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Breaking Point in the Gaza Strip: The ‘Cracking’ of the WASH-Health Nexus Since October 2023

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Abstract

Communities in Gaza face an unprecedented long-term water crisis, worsened by the war from October 2023 to October 2025 which has intensified the already dire situation caused by a 16-year blockade of Gaza. The recent blockades imposed after 7 October 2023 impeded the entry of goods, resulting in water and food insecurity and worsening severe public health issues exacerbated by these resource shortages. These developments have further exacerbated the already fragile conditions of Water, Sanitation, and Hygiene (WASH) infrastructure and installations. Access to clean water has decreased by 94 percent, to <5 liters/person/day, well below the World Health Organization's (WHO) minimum standards. The crisis has damaged 84.6 percent of critical WASH infrastructure in Gaza, causing operational services to decline and leaving no functional wastewater or desalination treatment plants. Over 1.9 million people (90 percent of Gaza's population) have been displaced. Due to overcrowded living conditions and inadequate sanitation, there has been a fivefold increase in the spread of epidemics compared to pre-war levels, including the recrudescence of polio in 2024¹. WASH-related diseases have surged, and the destruction of wastewater treatment facilities has contaminated freshwater resources, leading to severe health burdens for individuals, people, and communities. Gaza's healthcare system is overwhelmed and unable to respond adequately to the crisis. Many health facilities have been damaged or rendered non-operational due to the conflict. Despite the scale of conflict that has severely limited the healthcare sector's capacity for disease surveillance and ability to detect and track health conditions across the entire Gaza Strip, the WHO and the local health authorities have been able to scale up a flexible disease surveillance system in many of the shelters and health facilities.

In this working paper, we take stock of how the ongoing escalation of violence in the Gaza Strip has pushed the WASH and health systems to a breaking point, severely impacting both disease control and overall well-being. We assert that urgent action is needed to restore essential delivery service, improve healthcare capacities, implement disease prevention measures, and address human rights violations related to immediate water access and long-term water security (including a dedicated focus on the WASH-health nexus). We call for active and meaningful collaboration between local authorities, humanitarian agencies, and international organizations as 'response and recovery' processes and protocols are discussed and designed. Plans must meet Gazans' needs by addressing the complexity of fully addressing this nexus. Overall, the situation demands immediate attention, sustained intervention, and long-term solutions to protect the health and well-being of Gaza's residents, ensuring their fundamental human right to clean water, adequate healthcare, and infrastructure rehabilitation. Assessments from the United Nations Office for the Coordination of Humanitarian Affairs (OCHA) from July 2025 indicate that 1 million people in Gaza are accessing less than 6 liters of drinking water per day, a level catastrophically below emergency minimum standards. The crisis in Gaza has resulted in severe damage to critical WASH infrastructure, amounting to a complete loss of safely managed sanitation for the entire population. These new assessments underscore the growing intersection between climate-induced vulnerabilities, displacement, and public health emergencies, reinforcing the urgent need for integrated policy action.

Keywords

Gaza, water, WHO, health, disease

¹ On 16 August 2024, Palestinian health officials confirmed the first case of polio in Gaza in 25 years in an unvaccinated 10-month-old child from Deir al-Balah. Symbolically, the infant, partially paralyzed on the left leg, represents an ominous omen for the worsening public health crisis in the war-torn territory. This diagnosis comes after the detection of poliovirus in wastewater samples from 6 locations across Gaza in July 2024, signaling the potential for more widespread transmission (Source: World Health Organization/EMHJ 2025. Authors: Abuzerr S, Marzouk S, Nguyen D, Sabe C. Resurgence of polio during Gaza conflict. East Mediterr Health J. 2025;31(2):136-137).

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1. Introduction

Although Gaza has suffered through previous periods of insecurity and violence, the ongoing war, which began on 7 October 2023, stands out as unprecedented in the scale of lives lost, destruction, and human suffering it has incurred, with repercussions that will echo for generations to come. The current situation represents a profound crisis that intertwines public health concerns with environmental degradation. Armed conflict in Gaza has not only resulted in immediate casualties but has also severely undermined the region's health infrastructure and access to essential services. Water, a fundamental human survival and health requirement, is among the most critical of these resources. Without access to clean water, the risk of waterborne diseases escalates, posing significant threats to the already vulnerable population of Gaza. The intensification of airstrikes and the enforcement of Israeli evacuation orders starting 13 October 2023 resulted in the persistent displacement of a substantial portion of the population, who have sought refuge in safer locations. As reported by OCHA, at least 1.9 million people (nine in ten people) across the Gaza Strip were internally displaced (OCHA Mar 25, 2025).

A considerable number of internally displaced people (IDPs) have been repeatedly displaced, with some experiencing up to ten or more episodes of displacement. The constant displacement of populations represents a significant challenge for providing water supplies. The overcrowded conditions and deplorable environments in southern Gaza that have no access to safe water, effective sanitation systems, or basic hygiene standards have contributed to the emergence and spread of waterborne illness, such as acute jaundice syndrome and poliomyelitis as well as disease stemming from a lack of hygiene (PCHR, August 2024). The Gazan population is increasingly forced into the Israeli-designated zone in Al Mawasi, which is considered a humanitarian zone, spanning 11 percent of Gaza's total area. The severe overcrowding of this zone, with a density of 30,000 to 34,000 individuals per square kilometer, has exacerbated the dire shortage of essential resources (OCHA Dec 12, 2023; UNRWA Nov 11, 2023; Health Cluster and WHO, Sep 26, 2024). The staggering number of IDPs in southern Gaza has resulted in an increased prevalence of water stress, with water systems lacking the capacity to meet the rising demand.

