to 2018 shows that the incidence rates of salmonellosis in Ukraine are high and are markedly different from European statistics. When investigating outbreaks of salmonellosis in Ukraine, sanitary inspectors established that most mass catering establishments lacked the documents necessary to confirm the origin and to verify the quality and safety of the food products. They also found that the procedures for food handling, storage and transport were often violated, final inspections of the finished products were not carried out, and the deadlines for the periodic examination and vaccination of livestock were not respected [10]. The epidemiological reports prepared by the Ukrainian services that were released in June 2023 indicate noticeable cases of *Shigella* infections (71 cases in the first 5 months of 2023) [11]. *Shigella* bacteria are



Figure 3. The queue for drinking water at the dispensing point in Nikopol. Source: Andriy Dubchak, Donbas Frontliner. June 2023



Figure 4. Four-year-old Matvii came to get drinking water with his father in Nikopol. Source: Andriy Dubchak, Donbas Frontliner. June 2023

highly infectious since as few as around 100 microorganisms are capable of causing a disease. Hepatitis A is another health emergency which could potentially lead to an outbreak of an epidemic in the flooded areas. In the first 5 months of 2023, there were a total of 121 reported HAV infections (compared to 85 cases noticed in the same period of 2022) in the general Ukrainian population [11].

COMMENT

Currently it is impossible to determine the level of epidemiological risk for southern Ukraine. To do so it would be necessary to gather reliable epidemiological data from the flooded areas. According to media reports, the worst situation can be seen in the territories occupied by the Russian Federation (mass cholera vaccinations have already started in this area). The latest epidemiological reports available online did not reveal any new cholera cases or an increase in the number of salmonellosis, shigellosis and viral hepatitis A cases in the civilian population. Nevertheless, a large-scale anti-epidemic campaign is necessary to minimize the risk

of an epidemic outbreak. The campaign should primarily focus on a few critical disease prevention measures, i.e. delivery of safe drinking water (Figs. 3, 4), safe transport of water in water tanks specifically designed for this purpose, avoiding the consumption of food of unknown origin. According to the World Health Organization guidelines published in 2004 a person needs around 5 litres of water a day for drinking and food preparation, and around 15 litres a day for sanitary purposes. In field hospitals and emergency units a daily water requirement is 60 litres per person. When a natural disaster strikes, it should become a priority for emergency services to ensure the delivery of safe drinking water (15 litres per person/daily) as quickly as possible [12]. However, as combat operations continue in southern Ukraine, this may be difficult to achieve. Failure to deliver safe drinking water locally may increase the risk of an epidemic outbreak.

Conflict of interest: None declared

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