

The Impact of the Environmental Crisis on Children's Resilience Development in the Gaza Strip During the War Beginning on October 7, 2023

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THE IMPACT OF THE ENVIRONMENTAL CRISIS ON CHILDREN'S RESILIENCE DEVELOPMENT IN THE GAZA STRIP DURING THE WAR BEGINNING ON OCTOBER 7, 2023

Abstract

This study explored the impact of the environmental crisis on children's resilience development in the Gaza Strip during the ongoing war. A mixed-methods approach was used, combining quantitative and qualitative data collection methods. The sample included 406 children (317 participated in questionnaires and 89 in arts workshops), 118 caregivers, and 17 psychologists and teachers from 14 shelters across Gaza governorates. The study examined three main questions: (1) What are the key environmental challenges faced by internally displaced children in Gaza, particularly in IDP shelters? (2) How do these environmental conditions affect children's mental health and psychosocial well-being? and (3) What is the relationship between exposure to environmental crises and the development of resilience among displaced children?

The findings showed that children were exposed to severe and continuous environmental hazards, including overcrowding, unsafe water and sanitation, pollution, noise, heat, and unstable shelter conditions. These challenges were strongly associated with high levels of trauma symptoms, anxiety, depression, sleep disturbances, emotional dysregulation, and social withdrawal. At the same time, the findings indicated that despite these adversities, children demonstrated emerging forms of resilience through play, artistic expression, peer connection, and supportive relationships with caregivers and educators. The study highlights both the profound psychological impact of environmental deprivation and the critical role of protective psychosocial factors in sustaining children's adaptive capacities.

Key words: Early childhood development; environmental crisis; forced displacement; child resilience; psychosocial well-being; trauma; armed conflict; Gaza Strip; internally displaced children; humanitarian shelters

1. Introduction

Armed conflict increasingly intersects with environmental collapse, producing complex humanitarian emergencies that disproportionately affect children. In war settings, environmental degradation, manifested through unsafe water, sanitation breakdown, air pollution, overcrowding, and infrastructure destruction, becomes both a physical and psychological threat. Children, whose development depends on safety, stability, and supportive caregiving environments, are especially vulnerable to such conditions. Research from conflict-affected and climate-impacted contexts consistently demonstrates that prolonged exposure to environmental hazards is associated with trauma symptoms, anxiety, sleep disturbances, behavioural dysregulation, and impaired social functioning, while simultaneously shaping fragile forms of survival-based resilience.

The Gaza Strip represents one of the most extreme contemporary examples of the intersection between armed conflict and environmental collapse. Following the war that began on October 7, 2023, more than 1.9 million people were forcibly displaced, most of them children, and pushed into overcrowded shelters, tents, and damaged buildings with minimal access to clean water, sanitation, electricity, healthcare, or safe play spaces. The destruction of infrastructure, fuel shortages, waste accumulation, sewage overflows, and air pollution from debris and plastic burning transformed displacement sites into environments of chronic ecological and psychological stress. For children, these conditions are not merely contextual hardships but daily realities that shape emotional security, cognitive functioning, physical health, and long-term developmental trajectories.

While existing literature on Gaza has extensively documented war-related trauma and mental health outcomes among children, far less attention has been given to how environmental degradation within displacement settings interacts with psychological distress and resilience development. Moreover, many studies treat trauma exposure and environmental deprivation as separate phenomena rather than examining their compounded effects on children's well-being and adaptive capacities. Understanding this relationship is particularly important for younger children aged 5–8 years, whose emotional regulation, sense of safety, and coping systems are still developing and are especially sensitive to environmental instability.

This study examined how environmental crises in internally displaced persons (IDP) shelters in Gaza affect children's mental health, psychosocial well-being, and resilience development. Using a mixed-methods approach integrating quantitative surveys with children and caregivers, qualitative interviews with psychologists and teachers, and participatory analysis of children's drawings, the study captured both measurable psychosocial outcomes and children's symbolic expressions of distress, fear, hope, and adaptation. By situating children's resilience within an ecological and trauma-informed framework, the research contributes evidence supporting humanitarian, educational, and psychosocial interventions that address not only war-related trauma but also the

environmental conditions that perpetuate children's suffering and shape their survival-based coping strategies.

Overall, the findings demonstrate that children's resilience in Gaza should not be interpreted as immunity to harm but rather as an adaptive response to prolonged environmental adversity. Improving shelter conditions, water and sanitation systems, and access to safe learning and play environments is therefore not only a humanitarian necessity but also a psychological imperative for protecting children's development and long-term well-being in one of the world's most protracted conflict settings.

2. Background

2.1. Historical Context of Displacement

The Palestinian territories in the West Bank, Jerusalem, and Gaza Strip have a unique context shaped by prolonged displacement, challenging shelter conditions, and heightened vulnerability among children, women, and other vulnerability groups. The Palestinian people have experienced ongoing displacement since 1948, and they continue to suffer from a deeply rooted, chronic crisis caused by successive wars and forced displacements. Over the past 70 years, the Palestinian refugee situation has undergone several significant phases and turning points. Since 1948, the United Nations has played a central role in addressing this crisis, with UNRWA (the United Nations Relief and Works Agency for Palestine Refugees in the Near East) being one of the most active humanitarian actors.

2.2 The Role and Challenges and Restrictions on Humanitarian Access

In recent years, UNRWA has come under increasing pressure from the Israeli authority. During the opening plenum session of the Knesset's winter legislative session, MKs voted 92 to 10 to approve a law barring UNRWA from operating in Israeli territory, and 87-9 in favour of another measure curtailing UNRWA's activities in the Gaza Strip and the West Bank by banning state authorities from having any contact with the agency. The restrictions on humanitarian interventions and the targeting of humanitarian workers in the Gaza Strip—especially during the war that began on October 7—have had a significant negative impact on the Palestinian people, particularly children, women, and other vulnerable groups. Where providing the humanitarian interventions including; food, WASH, health, cash and non-food items are restricted and suspended totally in after the second ceasefire in March 2024. "[Israeli](#) forces have carried out at least eight strikes on aid workers' convoys and premises in [Gaza](#) since October 2023, even though aid groups had provided their coordinates to the Israeli authorities to ensure their protection."

2.3. Collapse of Shelter and Essential Services

The shelter conditions in Gaza during the war that started on October 7 became very bad. There was a serious public health crisis. Shelters were overcrowded. The air and land were polluted. There was not enough food, clean water, or basic services. People had little or no access to healthcare,

electricity, communication, or fuel. Because of the fuel shortage, many people burned plastic to cook. Others cut down trees for firewood. Farmland was also reduced. Many farming areas were marked as red zones or evacuation zones and were hit by airstrikes and military actions. Forensic-architecture organization mentioned that “Israel’s ground invasion has advanced over nearly 50 percent of Gazan farms and orchards. We used remote sensing to measure the scale of agricultural destruction resulting from this military activity, by comparing the region’s ‘vegetation index’ (an indicator of the health and robustness of plant life, measured by analysing satellite imagery) before and after the invasion. This comparison reveals that as of March 2024, of the agricultural areas targeted, approximately 40% of the land in Gaza previously used for food production has been destroyed.



Figure 6. NDVI analysis shows areas covered with vegetation. Map (left) shows plant life in Gaza in February 2021, and map (right) shows plant life in February 2024. Cloud free mosaics of Sentinel-2 satellite data between 20 January and 8 February of 2021 and 2024 is used as the bases of this NDVI study. (Forensic Architecture)

2.4 Forced Displacement and Makeshift Solutions

Internally displaced persons (IDPs) have been forced to relocate multiple times across different areas, often without access to basic livelihood necessities. After break down the second ceasefire, people began producing fuel and electricity by processing large amounts of plastic, due to the ongoing ban on importing solar systems and related devices. This desperate measure emerged as all border trade and humanitarian aid crossings remained completely closed. (According UNRWA) the resumed bombardment and the lack of access for humanitarian supplies are further deteriorating an already dire situation, impacting the humanitarian actors’ ability to respond to the food, water, sanitation, shelter, and other needs of the population.