Historically, Gaza has struggled with severe water shortages due to over-extraction from its Coastal Aquifer, which is increasingly contaminated by seawater intrusion and untreated sewage. In 2018, a World Bank report projected that Gaza would become uninhabitable within two years if current trends, including water contamination, continued (World Bank, 2018). UNICEF has since confirmed this critical situation, reporting that as of June 2023, approximately 96 percent of water from Gaza's Coastal Aquifer was unfit for human consumption, primarily due to salinization and pollution (UNICEF, 2023; ACAPS, 2023). Before the escalation of the current conflict, about 97 percent of Gaza's population had access to piped water networks, though most supplies were unsafe without additional treatment (UNICEF, 2023). The renewed and intensified hostilities since late 2023 have further exacerbated these vulnerabilities, causing widespread destruction to WASH infrastructure and rendering access to safe drinking water increasingly precarious (UNICEF, 2023; ACAPS, 2023). The closure of border crossings into the Gaza Strip has had a significant impact on the entry of fuel, goods and spare parts, resulting in critical shortages of electricity and water supply systems (UNFPA, 2024). Consequently, the scarcity of fuel has impeded the functionality of WASH infrastructure, including wells, pumping stations, and water-trucking operations. Furthermore, transport and piping networks have become predominantly either inoperable or inefficient. WASH partners have received only 28 percent of the minimum daily fuel requirements, prompting water-trucking operations to emerge as the predominant distribution method under these suboptimal conditions (OCHA, 10 May 2024; OCHA, 5-18 August 2024). As the United Nations (UN) recognizes access to water and sanitation as a human right essential for health, dignity, and prosperity, the ongoing conflict in Gaza represents a critical juncture where public health and human rights converge (UN, 2010). The emerging public health crisis underscores the urgent need for comprehensive strategies to address the intersection of conflict, environmental degradation, and health in Gaza (see Visual 1).

This working paper aims to illuminate the impact of the conflict on the WASH-health nexus, in part by providing examples of scenario impacts related to waterborne diseases. The paper additionally advocates for immediate and sustained interventions to protect the health and well-being of the population.



Visual 1: United Nations News covering how Gaza power cut impacted safe water access for hundreds of thousands (Source: UN, 10 March 2025).²

The reports from various national and international organizations operating in the Occupied Palestinian Territory (OPT) indicate an escalation in challenges and the emergence of novel issues after 7 October 2023 and through to October 2025. During this period, there was extensive destruction to critical infrastructure, including water treatment plants, pipelines, and distribution networks, which severely affected the functionality and reliability of essential services.

In this paper, we also reflect on the repercussions of the aggression that occurred between 9 October 2023 and 19 January 2025 in Gaza on the proliferation of WASH-related disease outbreaks. We also cover the period from March to October 2025, which was defined by an escalation of the crisis after Israel breached a negotiated truce on the evening of 17 March 2025.

2. Overview of Water and Sanitation Infrastructure Breakdown

The war in Gaza has resulted in severe damage to water and sanitation infrastructure, affecting the availability and quality of these essential services. Prolonged political instability, combined with actions taken by the Israeli government in response to the events of 7 October 2023, culminated in a blockade of the Gaza Strip. This blockade has restricted access to critical resources such as food, water, and electricity, contributing to heightened food insecurity and increased risk of malnutrition and public health instability among the population (Abdul Samad, Butcher, Khalidi, 2024). Clean water is unavailable for most living in Gaza. Some reports claim the Israeli government has deliberately targeted WASH facilities following 7 October 2023 to disrupt access to clean water for the civilian population, which would represent a potential violation of international humanitarian law (OHCHR, July 29, 2025). Overall, there has been extensive damage to critical facilities that deliver safe water and sanitation to the population. This deterioration not only affects the immediate availability of clean water but also has long-term implications for public health (PCHR, August 2024; Hall, Kirschenbaum, and Michel, January 12, 2024).

The ongoing aggression in Gaza has led to widespread and repeated displacement of the population. As of late August 2024, approximately 88.5 percent of the Gaza Strip had been placed under evacuation orders since October 2023. This has resulted in severe overcrowding, with up to 34,000 individuals per square kilometer in designated zones, and a critical shortage of essential resources such as water, sanitation, and healthcare services. These conditions have contributed to a catastrophic humanitarian situation (OCHA, 17 December 2024). Even before the onset of hostilities, the area in question was characterized by a paucity of sophisticated infrastructure. The region is sparsely populated and relies on partially operational farming wells, with percolation pits used for sewage disposal (OCHA, 31 Dec 2024).

² UN News. Gaza power cut impacts safe water access for hundreds of thousands. Source: <https://news.un.org/en/story/2025/03/1160961>

