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The Gaza conflict and its implications for the sustainable development goals: a comprehensive analysis

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Abstract
The ongoing conflict in the Gaza Strip has precipitated a severe humanitarian and socio-economic crisis with profound implications for sustainable development across environmental, social, and economic dimensions. As of June 2025, hostilities have resulted in approximately 55,000 fatalities and thousands of severe injuries, with critical infrastructure, such as hospitals, schools, and sanitation facilities, have been devastated. This study examines the far-reaching impacts of the Gaza conflict on progress toward the United Nations Sustainable Development Goals (SDGs), focusing mainly on areas such as public health, education, clean water access, and environmental preservation. The roots of the current crisis trace back to 2007, when a blockade was imposed, severely limiting access to essential resources and contributing to prolonged socio-economic decline. Escalating hostilities since October 2023 have intensified these challenges, leading to the degradation of vital natural resources, widespread environmental pollution, and further damage to already fragile ecosystems. This research employs a comprehensive review of both scholarly and grey literature, utilizing data from international reports and region-specific studies to assess how conflict-driven disruptions have impacted Gaza's trajectory toward critical SDGs. The study applies the '*Wedding Cake*' model of sustainable development to illustrate how environmental degradation undermines social structures and economic stability. By framing Gaza's challenges within the SDG framework, this analysis underscores the critical need for a multifaceted, globally coordinated response to address the intertwined crises of human suffering, environmental destruction, and economic collapse. Ultimately, the study advocates for sustainable solutions prioritizing ecological health and resilience as foundations for long-term peace and recovery in Gaza and beyond.

Keywords Gaza · Sustainable development goals · Environmental degradation · Socio-economic impact · Humanitarian crisis · Infrastructure damage · Resilience

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1 Introduction

The Gaza Strip, a densely populated and resource-scarce region, is currently experiencing one of the most severe humanitarian and socio-economic crises in recent history. The ongoing conflict has triggered profound disruptions across multiple sectors, exacerbating an already fragile situation and impacting every facet of life. With a population density among the highest in the world and limited natural resources, Gaza's vulnerability to conflict-driven shocks is unparalleled, creating unique challenges for sustainable development in this context. As of June 2025, the ongoing hostilities have resulted in approximately 55,000 fatalities, with thousands more injured or missing, and have caused extensive damage to critical infrastructure, including hospitals, schools, and water and sanitation facilities. Beyond these human impacts, the conflict has also led to significant environmental degradation, including increased pollution, destruction of natural areas, and long-term harm to the regional ecosystem (Hassoun et al., 2024; Hassoun, 2025a, 2025b, 2025c; Khalifa Aleghfeli, 2024; Kienzler et al., 2024).

The origins of the current crisis in Gaza can be traced back to 2007, following Hamas's takeover of the region, which led to the imposition of a blockade that significantly restricted access to essential resources. The blockade has significantly limited access to essential goods, including medical supplies, clean water, fuel, and food, contributing to prolonged socio-economic challenges and increased instability. Years of limited mobility of products and people have resulted in a stagnating economy, weakened public health, and a degraded education system, exacerbating poverty and reliance on foreign aid. Since that time, ongoing conflicts have escalated, worsening humanitarian crises and causing significant damage to essential infrastructure (Abuzerr et al., 2025; Alagha & Hussein, 2024; Ziadah et al., 2025). The situation escalated drastically on October 7, 2023, when Hamas launched an unprecedented attack that resulted in the deaths of approximately 1,200 Israelis, leading to an intense Israeli military campaign. The offensive involved widespread airstrikes and ground operations, inflicting further devastation on infrastructure and worsening an already dire humanitarian and environmental crisis (Abed Alah, 2024b; Asi et al., 2024; Harghandiwal, 2025; Nijim, 2024).

The current situation marks a significant setback not only for humanitarian relief but also for sustainable development in the region. In response, this research critically examines how the ongoing conflict disrupts sustainability across its three core dimensions, namely, environmental, social, and economic, and assesses its implications for progress toward the United Nations Sustainable Development Goals (SDGs). This paper frames the Gaza crisis through the lens of the SDGs, with particular attention to SDG 2 (zero hunger), SDG 3 (good health and well-being), SDG 6 (clean water and sanitation), and SDG 13 (climate action). These goals are not only relevant but severely compromised by the conflict. For example, widespread food insecurity and disruptions to agricultural systems hinder the achievement of SDG 2 (Faris et al., 2025a, 2025b; Hassoun, 2025a, 2025b, 2025c) the destruction of hospitals and water systems impedes progress toward SDG 3 and SDG 6 (Ashour et al., 2025a, 2025b; Harik et al., 2025); and intensified environmental damage further distances the region from achieving SDG 13 (Hassoun, et al., 2025c; Shaheen et al., 2024).

To structure the analysis, this research adopts the' Wedding Cake' model of sustainability. This framework conceptualizes development in three interdependent layers—environmental, social, and economic—emphasizing that environmental stability forms the foundation

upon which social systems and economic activity rely (Fig. 1). Within this model, sustainability is defined not merely as resilience or recovery but as the capacity to maintain essential systems and services in the face of protracted conflict while building toward long-term development.

This model emphasizes that achieving sustainability requires prioritizing ecological health as the basis for stable societies and robust economies, underscoring the interconnected nature of environmental, social, and economic pillars (Scharlemann et al., 2020; Trappey et al., 2023). Through this model, the analysis explores how environmental degradation caused by the conflict undermines social systems and economic stability, reinforcing the need for environmentally centered approaches to peacebuilding.

This work employs a comprehensive narrative review methodology, synthesizing information from diverse sources, including academic articles, reports from international organizations, government documents, and grey literature. References were meticulously curated to provide a robust, evidence-based analysis that underscores the urgent need for a comprehensive, multifaceted response to this critical crisis. By integrating qualitative and quantitative data from these varied sources, the study aims to provide a holistic understanding of the conflict's impact on Gaza's progress toward the SDGs. This paper explores the key dimensions of sustainability affected by the ongoing conflict, examining how environmental, social, and economic pillars have been impacted and what this means for Gaza's path toward recovery and long-term resilience. Section 2 discusses the environmental pillar, focusing on how the conflict has impacted natural resources, ecological stability, and critical environmental services. Section 3 focuses on the social pillar, analyzing the consequences on

Fig. 1 The 17 UN SDGs Organized by the 'Wedding Cake' Model (Scharlemann et al., 2020; Trappey et al., 2023)

poverty, food security, public health, and education. Section 4 examines the economic pillar, outlining the conflict's impact on local industry, jobs, and economic resilience. Finally, Section 5 offers a conclusion and specific recommendations, emphasizing immediate and long-term actions to lessen these effects and promote recovery efforts.

2 The impact on the environmental pillar of sustainability

The conflict has significantly affected Gaza's environmental sustainability, directly influencing.

essential resources and infrastructure. These consequences hinder the achievement of many SDGs, especially those pertaining to clean water (SDG 6), climate action (SDG 13), marine life (SDG 14), and terrestrial ecosystems (SDG 15) (Fig. 2).

2.1 Clean water and sanitation- SDG 6

The Gaza Strip faces severe water and sanitation challenges, which have been significantly exacerbated by the ongoing conflict, severely hampering the achievement of SDG 6, which aims to ensure access to clean water and sanitation. The relentless war has exacerbated the water crisis in Gaza, leading to widespread scarcity and contamination, with profound implications for the health and well-being of the population (Agudo, 2024; Hussein, 2023).

