



Issue 24 | February 2025

# The EMPHNET Emergency Bulletin

## The Intersection of Climate Change, Conflict, and Migration: Emerging Health Risks in the Eastern Mediterranean Region (EMR)

The Eastern Mediterranean Region (EMR) stands at the crossroads of complex health challenges caused by conflict, migration, and climate change. This issue focuses on understanding these intersections and driving collective action to mitigate their impact.

### Conflict and Climate Change in the EMR: A Growing Public Health Crisis

Climate change remains one of the most significant global health threats of the 21st century, further exacerbated by human activities. Its effects are anticipated to worsen, particularly in conflict-affected regions. From 2007 to 2016, weather-related disasters surged by 46% compared to the previous decade, creating cascading impacts such as displacement and health crises.

This issue of the **EMPHNET Emergency Bulletin** focuses on the critical intersection of climate change, conflict, and migration—three key forces that are increasingly shaping public health challenges in the EMR. By bringing together insights from experts, this issue highlights the cascading impacts of these challenges and the urgent need for coordinated action to strengthen resilience and protect the health and well-being of the region's populations.

In the EMR, this challenge is compounded by ongoing conflicts. Wars in Gaza, Lebanon, and Sudan are severely weakening

health systems, making them more vulnerable to climate-induced disasters. Additionally, environmental risks contribute to 23% of the total disease burden in the region, leading to over 1 million premature deaths annually. Air pollution alone accounts for approximately 500,000 deaths, while unsafe water and sanitation account for 80,000 deaths each year<sup>1</sup>.

To address the combined challenges of climate change and conflict in the EMR, governments and stakeholders must prioritize climate adaptation in health policies and infrastructure. This includes focusing on primary healthcare, integrating renewable energy, ensuring access to clean water, and strengthening disease surveillance systems. Aligning with global frameworks, such as the Paris Agreement, and advancing cross-sector collaboration are essential to building resilience. By acting collectively, we can protect vulnerable populations, enhance health systems, and create a sustainable future for the region. By **Dr. Sayed Himatt, Public Health Specialist at EMPHNET**

<sup>1</sup>Al-Mandhari A, Al-Yousf A, Malkawi M, El-Adawy M. "Our planet, our health": saving lives, promoting health and attaining well-being by protecting the planet—the Eastern Mediterranean perspectives. *EMHJ*. 2022;28(4):247–8.

## How Overlapping Crises of Climate Change, Conflict, and Displacement are Reshaping Public Health Challenges in the EMR

As climate change, conflict, and mass displacement continue to escalate, the EMR is witnessing a surge in public health challenges. Increasingly, climate change, conflict, and migration are acting as threat multipliers, worsening public health outcomes. These factors independently and collectively undermine essential social determinants of health, such as food, water, and socioeconomic security. They also hinder access to adequate hygiene and sanitation, safe and affordable housing, and the availability of health, education, and social services. These crises are disproportionately impacting vulnerable populations, including refugees, internally displaced persons (IDPs), and marginalized communities.

Climate change alone is a critical driver of public health challenges in the EMR, a region warming at nearly twice the global average, thus making it one of the most climate-vulnerable areas. Rising temperatures, prolonged droughts, and extreme weather events such as floods and sandstorms have disrupted ecosystems, agricultural livelihoods, and water resources. Water scarcity, for example, a long-standing issue in the region, is also intensifying due to climate change. Countries like Morocco, Egypt, Sudan, Yemen, Jordan, Iraq, and Syria face acute water shortages that threaten hygiene and sanitation and the prevention of communicable diseases.

Meanwhile, the reduced crop yields in rural areas exacerbate food insecurity and malnutrition, particularly among children under five, pregnant women, and lactating mothers. Prolonged heatwaves also contribute to heat-related illnesses, cardiovascular diseases, and respiratory issues, all of which strain already overwhelmed healthcare systems. Climate change has also

heightened the risk of vector-borne diseases in the EMR, including malaria and dengue fever, as warmer temperatures and changes in precipitation patterns create ideal conditions for the proliferation of disease-carrying vectors such as mosquitoes. The spread of these diseases disproportionately affects displaced populations living in overcrowded and unsanitary environments.