2.5. Pre-October 7 Conditions for Children and Environmental Hazards and Child Vulnerability

Before October 7th, 2023, children in the Gaza Strip who make up 0.9 million of 2.1 million population. They were already suffering from poverty, limited access to basic services including healthcare and mental health support, poor education quality, and food insecurity due to the ongoing siege. A significant number of children were affected by malnutrition and inadequate feeding programs. In just sample 1,800 children in Gaza city were admitted for nutritional treatment and management of wasting, growth faltering, and anaemia. Access to clean water was also severely limited. The environmental crisis has had a significant impact on children, particularly those living near random

waste dumps, close to valleys and areas of armed activity. They have also been affected by wastewater flooding, a severe lack of adequate shelters, and poor insulation. In some areas, children were directly exposed to floods and extreme weather conditions. Each winter, the coldest days and each summer, the hottest days, have resulted in the deaths of infants due to exposure to harsh temperatures. According to ANERA Gaza situation report on flooding in 2022 “During the winter season, hundreds of locations across Gaza experience extensive flooding due to heavy rains combined with insufficient stormwater collection systems. Flooding damages houses, closes roads, and prevents children from playing outside or reaching schools. The flood water often stagnates and becomes contaminated, exposing communities to waterborne illnesses”

This situation left children in extremely high-risk conditions and exposed them to a worsening health crisis in the Gaza Strip even before October 7th, 2023. The situation deteriorated further throughout 2023, 2024, and into 2025, as children continued to suffer from the destruction of the remaining essential services and facilities in their lives.

3. Statement of the Problem

3.1 Displacement After October 7, 2023

After October 7, 2023, at least 1.9 million people (about 9 in 10 residents across the Gaza Strip) became internally displaced. This percentage is including many who have been displaced multiple times (UNRWA, 2024). These internally displaced persons (IDPs) were forced to seek refuge in overcrowded shelters. They were hastily constructed to meet urgent needs.

3.2 Rafah Under Pressure

A significant number of people were displaced to Rafah. Rafah's infrastructure was originally designed to accommodate around 200,000 people. During the conflict, Rafah's population surged dramatically, hosting approximately 75% of Gaza's total population of 2.3 million. According to UNRWA estimates, more than half of these individuals were children. They faced critical shortages of food, water, shelter, and medical supplies. Intense fighting around Khan Younis has continued to drive thousands more into Rafah. Rafah was already overwhelmed and hosting more than half of Gaza's population. Most people were living in makeshift structures, tents, or in the open air (UNRWA, 2024).

3.3 Shelter and WASH Conditions

Shelters across the Gaza Strip have had been suffering from severe shortages of essential services, including shelter space, food, healthcare, and Water, Sanitation, and Hygiene (WASH) services. The majority of IDP households are living in overcrowded conditions, with an average of 4.1 persons per room. Approximately 72.3% of households are residing in shelters or makeshift tents, while only 11.5% have access to temporary housing with basic amenities. Access to clean water, sanitation, and electricity is extremely limited. 68.7% of households report having no access to clean drinking water, and 82.1% lack access to adequate sanitation facilities.

3.4. Children's Vulnerability

Until the recent days the Children are among the most vulnerable groups. They are exposed to mental and physical health problems due to environmental crises resulting from war and displacement. The Children face poor hygiene conditions, flooding from wastewater, and exposure to significant amounts of solid waste. The ongoing crisis has severely impacted mental health in Gaza of its population, particularly affecting children and young people. Children make up 65% of residents. Even before recent events, studies indicated that over half of Gaza's children experienced Post-Traumatic Stress Disorder (PTSD). The current situation of displacement and loss has made the mental health of Gaza's people worse. Out of 2.1 million people, two-thirds are refugees and many are deeply affected. Around 40% of Gaza's population are children under the age of 15, and 60% are refugees.

3.5. The Problem

Children in the Gaza Strip are facing severe environmental crises during the ongoing war, particularly while living in internally displaced persons (IDP) shelters. These conditions include the accumulation of solid waste, contaminated water, air pollution, electricity shortages, and limited access to clean water. Such environmental hazards have a profound impact on children's mental health and resilience, raising urgent concerns about their immediate well-being and long-term development.

3.6 Significance

Environmental crises themselves have a significant impact on human life everywhere, especially during wars and conflicts. In such situations, civilian agencies, governmental operations, and non-governmental organizations are often disrupted. Supply chains are cut off, humanitarian aid workers are targeted, infrastructure is damaged, and movement becomes extremely dangerous. Even this happens everywhere the targeted humanitarian workers, civilian people and children represented the highest rate in the modern age of civilian victims during the wars. Since 7 October 2023, at least 430 aid workers, including 305 UN staff, have been killed. This includes 151 female and 276 male aid workers, as of the end of April 2025. Moreover, MoH has reported that more than 1,400 healthcare workers have been killed. In this context the humanitarian operation to decrease the environmental crisis impacts are restricted and suspended in the complex chronic situation. The children are one of the most vulnerable affected group of this war. After nearly 18 months of war, more than 15,000 children have reportedly been killed, over 34,000 reportedly injured, and nearly one million children repeatedly displaced and deprived of their right to basic services. These factors, among others, contribute to worsening conditions. Internally displaced persons (IDPs), particularly children, are among the most affected. The crisis severely impacts children's physical health and hinders the development of their resilience.

The ongoing war in the Gaza Strip is closely linked with environmental degradation and climate change, both of which significantly affect children across multiple dimensions. This study focuses

specifically on the impact of these conditions on children's resilience development. The first-ever expert dialogue on the disproportionate effects of climate change on children, mandated by the Global Stocktake, emphasized the importance of integrating children's concerns into national frameworks—particularly through Nationally Determined Contributions (NDCs) and National Adaptation Plans (NAPs). This includes embedding child-rights commitments not only within critical social sectors such as health, education, and Water, Sanitation, and Hygiene (WASH), but also within disaster risk reduction, energy, and social protection strategies. Such integration is vital for strengthening climate resilience in education systems to ensure continued access during extreme weather events, improving health systems' capacity to respond to climate-related diseases, and enhancing WASH infrastructure and services. These measures are essential for supporting and improving children's resilience, especially in conflict-affected areas like Gaza.

Failing to implement effective interventions to mitigate the negative impacts of environmental crises on children's resilience will pose a serious and long-term challenge to their mental health and psychosocial well-being in the Gaza Strip. Without timely and targeted support, these children risk facing lasting emotional, cognitive, and developmental consequences.

4. Purpose of Study

Despite global awareness of the increasing vulnerability of children in conflict zones, severe environmental crises persist in the Gaza Strip, especially following the displacement of over 1.9 million residents after October 7, 2023. This issue is significant because it directly

endangers the mental health, physical well-being, and resilience of displaced children, who are living in overcrowded, unsanitary shelters without access to basic services such as clean water, sanitation, electricity, or medical care. Current efforts to address these challenges remain limited due to ongoing conflict, restricted humanitarian access, and the collapse of critical infrastructure. Therefore, this study purpose to explore how the compounded effects of environmental crises in IDP shelters impact children's resilience and mental health in Gaza strip, and to identify potential protective factors or intervention strategies that could mitigate these effects in the current emergency context.

Research Questions

- **What are the key environmental challenges faced by internally displaced children in Gaza, particularly in IDP shelters?**

(Focus: exposure to solid waste, contaminated water, air pollution, lack of electricity and clean water.)

- **How do these environmental conditions impact the mental health and psychosocial well-being of displaced children?**

(Focus: trauma, anxiety, PTSD, depression, stress.)

- **What is the relationship between exposure to environmental crises and the development of resilience in displaced children in Gaza?**

(Focus: coping mechanisms, emotional regulation, adaptive behaviours.)

5. Literature Review

5.1. Responding to the Impacts of the Climate Crisis on Children and Youth

Sanson, A., Van Hoorn, J., & Burke, S. (2019): Published in *Child Development Perspectives*, this review examines how climate change affects the physical and psychological well-being of children and youth, particularly in low- and middle-income countries.

Key Themes and Findings

- **Physiological Vulnerability:** Children are biologically more sensitive to climate-related stressors, with increased risk of malnutrition, respiratory illness, and infectious diseases.
- **Mental Health Impacts:** Exposure to climate crises can result in PTSD, anxiety, and eco-distress, especially in unstable environments.
- **Global South Disparity:** Impacts are more severe in regions with poverty and poor infrastructure, limiting mitigation capacity.
- **Resilience and Youth Participation:** The authors emphasize the need for resilience-building through climate education and youth civic engagement, though existing initiatives lack broad implementation and rigorous evaluation.

Relevance to the Current Study

This review offers a global framework for understanding children's climate-related vulnerabilities, supporting the need for targeted psychosocial interventions. However, it lacks focus on conflict-affected areas like Gaza, where environmental degradation is compounded by political violence and siege. The present research builds upon this by localizing the issue, focusing on how these compounded crises affect the resilience and development of internally displaced children in Gaza.

