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Perspective

Armed conflict and human displacement may lead to an increase in the burden of tuberculosis in Europe

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The ongoing war in Ukraine has led to millions of refugees and internally displaced people, plunging the country into a catastrophe unseen after the second world war. The war has led to loss of life, loss of homes and loss of livings. Cold, hunger and destitution has been thrust upon the lives of millions. Health care facilities within the combat zones have been damaged or destroyed, while services are disrupted in Ukraine, it is likely neighbouring countries healthcare systems will be strained. Even though tuberculosis (TB) incidence rates had been gradually decreasing over the years in Ukraine and Russia with rates of 73 and 46 per 100,000 individuals in 2020 (WHO, 2022; WHO, 2021), respectively, the countries have some of the highest burdens of drug-resistant TB (DR-TB) in the world with 30% and 50% of TB cases (total and relapses) reported as laboratory confirmed multi-drug resistant (MDR) or pre-extensively-drug resistant (XDR)/XDR-TB (WHO, 2022). The prevalence of *Mycobacterium tuberculosis* (Mtb) infection in Ukraine and Russia is estimated to be 19–20% (Cohen et al., 2019) of which a significant proportion of individuals are at risk of developing DR-

TB. Correspondingly, modelling studies have suggested that countries in the Eastern European region have some of the highest absolute numbers of individuals with latent MDR-TB (Knight et al., 2020).

Previous armed conflicts have demonstrated a rise in DR-TB cases in addition to increases in TB incidence and mortality (Acosta et al., 2014; Drolet, 1945; Githui et al., 2000; Gustafson et al., 2001; Hargreaves et al., 2017; Sharara and Kanj, 2014; Sindani et al., 2013; Toole et al., 1993; Toole and Waldman, 1988; Truong et al., 1997; Weinstock et al., 2001). Several war-associated risk factors could lead to, or explain, the higher risk of transmission, reactivation of latent TB infection (Goletti et al., 2022) or worsening of active disease such as overcrowding, malnutrition, suspension of health care services or interruption in ongoing treatment of HIV co-infection, among other stressors (Kimbrough et al., 2012). Assuming the following: 1) five million Ukrainian refugees are dispersed all over Europe, 2) 20% of these have Mtb infection (Cohen et al., 2019), 3) 30% of these infections are caused by drug-resistant strains (WHO, 2021), and 4) a 5-year cumulative risk of incident TB of 2–5% (Gupta et al., 2020): Then among the Ukrainian refugees in Europe this spring, there will be one million-infected individuals who are potentially at risk of developing active disease within five years. This corresponds to up to 50,000 new TB cases among refugees from Ukraine including up to 15,000 DR-TB (without consideration of further ongoing transmission, late reactivation, and an increased risk of reactivation among children and people living with HIV).

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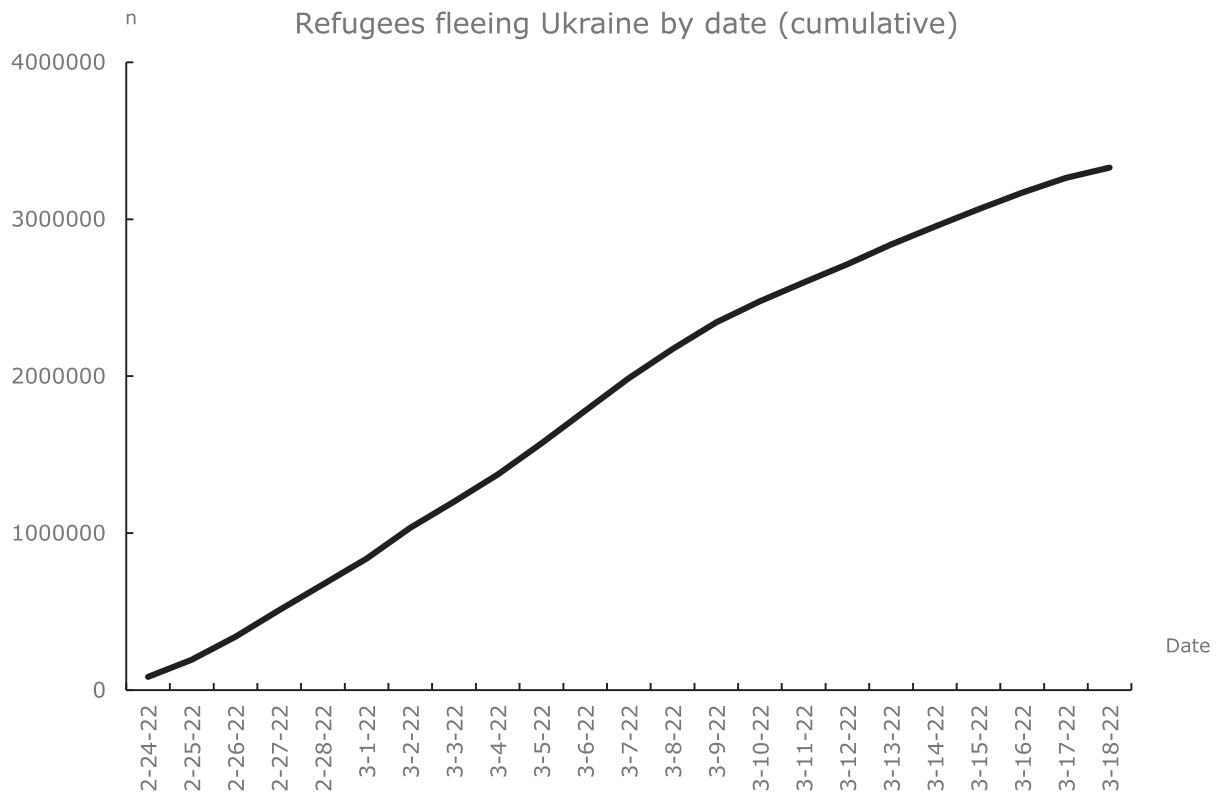
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Refugees fleeing Ukraine by hosting country