Apart from the effects of climate change, decades of armed conflict in the EMR have severely weakened public health infrastructures, leaving millions without access to essential healthcare services. Countries such as Sudan, Syria, Yemen, Libya, Iraq, and Palestine have witnessed the destruction of hospitals, the loss of healthcare personnel, and disruptions in the supply of medicines and vaccines. In conflict zones, healthcare facilities are often targeted. This further compromises their ability to respond to health emergencies. Additionally, conflicts exacerbate existing health challenges by creating conditions conducive to the spread of infectious diseases, among other public health crises. In Yemen, for instance, the protracted civil war has led to the world's largest cholera outbreak, with over 2.5 million suspected cases since 2016. In Syria, years of conflict have resulted in the resurgence of diseases such as polio and measles.

Moreover, the psychological effects of armed conflict pose another critical public health challenge. Mental health disorders, including post-traumatic stress disorder, anxiety, and depression, are prevalent among conflict-affected populations. Yet mental health services remain severely underfunded and inaccessible in displacement camps where conflict-affected persons seek safety. When climate change and

conflict act concurrently, mental health issues may be further exacerbated. In Somalia, for example, IDPs and refugees have reported significant trauma due to forced displacement resulting from the combined effects of drought and conflict.

These examples highlight how interactions between climate change and conflict in the EMR can act as co-drivers of migration, displacement, and associated public health consequences. Indeed, as global warming intensifies, climate change and conflict are interacting in complex ways, thus creating a vicious cycle that amplifies migration and displacement. Rising temperatures, unpredictable weather patterns, and resource depletion, such as diminishing water supplies and arable land, intensify competition for scarce resources. This escalates tensions and turns them into violent conflicts. In Sudan, for example, instances of cattle raiding have become common as pastoralists seek to compensate for drought-related herd losses.

In fragile settings, such conflicts catalyze significant displacement as individuals are forced to migrate in search of safety and stability. At the same time, climate-induced disasters like floods, droughts, and storms exacerbate existing vulnerabilities, further straining social cohesion and governance. Displaced populations face heightened risks, including loss of livelihoods, inadequate access to healthcare, and political marginalization. Yemen, for example, has become a major migratory route linking the Horn of Africa to the Gulf countries. It has also seen a surge in migration in recent years. Several concerning health risks have been documented among migrants following this route, including unsafe transportation, extreme exposure to environmental



elements, deprivation of food, water, shelter, sanitation, and healthcare, as well as violence, torture, drowning, accidents, and extortion.

The potential for interactions at this nexus to amplify public health challenges among migrants and displaced populations is a critical concern in the EMR, as it already hosts one of the largest displaced populations globally. Many refugee camps and informal settlements in the region lack adequate healthcare facilities, clean water, and sanitation systems, creating a fertile ground for disease outbreaks. Meanwhile, systemic barriers such as political instability, corruption, and weak governance have long hindered effective public health interventions in the region, while the lack of reliable data on health outcomes and population movements has hampered evidence-based decision-making and resource allocation.

Addressing these challenges requires a coordinated and multi-sectoral approach. Governments, international organizations, and local stakeholders must collaborate to transcend traditional disciplinary boundaries and build migrant-inclusive, climate-resilient health systems. Climate change adaptation measures, such as early warning systems for heatwaves and disease outbreaks, should be integrated into public health planning. Additionally, mental health services, particularly for conflict-affected and displaced populations, should be significantly

scaled up to meet the growing needs of vulnerable groups.

Moreover, ensuring that displaced populations are included in national healthcare systems and social protection programs is vital for reducing health disparities. Given the transboundary nature of these challenges, regional cooperation is essential and should include sharing resources, data, and expertise to address shared health risks. Additionally, digital health tools, mobile clinics, and telemedicine can improve healthcare delivery in remote and conflict-affected areas, while innovative financing mechanisms, such as climate adaptation funds, can also support public health initiatives.