The Gaza Strip has long faced critical water and sanitation challenges, but the situation has deteriorated drastically since the escalation of conflict in October 2023. Prior to the current hostilities, Gaza's population already struggled with limited water access due to

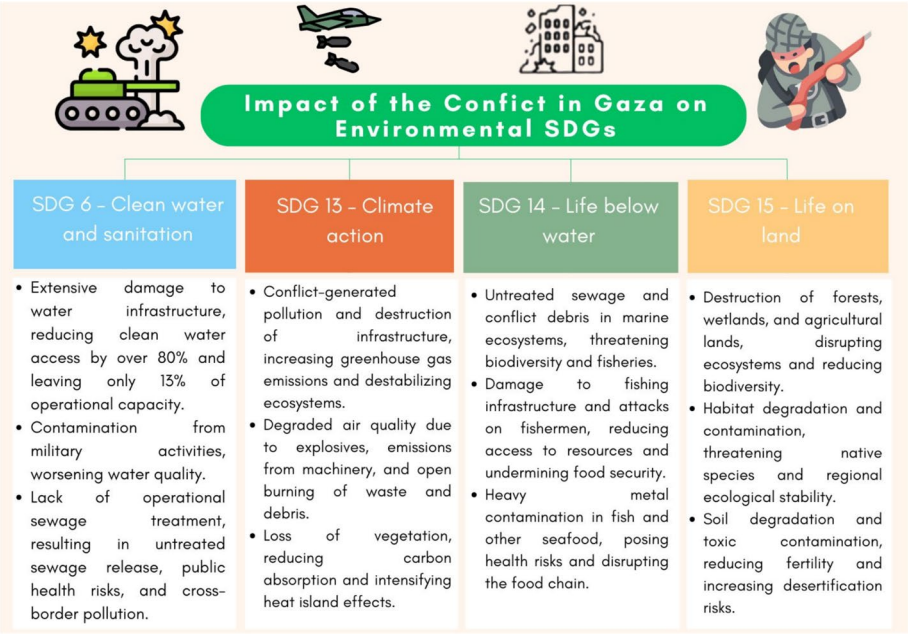

Fig. 2 Environmental impacts of the conflict in Gaza on key SDGs (*Source: Author's elaboration*)

over-extraction of the coastal aquifer, poor water quality, and aging infrastructure. However, the widespread destruction of desalination plants, pipelines, and sewage systems has now reduced water production by over 80%, leaving more than two million people with only a fraction of their previous access. Power outages and fuel shortages have halted key treatment processes, while contamination from military activities has further degraded water quality (Ahmed et al., 2024a, 2024b; Hussein et al., 2024; Razum et al., 2024).

The public health consequences of this collapse are alarming. As of mid-2024, less than 4% of Gaza's freshwater is considered safe for drinking, and in some areas, availability has dropped to 10% of the emergency minimum of 15 L per person per day. Sanitation facilities have become nearly inaccessible, with one toilet serving over 200 people and one shower per 4,500. Wastewater treatment is almost non-existent, with over 100,000 cubic meters of untreated sewage released daily into the Mediterranean, posing regional health threats. Diseases such as diarrhea, acute respiratory infections, scabies, jaundice, and hepatitis A have surged, particularly among children, indicating a severe reversal in public health conditions (Abuzerr & Zinszer, 2025; Beiraghdar et al., 2023; Harik et al., 2025; Taha et al., 2024a, 2024b).

Institutional and humanitarian responses remain severely constrained. Local authorities lack the operational capacity to restore or manage services, while many donor-funded water facilities were already under-resourced and lacked sustainability plans before the conflict. The destruction and obstruction of water infrastructure have raised international concerns regarding violations of humanitarian law. Accusations of using water as a weapon during the conflict have heightened international concern and underscored the urgent need for protected, sustainable water systems and coordinated recovery efforts (Abdul Samad et al., 2024; Dader & Joronen, 2025; Gleick, 2019; Human Rights Watch, 2024; Zaqout et al., 2024).

What makes the water and sanitation crisis in Gaza particularly alarming is its cascading effect on the broader humanitarian system and regional stability. The degradation of these services not only threatens individual health but also paralyzes critical sectors such as education, food security, and healthcare delivery. Schools and clinics cannot function without safe water and sanitation. Moreover, the environmental impact, particularly the daily discharge of untreated sewage into the Mediterranean, poses serious risks to marine ecosystems and neighboring countries, turning a localized collapse into a transboundary threat. Addressing clean water and sanitation is thus not only a moral and humanitarian imperative but also a prerequisite for preventing the spread of systemic instability.

2.2 Climate action- SDG 13

SDG 13 calls for urgent action to combat climate change and its impacts. Even before the current war, Gaza was facing a severe environmental crisis, with over 97% of its groundwater unfit for human consumption due to extreme salinity, nitrate, and fluoride contamination, posing significant health risks to the population. Gaza's urban areas were already generating substantial levels of waste and pollution, with inadequate waste management infrastructure unable to cope with increasing environmental pressures and emissions. Moreover, years of water scarcity, infrastructure breakdown, and high population density have left Gaza acutely vulnerable to climate-related shocks such as droughts and resource depletion, with electric-

ity shortages further weakening water treatment and sanitation services (Al-Hindi et al., 2021; Jafar et al., 2023; Shomar & Rovira, 2023).

Since October 2023, the environmental situation has deteriorated rapidly. This conflict has resulted in significant pollution of soil, water, and air and the dismantling of critical infrastructure, including water desalination and wastewater treatment plants. The detonation of military ordnance and the widespread destruction of buildings and roads generated approximately 42 million tons of debris during only the first year of this war, leading to a substantial rise in chemical pollution and greenhouse gas emissions, further destabilizing the already fragile ecosystem in this region. The emissions produced by global militaries equal 5.5% of the world's emissions, and Gaza contributes significantly to these numbers. In addition, the anticipated activities for post-conflict rebuilding are expected to lead to the creation of over 30 million metric tons of greenhouse gases, further exacerbating climate change (London et al., 2024; Qumsiyeh, 2024; Shaheen et al., 2024; UNEP, 2024; Weir, 2024).

Moreover, the destruction of solar farms, desalination plants, orchards, and wetland restoration zones has directly undermined the limited infrastructure available for climate mitigation and adaptation. Projects promoting sustainable development, such as solar energy systems, decentralized water purification, and environmental restoration efforts, have been deliberately targeted or rendered non-functional. This ongoing conflict has created an immense waste burden, exceeding 107 kg per square meter, which significantly strains the existing waste management system and hinders adaptation to climate-related challenges. The widespread open burning of waste, including electronics and hazardous materials, has released toxins into the environment, amplifying the region's ecological vulnerability and threatening long-term human and ecosystem health (Abd El Hay, 2024; Ashour et al., 2025a, 2025b; Dardona et al., 2024a, 2024b; ESCWA/UNDP, 2024; Hassoun, et al., 2025c; UNEP, 2024).

Taken together, the deliberate and systematic destruction of climate-critical infrastructure and natural resources in Gaza constitutes not only an environmental catastrophe but may also meet the threshold of '*ecocide,'* as defined in my recent publications (Ahmed et al., 2024a, 2024b; Hassoun, 2025a, 2025b; Wirtu & Abdela, 2025). The scale, intentionality, and irreversible damage inflicted on ecosystems, biodiversity, and vital environmental assets demand urgent recognition within international legal and climate justice frameworks.

2.3 Life below water- SDG 14

SDG 14 calls for the conservation and sustainable use of oceans, seas, and marine resources. Even before the escalation of hostilities that erupted in October 2023, the coastal and marine ecosystems of Gaza along the Mediterranean Sea were under immense strain due to years of infrastructure deterioration, limited environmental regulation, and chronic pollution. Untreated wastewater discharge into the sea was a longstanding concern, mainly due to insufficient wastewater treatment capacity and frequent electricity shortages. These conditions led to direct contamination of coastal waters with high levels of organic matter, heavy metals, and chemical residues, severely affecting marine life and public health (Sarsour & Nagabhatla, 2022; Wafi, 2015). In parallel, studies have already detected alarming concentrations of heavy metals in fish caught near Gaza's fishing harbor, indicating significant

bioaccumulation and contamination risks in the marine food chain (Ozyurt et al., 2017; Ramon et al., 2023; Wafi, 2015).

The current conflict has drastically worsened these conditions. Explosive bombardments and the destruction of coastal infrastructure have introduced massive volumes of debris and chemical pollutants into the marine environment. Fragile habitats, such as shallow reefs, seagrass beds, and intertidal zones, have been damaged by shockwaves, sediment disruption, and toxic runoff. This degradation threatens biodiversity and undermines the ecological functions that support fisheries, natural water filtration, and coastal protection. The persistent inflow of contaminants from damaged facilities and open waste dumps further amplifies these threats, as runoff and leachates seep into both surface and groundwater systems, eventually discharging into the sea (Hassoun, et al., 2025c; Qumsiyeh, 2024; Qumsiyeh & Abusarhan, 2021; UNEP, 2024).