Country	Data date	Population (n)
Poland	18/Mar/22	2,010,693
Romania	18/Mar/22	518,269
Republic of Moldova	18/Mar/22	359,056
Hungary	18/Mar/22	299,273
Slovakia	18/Mar/22	240,009
Russian Federation	17/Mar/22	184,563
Belarus	17/Mar/22	2,548
Total		3,441,180

Figure 1. Refugees fleeing Ukraine by date and by hosting country as of 19 March 2022. Data are reported by and reproduced from The UN Refugee Agency's operational data portal: https://data2.unhcr.org/en/situations/ukraine#_ga=2.75466838.536472932.1646823994-732371619.1646823994. Accessed 19 March 2022.

The current conflict will likely have a crucial impact on the burden of TB in Europe. Directly involved countries will be the most affected but there will likely be consequences for neighbouring countries and more remote countries due to the hosting of refugees. After the beginning of the Syrian crisis in 2011, a considerable surge in TB cases in surrounding countries was observed (Ismail et al., 2018). According to the United Nations Refugee Agency, over 3.3 million refugees have already fled to Poland, Hun-

gary, Moldova, Romania, and Slovakia, only twenty-three days into the war (Figure 1).

It is of utmost importance that Europe unites and takes responsibility for displaced and vulnerable individuals and delivers a coherent strategy that not only encompasses health but also takes TB management into account. We recommend that Europe scales-up the screening for Mtb infection and disease as well as the treatment capacity for MDR/XDR-TB. Both prevention, detec-

tion, and treatment of TB, particularly DR-TB, is logistically and resourcefully demanding. Allocating comprehensive health assessment in European countries for arriving refugees will alleviate some of the health issues related to the displacement and prevent future disease (Hvass et al., 2021). European countries will have to find the resources to take care of the health needs of the refugees from Ukraine. It may be important that active case-finding of TB and screening for LTBI is adopted quickly on a large scale (Bohlbro et al., 2021; Langholz et al., 2019).

Treating more than 6500 MDR-TB patients in war torn Ukraine and refugee camps is a massive undertaking with poor access to medicines even without considering the important burden of drug-susceptible TB cases (WHO, 2022). Even so, the available data from WHO on the number of MDR-TB patients may be underestimations due to under notification after two years of COVID-19 and the prior conflict in Crimea and Donbass. The health care system of neighbouring countries as Poland, Moldova, and Romania will likely be overwhelmed. As hospitals are bombed and electricity power plants are targeted, admitted TB patients in Ukrainian hospitals will need to be transferred to other TB treatment centres across Europe, hence all health care facilities need to prepare for this. Moreover, with the massive sanctions put upon Russia, TB management in the Russian population will also be strongly challenged with potential large consequences on the TB epidemic there. The treatment of MDR-TB in Ukraine and Russia is already suboptimal with a treatment success of only 50-51% (WHO, 2022; WHO, 2021). The risk of a disrupted or inappropriate treatment – or lack of treatment – seems much higher during war. Ideally, physicians need access to cross border health data of patients migrating to reduce delays and disrupted treatments.

With this viewpoint, we want to raise awareness of the consequences for regional and global health. Although the war may be a dispute about politics and land, the risk of a massive deterioration for TB management is colossal and a legacy of conflict that we might be able to mitigate. On World TB Day 2022, we need to be aware of the current catastrophe for TB control unfolding before our eyes. If the call to cease the violent aggression is not heard, we should do everything in our power to minimize the collateral TB-related damage through comprehensive support of TB screening and care of refugees and optimized care for TB patients and other affected vulnerable individuals.

We propose that the EU, WHO European Region and the UK urgently establishes a public health task force to support countries receiving refugees fleeing from the war. The aim should be to ensure every refugee will receive medical care either in the established health care system or in designated centers, including investigations of illness, treatment, and immunizations against both SARS-CoV-2 and childhood diseases.

Transparency declaration

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Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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Ethical Approval

Not applicable.

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