In conclusion, given the complex interplay of climate change, conflict, and displacement in the EMR, and the interconnected pathways by which they amplify health challenges in the region, coordinated and interdisciplinary responses have become a pressing public health imperative. Only through unprecedented regional effort, cooperation, and resource mobilization to address issues at the climate-conflict-displacement nexus can the EMR pave the way for more equitable and sustainable health outcomes while avoiding the most catastrophic impacts of climate change. – By **Ms. Hannah Marcus, the co-chair for the World Federation Public Health Association (WFPHA) Environmental Health Working Group.**

# The Environmental Impact of Conflict and Displacement in Khartoum

This section presents the findings of a study that is designed to analyze the environmental effects of conflict and displacement in Khartoum, focusing on the relationship between Land Surface Temperature (LST) and the Normalized Difference Vegetation Index (NDVI) from 2020 to 2024. Using satellite data from Landsat 8 and 9, the study analyzes temperature and vegetation changes to assess the impact of displacement on climate resilience and environmental degradation in the region.

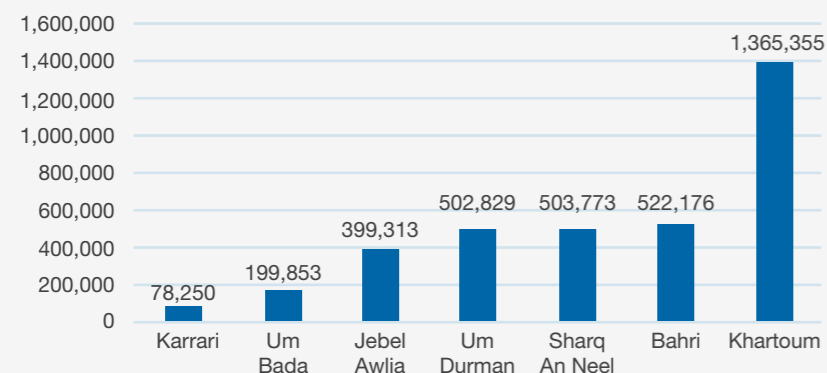
## Key Findings

### 1 Displacement in Khartoum (2020-2024):

The ongoing conflict in Sudan has led to widespread displacement, affecting over 3 million people in Khartoum alone. As displaced populations relocate to both urban and rural areas, local resources are stretched, exacerbating the humanitarian crisis. The following breakdown shows the distribution of IDPs in Khartoum's localities:

Locality	IDPs
Kerreri	78,250
Um Badda	199,853
Jebel Awliya	399,313
Um Durman	502,829
Sharg Al Neil	503,773
Bahri	522,176
Khartoum	1,365,355
<b>Total</b>	<b>3,571,549</b>

IDP by Locality of Khartoum State



Source: IOM DTM : <https://storymaps.arcgis.com/stories/9ab6d7999c434eaa8dbf1734d515de72>

### 2 LST and NDVI Trends (2020-2024):

- Land Surface Temperature (LST): The study observed a cooling trend in suburban and rural areas of Khartoum, with temperatures decreasing by 31% in rural areas and 28% in suburban zones. This cooling effect contrasts with the typical urban heat island phenomenon and is linked to land restoration efforts and increased green spaces.
- Normalized Difference Vegetation Index (NDVI): The NDVI revealed a positive shift in vegetation cover, particularly in rural and peripheral areas, where vegetation health improved by 14%-20%. However, urban areas saw a decline in vegetation, driven by rapid urbanization and infrastructure expansion.

### 3 Correlation Between LST and NDVI:

- In 2020, areas with denser vegetation (higher NDVI) exhibited lower temperatures (LST), demonstrating the cooling effects of vegetation.
- By 2024, this relationship became even more pronounced, with both rural and urban areas experiencing cooler temperatures due to an increase in green spaces and vegetation, particularly in urban settings.