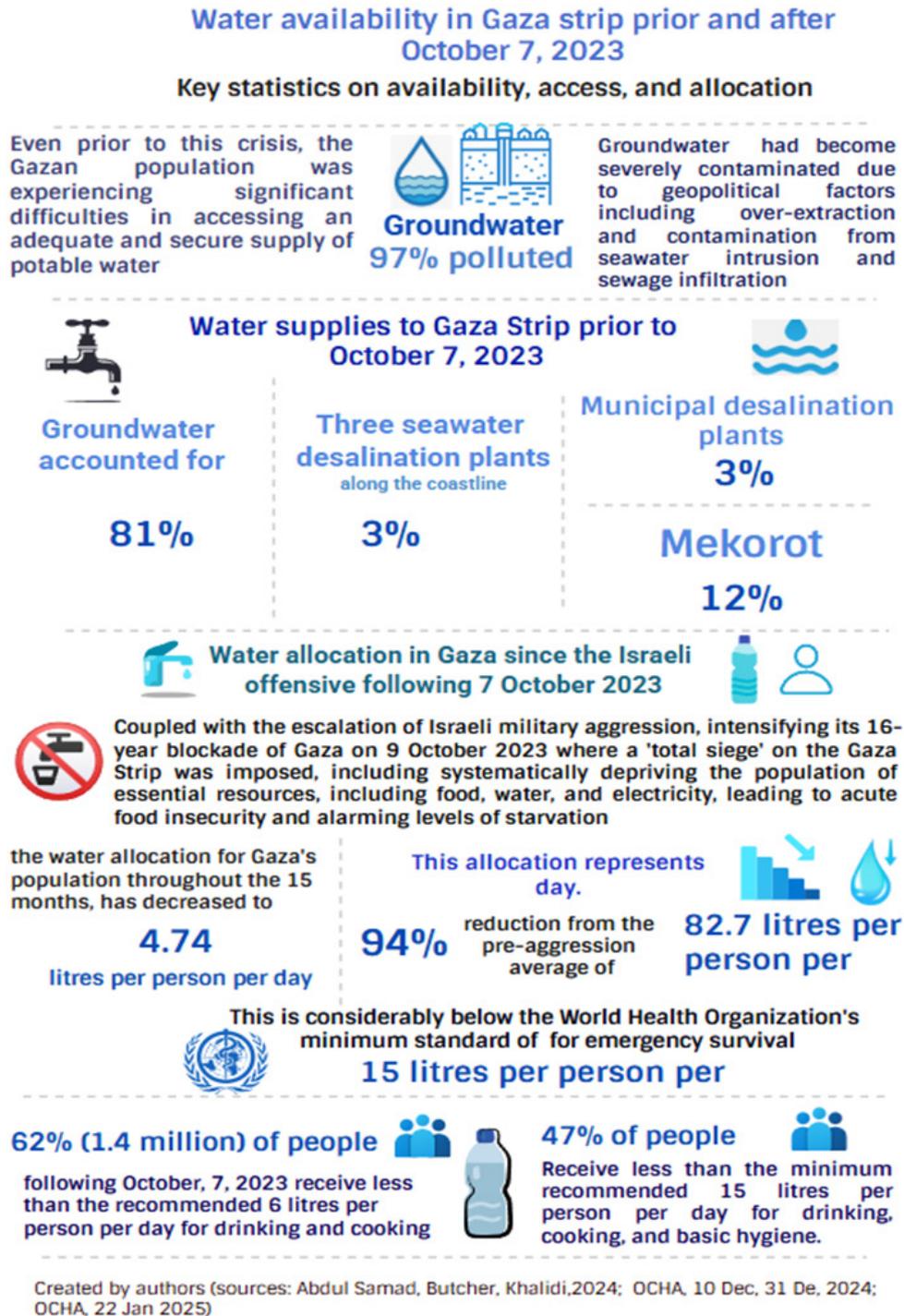


Figure 1: Water availability on the Gaza Strip before and after October 7, 2023 (Author's graphic. Source: Abdul Samad, Butcher, Khalidi,2024; OCHA, 10 Dec, 31 Dec 2024; OCHA, 22 Jan 2025).

The overcrowded and unsanitary conditions in southern Gaza have contributed to the emergence and spread of waterborne diseases. Since 7 October 2023, the water allocation for Gaza's population has decreased to 4.74 liters/person/day, representing a 94 percent reduction from the pre-conflict average of 82.7 liters per person per day. This is far below the WHO's minimum standard of 15 liters per person per day for emergency survival (Abdul Samad, Butcher, Khalidi, 2024). A recent OCHA report on the occupied Palestinian territories show that 62 percent (1.4 million) of people following 7 October 2023 receive less than the recommended 6 liters per person per day for drinking and cooking, while 47 percent of people receive less than the minimum recommended 15 liters per person per day for drinking, cooking, and basic hygiene (OCHA, 11 February 2025). Figure 1 shows that, even before this crisis, the Gaza population was experiencing significant difficulties in accessing an adequate and secure supply of potable water, driven by a lack of surface water sources and by Israel's asymmetric control over water resources (Perlman, Collins, Van Den Hoek, 2025). Only 6 percent of the population had access to "safely managed, piped drinking water" (UNEP, 2024).

Groundwater accounted for 81 percent of the total water available to the population in Gaza. This water originates from the Coastal Aquifer Basin, which extends along the eastern Mediterranean coast from Egypt through Gaza and into Israel. However, seawater intrusion, excessive extraction, and the infiltration of sewage and chemical substances compromise the water's quality, leaving 97 percent of it polluted (Abdul Samad, Butcher, Khalidi, 2024; OCHA, 16 November 2018). Consequently, residents of Gaza rely on small-scale municipal desalination plants and unregulated private water tankers, which can be costly and present additional health risks, particularly for older people and children who are more vulnerable. Of the remaining water supplied to Gaza, 3 percent was supplied by the three seawater desalination plants along the coastline, 3 percent by municipal desalination plants, and the remaining approximately 12 percent was sourced from three pipelines operated by Mekorot, the Israeli water authority (Abdul Samad, Butcher, Khalidi, 2024).

It is increasingly evident that the period following the aggression's onset on 7 October 2023 has intensified pre-existing challenges and led to the emergence of novel issues such as extensive destruction of critical infrastructure, including water treatment plants, pipelines, and distribution networks, severely affecting the functionality and reliability of essential services. WASH service providers, including public utilities, community-led initiatives, humanitarian actors, and households, struggle to meet the overwhelming demand for services. With 84.6 percent of critical WASH infrastructure damaged, operational services have drastically declined, leaving no functional wastewater treatment plants (OCHA, Dec 11, 2024). The systematic destruction of water infrastructure, the cutting-off of electricity supplies and severe restrictions on fuel needed to operate the remaining water systems, along with damaged roads preventing timely water trucking, resulted in people receiving water: (i) inconsistently, (ii) in quantities well below the internationally accepted emergency minimum quantity of 15 litres per person per day, and/or (iii) of poor quality, unfit for human consumption. Figure 1 shows how critical infrastructure and WASH facilities were affected during the conflict, exacerbating health crises for the Palestinian civilian population.

2.1 Exacerbation of the Crisis

Between March and October 2025, the humanitarian and environmental crisis worsened significantly after the negotiated truce was breached on the evening of 17 March 2025 (OCHA, 17 September 2025). Approximately 1 million people now access less than six liters of drinking water per day, while 89 percent of Gaza's WASH infrastructure has been either damaged or destroyed (OCHA, 17 September 2025; OCHA, 28 September - 11 October 2025). Following a complete collapse from the 85 percent connection rate before October 2023, no residents currently have access to safely managed sanitation (UN OCHA, 17 September 2025). In addition, over 1.2 million people are now exposed to sewage or fecal matter within 10 meters of their homes, posing severe public health and psychosocial risks (UNEP, 2025). Hygiene access has sharply declined, with 63 percent of households (1.3 million people) lacking soap, and nearly 500,000 women and girls without adequate menstrual hygiene materials (OCHA, 28 September - 11 October 2025; UNICEF, 2025). These conditions exacerbate already fragile community resilience, compounding psychological distress, displacement pressures, and the breakdown of social protection networks that are central to mental health (WHO, 2025; OCHA, 28 September - 11 October 2025) (See Figure 2).