Moreover, the destruction of wastewater treatment facilities has resulted in the ongoing discharge of untreated sewage into Gaza's coastal waters. This wastewater contains a harmful mix of organic and inorganic substances, including nitrates, chlorine, and heavy metals, which pose serious threats to marine ecosystems and to the health of communities relying on them. The continuous influx of these pollutants disrupts aquatic habitats, affects fish populations, and contributes to the broader decline in marine biodiversity. This degradation significantly hampers restoration efforts and undermines the long-term sustainability of marine life along the Eastern Mediterranean coast (Abd El Hay, 2024; Abdullah et al., 2025; Hassoun, 2025c; Masria et al., 2024).

The ongoing conflict has also had profound socio-economic consequences for Gaza's coastal communities, particularly for artisanal fishers. Violent restrictions on fishing activity and the destruction of port infrastructure have deprived small-scale fishers of their livelihoods and reduced access to marine resources. These communities, which rely on nearshore fishing for both subsistence and income, now face rising poverty, food insecurity, and displacement (Abuhasballah, 2023; Qafisheh, 2024). The loss of traditional fishing practices not only disrupts the local economy but also removes key stewards of sustainable marine resource use, contributing to further ecological decline.

2.4 Life on land- SDG 15

The ongoing conflict has severely undermined environmental integrity and biodiversity in Gaza, disrupting fragile ecosystems and impeding sustainable land use. Shelling and airstrikes have devastated forests, wetlands, agricultural zones, and coastal habitats, damaging freshwater resources and accelerating the decline of biodiversity. These impacts further erode Gaza's already limited capacity to conserve and restore its natural assets, and they threaten the ecological balance necessary for sustainable development (Meaza et al., 2024; Qumsiyeh & Abusarhan, 2021; Rist et al., 2024).

Land conservation and the sustainable use of native flora and fauna have become increasingly complex due to widespread habitat destruction. Fires, including those ignited by white phosphorus and other munitions, have scorched protected areas and ecologically significant sites, contributing to landscape fragmentation and the loss of key species. Soil contamination from heavy bombardment and debris has introduced toxic residues, such as fuel, chemicals, and metals, into agricultural lands, posing long-term threats to both environmental and human health. The destruction of renewable infrastructure, including solar panels, has com-

pounded this contamination, releasing lead and other hazardous heavy metals into the soil and water systems (Hassoun, et al., 2025c; Qumsiyeh, 2024; UNDP, 2023; UNEP, 2024).

The conflict has also physically degraded the soil structure across the Gaza Strip. The upper fertile layer has been stripped or compacted by heavy military vehicles, reducing soil fertility and hindering the viability of future cultivation. This compaction has created a hardened crust that requires deep plowing with specialized equipment, currently inaccessible in Gaza, to restore arable conditions. The widespread removal of vegetation and destruction of tree cover have increased the risk of desertification and accelerated erosion processes, deepening the Strip's ecological vulnerabilities. Moreover, damage to water infrastructure and sanitation networks has led to the uncontrolled release of waste and chemical pollutants, which now infiltrate key ecological areas such as Wadi Gaza. The degradation of this protected zone has disrupted local wildlife habitats and diminished the biological integrity of a corridor essential for migratory bird populations. Since these ecosystems are linked beyond Gaza's borders, their collapse carries broader regional consequences for biodiversity and environmental stability (Abd El Hay, 2024; ESCWA/UNDP, 2024; Hassoun, et al., 2025d; Qumsiyeh, 2024; UNEP, 2024).

3 The impact on the social pillar of sustainability

The ongoing conflict has severely impacted the social pillar of sustainability, deeply affecting progress toward poverty reduction, food security, health, education, gender equality, energy access, sustainable communities, and peace (Fig. 3).

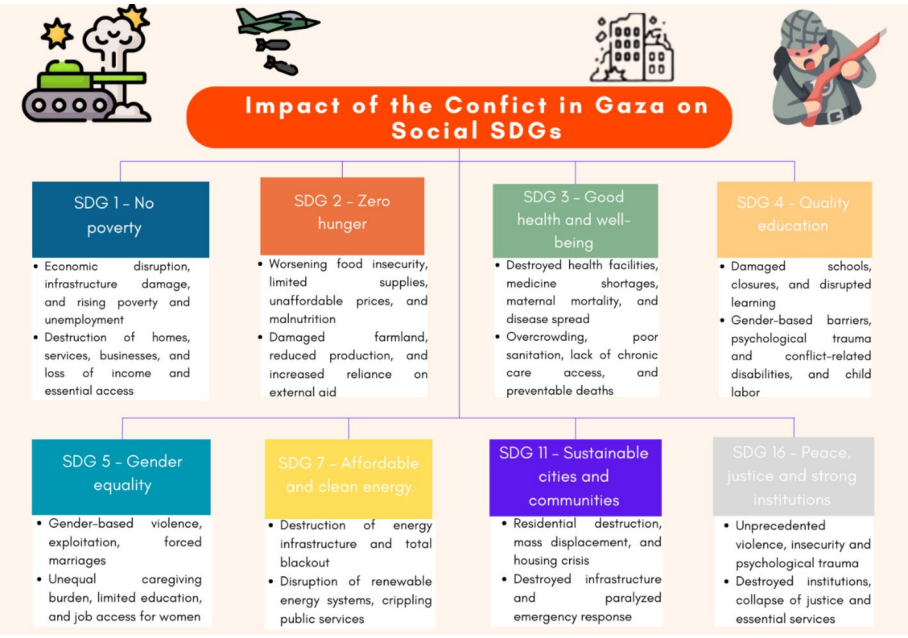

Fig. 3 Social impacts of the conflict in Gaza on key SDGs (*Source: Author's elaboration*)

3.1 No poverty- SDG 1

Poverty in Gaza has been a longstanding and growing issue due to the economic isolation, trade barriers, and movement restrictions imposed by land, sea, and air blockades, along with other geopolitical factors for many years (Adnan, 2022; Devi, 2006; UNCTAD, 2022). In mid-2022, the poverty rate reached 65%, which would have been much higher without international aid. Before October 2023, 80% of the population in Gaza was dependent on international aid (UNCTAD, 2023). Moreover, the severe economic conditions resulted in a 27% decline in the GDP per capita between 2006 and 2022 (Buheji et al., 2025; UNCTAD, 2024).

The ongoing conflict has exacerbated an already precarious situation, displacing at least 1.9 million people—around 90% of Gaza's population (UNRWA, 2024a)—and resulting in massive income losses that have pushed most of the population below the poverty line. (World Bank, 2024). Further, air strikes and ground shelling have caused catastrophic damage across all economic sectors by destroying essential infrastructure (World Bank, 2024) such as homes, transportation, public services (water, electricity, health, education, and waste management systems), natural ecosystems, agricultural land, and machinery, communications, and businesses. According to updated data from the United Nations Satellite Center (UNOSAT), 66% of all structures were damaged, while about 68% of permanent crop fields showed a significant reduction in health and density as of September 2024 (FAO, 2024; UNOSAT, 2024).

This situation has paralyzed most sectors and economic activities and caused multidimensional poverty. In fact, the cessation of most business operations has left most households without any source of income, with an unemployment rate approaching 80%, while the cost of essential goods has risen by almost 250% (ILO, 2024; World Bank, 2024). Therefore, these issues severely hinder the achievement of SDG 1, which aims to reduce the proportion of people living in extreme poverty while ensuring access to basic services, social protection, economic resources, and resilience.

3.2 Zero hunger- SDG 2

Even before the current escalation, Gaza faced one of the highest levels of food insecurity in the world. Chronic poverty, high unemployment, and dependence on aid had already left many Gazans food insecure (Faris et al., 2025a, 2025b; Hassoun et al., 2024). The region has faced significant challenges in ensuring adequate food access and availability for its population, particularly since the implementation of the blockade in 2007. This longstanding issue has been characterized by limited resources, restricted movement of goods and people, and economic instability, all of which have contributed to chronic food insecurity (Albelbeisi et al., 2018; El Kishawi et al., 2017). The ongoing conflict has exacerbated an already severe food insecurity crisis, significantly impacting all six of its fundamental pillars, i.e., availability, access, utilization, stability, agency, and sustainability (Hassoun et al., 2024). This crisis has, in turn, severely undermined progress across all targets of SDG 2, affecting efforts to end hunger, achieve food security, improve nutrition, and promote sustainable agriculture (Faris et al., 2025a, 2025b; Faris et al., 2025a, 2025b; Hassoun, et al., 2025f).

