



War in the Gaza Strip

PUBLIC HEALTH SITUATION ANALYSIS

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Summary of the crisis

The current public health situation analysis (PHSA) concerns the population living within the Gaza Strip and affected by the acute emergency resulting from large-scale military operations by Israel and Hamas. The start date of the current acute emergency is 7 October 2023. The crisis combines multiple typologies, including armed conflict, forced displacement and, depending on the evolution of humanitarian assistance, slow-onset food insecurity. The near-complete blockade of humanitarian and other supply chains, combined with large numbers of injury casualties including among frontline health workers, are resulting in severe disruptions to the health system and the virtual collapse of several facilities and health service components. The population affected as of the time of writing is as follows (Table 1):

Table 1. Current estimates of affected population size.

Category	Number (% of total population)	Source
Children under 5 years old	337,057 (15%)	UNFPA projection, 2023 [1]
Children under 15 years old	898,707 (40%)	UNFPA projection, 2023 [1]
Internally displaced persons	1.5 million 671,397 sheltering in 149 UNRWA installations (four times the intended capacity) 121,750 sheltering in hospitals, churches and other spaces 83,000 in non-UNRWA schools about 700,000 hosted by families	UNRWA as of 29 October at 6 pm [2] UNOCHA as of 30 October [3]
Total population	2,226,544	UNFPA projection, 2023 [1]

Priority health problems and their possible evolution

Table 2 summarises the current analysis of the magnitude (in terms of predicted excess morbidity and mortality) of different health problems affecting the crisis-affected population, grouped into major disease groups. Changes in the projected magnitude of these problems are also shown; these do not incorporate the possible mitigating impact of an improved humanitarian health response, and instead assume that the level of humanitarian assistance remains broadly the same as present, i.e. insufficient, intermittent deliveries of essential supplies through the Rafah crossing. We have also assumed that the war will protract for at least 6 months from the present time. Note that the World Health Organization has also issued a PHSA, using a somewhat different template, to which we refer interested readers [4].



Table 2. Predicted magnitude and evolution of health impacts of the crisis, by broad health problem category. Notes inside each cell summarise possible new developments at each time point, as justification for the magnitude rating.

(Excess) health problem	Month(s), starting now		
	1	2	3-6
Underlying health problems			
Worse nutritional status	Insufficient dietary diversity, reflected among others by high anaemia prevalence. However, low baseline of acute malnutrition.	Increasing acute malnutrition burden. Increasing burden of infant malnutrition due to disrupted feeding and care practices.	Increasing burden of acute malnutrition and infections. 'Epidemics' of micronutrient deficiencies, including anaemia.
Proximate health problems			
Worse reproductive, maternal and neonatal (RMN) outcomes	Increased risk factors for poor pregnancy outcomes including stress and inadequately clean birthing facilities. Unmanaged obstetric and neonatal emergencies.	Worsening maternal nutrition. Reduced access to antenatal care and family planning.	Worse birth outcomes (stillbirths, early neonatal and maternal deaths) due to missed antenatal care, lack of skilled birth attendance and inadequate maternal nutrition. Increased number of unwanted pregnancies.
Increased burden of endemic infectious diseases	Higher transmission of common faecal-oral and airborne-droplet transmitted pathogens due to overcrowding and insufficient WASH. Disrupted treatment access.		Higher transmission and disease severity due to increasing burden of acute malnutrition and missed routine vaccinations.
More frequent and severe epidemics	High vaccination coverage (baseline), unlikely circulation of key epidemic-prone pathogens.	With time, increasing chance of introduction of epidemic-prone pathogens. Risk factors: overcrowding, inadequate WASH.	Cumulatively higher chance of pathogen introduction. Additional risk factors: malnutrition, falling vaccine-acquired immunity.
Increased HIV and TB burden	Very low baseline burden.		Though burden remains low, TB transmission may increase.
Increased non-communicable disease (NCD) burden	Interruption of insulin supply for diabetes type 1 patients. Increasing chronic pulmonary disease burden due to dust inhalation.	Progression of cancer, chronic pulmonary disease and chronic kidney disease cases whose treatment is interrupted. Faster progression of cardiovascular disease due to interrupted treatment and stress.	Further progression of cardiovascular disease, hypertension and diabetes type 2 cases whose treatment is interrupted.
Crisis-attributable injuries	Shift from aerial bombardment to ground, close-quarter combat injuries. Inadequate and inaccessible pre-referral stabilisation and war surgery services.		
Worse mental health	Acute trauma and post-traumatic stress disorder. Reduced coping mechanisms, loss of social protection networks. Interrupted care for psychiatric patients.		Increasing anxiety, depression and suicide burden due to displacement, trauma, increasing gender-based violence, loss of livelihoods.