Figure 2: Exacerbation of WASH Crisis in Gaza between March and October 2025. (Author’s graphic. Source: OCHA, 17 September 2025; OCHA, 28 September - 11 October 2025; UNEP, September 2025; UNICEF, 11 September 2025; WHO, 27 July 2025)

2.2 Overview of the Cracking Nexus of ‘WASH-Health’: Disease Outbreaks Represent a Growing Threat

Access to quality water is key to ensuring a healthy, disease-free population. In conflict-affected areas, it is imperative to consider the nexus between WASH and public health. In recent years, public health has become viewed through the lens of conflict strategy, with actors seeking to harm an opponent’s public health in order to cripple and gain power or influence. Water insecurity significantly threatens nutrition, economic productivity, and physical and mental health (Perlman, Collins, and Van Den Hoek, 2025). In Gaza, the collapse of the WASH infrastructure following the conflict’s escalation on 7 October 2023 led to a sharp rise in waterborne diseases. The targeting of sanitation facilities and the blockade-induced shutdown of desalination plants have dismantled critical preventative measures, resulting in a dramatic surge in infection rates (Irfan et al., 2024). This has led to outbreaks of diarrhea, respiratory infections, hepatitis A, scabies, and the re-emergence of polio after 25 years (WHO, 12 Feb 2025). People have resorted to drinking water from agricultural wells that are 30 times saltier than freshwater, increasing the risk of health consequences. Using saline groundwater increases the risk of diarrheal syndromes, particularly for babies, pregnant women, and people with kidney disease (OCHA Oct 22, 2023). UN Women reports that 337,057 boys and girls under age five are at particular risk of water and sanitation-related diseases and health burdens and 107,000 older men and women face an elevated risk of contracting hepatitis A (UN Women, April 2024).

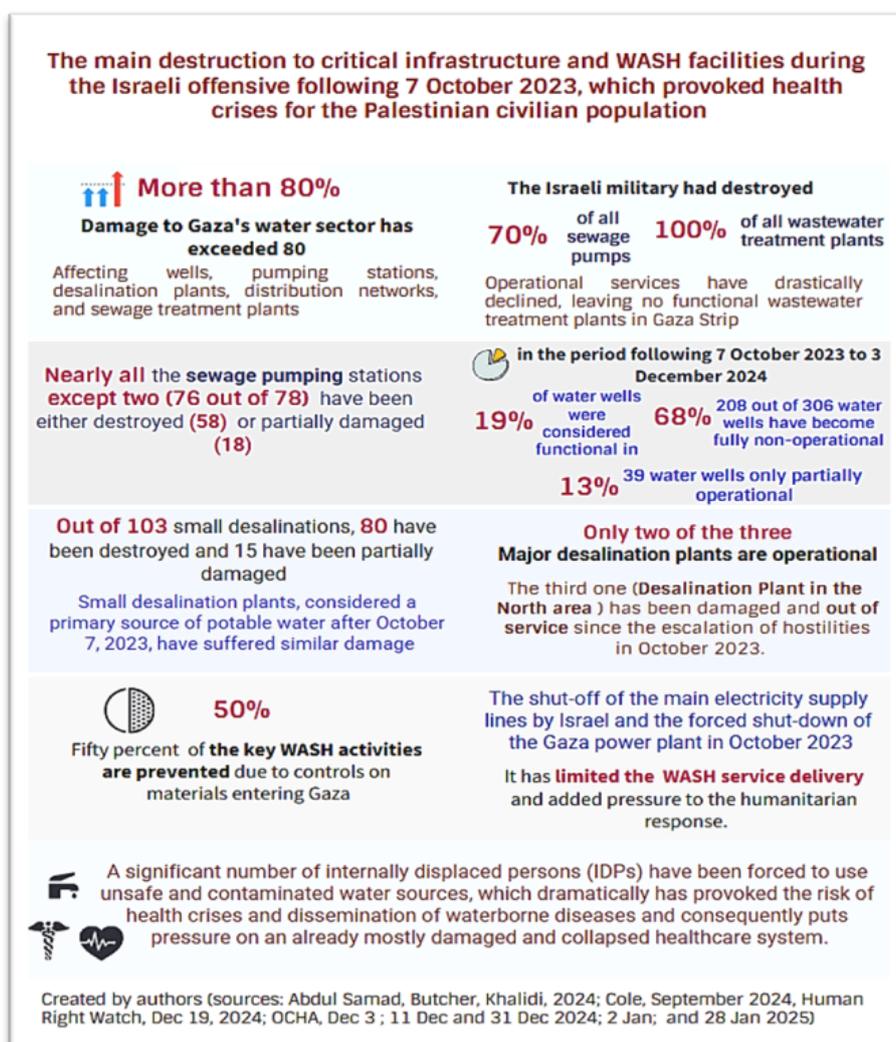


Figure 3: Overview of the destruction of critical infrastructure and WASH facilities and the resulting health crises for the Palestinian civilian population.³

The combination of inadequate access to clean water and deteriorating sanitation conditions has created a favorable environment for widespread outbreaks, which pose significant health risks (Cole, 2024; Dardona, Amame, Boussaa, 2024). As communities are forced to depend on contaminated water sources, the incidence of diseases such as cholera, dysentery, and gastroenteritis is increasing, endangering the lives and well-being of the population. Waterborne diseases primarily emerge from consuming contaminated water and inadequate sanitation practices (Allaq et al., 2023). The WHO has reported that “damaged water and sanitation systems in the Gaza Strip, with raw sewage running in the street and between tents of IDPs (Figure 3) and dwindling cleaning supplies have made it almost impossible to maintain basic infection prevention and control measures” in health facilities (WHO, November 8, 2023). Disruption to sewage pumping and water shortages have already caused a rise in waterborne diseases, bacterial infections, and diarrhea among children (The Guardian, Nov 14, 2023). Women and girls are particularly affected because the lack of clean water, supplies, toilets, clothing, and waste disposal systems challenges their safe management of menstrual health (Health Cluster et al. 29/11/2023). The lack of clean water and adequate WASH services has made it extremely difficult, if not impossible, to treat diseases linked to poor water and sanitation, according to a public health physician from an international organization (Human Rights Watch, December 19, 2024).