### 4 Environmental and Displacement Implications:

- The cooling effect in peripheral areas and the overall improvement in vegetation can be partly attributed to the displacement of populations, which led to land restoration and more green space in previously urbanized zones. However, the steady increase in population, particularly in urban areas, continues to strain resources and reduce available green space, which in turn contributes to rising temperatures.
- These findings highlight how Khartoum's environmental landscape is shifting due to conflict and displacement. The data indicates that the integration of green spaces and sustainable land management can enhance climate resilience while addressing the challenges faced by displaced communities.

## Methodology and Analysis

The study utilized satellite imagery to track changes in LST and NDVI from 2020 to 2024. A flowchart detailing the methodology outlines the process from data collection to analysis, including LST and NDVI calculations, change detection, and the merging of the data for comprehensive insights. Additionally, a displacement map was created to visualize the movement of populations within Sudan, focusing on shifts from Khartoum to other regions.

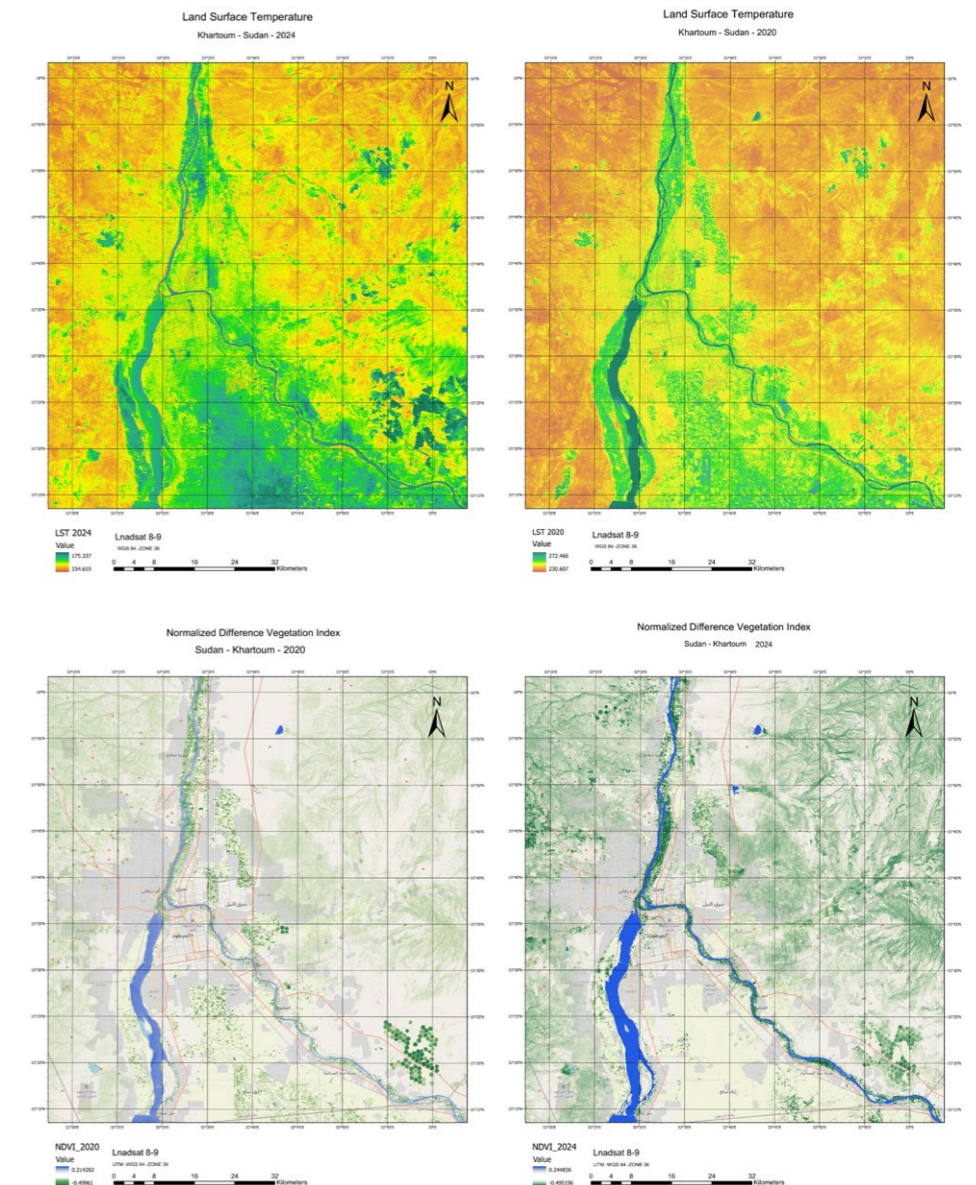
These findings offer critical insights into the interconnectedness of conflict, displacement, and environmental resilience. By understanding these dynamics, the study provides valuable information to guide future efforts in mitigating climate-related risks and supporting displaced populations.