Red: The health problem could result in high levels of excess mortality and/or mental health problems. **Orange:** Could result in considerable levels of excess mortality and/or mental health problems. **Yellow:** Could make a minor contribution to excess mortality and/or mental health problems. **Green:** Will very probably not result in negligible excess mortality or mental health problems. **Grey:** No plausible assessment can be made at this time.



Notes on health problem projections

Worse nutritional status

In Gaza, the baseline (pre-7 October 2023) burden of both acute and chronic malnutrition was low, with wasting prevalence at 0.8% (n=2,700), stunting at 9.0% (n=30,300) and underweight at 2.1% (n=7,100) among children under 5 years old (n=337,057) [5]. However, the majority of the population (77%) already relied on external food and cash assistance (n=1,714,000) [6], and only a minority enjoyed sufficient dietary diversity (44.2% of children aged 6-23 years old) [5], as reflected in a high prevalence of anaemia and obesity. Early infant feeding practices were suboptimal, with a low prevalence of exclusive breastfeeding (41.6% of children under 6 months old [5]) and high adoption of formula feeding.

The evolution of nutritional status (among weaned children and older people) will depend heavily on the extent to which humanitarian assistance (including cooking fuel and therapeutic food) is allowed into Gaza, and whether people are able to access distribution points. Even if there is a sustained, drastic reduction in nutrient intake, it will probably take some weeks before large numbers of people (especially children and pregnant women) progress to moderate and severe malnutrition. Moreover, the case-fatality of severe malnutrition will plausibly be *relatively* low, at least at first, due to the relative absence of complicating factors, notably high transmission of vaccine preventable infectious disease (see below). However, by months 3 to 6 it is plausible that the situation may precipitate into a nutrition crisis similar to those more commonly seen in low-income country crises. This may manifest as a large burden of acute malnutrition but also as epidemic-like occurrence of specific micronutrient deficiencies, including, but not limited to, anaemia.

Separately, nutritional status among neonates and infants may deteriorate more quickly due to factors including maternal stress, lack of privacy for breastfeeding and inadequate water, sanitation and hygiene (WASH) leading to contaminated formula bottles and milk. Infant and young child feeding practices may further deteriorate with time.

Worse reproductive, maternal and neonatal outcomes

Prior to 7 October 2023, preventive reproductive, maternal and neonatal health (RMNH) services had high coverage leading to relatively good maternal and neonatal mortality indicators. An estimated 43% of married women aged 15-49 years old used modern methods contraception, with 12% unmet need [5]. Ninety-five percent had 4+ ANC visits, 73% had WHO's recommended 8+ ANC visits and fewer than 1% of women delivered at home [5]. Eighty-seven percent received a postnatal check following birth in a health facility, and 89% of newborns had a separate visit to check on their health and to receive preventive care [5].

We can expect the use of preventive services to decline as health facilities stop functioning, become less safe to access and commodities run out, leading to unwanted births and higher rates of stillbirth, and neonatal and maternal deaths. There are approximately 60,000 livebirths in Gaza each year. Pre-war, 25-28% of pregnancies (15-17,000) [7, 8] were categorized as high-risk with 10% of pregnant women having diabetes/gestational diabetes (n=6,000) [7] and 10% having hypertension (n=6,000) [7]; these women will need intensive inter-professional medical care to avoid unnecessary morbidity and mortality. The caesarean-section rate was 22% (13,200 women) [5]. Many of these women will need repeat caesarean delivery or they will risk adverse outcomes such as stillbirth, ruptured uterus or maternal death. In hospitals, obstetric haemorrhages are among the biggest users of blood products, and with shortages, health care providers may need to resort to life-changing procedures (such as hysterectomy) to prevent death.

Low birthweight (<2500gms) was 9.1% of livebirths (n=5,460) [5] (largely overlapping with an estimated 9.3% preterm births (n=5,580) [7] and these levels are expected to increase due to stress, worsening



nutrition and antenatal care. Hospital care is critical in order for small and sick newborns survive and thrive. Estimates suggest that pre-crisis 9% of all live births needed neonatal intensive care units (NICUs) and a further 18% inpatient hospital care[9], but these percentages will increase because of inadequate post-natal care and worse infant feeding and birth outcomes (see above). Pre-war, it was reported that 10,000 babies a year (833 a month) were transferred to NICUs [8].

