Polio, conflict and health implications in Gaza

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Introduction

Polio, a paralyzing disease caused by the poliovirus, has shaped global health policies and public health responses since its recognition in the early 20th Century *(1)*. The disease predominantly affects under-5 children, leading to irreversible paralysis and even death in severe cases *(2)*. Despite significant advancements in vaccine development and administration, polio remains a public health concern in certain regions, particularly in areas impacted by conflict, such as Gaza *(3)*. The intersection of war, health infrastructure challenges and the continuance of polio underlies the complex and multifaceted nature of global health issues *(4)*.

In 1988, WHO launched the Global Polio Eradication Initiative (GPEI) with the ambitious goal of eradicating polio worldwide *(5)*. At the dawn of the 21st Century, significant progress was made, with the incidence of polio reducing by over 99% globally *(2)* and zero polio cases in many regions. However, certain areas, particularly the conflict zones, still contend with the disease.

Before the October 2023 war, the State of Palestine had maintained a polio-free status for over 25 years, attributed to a comprehensive routine immunization programme and a strong culture of vaccine acceptance. However, in July 2024, environmental samples collected from Khan Younis and Deir al-Balah revealed the presence of the poliovirus *(6)*. Alarmingly, 3 cases of children exhibiting signs of suspected acute flaccid paralysis (AFP), a typical indicator of polio, were reported in the Gaza Strip. Their stool samples were forwarded to the Jordan National Polio Laboratory for analysis. This situation heightened the potential for further transmission of the virus within the Gaza Strip and its neighbouring regions. Following the identification of circulating vaccine-derived poliovirus type 3 (cVDPV3) in sewage at the Wadi Alnar site, the Ministry of Health initiated a preventive vaccination campaign aimed at enhancing children's immunity in the 2 areas identified as most vulnerable: Bethlehem and Jerusalem *(6)*.

Consequences of conflict on polio eradication in Gaza

The conflict in Gaza continues to undermine the ability to combat polio effectively. It is estimated that between 7000 and 10 000 children in hard-to-reach areas such as Jabalia, Beit Lahiya and Beit Hanoun remain unvaccinated and at risk of contracting the poliovirus *(6)*. Due to the persistent conflict, polio immunization rates in Gaza plummeted, from an estimated 90% coverage in the 1990s to as low as 60% between 2000 and 2004, leading to a resurgence of the disease *(7)*. In 2002, a polio outbreak was reported in the Gaza Strip, with several cases of paralytic polio confirmed *(8)*. The blockade in the Gaza Strip has made it increasingly challenging to maintain a reliable cold chain for vaccine storage and distribution, a critical factor in ensuring the potency and effectiveness of the vaccines *(9)*. The repeated cycles of violence and military operations have disrupted routine immunization services and displaced large numbers of people, making it difficult to reach vulnerable populations with vaccination *(10)*. In addition to the resurgence of polio, other vaccine-preventable diseases, such as measles and diphtheria, have also seen a concerning increase in incidence in the Gaza Strip *(11)*.

A 2021 analysis projected that a widespread polio outbreak in Gaza could leave as many as 1 in 200 children permanently disabled, thus pushing the already overburdened healthcare system to the brink and devastating families and communities *(12)*. A resurgence of the disease could cripple Gaza's fragile economy, with the costs of treatment and lost productivity potentially amounting to hundreds of millions of dollars *(13)*. Therefore, strengthening immunization campaigns, improving disease surveillance and ensuring uninterrupted access to vaccines and medical care are crucial *(3)*.

Addressing the polio epidemic in Gaza

The emergence of vaccine-derived poliovirus (VDPV) is a significant concern for global polio eradication efforts, as it can undermine the progress made through widespread vaccination campaigns *(14)*. Addressing this challenge requires a multi-pronged approach, including the transition from OPV to IPV, which does not carry the risk of VDPV, as well as strengthening routine immunization services and disease surveillance *(15)*.

Immediate and coordinated intervention is needed to prevent the polio outbreak in Gaza from spiralling

into a full-blown pandemic. Urgent action is needed to rebuild infrastructure to reduce pressure on overcrowded shelters which has the potential to worsen transmission of the poliovirus *(16)*. Addressing the sewage contamination issue and improving water and sanitation infrastructure will be crucial to eradicating polio in Gaza and preventing future outbreaks in the region. Restoring and maintaining high routine immunization coverage is a critical priority, with strategies to reach all segments of the population and address barriers to immunization *(3)*. Strengthening disease surveillance and outbreak response capabilities, including improving laboratory capacity and healthcare worker training, is essential for early detection and effective management of polio cases *(17)*.

Addressing the polio challenge in Gaza will require strong regional and international cooperation, including collaboration between the Palestinian Authority, Israel, the World Health Organization, and other partners (5). The ultimate long-term solution lies in the resolution of the broader Israeli-Palestinian conflict, as sustained peace and stability would create an environment conducive for successful implementation of polio eradication efforts *(18)*.

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