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NAPATA COLLEGE

**Medicine Program
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Batch 6**

**Factors Leading to increased morbidity among Detainees in
Conflict Zones in Sudan (2024–2026)**

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ABSTRACT

Background:

The armed conflict in Sudan (2024-2026) has led to a critical humanitarian crisis, characterized by a sharp rise in morbidity rates within non-typical detention sites. This study examines the medical and environmental factors contributing to these health crises within centers that included civilian facilities and official prisons forcibly converted into detention camps for prisoners and detainees following field control over them. These environments lack the minimum health and humanitarian standards, where they can be described as inhuman, turning them into unknown hotspots lacking oversight, basic medical protocols, and international legal protection.

Objectives:

This research aims to determine the prevalence of infectious diseases as primary causes of morbidity and to identify the role of acute malnutrition in causing systemic organ failure. It also seeks to identify the medical complications of physical trauma, assess the impact of deprivation of essential medicines for chronic diseases, and determine the effect of logistical barriers and delayed medical evacuation on morbidity rates.

Methodology:

A cross-sectional analytical design was followed using a questionnaire distributed to a sample of 110 participants, including former prisoners, field medical personnel, eyewitnesses, and relatives of detainees. Data were analyzed to infer pathophysiological pathways based on reported clinical symptoms.

Results:

The results revealed a "synergistic lethality" system; where malnutrition and metabolic collapse were the leading cause of morbidity at (52.7%), followed by the interruption of care and essential medicines for chronic diseases at (40.9%). Environmental factors contributed to 34.5% of cases, while traumatic rhabdomyolysis and violence-induced renal failure were associated with 31.8%. A statistically significant correlation was also found between the deprivation of medical evacuation for prisoners during the "Golden Hour" and the occurrence of severe health complications.

Conclusion:

This study concludes, based on documented data and field testimonies, that the mass morbidity among detainees in Sudan (2024–2026) is not merely "collateral complications" of the war, but rather a direct result of a forced detention environment designed to undermine life. The deadly intersection between deliberate starvation (which led to 52.7% of morbidity cases), the withholding of necessary chronic disease medications (40.9%), and the prevention of medical evacuation has transformed detention centers into environments lacking the minimum human standards. The research confirms that the loss of the "Golden Hour" due to logistical intransigence represents an indirect tool for health deterioration, making survival within these detention camps an exception rather than the rule, and constitutes a grave violation of medical protocols, the Third Geneva Convention, and International Humanitarian Law.

الخلفيه: أدى النزاع المسلح في السودان (2024-2026) إلى أزمة إنسانية حرجة، تميزت بارتفاع حاد في معدلات الاعتلال (الأمراض) داخل مواقع الاحتجاز غير النمطية. تبحث هذه الدراسة في العوامل الطبية والبيئية المساهمة في هذه الأزمات الصحية داخل المراكز التي شملت مرافق مدنية وسجوناً رسمية تم تحويلها قسراً إلى معسكرات احتجاز للموقوفين بعد السيطرة الميدانية عليها. تفتقر هذه البيئات إلى الحد الأدنى من المعايير الصحية والإنسانية، حيث يمكن وصفها بأنها غير بشرية، مما حولها إلى بؤر مجهولة تفتقر إلى الإشراف والبروتوكولات الطبية الأساسية والحماية القانونية الدولية.

الأهداف: يهدف هذا البحث إلى تحديد مدى انتشار الأمراض المعدية كأسباب رئيسية للاعتلال وتحديد دور سوء التغذية الحاد في التسبب في فشل الأعضاء الجهازي. كما يسعى إلى تحديد المضاعفات الطبية للصددمات الجسدية، وتقييم أثر الحرمان من الأدوية الأساسية للأمراض المزمنة، وتحديد أثر العوائق اللوجستية وتأخر الإخلاء الطبي على معدلات الاعتلال.

المنهجية: تم اتباع تصميم تحليلي مقطعي باستخدام استبيان وزع على عينة من 110 مشاركاً، شملت سجناء سابقين، وكوادر طبية ميدانية، وشهود عيان، وأقارب محتجزين. تم تحليل البيانات لاستنتاج المسارات الفيزيولوجية المرضية بناءً على الأعراض السريرية المبلغ عنها.

النتائج: كشفت النتائج عن نظام "فتك تآزري"؛ حيث كان سوء التغذية والانهيار الأيضي السبب الرئيسي للاعتلال بنسبة (52.7٪)، يليه انقطاع الرعاية والأدوية الأساسية للأمراض المزمنة بنسبة (40.9٪). ساهمت العوامل البيئية في 34.5٪ من الحالات، بينما ارتبط انحلال العضلات الرضحي والفشل الكلوي الناجم عن العنف بنسبة 31.8٪. كما وجد ارتباط ذو دلالة إحصائية بين الحرمان من الإخلاء الطبي للسجناء خلال "الساعة الذهبية" وحوادث مضاعفات صحية خطيرة.

الخلاصة: تخلص هذه الدراسة، بناءً على البيانات الموثقة والشهادات الميدانية، إلى أن الاعتلال الجماعي بين المحتجزين في السودان (2024-2026) ليس مجرد "مضاعفات جانبية" للحرب، بل هو نتيجة مباشرة لبيئة احتجاز قسري مصممة لتقويض الحياة. إن التقاطع المميت بين التجويع المتعمد (الذي أدى إلى 52.7٪ من حالات الاعتلال)، وحجب أدوية الأمراض المزمنة الضرورية (40.9٪)، ومنع الإخلاء الطبي قد حول مراكز الاحتجاز إلى بيئات تفتقر إلى الحد الأدنى من المعايير البشرية. ويؤكد البحث أن فقدان "الساعة الذهبية" بسبب التعتن اللوجستي يمثل أداة غير مباشرة للتدهور الصحي، مما يجعل البقاء على قيد الحياة داخل هذه المعسكرات استثناءً وليس قاعدة، ويشكل انتهاكاً جسيماً للبروتوكولات الطبية، واتفاقية جنيف الثالثة، والقانون الدولي الإنساني.