³ Sources: Abdul Samad, Butcher, Khalidi, 2024; Cole, September 2024, Human Right Watch, Dec 19, 2024; OCHA, Dec 3, 2024; 11 Dec 2024; 31 Dec 2024; 2 January 2025; 28 January 2025



Visual 2: Raw sewage is running between tents of IDPs in the Gaza Strip (Source: WHO, August 2024)

Despite the constraints imposed on the healthcare sector's capacity for disease surveillance and ability to detect and track health conditions across the entire Gaza Strip (Abdul Samad, Butcher, Khalidi, 2024; PCHR, August 2024), WHO, and local health authorities have been able to scale up a flexible disease surveillance system in many of Gaza's shelters and health facilities (WHO, 8 November 2023). Furthermore, national and international organizations have released various reports weekly, monthly, and quarterly to provide updated figures on the health situation and reported cases of water and sanitation-related diseases. Since January 2024, WHO and health partners have strengthened syndromic surveillance of epidemic-prone diseases, revising the priority list at the one-year mark of the conflict. In collaboration with partners, WHO implemented the Early Warning Alert and Response System (EWARS) to enhance disease monitoring, alert investigation, outbreak preparedness and response. This effort included providing digital tools to 163 surveillance focal persons across 209 health facilities and recruiting four surveillance officers to strengthen surveillance in the Gaza Strip (WHO, 12 Feb 2025).



Figure 4: Summary of primary WASH-related disease outbreaks following the commencement of the recent Israeli assault on Gaza on 7 October 2023. Created by authors⁴

⁴ Sources: Dardona, Amane and Boussaa, 2024; Health Cluster et al. 6 and 29 Nov 2023; Human right Watch, Dec 19, 2024; MSF, February 8, 2024; OCHA, 22 Oct 2023; 3 Dec 2023; WHO, 8 Nov 2023; 12 Feb 2025; Zinszer and Abuzerr, 2024

2.3 Aggregation of Key Challenges in the Region with Focus on the ‘Cracking Nexus’

To circumvent the overlap between the findings of different studies, we considered the most updated information and findings. To ensure consistency in the actual numbers released by various sources, we highlight the initial cases of destruction and collapse of the WASH system in the aftermath of the commencement of intense hostilities in Gaza following 7 October 2023.

From mid-October 2023 to November 2023, over 33,551 cases of diarrhea were reported, with more than 50 percent affecting children (WHO, November 8, 2023). On 8 November 2023, the WHO issued a warning that the rapid spread of infectious diseases was a serious concern due to the combination of intensified hostilities, severe overcrowding living conditions, and the disruption of health, water, and sanitation systems (Human Rights Watch, December 19, 2024; WHO, November 8, 2023).

On 12 December 2023, the Ministry of Health in Gaza reported 360,000 recorded cases of infectious diseases in shelters (OCHA, Dec 12, 2023). Health partners, including WHO, have identified cases of meningitis, jaundice, impetigo, chickenpox, scabies, lice, diarrhea, and other upper respiratory tract infections, directly linked to inadequate sanitation conditions and the consumption of unsafe water (Health Cluster, Nov 6, 2023; OCHA, Dec 12, 2023).

One of the UNRWA shelters reported a hepatitis A outbreak in one of its shelters in Gaza on 1 December 2023 (OCHA, Dec 1 and 3, 2023). Also, in the first four months following October 7, 2023, there have been documented instances of unrecorded water-related health concerns, including dehydration, intestinal disorders, skin rashes, and influenza (MSF, February 8, 2024).

A total of 136,400 cases of diarrhea in children under five years of age have been reported in the first three months following conflict escalation (UNEP, June 2024).

On 23 June 2024, environmental surveillance detected cVDPV2 (a form of poliovirus) in six of seven sewage samples from Deir Al-Balah and Khan Younis governorates in the Gaza Strip. This discovery is critical given it occurred in an environment characterized by favorable conditions for spreading the virus: a fragile public health system, an ongoing humanitarian crisis, and population displacement. Remarkable given this situation, a two-phased nOPV2 vaccination campaign, organized and implemented by the MoH, WHO, UNICEF, UNRWA, and partners, successfully reached 591,714 children under 10 during the agreed humanitarian pauses (WHO, Feb 12, 2025).

Based on comprehensive reports and surveillance findings, the WHO’s Operational Response Report for the oPt from April to December 2024 states that as of 15 December 2024, over 2.4 million priority disease cases have been reported, primarily Acute Respiratory Infection (63 percent), Acute Watery Diarrhea rhea (31 percent), Acute Jaundice Syndrome (5 percent), and Bloody Diarrhea (1 percent), driven by worsening WASH conditions, overcrowding, and limited sanitation access (WHO, 12 February, 2025).

Dardona, Amane, and Boussaa (2024) reflect on the top five infectious disease outbreaks among displaced populations during the Gaza Conflict 2023-2024. Their paper explores the underlying causes of their spread. It provides a concise overview of each disease by analyzing the scant studies and statistics from trustworthy health and news sources and other research findings. The study concluded, through reviewing numerous studies, websites, and statistics, that the combination of overcrowding, poor sanitation, and a lack of necessities has contributed to the outbreak of multiple infectious diseases among the displaced. It revealed a significant spread of the top five infectious disease outbreaks among displaced populations during the intense conflict in Gaza from 2023-2024 and beyond. These diseases include scabies, lice, chickenpox, various diarrheal diseases, chest infections, and hepatitis A, with a brief mention of polio which was detected in sewage water (Dardona, Amane and Boussaa, 2024).