Economic access to food is constrained by rising prices coupled with low or non-existent household purchasing power, rendering the limited available food supplies unaffordable

for most households. Since the conflict began, Palestine's Consumer Price Index (CPI) has sharply increased. By August 2024, the overall CPI rose 51% from pre-conflict levels and 53% year-on-year, with the Food CPI up 43% and 37%, respectively. The CPI soared 244% since the conflict began, though it dipped 2% in August. Similarly, Gaza's Food CPI increased by 133%, despite a 4% decrease since June (WFP, 2024a). Consequently, as of June 2024, despite some improvements, acute food insecurity continued to affect 95% of the population who were classified in IPC Phase 3 or above (crisis or worse) and required urgent food aid. The breakdown of this food insecurity was severe: 15% of the population faced IPC Phase 5 (catastrophe), 29% experienced IPC Phase 4 (emergency), and 51% were in IPC Phase 3 (crisis). Moreover, the persistent risk of famine continues to endanger the entire Gaza Strip as the conflict endures, and humanitarian access remains severely restricted. The situation is expected to remain critical through late 2024, with 96% of the population projected to experience severe acute food insecurity (IPC, 2024a).

Further, before October 2023, 84% of Gaza's households relied on food aid, including staples like wheat flour, rice, and legumes, which helped mitigate malnutrition among children (Horino et al., 2024). However, intensified bombing and ground operations have severely disrupted food availability and essential services, with inflation and unemployment worsening food insecurity. A brief aid increase between May and August 2024 alleviated conditions, but supply levels dropped drastically by September and October. The upcoming winter, with colder temperatures, floods, and seasonal infections, is expected to further worsen malnutrition, especially in densely populated areas (IPC, 2024b). The likelihood of famine between November 2024 and April 2025 remains high as long as the conflict persists and humanitarian access is restricted (IPC, 2024c).

The conflict has severely worsened malnutrition, limiting access to adequate food and undermining nutritional health, especially among children in Gaza. Children are particularly vulnerable, with many facing stunted growth, underweight conditions, and micronutrient deficiencies due to prolonged food insecurity and inadequate dietary intake (Abuzerr et al., 2024; Albelbeisi et al., 2024; El Bilbeisi, 2025). Extreme hunger has driven people to prioritize basic survival over food safety, with many, including vulnerable children, at high risk of nutrient deficiencies (Nasreddine & Jomaa, 2024). Infrastructure challenges have exacerbated the crisis; safe water access has fallen below two liters per person daily due to fuel shortages, while a scarcity of cooking gas forces residents to burn wood or waste for cooking. This situation has also led to the closure of all 130 bakeries supported by the World Food Programme (WFP), severely limiting bread availability. Humanitarian organizations, including Refugees International, warn that even when food is accessible, the population's ability to prepare it safely is compromised, contributing to famine-like conditions across Gaza (Refugees International 2024).

The conflict has severely impacted Gaza's progress toward SDG 2 by drastically reducing local food production and disrupting essential supply chains. Extensive damage to agricultural infrastructure has left 67.6% of cropland affected, 71.2% of orchards, 67.1% of field crops, and 58.5% of vegetables. Heavy vehicle movements and artillery fire have also damaged 52.5% of agricultural wells and 44.3% of greenhouses, undermining food availability (FAO, 2024). The conflict has severely hindered humanitarian assistance and food aid to Gaza, with restrictions and security challenges blocking essential supplies. Damaged infrastructure, security checkpoints, and limited access routes disrupt aid convoys, while volatile conditions and operational constraints strain humanitarian organizations (NRC, 2024). In

October 2024, aid deliveries hit their lowest, forcing the WFP to halt food parcel distributions, risking support for one million vulnerable residents reliant on food aid (WFP, 2024b).

Since March 2025, food insecurity in Gaza has reached unprecedented and catastrophic levels, as Israel has intensified its military campaign while entirely blocking the entry of humanitarian aid, including food, water, and medical supplies. Attacks on hungry civilians waiting in long queues for minimal food distributions have also systematically dismantled Gaza's food system and pushed the population toward mass starvation. Legal experts and scholars increasingly describe these actions as the deliberate use of starvation as a weapon of war, constituting a potential war crime under international law. This weaponization of hunger has been widely condemned and represents one of the most severe forms of collective punishment in recent history (Alburai, 2023; Ashour et al., 2025a, 2025b; de Waal, 2024; Ennouri et al., 2025; Fekih-romdhane et al., 2024; Sah & Dawas, 2024).

3.3 Good health and well-being- SDG 3

In Gaza, progress toward achieving SDG 3 faces severe obstacles due to ongoing conflict and systemic collapse of healthcare infrastructure. The current war has triggered an unprecedented humanitarian crisis, marked by the devastation of hospitals, incapacitation of health personnel, and depletion of essential medical supplies, reversing years of hard-won advancements in healthcare.

The deliberate targeting and destruction of hospitals, along with the killing of medical personnel and patients in their beds, have turned Gaza's healthcare system into a warzone. This systematic devastation has not only crippled emergency and routine care but also stripped civilians of their fundamental right to life-saving medical treatment (Alkhaldi & Alrubaie, 2024; Ashour et al., 2025a, 2025b; Irfan et al., 2024a, 2024b). The conflict has severely impacted maternal health services, with pregnant women facing tremendous challenges in securing safe delivery care, as medical facilities are often overwhelmed or entirely devastated (Ashour et al., 2025a, 2025b; Beiraghdar et al., 2023). These circumstances are intensifying maternal mortality, which has seen a significant increase due to delayed and completely inaccessible healthcare (London et al., 2024). In this regard, the (International Rescue Committee (IRC) 2024) estimated that maternal mortality had increased significantly, with a concerning rate of 37 mothers dying each day since the onset of the conflict. The breakdown of healthcare infrastructure and severe shortages of medical supplies and personnel have worsened this situation. As a result, this situation mirrors instances seen in other conflict-affected areas, like Yemen and Syria, where maternal mortality rates spiked (Butt et al., 2022; Haar et al., 2024).

Further, the spread of infectious diseases has intensified during the ongoing conflict. The combination of overcrowding, insufficient access to clean water, and compromised sanitation systems has fostered conditions conducive to outbreaks (Abed Alah, 2024a; Dardona et al., 2024a, 2024b; Hussein et al., 2024; Taha et al., 2024a, 2024b). The interruption of vaccination campaigns amid the conflict has also exposed the population to preventable diseases such as polio and measles (Gupta et al., 2024). Moreover, non-communicable diseases (NCDs) pose a significant challenge. More specifically, the objective to reduce mortality from NCDs remains unattainable as limited access to medications for chronic conditions like diabetes and heart disease is resulting in unnecessary fatalities (Ashour et al., 2024). Additionally, Gaza faces an alarmingly severe mental health crisis. The relentless cycle of

violence, displacement, and loss has led to pervasive trauma, leaving mental health services struggling to keep pace with the escalating demand. Studies show that these untreated post-traumatic stress disorders and depression can result in enduring public health challenges (Abudayya et al., 2023; Ashour et al., 2025a, 2025b; Kienzler et al., 2024).

3.4 Quality education- SDG 4

The ongoing conflict has severely hindered the ability to achieve the targets outlined in SDG 4, which focuses on ensuring inclusive and equitable quality education. Indeed, educational infrastructure in Gaza has been under severe strain for a long time, even before the outbreak of the current conflict. The Global Coalition to Protect Education from Attack (GCPEA) previously identified Palestine as one of the countries most severely affected by attacks on education in recent years. Previous escalations in hostilities have left educational facilities in disrepair, hindering efforts to restore and maintain a stable learning environment (GCPEA, 2022; Naser-Najjab, 2020).