Increased burden of endemic infectious diseases

Endemic infectious diseases other than COVID-19 were not among the top 10 causes of death in Gaza in 2021[10]. In the short term, it may be expected that transmission of common infections, including endemic faecal-oral transmitted pathogens (e.g. *Salmonella*, *E. coli*, campylobacter, norovirus) and airborne-droplet pathogens (e.g. influenza, respiratory syncytial virus, *Streptococcus pneumoniae* and SARS-CoV-2) will increase due to overcrowding of internally displaced persons (IDPs) and inadequate WASH. Case-fatality will also increase immediately because of severely constrained access to case management, including antibiotic therapy, rehydration and respiratory support / oxygen. Inadequate feeding practices will also expose infants to higher transmission and increase case-fatality.

The combination of increasing transmission and case-fatality translates into an exponential increase in mortality. Unless access to health services is considerably improved, it is likely that common infections will cause increasing excess morbidity and mortality: from months 3-6, worsening nutritional status and missed routine vaccinations (including for *Haemophilus influenzae* type B and *Streptococcus pneumoniae*) will expose children to higher transmission of these infections, which are associated with community-acquired pneumonia and invasive bacterial disease.

More frequent and severe epidemics

At present there is no information on ongoing epidemics in Gaza, although it is worth noting that epidemic surveillance is likely to have degraded. Overcrowding and inadequate WASH are immediate risk factors for higher transmissibility, and overcrowding will have increased herd immunity threshold requirements for vaccine-preventable diseases. However, vaccination coverage was very high at baseline (first, second, and third doses of DTP/*Haemophilus Influenza B*/*Hepatitis B* -vaccines at 99.7%, 99.1%, and 97.3%, respectively; BCG vaccination at 100%, polio vaccination at 99.7%, rotavirus vaccine at 95.4%, and measles at 96.5% [5]). It is unclear whether key epidemic-prone infections (measles, cholera, meningococcal meningitis, wild or vaccine-derived poliovirus) were circulating in Gaza before 7 October (measles cases were confirmed in Gaza in 2020 [4] and *Neisseria meningitidis type A* transmission was documented in 2011; meningococcal conjugate vaccination is part of the routine schedule in Gaza, but only for specific risk groups, suggesting low herd immunity).

The ongoing war had a profound impact on water quality and availability, with significant repercussions for public health, particularly in relation to food and waterborne diseases. When infrastructure such as wells, desalination, and water treatment facilities are targeted or damaged, the result is often a severe shortage of clean drinking water. This exacerbates the risk of diseases such as cholera, dysentery, typhoid, and hepatitis A, which are easily spread through contaminated water and food that has been irrigated or washed with such water. The passage of people and goods via Rafah will pose an accumulating risk of introduction of pathogens, unless care is taken to ensure high levels of prophylaxis and infection control.

Over the next six months the main epidemic threats are likely to be cholera, meningococcal meningitis, typhoid fever and hepatitis A or E and skin infections (e.g. scabies).



Increased HIV and tuberculosis burden

Both HIV and tuberculosis have a very low baseline burden in Gaza [4]. Tuberculosis transmission is likely to increase due to overcrowding and worsening nutritional status, with disease cases appearing mostly beyond the timeframe of this PHSA. However, the pool of infectious cases is low.

Increased non-communicable disease burden

Alongside war injuries, NCDs will likely remain the main cause of excess morbidity and mortality for the foreseeable future. The baseline prevalence of NCDs was extremely high in Gaza. Before the war, among UNRWA registered refugees (77% of the population of Gaza), there were 1,716 documented cases of type 1 diabetes mellitus [7], 56,001 cases of type 2 diabetes mellitus [7], and 89,268 cases of hypertension. The WHO Steps study estimated 122,000 individuals with hypertension in the whole population [11], and 92,000 with raised cholesterol (>190 mg/dl) [11]. The total number of patients receiving haemodialysis was 1,034 [12].

There is accordingly an immediate risk to lives due to:

- Diabetes mellitus (DM) type 1 and other insulin-dependent DM type 2 cases who run out of insulin treatment (in such cases, case-fatality can be hours to days and is extremely high);
- Chronic obstructive pulmonary disease (COPD) and, to a lesser extent, asthma cases worsened by exposure to explosion-related dust and who do not receive prompt case management.

Over the medium term (next three months) the following additional risks will likely occur:

- Progression to severe disease and death among cancer cases (about 2,000 cases under treatment [12] whose care is interrupted or delayed; a large proportion of these cases received care inside Israel before 7 October);
- Progression to severe disease and death among cases of COPD and chronic kidney disease, especially people on haemodialysis.