The WASH-Health-Nutrition nexus has entered a state of collapse in Gaza, resulting in compounding health risks (Paris et al., 2025; WHO/OCHA, July–Oct 2025). The water crisis and sanitation failure have triggered a massive surge in infectious diseases, including a 36-fold increase in acute watery diarrhea (AWD) and a 384-fold rise in acute jaundice syndrome (hepatitis A) since October 2023.

The situation has also evolved into a malnutrition emergency. As of 7 October 2025, at least 461 malnutrition-related deaths—

including 157 children—have been documented, with the WHO warning that 63 of the 74 deaths in 2025 occurred in July alone. Current estimates suggest that one in five children under five in Gaza City is acutely malnourished (OCHA, 9 Oct 2025; WHO, 27 Jul 2025; UNICEF, 11 Sep 2025).

This convergence of water scarcity, disease, and nutritional deprivation is exerting unprecedented strain on community mental health, magnifying trauma, anxiety, and psychosocial exhaustion across affected populations.

3. Discussion

Beyond the physical health effects, the dire water situation in the Gaza Strip affects people's mental health and cognitive functions. These psychological and social impacts cannot be overlooked (Baker, Ma'adat, and Al-Quran, 2024). Communities already burdened by conflict and instability face additional stressors as families cope with illness, loss of income, and the challenge of accessing medical care. Insecurity about water quality and availability, and potentially high-water prices, can trigger stress and affect well-being (Zinszer & Abuzerr, 2024). Chronic stress is linked to severe and interlinked physical and psychological health problems, including depression and anxiety disorders, as well as cardiovascular diseases (Karami, et al., 2023). Additionally, the lack of water can cause fatigue, which impacts mood stability and cognitive function and can increase anxiety or irritability. This strain can lead to further destabilization and unrest, perpetuating the cycle of conflict and public health crises (Brugger et al, 2024).

3.1 Healthcare System Under Severe Strain

Israel's engagement in Gaza over the past 17 years, along with recent escalations of the conflict, has led to significant reliance on external aid. These circumstances have also imposed substantial restrictions on the movement of people and goods into and out of Gaza, including critical healthcare items. As a result, the healthcare system has faced persistent challenges impacting the availability and quality of care and raising concerns about the protection of human rights, including the rights to life and health, for the population in Gaza (OHCHR, Dec 31, 2024). The healthcare infrastructure in Gaza has been adversely affected by both physical damage and resource scarcity. The destruction of Gaza's healthcare infrastructure has left hundreds of thousands of people with waterborne illnesses, dehydration, and other water- and sanitation-related health problems without adequate access to health care (Human Rights Watch, Dec 2024).

Only 16 of 36 hospitals in Gaza remain even partially functional, and most hospitals cannot treat chronic diseases and complex injuries (WHO, Jan 3, 2025). On 20 January 2025, WHO reported that between 7 October 2023 and 31 December 2024, 651 attacks on health care had been registered in the Gaza Strip, affecting 122 health facilities, including 33 hospitals (WHO, Jan 20, 2025). Furthermore, the rising incidence of waterborne diseases has intensified the strain on healthcare services. The psychological toll on healthcare workers given this situation cannot be underestimated. Many are working in highly stressful conditions, facing the constant threat of violence and the emotional burden of treating patients in a crisis. The mental health of healthcare providers is critical to maintaining effective healthcare delivery, yet the ongoing conflict has led to increased burnout and fatigue among medical staff (Abed Alah, 2024). In areas where waterborne diseases remain a significant concern, hospital admissions have increased, placing additional strain on an already overburdened system. This situation severely constrains their capacity to provide high-quality patient care, particularly for patients affected by waterborne diseases (Irfan et al., 2024).

The fragmentation of the healthcare system, combined with the complexities of operating in a conflict zone, complicates efforts to implement effective disease prevention and control measures. In the Gaza Strip, the health system has been subject to continuous dismantling since the escalating hostilities on 7 October 2023, resulting in inadequate capacity to meet the population's healthcare needs (WHO, March 31, 2024). According to the United Nations Environment Program (UNEP), the aggression-driven environmental damage is directly harming human health and threatening long-term food and water security (UNEP, September 2025). The collapse of sewage treatment infrastructure and the destruction of piped water systems have likely led to increased aquifer contamination, endangering the sole freshwater resource for much of the population.

These findings underscore the importance of a risk-mapping and preparedness framework, which highlights how climate change, WASH, and infrastructure collapse interact to amplify mental health vulnerability, ecological instability, and community displacement across affected regions.

It is imperative to emphasize that the healthcare system in Gaza is experiencing significant strain due to the ongoing collapse, which has compounded the challenges associated with addressing waterborne diseases and other public health concerns. Immediate support is required to facilitate the reconstruction and fortification of healthcare infrastructure, enhance healthcare workers' capacity, and ensure the availability of essential medical supplies. In the absence of substantial intervention, the healthcare system's inability to effectively address the escalating prevalence of waterborne diseases is likely to have grave consequences for the population's health and survival.

3.2 Humanitarian and International Responses

In response to the escalating crisis in Gaza, humanitarian organizations have sought to increase potable water production within the Gaza Strip. However, WASH service providers, including public utilities, community-led initiatives, humanitarian actors, and households, have been unable to meet the overwhelming demand for services. The total blockade imposed on Gaza on 9 October 2023, has been identified as a key factor in the systematic delay and obstruction of the entry and delivery of critical water and sanitation supplies, including restrictions on the provision of piped water and electricity, fuel deliveries, and entry of water and sanitation supplies, materials, equipment, tools and spare parts, compounded by the destruction of key roads and infrastructure and widespread insecurity, which has severely undermined and debilitated efforts to save lives. This creates insurmountable barriers to accessing basic human needs, including water, and exacerbates the humanitarian disaster (Abdul Samad, Butcher, Khalidi, 2024; OCHA, 24 December 2024).