5.2 Psychological Impact of Political Conflict on Palestinian Children and Adolescents

Thabet, A. (2017): This paper synthesizes a decade of research (2007–2017) on trauma, mental health, and coping among Palestinian children under occupation and siege in Gaza and the West Bank.

Key Themes and Findings

- **High Prevalence of Mental Health Issues:** PTSD rates in Gaza ranged from 10% to 71%, with over 40% of children—especially orphans, child labourers, and those near conflict zones experiencing depression or anxiety.

- **Risk and Protective Factors:** Family violence, poverty, and lack of social support exacerbate trauma, while resilience is often sustained through religious faith, familial bonds, and community solidarity.
- **Service Gaps:** While trauma is well-documented, few interventions are rigorously evaluated, and there's limited data on long-term program efficacy.

Relevance to the Current Study

Thabet's work offers valuable context on the psychological burden of conflict on Palestinian youth. However, it lacks systematic analysis across subpopulations and does not fully explore the intersection of environmental collapse and displacement. The current study builds on these insights by adopting a trauma-informed, ecological perspective to investigate how war, displacement, and environmental precarity intersect to shape child development and resilience in Gaza.

5.3. Health and Environmental Impacts of the 2023–2024 Gaza Conflict

Dardona, A., Amane, M., Dardona, H., & Boussaa, D. (2025): Published in *One Health Bulletin*, this review documents the compounded health and environmental effects of the 2023–2024 war on Gaza.

Key Themes and Findings

- **Multidimensional Crisis:** The war intensified displacement, collapsed health systems, and worsened environmental degradation—leading to sewage overflow, water contamination, and disease outbreaks.
- **One Health Perspective:** The authors highlight how environmental destruction directly harms population health, framing the crisis as interconnected across human, ecological, and infrastructural domains.
- **Data and Methodology:** Drawing from NGO reports, satellite imagery, and field photos, the study provides urgent local insights, though it lacks systematic methodology and demographic breakdowns.
- **Limitations:** Heavy reliance on anecdotal and non-peer-reviewed sources, combined with occasional grammatical and formatting inconsistencies, weakens academic rigor.

Relevance to the Current Study

This review deepens the understanding of how environmental collapse exacerbates humanitarian crises in Gaza. By integrating local narratives and real-time evidence, it captures the immediacy of unfolding health hazards. The current study builds upon this by analysing how environmental destruction and public service breakdown compound psychosocial trauma and disrupt child development—especially among internally displaced children—using an ecological, trauma-informed framework.

Gaps in the Literature

Despite an increasing global focus on the intersection of climate change, conflict, and child development, several critical gaps remain unaddressed in the existing literature.

1. Few studies directly examine how environmental crises- such as solid waste accumulation, water contamination, air pollution, and electricity shortages- affect the resilience development of children in active war zones like Gaza.
1. Most existing research isolates mental health impacts of trauma or environmental degradation but rarely addresses their combined, compounding effects on displaced children's psychological well-being and adaptive capacity.
2. Research in Gaza has largely focused on PTSD and generalized mental health outcomes, with attention paid to protective resilience factors (e.g., coping strategies, family dynamics, community support) in relation to environmental hardship.
3. There is a significant gap in identifying or proposing context-appropriate, field-adapted intervention strategies that can be realistically implemented under prolonged siege, war and humanitarian access restrictions.
4. There is also a significant research gap regarding how shelter-related environmental crises-such as overcrowding, poor sanitation, and lack of safe play spaces-specifically affect the mental health and resilience development of children aged 5 to 8 years.
5. A gap in research exists regarding the most effective group-based well-being interventions in the field to mitigate the impact of the environmental crisis on children aged 5–8 years during the war.

Gaps in the Literature

- **Identification of Key Environmental Hazards in IDP Shelters:** The study will provide a detailed mapping of the most critical environmental challenges affecting displaced children aged 5–8 years in Gaza, including high exposure to solid waste, unsafe drinking water, air pollution from burning debris, and the lack of basic services like electricity and clean water.
- **Analysis of the Psychosocial Impact of Environmental Deprivation:** Findings will illustrate a strong correlation between poor environmental conditions and heightened symptoms of trauma, anxiety, stress, depression, and early signs of PTSD among displaced children, affecting their emotional security and daily functioning.
- **Understanding the Role of Environmental Stressors in Shaping Resilience:** The research will explore how chronic exposure to environmental crises either hinders or, in some cases, shapes adaptive responses such as emotional regulation, stress coping, and the emergence of early resilience traits in children.

6. Methodology

6.1 Research Design

This study employed a mixed-methods research design to examine the impact of environmental crises on children's resilience development in the Gaza Strip during the war beginning on October 7, 2023. The study integrated quantitative and qualitative approaches to provide a comprehensive understanding of the environmental, psychological, and resilience-related experiences of internally displaced children living in shelters across Gaza.

The quantitative component focused on measuring the prevalence of environmental stressors, psychosocial symptoms, and resilience indicators among displaced children and caregivers. The qualitative component explored children's emotional experiences and coping mechanisms through drawings, participatory workshops, and semi-structured interviews with psychologists and teachers working in Temporary Learning Spaces (TLSs) and shelters.

The use of mixed methods allowed for triangulation of findings across multiple data sources, increasing the depth, validity, and contextual understanding of children's lived experiences during displacement and environmental collapse.

6.2 Study Setting

The study was conducted in 14 internally displaced persons (IDP) shelters and temporary learning spaces across several governorates in the Gaza Strip, including Gaza City, Middle Area, Khan Younis, Rafah, and North Gaza. These shelters included tents, damaged schools, temporary classrooms, and overcrowded collective shelters established during the ongoing war.

The environmental conditions within these settings were characterized by overcrowding, limited access to water and sanitation services, solid waste accumulation, air pollution, electricity shortages, flooding, and insufficient protection from heat and cold weather conditions.

6.3 Study Population and Sample

The study targeted displaced children aged 5–8 years, caregivers, and psychosocial and educational practitioners working in shelter-based environments.

A total of 541 participants were included in the study:

- 317 children participated in the quantitative questionnaire.
- 89 children participated in participatory drawing and arts workshops.
- 118 caregivers completed caregiver questionnaires.
- 17 psychologists, teachers, and psychosocial facilitators participated in semi-structured qualitative interviews.

Participants were selected using purposive and convenience sampling techniques due to the unstable security situation, repeated displacement, and restricted humanitarian access during the war.

Children included in the study were internally displaced and residing in shelters or temporary housing settings during the data collection period. Caregivers were selected from the same shelter communities, while psychologists and teachers were recruited based on their direct experience working with displaced children in educational and psychosocial support settings.

6.4 Data Collection Tools

6.4.1 Children's Questionnaire

A structured questionnaire was developed for children aged 5–8 years to assess:

- exposure to environmental stressors,
- emotional and behavioural responses,
- psychosocial wellbeing,
- coping strategies,
- and resilience-related behaviours.

The questionnaire included closed-ended questions using simplified response categories appropriate for children's developmental levels. Data collection was conducted with support from trained facilitators to ensure child-friendly communication and ethical engagement.

6.4.2 Caregiver Questionnaire

A second questionnaire was administered to caregivers to assess:

- shelter and environmental conditions,
- children's emotional and behavioural wellbeing,
- access to WASH services,
- coping mechanisms,
- and perceived resilience indicators.

The caregiver questionnaire provided additional contextual and observational perspectives regarding children's functioning within displacement settings.

6.4.3 Participatory Drawing and Arts Workshops

Four participatory drawing and arts workshops were conducted with 89 children. These workshops aimed to explore children's symbolic and emotional expressions related to:

- displacement,
- shelter conditions,
- environmental fears,
- safety,
- loss,
- hope,
- and resilience

Children were encouraged to freely draw their experiences and discuss their artwork in supportive group settings. The workshops also served as child-friendly psychosocial engagement activities.

6.4.4 Semi-Structured Interviews

Semi-structured interviews were conducted with 17 psychologists, teachers, and psychosocial facilitators working in shelters and temporary learning spaces.

The interviews explored:

- observed psychological impacts of environmental conditions,
- children's coping mechanisms,
- behavioural changes,
- resilience-building practices,
- and challenges affecting psychosocial support delivery in shelters.

Interviews were conducted in Arabic, documented through written notes and recordings when possible, and later transcribed for analysis.

6.5 Data Collection Procedures

Data collection was conducted between August 2025- Nov 2025 under emergency humanitarian conditions in Gaza. Due to ongoing displacement, insecurity, and infrastructure destruction, flexible field procedures were adopted.

