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Gaza Starvation: A War-Induced Syndrome of Deliberate Deprivation

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We propose 'Gaza Starvation' as a novel clinical and public health terminology to describe a unique and acute form of starvation observed within the ongoing Palestine-Israel conflict. This term specifically refers to the intentional weaponization of hunger, resulting from deliberate or sustained deprivation of food, water, and medical resources under conditions of siege and armed conflict [1,2]. It transcends general acute starvation by highlighting the profound human-made disaster and its extraordinary medical, immunological, and humanitarian after effects.

Operationally, the term 'Gaza Starvation' describes a distinct clinical and public health crisis observed when a population meets the Integrated Food Security Phase Classification criteria for Famine. These IPC thresholds serve to define the context and scale of Gaza Starvation as a deliberate weaponization of hunger, rather than serving as direct individual diagnostic criteria [3,4].

These critical thresholds include:

1) At least 20% of households face an extreme lack of food.
2) A Global Acute Malnutrition prevalence exceeding 30%.
3) A Crude Death Rate of 2 deaths per 10,000 people per day.
4) An Under-5 Mortality Rate (U5MR) of 4 deaths per 10,000 children under 5 per day.

This distinct terminology emphasizes the deliberate nature and specific conditions of the crisis in Gaza, where the outcome of war has become so deeply inculcated that it constitutes an intentional weapon. While the World Health Organization often employs broader terms such as "malnutrition" and "acute malnutrition", further classified into Moderate Acute Malnutrition with a Weight-for-height Z-score between –2 and –3 SD, and Severe Acute Malnutrition (SAM) with a Weight-for-height Z-score below –3 SD or presence of bilateral pitting edema), the term 'Gaza Starvation' underscores the crisis's specific anthropogenic origins and severe consequences in this context.

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Pathophysiology of Starvation

The pathophysiological response to starvation involves a complex and orchestrated sequence of metabolic adaptations aimed at preserving vital organ function. Initially, the body rapidly depletes its endogenous glycogen stores, typically within 24 to 48 hours, to maintain normoglycemia [5]. Following glycogen exhaustion, the primary metabolic shift occurs towards lipid mobilization, with fatty acids becoming the predominant energy substrate for most tissues. The liver concurrently initiates robust ketogenesis, producing ketone bodies (e.g., β-hydroxybutyrate and acetoacetate) from fatty acids. These ketone bodies serve as a crucial alternative fuel source for the brain and other tissues, significantly reducing the brain's reliance on glucose and thereby sparing protein. The World Health Organization often employs broader terms such as "malnutrition" and "acute malnutrition" further classified into Moderate Acute Malnutrition and Severe Acute Malnutrition. This is also classified as the presence of bilateral pitting edema, or Mid-Upper Arm Circumference thresholds, such as MUAC < 12.5 cm for Moderate Acute Malnutrition and MUAC < 11.5 cm for Severe Acute Malnutrition [6,7].

Simultaneously, gluconeogenesis the synthesis of glucose from non-carbohydrate precursors becomes vital to maintain blood glucose levels for obligate glucose-dependent cells. Key precursors for gluconeogenesis include amino acids, primarily derived from protein catabolism, and glycerol, released during fat breakdown. These profound metabolic shifts are intricately regulated by hormonal adaptations, characterized by a significant decrease in insulin and a compensatory increase in glucagon, cortisol, and growth hormone, which collectively promote catabolic processes and fuel re-distribution [8].

Prolonged starvation inevitably leads to the progressive catabolism of muscle and organ proteins for sustained gluconeogenesis, resulting in severe tissue wasting (sarcopenia) and functional impairment [9].

A critical clinical concern during re-nutrition of severely malnourished individuals is refeeding syndrome, a potentially fatal complication characterized by severe electrolyte and fluid shifts (particularly hypophosphatemia, hypokalemia, and hypomagnesemia) and metabolic disturbances that occur upon the rapid reintroduction of nutrition after a period of starvation. Its pathophysiology involves the sudden cellular uptake of glucose and subsequent cellular demands for electrolytes and micronutrients, which can precipitate cardiac arrhythmias, respiratory failure, and other severe organ dysfunction [10].

