



## Letter to the Editor

**Infectious diseases within a war-torn health system: The re-emergence of polio in Gaza**

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*Dear Editor,*

In the Eastern Mediterranean Region (EMR), 20 out of 22 countries have been declared free of wild poliovirus. Afghanistan and Pakistan are the only countries in the region where wild poliovirus type 1 continues to circulate. Globally, wild poliovirus types 2 and 3 have been certified as eradicated [1].

Armed conflicts significantly increase the risk of infectious disease outbreaks by disrupting healthcare and sanitation infrastructure, people displacement, and deteriorating living conditions. Also, surveillance and timely response to infectious diseases outbreaks are hindered, leading to prolonged suffering and increased transmission risks both within and beyond the affected countries or territories. Studies indicate that polio is more prevalent in regions experiencing political instability and armed conflicts, where access to clean water, sanitation, and vaccination services is significantly compromised [2]. For instance, in Afghanistan, armed conflicts have impacted public health services, including routine immunization, leading to reduced vaccination rates and exacerbation of polio transmission [3]. Similarly, in the Syrian Arab Republic, the collapse of the country's healthcare system during the civil war resulted in a resurgence of polio due to reduced vaccination coverage and poor sanitary conditions.

The ongoing war on Gaza exemplifies these challenges, with infectious diseases outbreaks highlighting the need for robust health infrastructure and international support to mitigate disease spread in armed conflict settings. As of September 04, 2024, the war on Gaza has resulted in more than 94,000 wounded people, while the death toll surpassed 40,700, however, casualties and fatalities might be underreported due to the collapse of the healthcare system in Gaza; thus, the already grim picture painted by these statistics could become even more disastrous. Gazans are currently living in inhumane conditions, and the associated consequences of the ongoing war are uncountable, some of which are the complete destruction of the healthcare system and famine [4].

A variant of poliovirus known as circulating Vaccine-Derived Poliovirus (cVDPV) can emerge in areas with low immunization coverage. Generally, the most common type of cVDPV is cVDPV type 2 which was responsible for 959 cases of polio in 2020 globally [5].

cVDPV is related to the live-attenuated wild polio virus included in oral polio vaccine (OPV). The weakened virus in OPV can be excreted in feces; thus, it can potentially spread in communities with impacted sanitation and sewage infrastructure, such as during armed conflicts. The circulation of the weakened virus in communities with low vaccination rate between unvaccinated people over a long duration of time can cause mutations in the virus, leading to the emergence of cVDPVs [5].

Although Gaza was declared free of polio since 1999, on July 16, 2024, cVDPV type 2 was confirmed in environmental (wastewater) samples that were collected from two different sites in Gaza (Khan Younis and Deir al Balah). Before the current war, Gaza had a polio vaccination coverage of 99 %, which significantly dropped to less than 90 % in the first quarter of 2024 due to the current destruction of healthcare infrastructure, and disruptions in routine vaccination. In mid-August 2024, a case of polio in a 10-month-old infant was declared by the ministry of health in Gaza, and the affected infant suffered from partial paralysis. This is considered the first polio case in Gaza in 25 years [6]. Previously, wild poliovirus had been identified in environmental samples in Gaza in 2013, indicating the presence of the virus in the environment even though no human cases were reported at that time [7]. This finding highlighted the risk of polio re-emergence in the area, especially given the challenges of maintaining high vaccination coverage amidst the ongoing war and the destruction of the public health infrastructure.

In light of the current war on Gaza, the discovery of cVDPV type 2 in the wastewater has heightened the potential threat of spread of infectious diseases. Health ministers in the EMR, under the coordination from the World Health Organization (WHO), have rallied to address this emergency. Regional Polio Eradication and Outbreaks subcommittee emphasized on the need for coordinated regional action to combat the spread of the virus [8]. Following the re-emergence of poliovirus in Gaza after 25 years, the Palestinian Ministry of Health sought support for enhancing surveillance and laboratory capacities, with Jordan, Iraq, Saudi Arabia, and Syria pledging technical and logistic assistance. Additionally, The WHO announced the shipment of more than one million polio vaccines to Gaza.

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The re-emergence of polio in Gaza necessitated an urgent and coordinated public health response under extremely challenging conditions. The WHO, alongside UNICEF, the United Nations Relief and Works Agency for Palestine Refugees (UNRWA), and the Palestinian Ministry of Health has launched a mass vaccination campaign in the past few days. Within the first two days of the campaign, more than 161,000 children under the age of 10 years were vaccinated. To facilitate the vaccination efforts, a series of localized humanitarian pauses were announced. The humanitarian pauses have allowed healthcare workers to safely administer vaccines across different regions in Gaza. The campaign, structured in phases, began in central Gaza and will progress to the southern and northern regions. Despite the challenges, the campaign aims to vaccinate 640,000 children, with the goal of achieving at least 90 % coverage to halt the transmission of the virus and prevent its spread to surrounding countries [9].

The current conditions in Gaza have created a fertile environment for infectious disease outbreaks, such as Polio. The severe damage to water and sanitation infrastructure in Gaza due to the ongoing war has contributed to cVDPV transmission. As poliovirus is transmitted through fecal-oral route, efforts to reduce the transmission of cVDPV must combine both vaccination with improved sanitary settings. The risk of poliovirus contamination in the environment can be reduced by ensuring access to clean water and proper disposal of waste, particularly in areas where sanitation infrastructure has been compromised. The current situation in Gaza highlights the critical need for a permanent ceasefire, sustained international support and uninterrupted access to healthcare and routine vaccination to prevent the re-emergence of other vaccine-preventable diseases.

#### CRedit authorship contribution statement

**Dalia Zayed:** Writing – review & editing, Writing – original draft, Data curation. **Mus’ab Banat:** Writing – review & editing, Writing – original draft, Data curation. **Ala’a B. Al-Tammemi:** Writing – review & editing, Writing – original draft, Validation, Supervision, Data curation, Conceptualization.

#### 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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