The ongoing conflict has severely affected both the physical and mental well-being of students, leading to far-reaching consequences. These impacts have deepened the vulnerabilities many children and young people face, stemming from a 17-year blockade. The current conflict has resulted in war-related disabilities, heightened psychological challenges such as trauma, stress, and anxiety, and an increased risk of early marriage and child labor (Aldahdouh et al., 2025; Iriqat et al., 2025; Salameh, 2025). Since October 7, 2023, all educational institutions in Gaza, including schools, universities, and training centers, have remained closed. Displacement, widespread facility destruction, and severe access restrictions resulting from Israeli military operations have deprived Gazans of access to education, leaving an entire generation without critical learning opportunities (ACAPS, 2024; Ali & Jaber, 2024; UNRWA, 2024b).

In September 2024, an assessment revealed that 94.7% of all schools had sustained some damage, with 87.4% requiring complete reconstruction or significant repairs before operation (Occupied Palestinian Territory—Education Cluster, 2024). Educational infrastructure has been nearly obliterated, with the few remaining schools now functioning as shelters for displaced families. Instead of attending classes, children spend their days waiting in long lines for food and water aid, further disrupting their education. In addition to schools, higher education institutions, including universities, colleges, and vocational training centers, have suffered severe damage or destruction (Milton et al., 2023; Moshtari & Safarpour, 2023; Abusamra, 2024; Korhonen et al., 2024); McGahern, 2024).

3.5 Gender equality- SDG 5

The ongoing conflict has intensified gender inequalities, significantly hindering progress toward SDG 5. Gazan women have been thrust into compounded roles, balancing caregiving with responsibilities in resource management and community resilience. This crisis has magnified pre-existing gender-based challenges, highlighting the urgent need for gender-sensitive interventions and protective measures for women and girls affected by the current hostilities.

The conflict has exacerbated discrimination and gender-based violence against women and girls, impacting their safety, health, and access to resources. Amid escalating violence,

Gazan women face heightened risks of exploitation and abuse. Some reports have raised concerns about the treatment of Palestinian women in Israeli detention settings, highlighting issues such as potential abuse and emphasizing the need for protective measures (Ferguson & Desai, 2024; Swan, 2024). Furthermore, conflicts lead to increased rates of early and forced marriages as families struggle with instability and poverty while also exposing women and girls to heightened risks of sexual assault and systemic discrimination, compounding the challenges women face in maintaining their well-being and autonomy (Ahmed et al., 2025; Guaita-Fernández et al., 2024; Hamad et al., 2021; UN Women, 2024a, 2024b).

Amidst acute food insecurity and a collapsing healthcare system, women in Gaza shoulder an immense caregiving burden, often prioritizing their children's nourishment over their health, which undermines their ability to breastfeed and affects both maternal and infant well-being. Moreover, the blockade has further restricted access to essential supplies, including those crucial for women's health. With safe menstrual hygiene products unavailable, many women are forced to resort to hazardous alternatives, increasing their risk of infection and other health issues (UN Sabet et al., 2024; Women, 2024b).

Additionally, the famine, compounded by the destruction of healthcare facilities, has severely disrupted maternal services, leaving pregnant women with limited or no access to essential prenatal care. These prenatal nutritional deficiencies profoundly affect the offspring's health, impairing physical development, cognitive function, and long-term well-being (Khoodoruth & Khoodoruth 2024). Moreover, hospitals, including maternity wards, remain under constant threat of bombardment, placing mothers and newborns in immediate danger and creating an environment of profound fear and insecurity. The conflict has turned pregnancy into a life-threatening condition for thousands of women, with some forced to give birth outside, in unsanitary conditions, without medical assistance (Ben, 2024; Elnakib et al., 2024; Irfan et al., 2024a, 2024b).

Women are also disproportionately affected by the water and sanitation crisis in Gaza, as they are primarily responsible for heavy tasks such as water collection and household hygiene. Even before the current crisis, 30% of households had access to running water for only 6–8 h every four days (Añaños et al., 2023). This increases women's workload, exposes them to health risks and gender-based violence, and limits their opportunities for education and work (Kayser et al., 2019).

3.6 Affordable and clean energy- SDG 7

In Gaza, energy access has always been a critical challenge due to longstanding conflicts and blockades. Before October 2023, Gaza's energy system was already under severe strain due to the longstanding blockade and conflicts. The region relied heavily on external electricity, importing 120 MW from Israel, while the Gaza Power Plant (GPP) generated 70–140 MW based on fuel availability. Electricity from Egypt, supplying 23 MW, has been disrupted since 2018 due to political concerns, leaving Gaza unable to meet daily energy needs (UNDP, 2021). This resulted in chronic power outages, with 12–18 h cuts, severely affecting the availability and accessibility of essential services like water and healthcare (World Bank Group 2017; UNDP, 2021).

Further, Gaza's broader energy production depends on diesel, liquefied petroleum gas (LPG), and natural gas to meet its population's needs. Diesel powers the GPP and backup generators during outages, ensuring essential services continue. However, reliance on

imported diesel makes Gaza vulnerable to supply disruptions, often forcing the GPP to reduce capacity or shut down, while the high cost further strains its economy. Similarly, LPG, primarily used for cooking, faces frequent shortages due to import delays. In contrast, natural gas from the Gaza Marine gas field holds substantial long-term potential to fulfill Gaza's energy needs. However, political and logistical challenges have persistently hindered its development and exploitation (Juaidi et al., 2016; UNCTAD, 2019).

The ongoing conflict has caused significant damage to Gaza's already fragile energy infrastructure, further undermining energy security and leaving a large portion of the population without reliable access to electricity. Initial estimates placed the damage at US$279 million, with over 60% of the energy infrastructure either damaged or destroyed. The GPP, already operating with critically low fuel reserves, ceased functioning within days after October 2023 (ESCWA, 2023; The World Bank, 2024). According to an early report by the Gaza Electricity Distribution Company (GEDCO), more than 68% of medium voltage and transmission networks were destroyed, along with 70% of company buildings, 90% of warehouses, and 82% of vehicles and machinery. Additionally, 830 km of medium voltage lines, 2,700 km of low voltage lines, and 2,105 electrical transformers were destroyed. The conflict also resulted in 55 employees losing their lives, with many others injured. GEDCO called for international assistance to rebuild energy infrastructure in Gaza and stressed the urgent need to restore power to essential sectors like healthcare, water, sanitation, education, and public services (Kurdi, 2024; Mahdi et al., 2025); Palestinian Energy & Natural Resources Authority, 2024).

Prior to the escalation of conflict in October 2023, renewable energy initiatives, particularly solar energy, were gaining momentum in Gaza. Solar power contributed around 5% of the energy supply, with 20% of households depending on it for basic needs (ESCWA/UNDP, 2024). Solar energy was vital to reducing dependence on fossil fuels and stabilizing the energy supply, especially during frequent fuel shortages. However, the conflict severely disrupted this progress, destroying 67 MW of solar photovoltaic systems and releasing 1,675 kg of lead into the environment, further exacerbating environmental conditions (UNEP, 2024). Over 70% of solar panels on critical infrastructure like hospitals and schools were damaged, hindering essential services during blackouts. The remaining installations are insufficient to meet growing demand, worsening the energy crisis. The destruction of large-scale solar projects, like the Gaza Industrial Estate, which relied on solar energy for 80% of its electricity, had profound economic impacts (Abd El Hay, 2024; Todman & Jun, 2023; UNEP, 2024). The loss of these renewable energy projects has been a significant setback for energy sustainability efforts in Gaza.

3.7 Sustainable cities and communities- SDG 11

The ongoing conflict has resulted in widespread devastation of residential areas, with consequences extending far beyond physical destruction. Thousands of homes and neighborhoods have been reduced to rubble, displacing countless families, starkly contradicting SDG 11, which aims to make cities and human settlements inclusive, safe, resilient, and sustainable.