While outward clinical signs of severe starvation can be stark, accurate and standardized diagnosis of malnutrition requires trained healthcare and public health professionals utilizing established anthropometric measurements and clinical assessments. These include Mid-Upper Arm Circumference, Weight-for-Height Z-scores, and clinical examination for bilateral pitting edema. These standardized approaches are crucial for severity grading, monitoring progression, and guiding effective intervention strategies, particularly within humanitarian nutrition contexts.

Prolonged malnutrition can manifest in complex clinical syndromes such as marasmus and kwashiorkor in children, or cachexia and nutritional edema in adults. It is important to note that the distinction between marasmus and kwashiorkor, while traditionally linked to energy versus protein deficiency, is now understood to be multifactorial and nuanced [11-13]. These syndromes reflect varying degrees of protein-energy deficiency, often compounded by inflammatory responses, oxidative stress, gut dysbiosis, and specific micronutrient deficiencies, rather than a simplistic sequential progression or binary distinction. Overlapping features and mixed forms (marasmic-kwashiorkor) are common within the spectrum of Severe Acute Malnutrition [14]. Ultimately, starvation leads to profound deterioration of the immune system, resulting in weakened mucosal integrity, decreased neutrophil and lymphocyte function, and suppression of both innate and adaptive immunity [15]. This leaves individuals highly vulnerable to infections, impaired wound healing, and diminished vaccination responses.

Clinical Outcomes in Gaza

In Gaza, the blockade imposed after October 7, 2023, has escalated to a near-total cessation of aid at key border crossings.5 Food insecurity has reached famine levels, with numerous reports indicating severe mortality from starvation, particularly among children [16]. Hospitals are already crippled by shortages of electricity and medicine [17]. This has resulted in extreme disaster in health facilities where dehydration, sepsis, marasmic wasting, and kwashiorkor have created chaos. Children under five are particularly vulnerable, experiencing severe acute malnutrition with high rates of wasting and stunting, and increased mortality from common infections, as documented in humanitarian assessments for the region [18]. Adults develop profound sarcopenia, worsening of chronic diseases such as diabetes and cardiovascular illness, and increased maternal and perinatal mortality. Above all, the insecurity is not limited to food and water only; hospitals are targeted along with health care workers. The blockade of medicines and lack of simple supportive measures

intravenous fluids, antibiotics, nutritional rehabilitation has profoundly exacerbated the humanitarian and health crisis in Gaza, leading to unprecedented levels of suffering and mortality. The invisible harm, suppression of immune responses has resulted in more fatal outcomes.

Clinical Management and Public Health Responses

Addressing Gaza's Starvation necessitates a multi-faceted approach encompassing immediate clinical intervention for individuals and broader public health strategies to mitigate the crisis's impact. The World Health Organization has provided a severe acute malnutrition framework; however, there are severe constraints on the provided framework because of the ongoing collapse of the healthcare infrastructure in Gaza. This severe damage does not allow a full implementation of the standard protocols.[17]

Inpatient Management of Severe Acute Malnutrition

For children with Severe Acute Malnutrition presenting with medical complications, the World Health Organization has established a 10-step protocol for inpatient management, which has been shown to substantially reduce mortality. These steps are critical for stabilizing acutely ill patients and include:

1) Treating/preventing hypoglycemia.
2) Treating/preventing hypothermia.
3) Treating/preventing dehydration.
4) Correcting electrolyte imbalances.
5) Treating/preventing infection.
6) Correcting micronutrient deficiencies.
7) Starting cautious feeding.
8) Achieving catch-up growth.
9) Providing sensory stimulation and emotional support.
10) Preparing for follow-up after recovery.

These guidelines emphasize prompt management of life-threatening conditions and careful nutritional rehabilitation [19].

Community-Based Management of Acute Malnutrition

To expand reach and improve outcomes, the WHO and other international agencies advocate for Community-based Management of Acute Malnutrition (CMAM). CMAM decentralizes the management of acute malnutrition, allowing most cases of uncomplicated SAM to be treated at the community level, typically through outpatient programs utilizing Ready-to-Use Therapeutic Foods.[11] This approach reduces the burden on inpatient facilities, decreases the risk of hospital-acquired infections, and makes treatment more accessible to affected populations [2,20]. CMAM programs often include community outreach, screening, outpatient care, and inpatient stabilization for complicated cases.