Questionnaires were administered individually or in small groups inside shelters and temporary learning spaces. Drawing workshops were facilitated in safe child-friendly spaces whenever available. Interviews with practitioners were conducted face-to-face in shelters or remotely when field access was restricted.

All participants were informed about the purpose of the study, and verbal informed consent was obtained from caregivers and adult participants prior to participation. Assent procedures appropriate for children's ages and psychological conditions were also followed.

7. Data Analysis

Quantitative data were analysed using the Statistical Package for the Social Sciences IBM SPSS Statistics and Python-based statistical coding procedures.

Descriptive statistics, including frequencies, percentages, means, and standard deviations, were used to describe demographic characteristics, environmental conditions, psychosocial indicators, and resilience-related variables.

Pearson product-moment correlation analysis was conducted to examine the relationship between:

- environmental and shelter quality,
- children's wellbeing,
- and resilience development.

Reliability analysis was conducted using Cronbach's alpha to assess the internal consistency of study scales.

Qualitative data from interviews and drawing workshops were analysed using thematic analysis. Children's drawings underwent thematic visual coding to identify recurring emotional, environmental, and resilience-related themes, including symbols of fear, safety, instability, attachment, and hope. Interview transcripts were manually coded and reviewed independently by two coders to improve reliability and reduce interpretive bias.

The analysis process involved:

1. Familiarization with the data,
2. Initial coding,
3. Theme generation,
4. Theme review and refinement,
5. Interpretation of patterns across data sources.

Triangulation between questionnaires, drawings, and interviews was used to strengthen the validity and credibility of the findings.

7.1 Reliability and Validity

The study employed several strategies to enhance reliability and validity:

- pilot review of questionnaires by professionals in education and psychosocial support,
- use of multiple data sources,
- triangulation between quantitative and qualitative findings,
- independent coding procedures,
- and internal consistency testing using Cronbach's alpha.

The children's questionnaire demonstrated strong reliability for emotional and behavioural response items ($\alpha = .820$) and acceptable reliability for environmental stressor items ($\alpha = .708$). The caregiver questionnaire demonstrated acceptable to strong reliability across environmental and combined wellbeing scales.

7.2 Ethical Considerations

This study addressed sensitive issues affecting displaced children during ongoing armed conflict. Ethical principles were therefore prioritized throughout all stages of the research process.

Participation was voluntary, and participants had the right to withdraw at any stage. Confidentiality and anonymity were maintained by removing identifying information from data records.

Special care was taken to ensure that children were not exposed to retraumatization during data collection. Activities were conducted using child-friendly and trauma-informed approaches, and psychosocial facilitators were available during workshops when emotional distress emerged.

The research focused on minimizing harm while amplifying children's voices and lived experiences within the context of environmental crisis and war.

8. Results

8.1 Reliability of Study Questionnaires

8.1.1. Children's Questionnaire Reliability

The children's questionnaire demonstrated strong overall reliability. Section One (18 items measuring emotional and behavioural responses) showed high internal consistency ($\alpha = .820$; $N = 318$), with most items contributing adequately and no meaningful improvement observed through item deletion.

Section Two (16 items assessing environmental stressors) showed acceptable reliability ($\alpha = .708$; $N = 317$). Although one item demonstrated a negative correlation and several items showed weaker contributions, the scale remains suitable for analysis but may benefit from refinement in future studies.

8.1.2. Caregiver Questionnaire Reliability

The caregiver questionnaire also demonstrated acceptable to strong reliability. The full combined scale (14 items) showed good internal consistency ($\alpha = .786$; $N = 118$), improving to $\alpha = .811$ when the psychosocial intervention item was removed.

The environmental conditions subscale (8 items) showed good reliability ($\alpha = .765$), while the child wellbeing subscale (7 items) showed relatively lower reliability ($\alpha = .568$), likely due to its multidimensional structure. Overall, the environmental and combined scales are suitable for analysis, whereas the child wellbeing and intervention-related items require further refinement.

8.2 Demographic and Contextual Profile of Study Participants

8.2.1. Child Participants (Questionnaires and Drawing Workshops)

Across all child-focused tools, a total of 406 children participated (317 in questionnaires and 89 in drawing workshops). Females were slightly more represented (54.1% in questionnaires; 59.6% in drawings), while males accounted for 45.9% and 40.4%, respectively.

Most children were aged 5–8 years, with the largest proportion being 8-year-olds (44.3%) in the questionnaire sample. In drawing workshops, 96% of participants were aged 5–8 years, consistent with developmental suitability for symbolic expression.

Geographically, most children were from Gaza City (42.5% in questionnaires; 56.2% in drawings), followed by the Middle Area (29.2% and 30.3%), KhanYounis (16.4% and 13.5%), Rafah (7.2%), and North Gaza (4.7%) in the questionnaire sample.

The majority of children (94.7%) reported no disability, while 5.3% reported having a disability. Living conditions were highly precarious: 43.4% resided in tents, 27.4% in classrooms, 21.4% in damaged houses, and only 7.9% in relatively stable shelters.

8.2.2. Caregivers and Psychosocial Workers

The caregiver sample included 118 participants, primarily mothers (55.9%), followed by fathers (41.5%) and siblings (2.5%). Most caregivers were aged 31–40 years (56.8%), followed by 41–50 years (28%) and 20–30 years (11%).

Prolonged displacement was common, with 58.5% displaced for more than 10 months. Most caregivers (75.4%) were responsible for three or fewer children, while 24.6% cared for four or more children.

Additionally, 17 psychosocial workers and facilitators participated in qualitative interviews, providing contextual insights into environmental deprivation, psychological distress, service gaps, and resilience processes among displaced children aged 5–8 years.

Table No 1 Demographic and Contextual Profile of Study Participants

Group	Tool	N	Gender Distribution	Age Range / Profile	Geographic Coverage	Key Contextual Characteristics
Children	Questionnaire	318	54.1% female, 45.9% male	5–8 years (largest: 8 yrs = 44.3%)	Gaza City 42.5%, Middle Area 29.2%, KhanYounis 16.4%, Rafah 7.2%, North Gaza 4.7%	43.4% tents, 27.4% classrooms, 21.4% damaged houses; 5.3% with disabilities
Children	Drawing Workshops	89	59.6% female, 40.4% male	4–8 years (96% aged 5–8)	Gaza City 56.2%, Middle Area 30.3%, KhanYounis 13.5%	Used for emotional and symbolic expression analysis
Caregivers	Questionnaire	118	55.9% mothers, 41.5% fathers, 2.5% siblings	Mostly 31–40 years (56.8%)	Same shelter communities as children	58.5% displaced >10 months; 24.6% caring for ≥4 children
Practitioners	Interviews	17	Mixed gender	Psychosocial staff and facilitators	Multiple Gaza locations	Provided qualitative insights on distress, environment, services, and resilience

8.3 First Study Question

What are the key environmental challenges faced by internally displaced children in Gaza, particularly in IDP shelters?

This question was assessed using two questionnaires administered to children and caregivers, as well as interviews with psychologists and teachers.

8.3.1. Table No. 2 Environmental Challenges (Questionnaires)

Data collection Tool	Questions	Never	Sometime	Often
Children Questionnaire	Dust or smoke in the camp	3.5	25.5	71.1
	Garbage areas cleaned regularly	10.4	28.6	61
	Insects or mice in the camp	10.7	26.7	62.6
	Not enough cleaning/drinking water	5	23	75
	Living place is crowded/annoying	15.1	20.4	64.5
	Generator or traffic noise bothers	4.4	23.6	72
	Lack of clean bathrooms/sanitation	10.4	8.8	80.8
	Soil is contaminated	12.6	36.5	50.9
	Skin problems from playing on soil	17.3	38.4	44.3
	Winter rain floods tents/shelters	15.4	28.6	56
	Random dumps near tents	13.8	32.4	53.8
	No hygiene items (soap, supplies)	2.2	15.4	82.4
	Families use absorption pits	4.4	22.3	73.3
	Lack of fresh water supply	2.5	7.2	90.3
	Stagnant water/open sewage nearby	42.5	43.4	14.2
	No separate toilets (girls/boys)	50.9	35.5	13.5
	Clean Drinking Water Access	49.2	37.3	13.6
Caregiver Questioner	Clean Water for Washing	38.1	44.1	19.9
	Solid Waste Collection	37.7	38.1	27.1
	Hygiene Facilities Regularly Provided	38.1	48.3	13.6
	Air Quality Around Shelter	39.8	27.1	33.1
	Access to Electricity	33.9	38.1	28
	Clean Toilet Facilities	49.2	14.4	36.4

Findings from children's and caregivers' questionnaires reveal a severely deteriorated environmental situation in IDP shelters, characterized by persistent health, hygiene, and safety risks.