The destruction has also severely disrupted essential public services like electricity, water, and sanitation, making daily life increasingly difficult for Gazans. Beyond the loss of physical structures and the massive damage to buildings (Holail et al., 2024), entire communities

have been dismantled, leaving emotional and psychological scars on survivors, especially children, who face growing trauma from the constant threat of violence. This systematic destruction of homes and the erasure of communal spaces have been described as "*domicide*"— the deliberate annihilation of the living environment, severing people from their sense of place, safety, and identity (Gray, 2025; Hassoun, et al., 2025b; Migdad & Buheji, 2024). Residential buildings, essential public infrastructure, and services have been decimated in Gaza. Apartment blocks, houses, and community structures have been demolished, leaving thousands of families without shelter. This situation, combined with the collapse of essential services, has exacerbated living conditions for people, while many displaced families struggle in makeshift shelters or overcrowded refugee camps (Goodarzi et al., 2024; Migdad & Buheji, 2024). According to a comprehensive 2024 assessment by UNOSAT, approximately 66% of Gaza's structures have been damaged or destroyed, including over 163,000 housing units. This immense scale of destruction has turned many neighborhoods into uninhabitable zones, creating a severe humanitarian crisis (UNOSAT, 2024).

Further, the transport sector has suffered damages estimated at approximately US$358 million, impacting 62% of roads, including 92% of main streets and a substantial number of vehicles (UNEP, 2024). Additionally, the conflict has affected cultural heritage sites, including historic buildings and libraries, limiting access to cultural resources (Al-houdalieh et al., 2024; Andreou et al., 2024; Taha, 2024) Moreover, the displacement of residents has had significant psychological and social impacts, as the loss of homes affects stability and a sense of belonging, particularly among children, women, and the elderly (Hammad & Tribe, 2020; Buheji, 2024).

3.8 Peace, justice, and strong institutions- SDG 16

SDG 16 is essential for achieving all other SDGs, as it provides the foundation of peace, justice, and strong institutions needed to sustain progress in areas like education, economic growth, and reduced inequalities (Hope, 2020; Salmon et al., 2018). In Gaza, however, the division between Hamas and Fatah has obstructed the creation of a unified Palestinian political structure, hindering governance reforms essential for SDG 16. Moreover, 17 years of blockade and repetitive series of escalations and violence, alongside this ongoing political fracture, have exacerbated instability and impeded progress toward a Palestinian state, directly undermining this SDG (ESCWA/UNDP, 2024; Levy, 2023).

The ongoing conflict in Gaza has severely undermined efforts to protect children from abuse, exploitation, trafficking, and violence. The intense violence has led to countless child casualties, displacement, and psychological trauma, with thousands forced to endure conditions that no child should face. Limited access to basic resources, disrupted education, and constant exposure to conflict foster a climate where the safety and well-being of children are profoundly compromised (Alburai, 2023; Boukari et al., 2024; Taha et al., 2024b).

The ongoing conflict and recurrent military actions in Gaza and across Palestine have led to the systematic destruction of critical institutions, severely undermining governance structures. Public institutions, including administrative buildings and local government offices, have been damaged or destroyed, creating a vacuum in essential services and weakening the foundations of effective governance. The extensive longstanding governance issues, which began well before the current conflict, have disrupted daily life and

obstructed the development of stable, accountable, and transparent institutions, as envisioned by SDG 16 (Awad, 2023; Hassoun, et al., 2025e). This situation highlights the urgent need for a new governance approach that actively involves all political factions, young people, and women in inclusive, participatory decision-making (Iriqat, 2024), in order to foster resilience and unity within the Palestinian political system and pave the way toward sustainable peace.

Various international observers have expressed concerns that actions in Gaza, including the blockade and military operations, may conflict with international humanitarian standards and United Nations resolutions, such as Resolutions 2334 (2016) and 2735 (2024). Numerous cases involving alleged war crimes and violations of international law have been brought before international courts, including the International Criminal Court (ICC) and the International Court of Justice (ICJ), highlighting growing demands for accountability and equal access to justice (Falk et al., 2022; Iriqat, 2023; Mahomed, 2024).

4 The impact on the economic pillar of sustainability

The economic pillar of sustainability in Gaza has been severely compromised by ongoing conflict, which has resulted in the collapse of critical infrastructure, disrupted trade, and increased unemployment. These challenges have hindered Gaza's progress toward economic growth, reduced inequalities, sustainable industry, responsible consumption, and productive partnerships (Fig. 4).

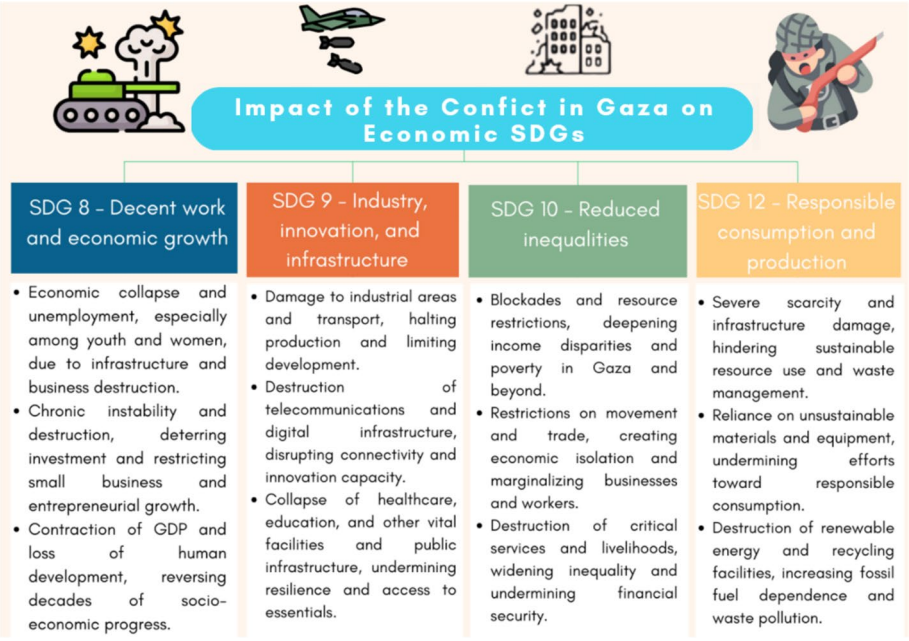

Fig. 4 Economic impacts of the conflict in Gaza on key SDGs (*Source: Author's elaboration*)

4.1 Decent work and economic growth- SDG 8

Since 2007, Gaza has endured severe hardship due to the prolonged blockade, leading to isolation and economic decline (Amir, 2021; Barakat et al., 2018). The current conflict has devastated most economic foundations, worsening trade disruptions and resource shortages. UNCTAD reports show a steep drop in GDP per capita, escalating poverty, rising unemployment, and significant socio-economic obstacles to achieving SDG 8 (Migdad et al., 2025; UNCTAD, 2024).

The collapse of infrastructure in Gaza has severely impacted industries, government services, and financial institutions, leading to nearly 80% unemployment, especially among youth and women, increasing disparities and social instability (ESCWA/ILO, 2024; UNDP, 2024). The ongoing conflict has escalated the economic situation in the Gaza Strip from a severe crisis to a state of near-total collapse. Recent economic analyses underscored the unprecedented scale of devastation confronting the region (Khalidi & Iwidat, 2024). Hazardous conditions for work have escalated due to extensive bombardments and large-scale ground operations. The labor market has experienced substantial reductions in employment options and pay, exacerbating household incomes and poverty levels. Many small and medium-sized firms have been obliterated or compelled to cease operations (World Bank, 2024).

The ongoing conflict has profoundly impacted development in Gaza, undermining economic stability and sustainable growth. These conditions have led the GDP in Gaza to contract by almost 85%, leaving its economy in a state of devastation. Moreover, recent assessments estimate that the Human Development Index (HDI) in Gaza could fall to 0.408, a level comparable to that of 1955, effectively erasing over 69 years of progress (ESCWA/ILO, 2024; UNDP, 2024). Reconstructing Gaza is projected to require $30 to $40 billion by May 2024, underscoring the immense financial burden of rebuilding essential infrastructure and restoring basic services (Alkhaldi & Alrubaie, 2024; The Times of Israel, 2024). Additionally, neighboring countries, especially Lebanon and Egypt, have suffered considerable economic losses due to disrupted trade, increased security costs, regional instability, and other adverse economic repercussions, highlighting the broader economic impact of the ongoing conflict (Al-Riffai, 2024; Butter, 2024; UNDP, 2023).