In recognition of the dire situation, 169 UN Agencies, international and national NGOs, and the International Red Cross/Red Crescent Movement submitted the 2025 OPT Flash Appeal on Dec 11, 2024 calling for billions in humanitarian aid to address the severe needs of the entire population of Gaza, estimated at 2.1 million people, and 900,000 people in the West Bank. To address the acute humanitarian needs of Gaza, it is essential that there is immediate delivery of emergency supplies and provision of critical services, including protection, until local services and markets are restored (OCHA, Dec 11, 2024).

Regarding WASH-related diseases and the necessity for intervention, UN's health agency and the Health Cluster lead in the occupied Palestinian territory. The WHO is uniquely positioned to coordinate and deliver life-saving health interventions alongside key partners (WHO Feb 12, 2025) and has continued to operate through local, regional, and global mechanisms to address the most urgent health needs with seven key developments noted below.

1. Since January 2024, WHO and health partners have strengthened syndromic surveillance of epidemic-prone diseases, revising the priority list at the one-year mark of the conflict.
2. Between April and December 2024, WHO led and supported 78 Health Cluster partners in implementing streamlined, evidence-based humanitarian health interventions with minimal duplication, ensuring the integration of cross-cutting health and environmental considerations.
3. In collaboration with partners, WHO implemented the Early Warning Alert and Response System (EWARS) to enhance disease monitoring, alert detection, outbreak management, and response.
4. This effort included providing digital tools to 163 surveillance focal persons across 209 health facilities and recruiting four officers to strengthen the Gaza Strip surveillance. To prevent, detect, and promptly respond to disease outbreaks, the WHO trained 14 Rapid Response Teams to conduct initial investigations and respond when outbreaks are detected.
5. Two polio vaccination campaigns with vitamin A supplementation across the Gaza Strip to strengthen the population's immunity following the detection of circulating vaccine-derived poliovirus type 2 (cVDPV2) were conducted.
6. Improve infection prevention and control (IPC) & water, sanitation, and hygiene (WASH). Between April and December 2024, the WHO published over 20 situation reports, four Public Health situation analyses, and several dashboards, including the WHO oPt Disease Surveillance Dashboard and the oPt Unified Health Dashboard managed by the Health Cluster.
7. Local authorities and partner organizations worked to rehabilitate health facilities, restore essential WASH services, and expand bed capacity to ensure the continuity of life-saving services.

3.3 Recommendations for WASH-related Disease Prevention and Management

To effectively address the emerging threat of waterborne diseases in Gaza, comprehensive and targeted emergency interventions are key. Without sustained solutions to end the violence, humanitarian needs will continue to rise. Beyond peace, genuine efforts to enable humanitarian assistance will require critical changes in the operating environment, where the following recommendations (Figure 5) could help support disease prevention and control efforts, improve public health outcomes, and ensure the availability of clean water and sanitation facilities for the population. These recommendations include:

1. Immediately lifting the siege of Gaza and end the blockade: The primary and most imperative action to be taken is to lift the blockade of Gaza and end the embargo immediately. This will enable unobstructed and reliable humanitarian access for aid agencies and restore freedom of movement for the civilian population. Furthermore, it is essential to facilitate the restoration of access to water and electricity and to ensure the delivery of basic goods, including water, food, medical aid, and fuel, via all land crossings.
2. Strengthening water and sanitation infrastructure: Immediate investments in water and sanitation infrastructure rehabilitation, expansion and protection of these installations against future shocks and impacts remain crucial. Enhance support for humanitarian relief initiatives in Gaza, focusing on water and sanitation projects. This includes funding for emergency water supply, desalination projects, rebuilding damaged infrastructure, repairing damaged pipelines, upgrading wastewater treatment facilities, and improving the distribution of clean water to affected communities. Establishing temporary sanitation facilities in IDP shelters is also vital to prevent the spread of waterborne diseases.
3. Enhancing access to clean water: Ensure the supply of clean water, fuel, and electricity is sufficient to meet the needs of all people in Gaza and is adequate to ensure health and survival after prolonged deprivation of access to water.
4. Promoting hygiene education and awareness campaigns: Implement public health campaigns that promote hygiene practices, such as risk communication and community engagement, health education, handwashing and hygiene products distribution, safe food preparation, and proper sanitation. These campaigns should be tailored to the cultural context of the population and delivered through community engagement strategies to maximize impact.
5. Boosting healthcare capacities and health support systems at all levels: Enhancing healthcare capacities and health support systems at all levels is imperative. This necessitates an increase in the resources allocated to healthcare facilities, encompassing the provision of essential medicines and medical supplies. Moreover, with the most recent updates and requirements, it is crucial to ensure the ongoing training of healthcare workers in diagnosing and treating waterborne diseases.
6. Enhancing smart and sustaining health surveillance systems: According to the recent report by the WHO (WHO, Dec 2024) regarding its response to public health intelligence, early warning, prevention, and control through strengthened disease surveillance, in addition to preventing, detecting, and promptly responding to disease outbreaks during this crisis following October 7, 2023, it is recommended that the robustness and sustainability of this intervention be boosted through monitoring and evaluation, and that the system be kept updated to monitor the incidence and prevalence of WASH-related diseases in real time. This data is imperative for the effective allocation of resources and the prompt response to outbreaks, thus ensuring the optimal management of public health interventions.
7. Fostering global and regional cooperation for an integrated health agenda: Encourage collaboration between local and international organizations to share knowledge, resources, and best practices in water management and WASH-related disease prevention. Engaging in 'impact-oriented' partnerships can enhance the effectiveness of interventions and leverage additional funding for public health initiatives and health support systems.
8. Support an independent international investigation into the repeated attacks on water and sanitation infrastructure in Gaza that potentially breach international humanitarian law and other relevant rules of international law.