Infant and Young Child Feeding in Emergencies (IYCF)

Optimal Infant and Young Child Feeding practices are paramount in emergency settings, as infants and young children are particularly vulnerable to malnutrition, illness, and mortality. Guidelines for IYCF in emergencies aim to protect, promote, and support appropriate feeding, with a strong emphasis on continued breastfeeding [21]. This includes providing targeted support to breastfeeding mothers, preventing inappropriate marketing of breastmilk substitutes, and ensuring safe access to alternative feeding options when necessary [22]. Suboptimal IYCF practices are common in conflict areas, highlighting the need for effective interventions [23].

Water, Sanitation, and Hygiene

Integrated Water, Sanitation, and Hygiene interventions are crucial for preventing undernutrition and improving health outcomes in humanitarian contexts. Poor WASH conditions directly contribute to infectious diseases, which exacerbate malnutrition by increasing metabolic demands and impairing nutrient absorption [24]. Strengthening access to safe water, improving sanitation facilities, and promoting hygiene practices (e.g., handwashing) are fundamental in breaking the cycle of infection and malnutrition [2].

Vaccination Programs

Malnutrition severely compromises the immune system, making children highly susceptible to infections and vaccine-preventable diseases. Therefore, robust vaccination programs are a critical component of public health responses in crisis settings. While the immune response can be impaired in severely malnourished children, many can still mount a protective immune response following vaccination, and nutritional interventions can improve vaccine immunogenicity [25].

Malnourished children can respond effectively to vaccinations, and immunization can significantly improve recovery rates and reduce mortality among children with SAM [26]. Efforts must focus on ensuring routine immunization services reach vulnerable populations, including zero-dose children and those in conflict-affected areas, despite logistical and security challenges.

Historical and Political Context

The weaponization of hunger is not a new phenomenon. Throughout history, from medieval sieges to contemporary conflicts, siege starvation has been intentionally used to subdue populations. Gaza, however, represents an exceptionally severe and extensively documented case in the modern era [1,18]. Restrictions on food, fuel, and medicine since the mid-2000s, further tightened after the Hamas attack of October 7, 2023, have culminated in unprecedented levels of hunger in a densely populated civilian territory [5].

The deliberate use of starvation as a method of warfare is explicitly prohibited under International Humanitarian Law, including by Article 54 of Additional Protocol I to the Geneva Conventions and Article 8(b)(xxv) of the Rome Statute of the International Criminal Court [27,28]. Furthermore, UN Security Council Resolution 2417 strongly condemns the use of starvation as a weapon and recognizes the link between armed conflict and food insecurity [2].

Humanitarian Efforts and Their Limits

International efforts to deliver aid by land have been repeatedly blocked or delayed. Maritime initiatives attempting to transport essential food and medical supplies by sea have also encountered restrictions and interceptions, further limiting the flow of assistance to affected populations. If successful, such flotillas could have reduced acute malnutrition and bought time for hospital systems; instead, their interception highlights the systematic prevention of relief. Symbolic local initiatives such as throwing bottled food parcels or messages into the sea have provided momentary hope but cannot meet the caloric needs of over two million people.

Conclusion

War starvation is a crime. Starvation in Gaza represents a deliberate strategy of deprivation that functions as a biomedical instrument of war to force Palestinians to surrender; it is the predictable and preventable outcome of aid obstruction. For clinicians, the medical evidence is clear: starvation undermines immunity, increases susceptibility to infection, and leads to mass preventable deaths, particularly among children. For the global medical community, the imperative is equally clear: to document, denounce, and advocate for immediate, protected humanitarian access. The prohibition against using starvation as a method of warfare is a fundamental principle of international humanitarian law. Continued inaction risks establishing a dangerous precedent for the use of starvation in conflict settings an outcome incompatible with international humanitarian law and with medical ethics. To conclude, Gaza starvation is defined as a specific war-induced syndrome of protein-energy malnutrition that manifests as acute, subacute, or chronic starvation. The condition is compounded by blockade, displacement, and the collapse of healthcare systems, leading to inadequate treatment and a high risk of mortality, particularly among children and vulnerable adults.

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