4.2 Industry, innovation, and infrastructure- SDG 9

The conflict has significantly impacted SDG 9, which aims to build resilient infrastructure, promote sustainable industrialization, and foster innovation. Years of violence and blockades have devastated critical infrastructure, such as water, sanitation, healthcare, energy, education, and public services in Gaza, creating an unprecedented humanitarian crisis (Abuzerr et al., 2025; Alkhaldi et al., 2024).

The extensive damage to water infrastructure, visible from satellite images, points to systematic destruction, endangering essential services and putting civilians at risk (Cole, 2024). Despite external aid, water and sanitation services in Gaza remain unsustainable due to resource constraints and a lack of economic sovereignty (Zaqout et al., 2024). Healthcare facilities have also been heavily damaged, adding immense pressure to an overstretched system, while road damage and power shortages hinder emergency response. This deliberate targeting of vital infrastructure has been considered by many as a grave violation of

human rights, given its catastrophic impact on access to life-saving healthcare and the well-being of the civilian population (Alkhaldi & Alrubaie, 2024; Mohammed et al., 2024). The destruction of educational infrastructure has resulted in the tragic loss of life and severely disrupted learning (Dader et al., 2024; Nijim, 2023; Shellah, 2024). This mass destruction hinders the present and undermines future opportunities for the next generations in the Strip.

Bombings and military incursions have devastated industrial zones, factories, and workshops, wiping out local production capacity. This destruction of industrial facilities, coupled with damage to roads, bridges, and transportation systems, disrupts not only production but also the movement of raw materials and finished products, paralyzing the local economy and making industrial activities barely viable (Abd El Hay, 2024; The World Bank, 2024; UNEP, 2024).

Further, the conflict has severely hindered innovation, undermining SDG 9 and efforts to promote scientific research, technological advancement, and innovation. The conflict has stalled progress due to brain drain and a lack of resources for research and development (Abusamra, 2024). Resource constraints and ineffective collaboration frameworks prevent municipalities from adopting advanced technologies essential for public sector innovation and urban management (AlAstal, 2023). Further, several promising projects, including smart city initiatives and Geographic Information Systems (GIS) for city planning and water management, have been halted due to resource scarcity and infrastructure damage (AlAstal, 2023).

4.3 Reduced inequalities- SDG 10

SDG 10 calls for actions to lessen the social and economic disparities and reduce inequality between populations within and among countries. However, in the Gaza Strip, policies and actions have been criticized for exacerbating social and economic inequalities, which hinder progress toward achieving this SDG.

Following October 7, 2023, the decision taken by Israel to cut off food, water, and electricity to Gaza, along with extensive bombing of essential infrastructure, has intensified economic inequalities between Gazans and Israelis, obstructing progress toward SDG 10. The destruction of critical facilities like bakeries, desalination plants, and energy resources has forced many Gazans to abandon their homes and businesses, drastically limiting their financial security. While Israelis generally have robust protections and equal access to resources, Gazans struggle daily for essentials like clean water, food, and electricity. This stark income disparity, with Israel's per capita income at $52,000 versus the severe constraints of Gazans, undermines SDG 10, which promotes income growth for disadvantaged populations. The blockade and ongoing marginalization perpetuate deprivation, deepen socio-economic disparities, and hinder prospects for a dignified future (Butter, 2024; Fakhry et al., 2025; Zaragoza, 2020).

Some critics have compared specific policies affecting Palestinians, particularly in Gaza, to systems of segregation, raising concerns about laws and structural mechanisms that may lead to discrimination based on ethnicity and nationality. Some policies have been criticized for creating disparities, with concerns that they may restrict Palestinian access to essential resources, services, and economic opportunities, thereby contributing to entrenched inequalities (Gordon, 2024; Jellad, 2024). These conditions perpetuate socio-economic disparities and create a framework that hinders progress toward achieving SDG 10, highlight-

ing the urgent need to dismantle discriminatory structures to ensure equal opportunities for all. Moreover, the conflict in Gaza has deepened economic disparities in neighboring countries, undermining many of the SDG 10's targets. In the first three months, poverty rates rose by 4% in Jordan, 7.1% in Lebanon, and 6% in Iraq (ESCWA/UNDP, 2023). This has exacerbated economic vulnerabilities in these countries, widening regional inequalities and placing significant economic strain on already fragile systems.

4.4 Responsible consumption and production- SDG 12

Even before the war, Gaza faced severe challenges to SDG 12 due to fragile infrastructure and limited waste management capacity. The ongoing conflict in Gaza severely undermines SDG 12 as continuous violence and blockades have worsened resource scarcity and disrupted infrastructure, especially water, energy, and waste management. Instead of progressing towards sustainable consumption, Gaza faces a growing waste crisis due to damaged waste facilities and limited access to waste management resources, obstructing sustainable practices (Hassoun, et al., 2025a; Rabah et al., 2024; Rantissi et al., 2024).

Conflict-driven infrastructure damage has led to minimal water treatment and desalination plant functionality, causing severe water shortages. With unstable energy and limited water access, Gaza relies on unsustainable practices like over-extraction of groundwater, further degrading the environment (Abd El Hay, 2024; ESCWA/UNDP, 2024; UNEP, 2024). This not only depletes natural resources in Gaza but also severely compromises the well-being of its population, creating a cycle of dependency on emergency aid rather than fostering sustainable resource management. Moreover, the destruction of renewable energy facilities increases dependence on fossil fuels, worsening environmental degradation (FAO, 2024; Hughes et al., 2023; IPC, 2024d). The conflict also restricts waste reduction efforts, as blockades and infrastructure destruction prevent effective recycling and safe waste disposal. Rubble from destroyed buildings, often containing toxic materials, pollutes land and water, threatening public health and contravening SDG 12 (Abdul Samad et al., 2024; ESCWA/UNDP, 2024; The World Bank, 2024; UNDP, 2024; London et al., 2024).

4.5 Partnerships for the goals- SDG 17

The conflict has resulted in immense human suffering, extensive infrastructure destruction, and declining trust in international institutions, diverting resources from essential development efforts. This highlights the urgent need for global collaboration, peace-building, and stronger partnerships, as outlined in SDG 17, which promotes financial support, technology access, fair trade, and enhanced policy alignment.

One significant impact of the Gaza conflict is the erosion of trust in international institutions and multilateral frameworks essential for diplomacy and sustainable development. Persistent violence and humanitarian emergencies in Gaza have exposed perceived shortcomings and biases, undermining the credibility and effectiveness of these institutions in implementing sustainable development projects. This crisis of trust could weaken multilateral efforts needed for broader global challenges, including climate change, poverty, and health crises (Abousalem, 2025; Guo et al., 2024; Lazzarini, 2024).

The persistent violence and humanitarian crisis in Gaza have weakened international cooperation, disrupting efforts to mobilize resources and implement development initiatives

in conflict-affected regions (Razum et al., 2024). This erosion of collaboration not only isolates Gaza but also diverts resources from SDG 17's sustainable development partnerships. The economic impact extends globally, as infrastructure damage and trade disruptions in Gaza contribute to regional instability, creating ripple effects in the interconnected global economy (Butter, 2024; Rusanti et al., 2025; UNDP, 2023).

One significant area affected is the mobilization of financial resources, as restrictions and bans on donors and UN organizations, including the United Nations Relief and Works Agency (UNRWA), have drastically reduced the financial support available for long-term development projects. This lack of funding is compounded by limitations on UN agencies, which play a critical role in coordinating humanitarian assistance and development initiatives (Roy, 2016; Buheji & Marouf, 2024; Zaqout et al., 2024). This scarcity of funding and limited institutional support impede efforts to develop resilient local capacities, perpetuating a cycle of dependency and hindering sustainable progress both in Gaza and beyond.

5 Recommendations and conclusion

The ongoing conflict in Gaza has resulted in catastrophic impacts across environmental, social, and economic dimensions, creating a significant humanitarian and sustainability crisis. However, this crisis did not begin on October 7, 2023. It is the result of a prolonged history of systemic discrimination, military occupation, and recurring violence, which has eroded Gaza's resilience over decades. Years of blockade, institutionalized marginalization, and asymmetric warfare have steadily undermined the region's ability to achieve sustainable development and protect human rights (Elkahlout, 2024; Hassoun, 2025c; Verdeja, 2025). The research highlights how severe environmental degradation, societal breakdown, and economic collapse have undermined the ability of this region to achieve key SDGs, impacting not only the local population but also the broader regional stability and global sustainability efforts. These interrelated impacts can be grouped into three main dimensions, namely environmental, social, and economic, that together illustrate the depth and complexity of the crisis:

Firstly, as the research outlined, widespread environmental degradation, including polluted water sources, deteriorating air quality, damaged ecosystems, and depleted land resources, has placed severe strain on the Gaza Strip's fragile natural assets. This destruction has critically undermined the region's capacity to sustain a healthy population and support sustainable agricultural practices, threatening both public health and long-term food security. The war is expected to leave a toxic environmental legacy, as the scale and persistence of damage to natural systems will have enduring effects on ecosystems, biodiversity, and environmental resilience for generations to come.