Children reported high exposure to dust or smoke (71.1%), generator or traffic noise (72%), and overcrowding (64.5%). Critical water insecurity was evident, with 75% reporting insufficient drinking or cleaning water and 90.3% lacking reliable access to fresh water.

Sanitation conditions were particularly alarming, as 80.8% reported a lack of clean bathrooms, and 73.3% relied on absorption pits. Environmental contamination—including flooding (56%), waste accumulation (53.8%), and polluted soil (50.9%)—was widespread and associated with skin problems in 44.3% of children.

Caregivers confirmed these findings, with nearly half reporting no access to clean drinking water or toilets (49.2%), and 73.7% indicating that hygiene facilities were rarely available. Poor air quality, inconsistent waste management, and limited electricity further intensified children’s distress and disrupted daily functioning.

Overall, the data indicate that environmental risks in shelters are structural, prolonged, and normalized, significantly undermining children’s physical and psychosocial well-being.

8.3.2 Table 3. Environmental Stressors in IDP Shelters as Reported by Psychologists and Teachers (N = 17)

Environmental Stressor	Frequency (n/17)	Percentage
Accumulated waste / poor sanitation	17/17	100%
Contaminated water	17/17	100%
Overcrowded shelters	17/17	100%
Lack of clean food	13/17	76.5%
Insect infestations	13/17	76.5%
Electricity outages	9/17	52.9%
Extreme temperatures	8/17	47.1%

Qualitative interviews with 17 psychologists and teachers working in shelter-based learning spaces revealed a **high level of agreement regarding the severity and consistency of environmental stressors affecting children** in IDP shelters.

All participants (100%, N = 17) identified **accumulated waste, poor sanitation, contaminated water, and overcrowding** as the most critical environmental challenges within shelters. These conditions were described as persistent and structurally embedded across living environments rather than isolated or temporary issues.

Less frequently but still significantly reported stressors included:

- lack of food security (76.5%),

- insect infestations (76.5%),
- electricity outages (52.9%),
- and extreme temperature exposure (47.1%).

Professionals consistently reported that these environmental conditions were strongly associated with **heightened psychological distress among children**, including:

- increased anxiety and fear responses,
- irritability and emotional dysregulation,
- sleep disturbances,
- social withdrawal,
- and episodes of aggressive or hyperactive behaviour.

In addition, respondents emphasized that **overcrowding and lack of privacy significantly undermined children's sense of safety and emotional regulation**, limiting their ability to:

- concentrate in learning activities,
- engage in structured play,
- and interact socially in a stable manner.

Overall, the findings indicate that environmental deprivation in shelters operates as a **continuous psychosocial stressor**, directly shaping children's emotional, behavioural, and learning outcomes within displacement settings.

8.4. Second Study Question

How do these environmental conditions impact the mental health and psychosocial well-being of displaced children?

The second question was measured using two questionnaires administered to children and caregivers, 17 interviews with specialists and teachers, and four workshops with children to explore their feelings about the shelter environment during the war.

8.4.1. Table 4. Psychosocial Impact of Environmental Conditions

Domain	Indicator	Often (%)	Sometimes (%)	Never (%)
Emotional Distress	Child feels sad (Child)	43.4	44.7	11.9
	Child appears anxious, afraid, or sad (Caregiver)	33.1	42.4	24.6
Fear & Trauma Responses	Afraid of loud noises/simple things (Child)	55.0	35.8	9.1
	Separation fear from parents (Child)	77.7	16.4	6.0
	Panic/nervous during sudden events (Child)	17.3 panic	36.8 nervous	45.9 brave

Domain	Indicator	Often (%)	Sometimes (%)	Never (%)
Sleep Disturbance	Nightmares or difficulty sleeping (Child)	38.4	49.4	12.3
	Difficulty sleeping or nightmares (Caregiver)	26.3	49.2	24.6
Behavioural Changes & Stress Reactions	Changes in child behaviour since displacement (Caregiver)	33.1	40.7	26.3
	Gets angry quickly/shouts (Child)	40.9	41.8	17.3
	Cries without reason (Child)	30.5	42.8	26.7
Social Withdrawal & Play Difficulties	Difficulty enjoying play with friends (Child)	61.0	29.9	9.1
	Feels lonely/no friends (Child)	28.9	45.3	25.8
Cognitive & Physical Stress Symptoms	Difficulty concentrating (Child)	34.3	50.9	14.8
	Feels tired or sick without reason (Child)	40.6	42.8	16.7
Environmental Stress Triggers	Strong reaction to smell/crowding/noise (Caregiver)	33.9	50.8	15.3
	Suffocated by plastic/cooking smell (Child)	85.8	11.3	2.8
Coping & Regulation	Cannot calm self (Child)	32.7	42.1	25.2
	Child ability to adapt (Caregiver)	45.8	35.6	18.6
Protective Factors	Knows how to protect self (Child)	24.2 yes	54.4 sometimes	21.4 no
	Encourages self (positive self-talk) (Child)	42.1 yes	34.3 sometimes	23.6 no
Sources of Safety	Feels safe with family (Caregiver)	53.4	—	—
	Feels safe through play/art/music (Caregiver)	18.6	—	—

The findings reveal severe psychological distress among children, strongly associated with harsh environmental conditions in shelters, including overcrowding, noise, inadequate sanitation, heat, and pollution.

More than half of the children (55%) reported fear of loud sounds, while 77.7% reported separation anxiety from caregivers. Emotional distress was widespread, with 88.1% reporting frequent sadness and 74.7% reporting loneliness. Sleep disturbances were highly prevalent, with 87.8% experiencing nightmares or difficulty sleeping.

Behavioural dysregulation was evident, as more than 82% of children reported anger outbursts or unexplained crying. Social functioning was significantly affected, with 61% reporting difficulty engaging in play and 74.2% reporting loneliness.

Environmental factors also acted as direct psychological triggers, with 85.8% reporting distress from plastic-burning smells and 72.3% reacting strongly to heat and suffocation in tents.

8.4.2 Table 5. Environmental Conditions and Their Psychosocial Expression in Children's Drawings (N = 89)

Domain	Indicator	Count	Percentage	Psychological Meaning
Shelter Representation	Houses / shelters	67	75.3%	Strong need for safety, stability, and belonging
	Tents (temporary shelter)	8	9.0%	Perception of instability and displacement
Natural & Environmental Elements	Sun	44	49.4%	Hope, warmth, emotional coping
	Trees / greenery	27	30.3%	Need for safety, calm, and growth
	Water (sea / flood / pond)	22	24.7%	Emotional uncertainty and perceived risk
Emotional & Identity Symbols	Hearts	8	9.0%	Attachment and emotional vulnerability
	Flags / identity symbols	11	12.4%	Belonging and identity affirmation
Psychological Stress Indicators	Chaotic / heavy scribbles	10	11.2%	Anxiety and emotional overload
	Faint / minimal drawings	13	14.6%	Withdrawal and emotional numbing
Colour Dominance	Blue	40	45.0%	Sadness and emotional depth
	Yellow	36	40.4%	Hope and psychological resilience
	Green	27	30.3%	Stability and need for safety
	Red	18	20.2%	Tension and emotional arousal
	Pink	13	14.6%	Affection and emotional bonding
	Purple	4	4.5%	Imagination and creativity
Overall Psychological Orientation	Resilience indicators	49	55.1%	Adaptive coping and emotional strength
	Distress indicators	18	20.2%	Exposure to stress, fear, or loss

The analysis of children's drawings (N = 89) reveals a complex coexistence of psychological distress and emerging resilience in the context of prolonged environmental crisis and displacement.

Dominant need for safety and stability

A large majority of drawings (75.3%) depicted houses or shelters, indicating a strong psychological preoccupation with safety, protection, and stability. In contrast, only 9% of drawings included tents, reflecting children's awareness of instability and temporary living conditions.

Environmental symbolism and emotional meaning

Natural elements were frequently used as symbolic coping expressions:

- Sun (49.4%) reflected hope, emotional warmth, and coping capacity
- Trees (30.3%) indicated a need for calm, safety, and psychological grounding
- Water-related imagery (24.7%) reflected uncertainty, fear, and emotional overwhelm

These findings suggest that children use environmental symbols to process both threat and recovery needs.

Emotional expression and identity

Symbolic elements such as hearts (9%) and flags (12.4%) reflected:

- emotional attachment,
- identity affirmation,
- and a need for belonging and connection.