## Conclusions

**Improvement in Vegetation Due to Displacement:** The large-scale displacement of people in Khartoum due to the conflict has led to changes in land use. The reduction in population density in some areas has allowed for the restoration and improvement of vegetation. Areas that saw an increase in green spaces benefited from the return of lands that were previously used for construction or intensive agriculture.

**Decrease in Temperature:** With the increase in vegetation in rural and peripheral areas, a decrease in land surface temperature was observed. Plants act as a natural buffer, helping to reduce the impact of high temperatures. Additionally, the displacement of populations contributed to a reduction in carbon dioxide emissions due to the halt of factories and a decrease in car movement, which helped lower levels of thermal pollution.

**Positive Environmental Impact of Displacement:** Despite the negative social impacts of displacement and war on the human community, displacement has indirectly contributed to improving the environmental situation in certain areas through increased green spaces and reduced pollution levels. This has helped lower temperatures and improve environmental quality. – By **Mr. Mohamed Al Kamel, Senior GIS Analyst**



## Climate, Health, and Mobility in the EMR

Climate change remains one of the most significant challenges in the EMR. Climate change is not a new phenomenon in the EMR. Researchers note that the region has experienced nine major climatic shifts over the past 15,000 years, or since the end of the last ice age! However, what distinguishes the current shift is that it is largely driven by human actions and activities. Our region is experiencing significant climate variability and extremes that are unprecedented in our lifetime. In fact, it is projected to be one of the hardest to be hit by climate change in the coming years. This escalating climate variability threatens livelihoods, safety, and overall stability.

This article highlights the pressing issues of climate change and its effects on health, as well as human mobility and immobility in the EMR. Addressing this regional challenge requires a holistic approach that encompasses global, regional, national, and community-level actions. We must identify targeted strategies to mitigate and adapt to the multifaceted challenges posed by climate change.

At the global level, fostering international collaboration is essential to support the EMR in building climate-resilient health systems. The World Health Organization's (WHO) proposed regional framework for action aims to prioritize health in climate change policies, to engage the health sector in supporting climate action across various sectors, and to improve access to climate change funding. Additionally, the Union for the Mediterranean (UfM) has emphasized that current mitigation and adaptation efforts in Mediterranean countries are insufficient, highlighting the need for enhanced regional cooperation to ensure livable futures.

Developing and implementing policies that integrate climate adaptation into public health systems at the national level will enhance disease surveillance for climate-sensitive diseases, strengthen health infrastructure to adapt to extreme weather events, and promote sustainable urban planning. For example, urban centers like Amman, Jordan, face compounded challenges from rapid urbanization and climate change, requiring investments in climate-resilient infrastructure and effective waste management systems. Community engagement is also crucial, as local populations should be empowered to participate in climate-resilient solutions, such as community-based water conservation projects and public awareness campaigns. These grassroots efforts do not only build resilience, but they also ensure that adaptation strategies are culturally appropriate and widely accepted.