Beyond three months burden is likely to increase further due to interrupted or disrupted clinical and lifestyle-based management of:

- Cardiovascular disease cases (whose burden will simultaneously increase due to unmanaged hypertension);
- DM type 2 cases, which includes excess pneumonia cases among advanced DM patients.

Note that DM and hypertension are mutual risk factors. Deteriorating mental health is also likely to exacerbate NCD outcomes.

Crisis-attributable injuries

Acute injuries are particularly affected by the closure or overloading of health facilities. Hospitals are overwhelmed and struggling due to the lack of essential medicines, supplies, and no clear mechanisms for replenishment in the absence of a humanitarian corridor, leading to critical shortages in stocks, anaesthesia, and blood supplies.

During the 2014 war in Gaza, the most reported injuries included shrapnel wounds, burns, multiple organ injuries, fractures, internal organ injuries, bleeding, amputations, abrasions, lacerations, contusions, and vision and hearing loss. Twenty six percent of the injuries sustained during the 2014 war led to long-term disability [13]. As of the latest update, 22,911 individuals [3] have been reported as injured. This seems to follow the typical ratio in urban high-intensity conflict of 3 or more injuries per 1 death [14]. It is



anticipated that the prevalence of physical and motor disabilities will increase in the population due to the current war, necessitating long-term support and rehabilitation efforts. The current crisis will also further increase the vulnerability of the 24,934, 9,821, and 15,063 Gazans registered as of 2017 as living with mobility, hearing and visual disabilities [15].

Worse mental health

It is critical to underscore that mental health is inextricable from physical health problems. At baseline, the population of Gaza had an exceptionally high prevalence of common mental health problems, including anxiety, depression (71% of adult population had symptoms of one or both of these) and post-traumatic stress disorder (PTSD; 7% of adult population) [16]. Over the past three weeks, it is plausible that a very high proportion of the population was exposed to traumatic events, which would immediately result in a high incidence of acute psychological distress. This will be exacerbated by the lack of basic services and security.

The large pool of acute trauma cases will, particularly in the absence of mitigating factors such as acute psychological care and social coping mechanisms available in peacetime, lead to a high prevalence of post-traumatic stress disorder (PTSD), and, within months, anxiety and depression disorders and generalized psychological distress. Children may be particularly vulnerable and lose human capital not just through ill-health but also from lost schooling. The best baseline estimate of prevalence of PTSD in representative samples of children in Gaza is 24%, with studies ranging from 6-70% [17].

An important immediate concern is the safety and continued care of psychiatric patients, including those living in institutions.

Baseline levels of intimate partner violence (IPV) were high: a household survey in 2005/6 showed 12-month prevalence estimates of psychological aggression, physical assault, and sexual coercion to be 61.6%, 22.2%, and 10.6% respectively [18]. Prevalences of severe forms of these outcomes were 11.5%, 5.7%, and 6.32% respectively [18]. Totals. IPV is known to increase in settings with conflict.

Health system disruptions

Since the war, the healthcare system in Gaza is in a critical state due to fuel and electricity shortages. Currently, 14 out of 35 hospitals with inpatient capacities and 71% of primary care facilities in Gaza, especially in Gaza City and northern Gaza, are not functioning [3, 19]. Only 9 UNRWA primary healthcare centers are still operational in the south. Healthcare services in UNRWA shelters were maintained with the support of 92 mobile medical units[19].

All functioning hospitals and clinics are grappling with severe fuel shortages, which limit generator use to essential functions. The maintenance and repair of backup generators are increasingly challenging due to the scarcity of spare parts.

Ministry of Health figures indicate 116 healthcare workers were killed as of 30 October 2023 out of an estimated 18,404 healthcare workers in Gaza [20-22]. Health workers in hospitals are working long shifts and are likely to face burnout.

The overall capacity to treat injuries and address health needs is heavily dependent on the functionality of the healthcare system. International assistance and support are urgently needed to address this critical situation and ensure a steady supply of essential medications.



Summary projection of excess mortality

The current magnitude of health problems, taken together, is expected to result in very high excess mortality (doubling, tripling or more of baseline death rates), unless the humanitarian public health response is scaled up accordingly.

There is already evidence covering the 7-26 October 2023 period that, across all age groups, except for perhaps the very oldest, mortality was far higher than pre-crisis (see separate LSHTM report on mortality). It is possible that in the next few weeks the intensity of aerial bombardment will subside, but this may be counterbalanced by a substantial increase in deaths indirectly attributable to the crisis, particularly from NCDs and worse reproductive, maternal and neonatal outcomes.

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