This indicates that despite instability, children continue to express social and emotional connectedness.

Indicators of psychological distress

Negative emotional states were clearly visible:

- Chaotic drawings (11.2%) suggest emotional overload and anxiety
- Faint or minimal drawings (14.6%) suggest withdrawal, fatigue, and emotional numbing

These patterns are consistent with chronic stress exposure and reduced emotional regulation capacity.

Colour symbolism and emotional state

Colour analysis revealed mixed emotional states:

- Blue (45%) → sadness and emotional depth
- Yellow (40.4%) → hope and adaptive coping
- Green (30.3%) → need for safety and balance
- Red (20.2%) → emotional tension and alertness

This combination reflects a dual emotional experience of distress and resilience.

Overall psychological orientation

Overall, 55.1% of drawings reflected resilience indicators, compared to 20.2% showing distress indicators. This suggests that children are not only experiencing psychological stress but are also actively engaging in adaptive coping and meaning-making processes, even within highly adverse environmental conditions.

8.4.3. Table No (6) Environmental Conditions and Their Psychosocial Impact on Displaced Children (17 psychologists and teachers, Interviews)

Psychological & Behavioural Impact
Anxiety, fear, irritability, sleep disturbance
Fear, health concerns, crying
Withdrawal, aggression, sleep problems
Irritability, hyperactivity
Skin irritation, anxiety, irritability
Fatigue, discomfort, irritability
Nighttime fear, disrupted sleep

Psychologists and teachers consistently reported that children experienced high levels of anxiety, fear, irritability, and sleep disturbances linked to environmental stressors. Many children showed withdrawal, aggression, hyperactivity, crying, and ongoing health concerns, alongside physical symptoms such as skin irritation and fatigue. Nighttime fear and disrupted sleep were particularly common, reflecting a constant sense of insecurity. Overall, these patterns reveal chronic emotional distress and behavioural dysregulation among children living in shelter environments.

8.4.4. Table No (7) Environmental Conditions and Their Psychosocial Impact on Displaced Children (17 psychologists and teachers, Interviews)

Observed Coping & Resilience Mechanisms
Cleaning activities, peer support
Caregiver guidance, storytelling
Group play, establishing routines
Imaginative play, structured meals
Family & peer support, distraction through play
Shade and movement breaks
Calm storytelling, night routines

Psychologists and teachers reported that children used multiple coping and resilience mechanisms to manage environmental stressors in shelters. These included cleaning activities and peer support, caregiver guidance and storytelling, and group play with structured routines that helped restore a sense of normalcy. Imaginative play, regular meals, and family support were also key strategies for emotional regulation and social connection. In addition, children benefited from shade and movement breaks during the day, as well as calm storytelling and bedtime routines to reduce fear and improve sleep.

8.5. What is the relationship between exposure to environmental crises and the development of resilience in displaced children in Gaza?

The findings reveal a significant and complex relationship between exposure to environmental crises and resilience development among displaced children in Gaza.

8.5.1. Table No (8)

Descriptive Statistics			
	Mean	Std. Deviation	N
Environment and shelter Quality	1.51	0.32	318
Resilience and Strength	1.87	0.3	318

8.5.2. Table No (9)

Correlations			
		Environment and shelter quality	Resilience and Strength
Environment and shelter Quality	Pearson Correlation	1	.513**
	Sig. (2-tailed)		0
	N	318	318
Resilience and Strength	Pearson Correlation	.513**	1
	Sig. (2-tailed)	0	
	N	318	318
**. Correlation is significant at the 0.01 level (2-tailed).			

Data from the children's questionnaire showed a moderate positive correlation between poor environmental and shelter quality and resilience levels ($r = .513$, $p < .01$). Although living conditions were generally weak ($M = 1.51$), children demonstrated moderate resilience ($M = 1.87$), suggesting

that prolonged exposure to environmental stressors such as overcrowding, noise, dust, and lack of sanitation has pushed children to develop coping mechanisms, including emotional endurance, problem-solving, and psychological adaptability. This reflects a form of survival-based resilience, where children regulate emotions and adapt behaviours to function within chronic adversity rather than in supportive developmental environments.

8.5.3. Correlation Between Environment of Shelter Quality and Child Wellbeing

Table No (10)

Correlations			
		Environment and Shelter quality	Child Well-being and Mental Health AND Coping and Resilience
Environment and Shelter quality	Pearson Correlation	1	.486**
	Sig. (2-tailed)		0
	N	118	118
Child Well-being and Mental Health AND Coping and Resilience	Pearson Correlation	.486**	1
	Sig. (2-tailed)	0	
	N	118	118
**. Correlation is significant at the 0.01 level (2-tailed).			

Similarly, findings from the caregiver questionnaire confirmed this relationship, showing a significant correlation between shelter quality and child wellbeing and resilience ($r = .486$, $p < .01$). Caregivers reported that deteriorating environmental conditions were associated with increased emotional distress, fear, sleep difficulties, and reduced psychological stability, indicating that while children may appear resilient, their emotional regulation capacities are under strain, and their adaptive behaviours often reflect coping rather than healthy development. Together, these findings suggest that environmental crises act as both a risk and a resilience-shaping factor: they undermine children's mental health while simultaneously compelling children to develop coping strategies to survive displacement. However, this resilience is costly and fragile, emphasizing that resilience should not be interpreted as protection from harm but rather as an adaptive response to persistent adversity. Improving shelter quality and environmental conditions remains essential to support healthy emotional regulation, sustainable coping mechanisms, and long-term developmental wellbeing for displaced children in Gaza.

8 Discussion and Recommendations

This study examined the impact of environmental crisis exposure on the wellbeing and resilience development of internally displaced children aged 5–8 living in shelters in the Gaza Strip during the war that began on 7 October 2023. The findings provide strong evidence that environmental conditions in displacement settings function as a major ecological risk factor shaping children's psychological wellbeing, development, and adaptive coping.

The study revealed a statistically significant relationship between environmental crisis exposure and children's wellbeing and resilience. Shelter environments were characterised by severe and chronic deprivation, including overcrowding, inadequate water and sanitation, extreme temperatures, noise, smoke, dust exposure, and unstable infrastructure. These findings strongly align with global research showing that children are biologically and psychologically more vulnerable to environmental stressors, particularly in low-resource settings (Sanson et al., 2019).

The environmental crisis documented in this study is not an isolated phenomenon but reflects the broader collapse of environmental and public service systems in Gaza. Recent environmental assessments have highlighted large-scale destruction of water systems, waste infrastructure, and energy networks, resulting in severe contamination and health risks (United Nations, 2024; AJPH, 2025). The present findings extend this literature by demonstrating how these environmental hazards are directly experienced by children in their daily lives and internalised as psychological stressors.

One of the most significant findings was the moderate positive correlation between environmental hardship and children's resilience levels. Although living conditions were extremely poor, children demonstrated moderate resilience and adaptive coping behaviours. However, caregiver data revealed that deteriorating environmental conditions were associated with increased emotional distress, fear, and sleep disturbances. This suggests that observed resilience reflects survival-driven coping rather than healthy developmental adaptation.

This interpretation is consistent with previous research showing that children exposed to climate disasters and conflict often develop coping mechanisms that mask underlying distress (Burke et al., 2018; Soomro et al., 2024). Meaning-focused coping may support short-term functioning, but prolonged exposure to adversity can undermine emotional regulation, learning, and long-term mental health outcomes.

The current study contributes to the literature by demonstrating how resilience in war-affected displacement contexts emerges within chronic environmental deprivation. This finding addresses a major gap identified in the literature: the lack of research examining resilience development in children simultaneously exposed to environmental collapse, displacement, and armed conflict.

The findings must also be interpreted within the broader context of environmental contamination resulting from warfare. Previous studies have identified exposure to weapon-related heavy metals in Gaza, including chromium and uranium, which negatively affect emotional and neurological development beginning in utero (Vänskä et al., 2019; Skaik et al., 2010). The scale of environmental destruction during the current war further intensifies these risks.

By linking environmental exposure to psychological outcomes, the present study supports the growing “One Health” perspective, which emphasises the interconnected nature of environmental, physical, and mental health (Dardona et al., 2025). The results suggest that environmental degradation should be considered a direct developmental and psychological risk factor rather than a background humanitarian issue.

Flooding, storms, extreme heat, and cold were frequently reported by children, caregivers, and professionals. More than half of children reported exposure to flooding in shelters, and nearly one quarter depicted flooding in drawings. These findings mirror research from India and Bangladesh showing that exposure to flood disasters leads to fear, uncertainty, and trauma responses among children (Wickrama et al., 2017; Kar et al., 2004).