Below are key points summarizing critical issues surrounding climate change in the region:

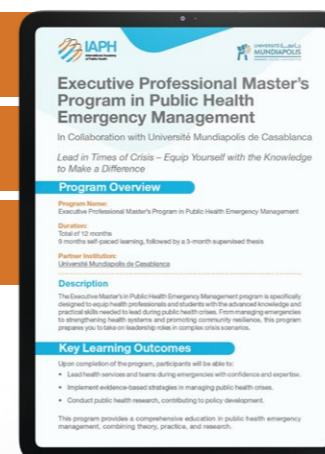
- **Impact of Climate Change:** The EMR is witnessing tangible effects such as water scarcity, increased high-heat days, humidity extremes, dust storms, coastal flooding, sea level rise, desertification, and biodiversity loss. Most of these changes have significant implications for human health.
- **Human Mobility and Immobility:** Understanding the interplay between climate change and factors like health, conflict, and governance is essential for comprehending human movement and settlement patterns. However, comprehensive research is needed to investigate these dynamics more thoroughly.

- **Community Resilience:** Many individuals choose to remain in their communities, demonstrating resilience unless their safety or livelihoods are severely threatened. This preference highlights the importance of familiar environments when evaluating migration trends and raises the question: what health impacts need to be addressed as climatic conditions worsen?
- **National Responses:** Climate adaptation strategies often lack prioritization at the national level across many countries in the EMR. Without prompt action, these shortcomings could exacerbate issues related to displacement and resource allocation.
- **Socioeconomic Disparities:** The impacts of climate-induced mobility vary significantly among different socioeconomic groups, revealing substantial inequalities both within and between countries. Addressing these disparities is crucial for effective adaptation measures.
- **The Need for Research:** The absence of disaggregated data on the impacts of climate change and mobility, particularly regarding human health, can lead to misunderstandings. Enhanced research is needed to shape policies and programs tailored to the unique needs of affected communities.
- **Integrating Health and Mobility into Climate Strategies:** There is an opportunity for nations to incorporate health and human mobility considerations into their climate strategies. This integration is vital for devising effective solutions to climate-related challenges.

The intricate relationship between health, climate change, and human mobility in the EMR deserves greater attention. We invite you to further explore and discuss these urgent topics. – By **Mr. Mohammad T. Asfour, Global Green Strategist**

## Get Involved: Inspiring Action and Sharing Knowledge

Take your knowledge to the next level with the International Academy of Public Health (IAPH)! Explore Its Master's Program, Diploma, and several courses [Here](#)