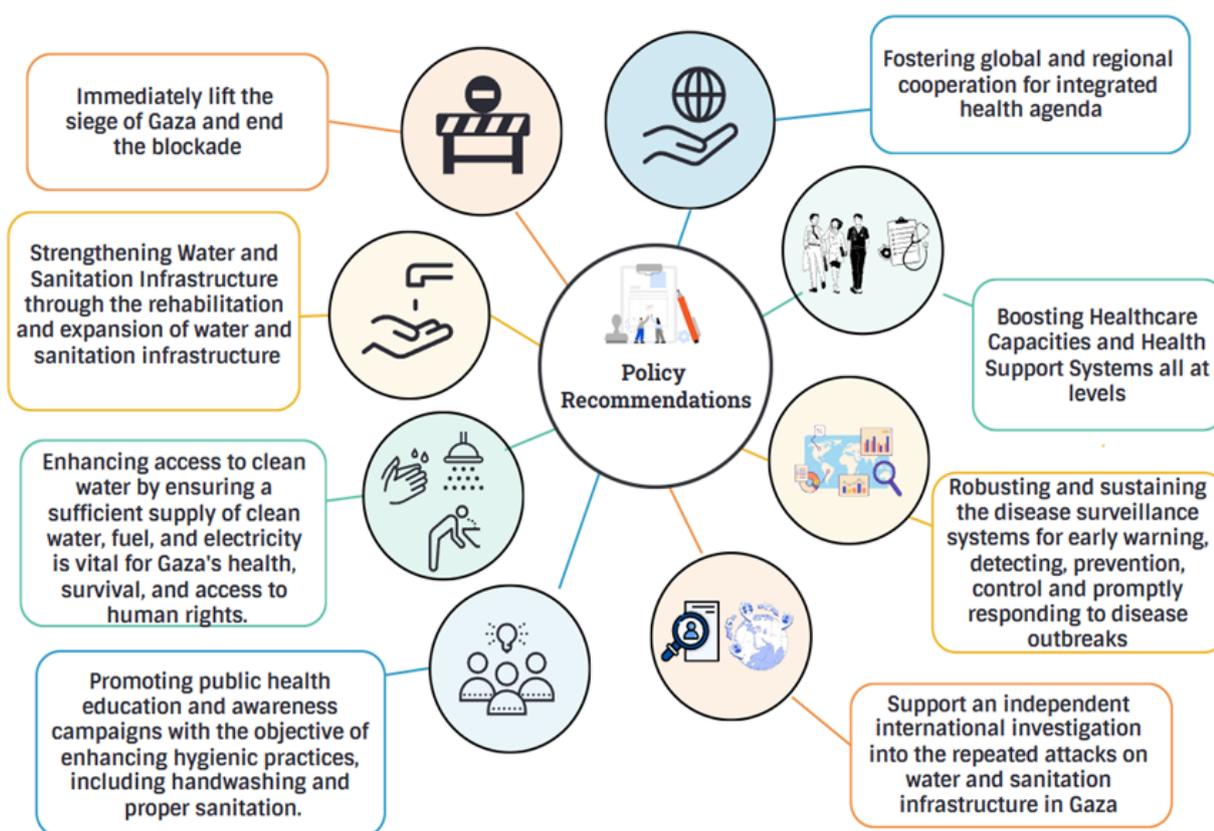


Figure 5: Visual representation of recommendations for WASH-related Disease Prevention and Control in Gaza (Source: Created by authors)

4. Conclusions

Despite the United Nations' formal acknowledgement of access to water and sanitation as an inalienable human right, this right is under imminent threat in Gaza due to the ongoing violent conflict.

Since October 2023, up to 89 percent of Gaza's critical WASH infrastructure—including desalination plants, pipelines, and wells—has been destroyed, leading to a complete loss of safely managed sanitation for the entire population. It is estimated that over two million people, one million of whom are children, have limited access to potable water. The majority of these populations subsist on an average daily water consumption of 3–5 litres, which falls well below the minimum emergency standard. Furthermore, a significant proportion of this water is contaminated. The situation is most critical in the areas most severely affected, where less than 7 percent of the pre-conflict water supply and over 85 percent of water and sanitation facilities are non-operational. These novel data points accentuate the mounting nexus between climate-induced vulnerabilities, displacement, and public health emergencies, thereby underscoring the pressing necessity for integrated policy action across the European and neighboring regions. Massive rehabilitation is urgently required.

The crisis is further exacerbated by the displacement of nearly 2 million people, leading to extreme overcrowding and severely strained living conditions. This has significantly increased the risk of infectious disease outbreaks, with rising cases of waterborne illnesses such as diarrhea and acute respiratory infections. Gaza's already fragile healthcare system is overwhelmed—many hospitals and clinics are damaged, non-functional, or operating beyond capacity. In addition to the physical health challenges, the mental health toll on the affected population is profound. Prolonged exposure to trauma, loss, and uncertainty—especially among children and women—will likely cause a surge in psychological distress, anxiety, and depression. With limited access to mental health services and psychosocial support, the psychological needs of the displaced and traumatized communities remain

largely unmet, compounding the humanitarian crisis and threatening well-being. The ongoing destruction of infrastructure, combined with severe restrictions on the delivery of humanitarian aid, fuel, and medical supplies, has deepened the crisis to catastrophic levels.

International organizations, including the WHO, are working to strengthen disease surveillance and implement urgent health interventions, such as vaccination campaigns and syndromic monitoring. However, these efforts remain severely constrained by access restrictions and ongoing insecurity. To avert a deepening public health crisis in Gaza, there is an urgent need for coordinated and strategic humanitarian action. Key priorities must include lifting the blockade to enable the flow of essential supplies and personnel; restoring critical water and sanitation infrastructure; expanding healthcare system capacity; and launching targeted public health education campaigns. Integrating WASH as a central pillar of humanitarian response is imperative to curtail disease transmission and protect vulnerable populations. Equally, international and regional oversight is crucial to ensure the protection of water and health infrastructure and to uphold international humanitarian law.

In an additional dimension to response, we call for integrating water-related learning content into the education system, which is also important for fostering awareness, responsibility, and sustainable practices among individuals from an early age. Embedding such content across curricula will help support public health and environmental stewardship in the post-conflict recovery period. Such efforts will go a long way to empower future generations to actively protect and advocate for water security and resilience in their communities and the larger region.

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Breaking Point in the Gaza Strip: The ‘Cracking’ of the WASH-Health Nexus Since October 2023

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