The qualitative accounts from children illustrate how environmental instability becomes a direct source of fear. Rain—previously associated with comfort—became frightening when experienced inside unstable shelters. This shift highlights how environmental stressors can transform children’s emotional relationships with their surroundings.

Water scarcity and poor sanitation emerged as among the most critical environmental stressors. Most children lacked clean water and safe bathrooms, and caregivers reported widespread hygiene shortages. These findings are consistent with research showing that displacement camps often lack adequate WASH services, increasing disease risk and psychosocial stress (Rafa et al., 2021; Rashid & Michaud, 2000).

Importantly, the study identified gender differences, with girls experiencing greater fear and hygiene-related distress. This supports evidence that inadequate sanitation disproportionately affects girls’ health, safety, and dignity in humanitarian settings.

The study documented widespread psychological distress among displaced children, including anxiety, sadness, fear, loneliness, sleep disturbances, behavioural dysregulation, and reduced enjoyment of play. These findings strongly align with research demonstrating that climate disasters and conflict exposure increase risks of PTSD, depression, anxiety, and developmental disruption (Burke et al., 2018; Soomro et al., 2024).

Notably, the prevalence of distress indicators in the current study appears higher than in earlier Gaza research, suggesting that the current war and environmental collapse have intensified mental health risks. Previous studies documented high levels of PTSD, anxiety, and depression among

Palestinian children (Thabet, 2017; Albelbeisi et al., 2025), but the present findings indicate that environmental crisis conditions further amplify these outcomes.

A key contribution of this study is the demonstration that environmental conditions function as daily trauma triggers. Constant exposure to noise, smoke, overcrowding, and instability repeatedly activates children's fear responses. This finding supports ecological and trauma-informed frameworks, which emphasise that trauma is sustained not only by discrete events but also by chronic unsafe environments.

Children's drawings provided powerful evidence of emotional overload, with chaotic scribbles and flood imagery reflecting anxiety and insecurity. These findings highlight the value of arts-based methods for understanding young children's emotional experiences in crisis settings.

8.1. Environmental crisis impact on the children resilience

Environmental crisis impact on the IDPs children resilience development in Gaza strip is presented in **Table No. 5** the findings shows a **moderate positive correlation** between environmental crisis and children resilience levels ($r = .513$, $p < .01$). Although living conditions were generally weak ($M = 1.51$), children demonstrated moderate resilience ($M = 1.87$), suggesting that prolonged exposure to environmental stressors such as overcrowding, noise, dust, and lack of sanitation has pushed children to develop **coping mechanisms**, including emotional endurance, problem-solving, and psychological adaptability. And in table No. 6 the Similarly, findings from the **caregiver questionnaire** confirmed this relationship, showing a significant correlation between shelter quality and child wellbeing and resilience ($r = .486$, $p < .01$). Caregivers reported that deteriorating environmental conditions were associated with increased emotional distress, fear, sleep difficulties, and reduced psychological stability, indicating that while children may appear resilient, their **emotional regulation capacities are under strain**, and their adaptive behaviours often reflect coping rather than healthy development. These results agree with many studies.

As an example evidence about the high risk of the environmental crisis that caused of the wars in Gaza strip, Analysis of maternal hair samples found that two weapon-related heavy metals, chromium and uranium, negatively contributed to the emotional development of infants due to in utero exposure (Vänskä et al., [2019](#)). and another study mentioned that high concentrations of these metals have also been seen in wound tissue from victims of war injuries in Gaza following conflicts in 2006 and 2009 (Skaik et al., [2010](#)). This indicates that the environmental impact of war may negatively affect emotional development and long-term population health. Including mental health of children, specially if we know that just until Nov 2024 after 13 months of the genocide war on Gaza strip, a study refer that over 25,000 tons of explosives — equivalent to two nuclear bombs- have been dropped on Gaza (United Nation, [2024](#)).



Mohammed, 7 years old, said: “When we were living in our house, the sound of rain was comforting, but in the tent, it is very frightening.”

Our study also agreed with a study refer that after a flood event in India and Bangladesh many adolescents reported they felt worried about their parents and the uncertainty of their future. Also, fear, shock, disbelief, avoidance, and flashbacks of incidents were commonly observed among adolescents (Wickrama et al., [2017](#); Kar et al., [2004](#)). where the children and there caregivers, and the psychologists mentioned that they were exposed to flood, storms, cold and hot wither in tents in Table No. 2, 56% of children said that they were exposed to flood in there tents, and the interviews with psychologists showed that the children and caregivers where suffering of flood, cold, rain, storms, very hot wither in summer in the shelter and with the frequently displacement where the table No 1 refer that the participants families shelters were 43.4% tents, 27.4% classrooms, 21.4% damaged houses. In the same topic 24.7% of children who participated in the painting workshops drew water, sea, flood and these were explained as **Risk, uncertainty, emotional overwhelm**



Maram, 8 Years old “I like the people around me, but I don’t like the sound of water when it rains on the tent.” (she said she drew the storm)

And other study findings show that children exposed to extreme climate-related events—such as floods, wildfires, heatwaves, droughts, and typhoons—frequently suffer acute psychological effects, including post-traumatic stress, anxiety, depression, and grief. These impacts are not merely short-term reactions but can become chronic and debilitating in the absence of adequate support and recovery systems (Paul E Rapp, 2025) children, Caregivers, mentioned that the IDPs in the shelter were suffering of lack of water and WASH services including provision bathrooms. Table No. 2 75% of children mentioned that often there is no clean water for cleaning or drinking, 80.8 of children see that often there is no clean bathrooms in their shelters, 73,7 of caregivers see that the hygiene facilities are not provided in their shelters or local markets. Teachers and psychologists mentioned that **Water-related challenges were among the most critical issues**, with **75% reporting insufficient cleaning or drinking water**, and **90.3% reporting a lack of fresh water supply**. These conditions directly threaten children’s physical health and emotional security. These findings agree with a study found that most relief camps are deprived of safe drinking water and lack hygienic toilets, making adolescent girls vulnerable to communicable diseases like UTI and reproductive tract infection (RTI) (Rafa et al., [2021](#)), some even feel ashamed of not able to take bathe due to contaminated water during flood time (Rashid & Michaud, [2000](#)). the children in the paintings

workshop express themselves and talked about the suffering of lack drinking water where child draw the line of wating food and water as below;



Ahmed, 7 years old, said, "Oh, how long will I have to stay in this line waiting for water and food?"

44.3 % of Children mentined that they experinced skin problems and desases oftenly, and 38.4 sometimes and just 17.3 said never (table No. 2). this result agree with a study revealed that children are suffering from widespread malnutrition leading to stunted growth and cognitive deficits, compounded by outbreaks of infectious diseases in overcrowded, unsanitary shelters, and further endangered by unsafe environments marked by bombed infrastructure and contaminated water;

these factors, along with a deliberate collapse of healthcare services, create a cycle of deprivation and despair. (Hamamra, Mahamid, Mayaleh, [2025](#))



The results indicate severe psychological distress among displaced children, marked by high levels of trauma, fear, and PTSD-related symptoms, with many children showing hypervigilance and strong reactions to environmental stressors. Anxiety and depressive symptoms are widespread, as most children report sadness, loneliness, and emotional withdrawal, confirmed by caregivers. Sleep disturbances are also highly prevalent, reflecting chronic stress, insecurity, and unsafe living conditions. Behavioural dysregulation is evident through frequent anger, crying, and emotional reactivity, indicating overwhelmed coping systems. Social withdrawal and reduced enjoyment of play further demonstrate how environmental hardship disrupts children's natural recovery processes. Overall, the findings reveal profound impacts of prolonged displacement and environmental crisis on children's mental health and emotional wellbeing. (Table No. 4) also, children paintings shows that 11.2 % draw chaotic, heavy scribbles which mean mostly they reflect Anxiety, emotional overload (Table No.5). These results agree with the two following studies ;

Both the direct and flow-on effects of climate change place children at risk of mental health consequences including PTSD, depression, anxiety, phobias, sleep disorders, attachment disorders, and substance abuse. These in turn can lead to problems with emotion regulation, cognition, learning, behaviour, language development, and academic performance. Together, these

create predispositions to adverse adult mental health outcomes. Children also exhibit high levels of concern over climate change. Meaning-focused coping promotes well-being and environmental engagement ([Susie E L Burke 1](#), [Ann V Sanson 2](#), [Judith Van Hoorn 3](#), 2018)

Climate change can have detrimental effects on children's mental health. (1) Children's Stress Index (CSI): (2) climate change anxiety (CCA), (3) generalised anxiety disorder (GAD) and (4) major depression disorder (MDD), as reported by the children with mental health outcomes. The findings of this study show that climate change has a stressful effect on mental health. The article concludes with a discussion on strategies to address the anticipated mental health issues among children due to climate change. ([Shazia Soomro 1](#), [Dianen Zhou 1](#), [Iftikhar Ahmed Charan 2](#), 2024)

Environmental Crisis

Aymen, 7 years old said,

"The sky turns black because of smoke, since there is no gas and people use firewood."