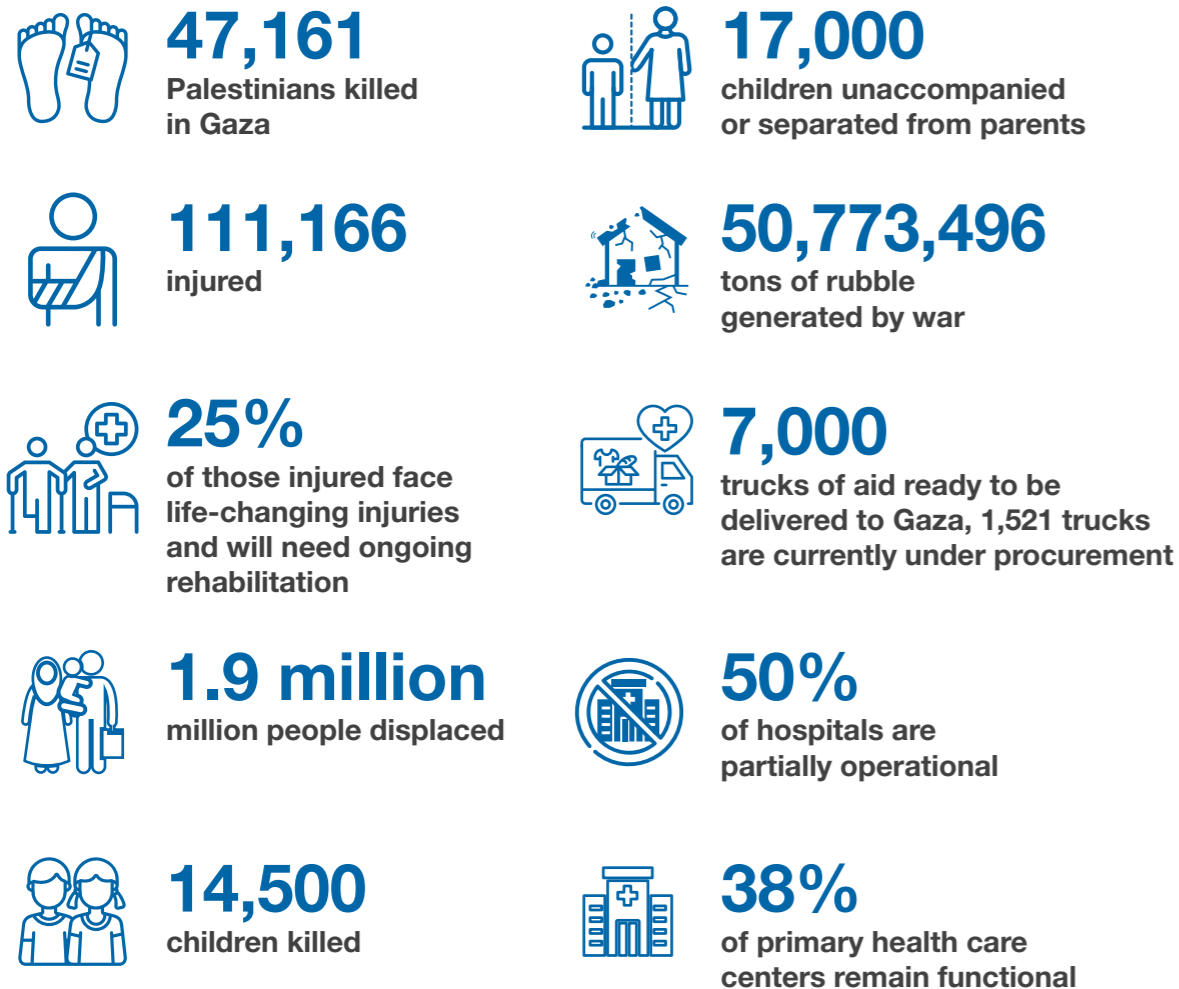


# In Numbers

In our turbulent world, crises have become a constant reality for communities across the EMR and beyond. These crises, ranging from natural disasters to man-made emergencies driven by war and conflict, take a significant toll on healthcare systems and the health of populations. More critically, they contribute to the collapse of health infrastructure, with climate change exacerbating the situation further. This section provides an overview of alarming statistics, along with suggestions for further reading.

## Gaza

After the implementation of a ceasefire in Gaza, these numbers highlight the effects of the war:



## Sudan

As access to Gezira state and other areas in Sudan has been secured, the Sudan Federal Ministry of Health (FMOH) and other agencies are currently assessing the needs in these areas, including the anticipated return of displaced populations. They are addressing health concerns such as shortages of healthcare centers and workers, damage to hospitals, and limited access to medical care and essential health services for vulnerable groups. Recommendations include scaling up support for health facilities and advocating for timely access to humanitarian assistance. Recommendations include scaling up support for health facilities and advocating for timely access to humanitarian assistance.

## Lebanon



## Syria



## References

- <https://applications.emro.who.int/EMHJ/V28/04/1020-3397-2022-2804-247-248-eng.pdf>
- <https://www.unicef.org/press-releases/statement-unicef-executive-director-catherine-russell-announcement-ceasefire-gaza>
- <https://reliefweb.int/report/lebanon/lebanon-flash-update-55-escalation-hostilities-lebanon-16-january-2025>
- <https://reliefweb.int/report/syrian-arab-republic/unhcr-regional-flash-update-8-syria-situation-crisis-2-january-2025>
- <https://www.unrwa.org/resources/reports/unrwa-situation-report-156-situation-gaza-strip-and-west-bank-including-east-jerusalem>
- <https://www.who.int/news/item/19-01-2025-the-ceasefire-in-gaza-brings-hope--but-immense-challenges-lie-ahead-to-restore-the-health-system>
- <https://reliefweb.int/report/occupied-palestinian-territory/humanitarian-situation-update-259-gaza-strip-enarhe>