Secondly, the region's social infrastructure, including healthcare, education, water, and sanitation services, has suffered extensive damage, intensifying existing vulnerabilities and further entrenching poverty. This degradation has compromised essential services, reduced access to medical care, limited educational opportunities, and worsened public health conditions. In parallel, the collapse of clean water systems and sanitation networks has heightened the risk of disease outbreaks. At the same time, food insecurity has escalated to emergency levels, with large segments of the population facing hunger and an imminent

threat of famine. Together, these breakdowns have deepened hardship and insecurity across every layer of society.

Thirdly, economic challenges in the region are worsening, with conflict-driven disruptions severely impacting key sectors. Local industries face prolonged shutdowns due to infrastructure damage, raw material shortages, and restricted energy access, severely limiting production capacities. Border closures have disrupted commercial activity and cut off access to regional markets. Consequently, unemployment rates have surged, leaving a large portion of the population without stable income sources, which has led to widespread poverty and a collapse of livelihoods across entire communities, deepening economic dependency and long-term instability.

Addressing the crisis demands a comprehensive, internationally coordinated approach prioritizing immediate ceasefire and urgent humanitarian relief, followed by sustainable recovery and long-term peace-building initiatives. International partnerships should focus on promoting resilience and sustainable development to support long-term stability and progress toward the SDGs. However, given the multiple effects of the continuing conflict on Gaza's capacity to attain the SDGs, this research acknowledges that fulfilling each objective holistically is beyond the reach of present circumstances. As a result, the recommendations below concentrate on the most pressing issues, meeting humanitarian needs, repairing critical infrastructure, and maintaining fundamental social services.

Our recommendations begin with the urgent need for a sustained and unconditional ceasefire. All parties must immediately halt hostilities and uphold international humanitarian law, ensuring the protection of civilians, medical workers, and critical infrastructure. Establishing humanitarian corridors is essential to facilitate the safe and unrestricted delivery of aid and to evacuate those who are injured or at risk. Reconstruction of Gaza's critical infrastructure must be prioritized. This includes rehabilitating hospitals, water and energy facilities, sanitation systems, and waste treatment plants using sustainable and resilient approaches. Donor support should focus not only on restoring functionality but also on rebuilding with improved designs that can endure future shocks and support long-term resilience.

Food security interventions should combine emergency food assistance with initiatives that restore local agricultural capacity. Support for urban farming, rooftop gardens, and efficient irrigation systems can reduce external dependence. In parallel, resources must be directed toward empowering local farmers and encouraging sustainable food production to mitigate the risk of famine and improve nutrition.

Addressing the long-term environmental consequences of war requires an independent and systematic environmental assessment. This should be followed by a comprehensive remediation plan focused on soil rehabilitation, ecosystem restoration, and pollution cleanup. Integrating environmental justice into reconstruction efforts is vital to restoring both the land and the livelihoods that depend on it. Restoring education is essential for social recovery and long-term development. Rebuilding damaged schools and universities must be coupled with psychosocial support programs, vocational training, and youth-led community engagement initiatives. These measures are crucial for healing trauma, preventing radicalization, and equipping future generations to rebuild Gaza.

Finally, justice and accountability mechanisms must be actively supported. This includes independent investigations into violations of international law and war crimes, as well as support for local governance reforms aimed at rebuilding public trust and ensuring inclu-

sive participation. Only by strengthening institutions and restoring the rule of law can Gaza begin to move toward sustainable peace and development.

While the primary focus of this paper is on sustainability outcomes, it is also important to acknowledge the forward-looking role of emerging digital technologies in humanitarian and development contexts. Technologies such as artificial intelligence (AI) and satellite imageries can significantly strengthen crisis forecasting, improve early warning systems, and improve the efficiency of rapid post-disaster investigation (Yin et al., 2025; Zhao et al., 2024); blockchain applications offer transparent and secure tracking of humanitarian aid by enabling real-time monitoring and immutable record-keeping (Bhattacharjee et al., 2025), which help ensure accountability and build trust among donors and recipients alike. Metaverse-based platforms could support remote education and psychosocial support for displaced populations (Giosan et al., 2024). Although not examined in this study, these innovations are increasingly relevant for building resilience and recovery frameworks aligned with global SDG efforts. However, Israel has deployed some of the most advanced military AI and surveillance technologies in Gaza, including systems like Gospel, Lavender, and Where's Daddy, which enable algorithmic targeting of individuals with minimal human oversight. These systems have been used not only to kill low-level suspects but often their family members, aid workers, and journalists, amounting to cold, calculated killings rather than accidental wartime casualties. The use of drones, AI-assisted decision-making, and biometric surveillance has turned Gaza into what was described as a "Palestinian Laboratory" where Israel tests and markets high-tech weaponry under real-world conditions. This normalization of automated, disproportionate, and dehumanizing warfare sets a dangerous precedent for future conflicts globally, eroding legal and moral boundaries meant to protect civilians (Gray, 2025).

To improve the strategic clarity and operational value of the recommendations, we have organized them into a phased framework that differentiates between immediate needs, medium-term recovery efforts, and long-term development objectives. This structure is intended to guide decision-makers in prioritizing actions based on urgency, feasibility, and interdependencies, ensuring a more coherent and impactful recovery process.

Immediate priorities involve life-saving interventions and the rapid stabilization of essential services. These include the provision of emergency humanitarian aid, such as food, clean water, shelter, and medical supplies, as well as the urgent restoration of critical infrastructure, particularly hospitals, electricity, and sanitation systems. Ensuring immediate access to food, healthcare services, and psychological support is essential to address the acute physical and mental health crises resulting from this war.

Medium- and long-term actions focus on rebuilding and resilience. In the medium term, efforts should prioritize the rehabilitation of education systems, the revitalization of local food systems and markets, and the restoration of basic public services, including transportation and waste management. These interventions are critical not only for restoring functionality but also for re-establishing community stability, generating livelihoods, and reducing dependence on external aid. Over the long term, the focus should shift toward institutional capacity-building, environmental rehabilitation, and sustainable development. This includes investments in renewable energy, climate-resilient infrastructure, and the integration of digital technologies, such as AI for health monitoring, blockchain for aid tracking, and digital platforms for remote education to enhance service delivery and governance.

These measures are essential for creating a foundation for long-term peace, self-reliance, and sustainable development in Gaza.

Ultimately, this study underscores the urgent need for sustainable peace in Gaza as a foundation for addressing its complex challenges. A future built on resilience, justice, and sustainability is possible only through global solidarity and a commitment to upholding human rights and environmental protections. By fostering collaborative efforts to mitigate the impacts of this conflict, the international community can play a crucial role in helping Gaza transition from a state of crisis toward a future of hope and stability.

In conclusion, efforts to rebuild the shattered systems in Gaza must address the structural inequalities and systemic injustices that existed before the current conflict. Proper recovery requires more than physical reconstruction; it demands a commitment to justice, dignity, and the protection of the rights of the Palestinian population. This paper has demonstrated how the compounding effects of environmental devastation, social collapse, and economic stagnation have dismantled the capacity of Gaza to achieve core SDG goals. Sustainable recovery is not feasible without ending the blockade, ensuring accountability for violations of international law, and recognizing the right of Palestinians to self-determination and equitable development. The crisis in Gaza highlights a broader failure by the international community to uphold its responsibilities to protect civilian populations and support just development pathways. Through investments in resilient infrastructure, the empowerment of local institutions, and the advancement of inclusive governance, the international community can contribute to building a future for Gaza and the Palestinian people grounded in peace, justice, and sustainable prosperity.

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