Children reported constant exposure to environmental hazards, with 71.1% affected by dust or smoke, 72% by noise, and 64.5% by overcrowding. Severe water insecurity was evident, as 75% lacked sufficient cleaning/drinking water and 90.3% lacked fresh water. Sanitation conditions were critical, with 80.8% reporting unclean bathrooms and 73.3% unsafe waste disposal practices. Environmental contamination was widespread, including soil pollution (50.9%), waste near shelters (53.8%), and flooding (56%), contributing to skin problems in 44.3% of children. Additionally, 82.4% lacked basic hygiene items, increasing health risks and emotional distress. (Table No.1) these findings have been inhneced by caregivers, and psychologists where they reported the same issues in the interviews and cargivres quastioner (tables 3,2) these findings agreed with many studies. A preliminary assessment by UNEP responds to a request from the State of Palestine to evaluate environmental impacts of the conflict in Gaza.

It documents damage to waste systems, energy infrastructure, buildings, air quality, and marine and land environments. The report also highlights serious environmental risks where data remain limited. Ongoing conflict and access restrictions constrained the assessment process. Further field sampling is needed to fully understand soil and water contamination when conditions allow. (United Nations, [2024a](#))

Palestinians are beset with a public health crisis resulting from targeted environmental destruction. Water shortages and sewage contamination increase dehydration, famine, and disease. Air pollution from explosives and waste burning exposes residents to toxins. Waste management has collapsed, heightening disease outbreaks, including polio. Agricultural land is devastated, and food security is threatened with the aid blockade. Power grid destruction has crippled essential services. (AJPH, [2025](#))



Nada, 8Years old, said “When it rains, the ground becomes muddy, so it’s uncomfortable. In winter the tent is very cold, and in summer it’s very hot.”

One of the clearest findings from the analysis of children’s paintings is that 24.7% depicted flooding caused by rain and sea waves during winter, which repeatedly destroyed shelters. This finding is consistent with studies indicating that environmental flooding in displacement settings significantly increases children’s stress, fear, and vulnerability. **(Table No.5)** Flooding risks in Gaza are rising as damaged drainage systems cannot manage seasonal rains, leading to contaminated water entering streets, homes, and shelters. Sewage overflows are expected to worsen, increasing waterborne disease risks. Makeshift shelters are especially vulnerable to collapse during heavy rains. These conditions are likely to cause further displacement and overcrowding. (institute for Palestine Studies, [2024](#))

8.2. Children are experiencing multiple psychological symptoms

The study finding refer that the IDPs children in Gaza strip shows multiple psychological problem symptoms as sadness, crying, fear, anxiety, nightmares, sleep problem, emotional insecurity, etc. Caregivers reported that 55% fear loud noises, 77.7% fear separation, and 33.9% of caregivers report strong stress reactions. (Table No.4) This result associated with other studies finding, which refered that, many children exhibit symptoms of aggression, fear, withdrawal, and severe anxiety,

alongside a pervasive sense of hopelessness. Years of displacement, loss, and relentless bombing have left children psychologically scarred and their families in dire circumstances. (war child, [2024](#))

Other study associated with our findings regarding sleep problems particularly among the children as direct impact of war in Gaza strip, even our study examine the impact of environmental crisis on the children resilience we still have a significant match between two studies, because in our case we are examining the environmental crisis impact during the war. The findings highlight the negative impact of war-related trauma on the sleep of Gazans, leading to various disturbances such as nightmares, particularly among children. ([Hamamra](#), [Mahamid](#), [Bdier](#) , 2025) We see in the table (5) other important findings that refer that **Trauma & PTSD**: 100% of specialists/teachers reported children covering ears or hiding during loud sounds, 75% panicked during airstrikes, and 50% showed regression (e.g., bedwetting, fear of darkness).

The level of hostilities and infrastructure destruction during the current war in Gaza has been unprecedented, and our results prove that due to these hostilities, the level of stress, suffering and other mental health problems is very high. A 2017 study showed that 21.9% of children in Gaza had anxiety and 50.6% had depression. Compared to the 2007 war (the second uprising or intifada), our study showed that the prevalence of mental disorders has increased. A 2007 study showed that 68.9% of 229 participants had PTSD, 40.0% had moderate or severe depression, 94.9% had severe anxiety levels, and 69.9% had adverse coping responses (Albelbeisi1, Hajizadeh2, Al-Zeer3, Saeidpour2 and Kakemam, 2025) while in our study, over 82% get angry or cry easily, and 73.8% show behaviour negative changes. 61% struggle to enjoy play, 74.2% feel lonely. **(Table No. 4)** Other study agreed with above findings highlights a high prevalence of depression, anxiety and stress among IDPs in the Gaza Strip, particularly among those living in tents and those frequently forced to change their shelters. (Albelbeisi1, Hajizadeh2, Al-Zeer3, Saeidpour2 and Kakemam, 2025).

8.3 Study Limitations

Several limitations should be considered when interpreting the findings of this study. First, data collection was conducted during an active conflict and humanitarian crisis, which may have affected participants' emotional stability, availability, and willingness to disclose sensitive experiences. As a result, some trauma symptoms, psychological reactions, or environmental difficulties may have been underreported or inconsistently expressed.

Second, the study relied on non-random purposive sampling within accessible shelters and learning spaces in Gaza. Therefore, the findings cannot be generalized to all internally displaced children in Gaza or other conflict settings.

Third, many children participating in questionnaires and drawing workshops were between 5 and 8 years old, which may have influenced the accuracy and depth of self-reported responses due to developmental and communication limitations. To reduce this limitation, the study combined

multiple data collection tools, including caregiver questionnaires, interviews with psychosocial workers and teachers, and children's drawings.

In addition, environmental conditions and displacement contexts were continuously changing during the research period, meaning that children's experiences and psychosocial conditions may have shifted over time.

Finally, although the study identified significant relationships between environmental stressors and psychosocial outcomes, the cross-sectional design does not allow for establishing direct causality. Future longitudinal studies are recommended to better examine the long-term psychological impact of environmental crises and displacement on children in Gaza.

9. Conclusions

This study provides compelling evidence that the environmental crisis in Gaza's displacement shelters is not merely a humanitarian or infrastructural emergency, but a profound developmental and psychological crisis for children. Findings from children's questionnaires, caregiver reports, professional interviews, and children's drawings consistently demonstrate that overcrowding, unsafe water and sanitation, pollution, heat, noise, flooding, and environmental instability are persistent and normalized conditions shaping children's daily lives. These environmental stressors were directly associated with high levels of trauma symptoms, anxiety, sleep disturbances, emotional dysregulation, social withdrawal, and reduced opportunities for play and learning.

At the same time, the study highlights that children's resilience in Gaza emerges primarily as survival-based adaptation rather than recovery-based wellbeing. While some children demonstrate coping through drawing, storytelling, play, and emotional expression, these capacities remain fragile and constrained by ongoing environmental deprivation. Rather than buffering distress, prolonged exposure to unsafe living conditions appears to undermine children's emotional regulation systems and sense of security, placing them at heightened risk for long-term psychological harm and developmental disruption.

Importantly, the convergence of quantitative and qualitative data confirms that environmental degradation operates not only as a background condition but as a direct psychological trigger, activating fear, distress, and trauma responses through daily sensory exposure to noise, pollution, crowding, and instability. This underscores the need to move beyond trauma-focused interventions alone and adopt integrated ecological approaches that address shelter conditions, sanitation infrastructure, environmental safety, and access to dignified living spaces as core components of child protection and mental health programming.

The findings call for urgent, coordinated action by humanitarian actors, policymakers, and donors to prioritize child-centered environmental rehabilitation in displacement settings, alongside psychosocial and educational interventions. Without meaningful improvements to children's

physical environments, psychological recovery and resilience development will remain severely constrained. This study therefore contributes critical evidence that protecting children's mental health in war contexts requires not only trauma-informed care, but also safe, stable, and humane environments in which children can rebuild trust, play, learn, and grow.

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