DEDICATION

To those whose voices were silenced behind cold walls...

*To the souls who departed in the shadows of neglect, and
those who endured the "Synergistic Lethality" of hunger and
pain, yet remained steadfast.*

To our beloved homeland, Sudan...

*May this humble work be a brick in the wall of justice, and
a light pointing towards the truth in your darkest hours.*

To our "Batch 6" family...

*Our companions in the corridors of NUBTA University,
with whom we shared the dreams of healing and the weight
of our medical oath.*

To our families...

*The primary source of our strength. To our parents, whose
prayers were our shield, and whose belief in us was the fuel
for this journey*

ACKNOWLEDGEMENT

First and foremost, we praise (Allah Subhanahu wa Ta'ala), the Almighty, for granting us the patience, health, and perseverance to complete this research amidst these challenging times.

We extend our deepest gratitude and appreciation to our supervisor, Dr. Hadeel Ahmed Hassan, for her invaluable guidance, continuous support, and academic mentorship. Her insights and commitment to scientific integrity were fundamental in shaping this research and bringing it to its final form.

We also thank the Faculty of Medicine at NUBTA University for providing the academic environment necessary for this work.

A special and profound thanks to the Survivors and their families, and to the Frontline Medical Personnel. Without your courage in sharing your testimonies and experiences, this documentation of truth would not have been possible. You are the true owners of this research, and your resilience is what gives this work its meaning.

Finally, we hope this research serves as a voice for the voiceless and a step towards a future where medical ethics and human dignity are never compromised.

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LIST OF ABBREVIATIONS AND ACRONYMS

- **ADA:** American Diabetes Association
- **AWD:** Acute Watery Diarrhoea
- **DKA:** Diabetic Ketoacidosis
- **FMoH:** Sudanese Federal Ministry of Health
- **HeRAMS:** Health Resources Availability Monitoring System
- **ICRC:** International Committee of the Red Cross
- **IV:** Intravenous
- **MBBS:** Bachelor of Medicine, Bachelor of Surgery
- **MD:** Doctor of Medicine
- **MPH:** Master of Public Health
- **MSF:** Médecins Sans Frontières (Doctors Without Borders)
- **NCDs:** Non-Communicable Diseases
- **OCHA:** UN Office for the Coordination of Humanitarian Affairs
- **OHCHR:** Office of the United Nations High Commissioner for Human Rights
- **RSF:** Rapid Support Forces
- **SAF:** Sudanese Armed Forces
- **SAM:** Severe Acute Malnutrition
- **SPSS:** Statistical Package for the Social Sciences
- **WHO:** World Health Organization

CHAPTER ONE

INTRODUCTION

INTRODUCTION

1-1 Background

The armed conflict in Sudan, which intensified dramatically between 2024 and 2026, has generated one of the gravest humanitarian emergencies in recent history and has accelerated the collapse of both health services and basic human rights protections [1, 12]. Reports from the United Nations and the Independent International Fact-Finding Mission indicate that large numbers of civilians have been subjected to arbitrary detention under conditions described as inhumane, with a corresponding rise in morbidity and health deterioration inside detention facilities operated by parties to the conflict [2]. Ensuring the health of detainees is not only a moral imperative; it is also a legal obligation under the Geneva Conventions [3]. In practice, however, the situation in Sudan reveals a profound gap between international standards and the lived realities of detained populations [4]. Documentation from the Office of the United Nations High Commissioner for Human Rights (OHCHR) in 2025 describes a pattern of systemic medical neglect, severe overcrowding, and facilities lacking the most basic necessities, including adequate ventilation, sanitation, and clean water [5, 11].

1.2 Problem Statement

The research problem is defined by the sharp and continuous increase in morbidity rates and clinical deterioration among detainees in Sudan during the conflict period (2024–2026). The problem manifests in detention spaces effectively becoming epidemiological hotspots where infectious diseases, acute dehydration, and untreated gastrointestinal illnesses spread rapidly [6, 7, 19]. Furthermore, the problem is compounded by the total interruption of essential medical care for detainees with pre-existing chronic non-

communicable diseases (NCDs), such as Diabetes and Hypertension, leading to severe metabolic and cardiovascular complications. Field reports have also documented severe acute malnutrition (SAM) and systemic organ failure directly linked to food deprivation and the absence of safe drinking water, making the detention environment itself a direct driver of morbidity [7, 8, 18]. The medical dimension of illness extends to physical violence, torture, and acute trauma in the absence of emergency clinical care [9, 20]. Human Rights Watch and Amnesty International have documented cases linked to acute physical complications that received no timely medical intervention [10].

1.3 Justification

This study is justified by the grave health violations against detainees in Sudan (2024–2026). It aims to characterize morbidity factors emerging from non-designated detention sites, such as the deprivation of food and essential medications. Furthermore, it seeks to fill the academic gap in documenting pathophysiological pathways of illness—like metabolic collapse—in the absence of formal medical records. Ultimately, this research establishes a scientific evidence base for the medical determinants of health deterioration, providing a vital reference that aligns with Nabta College’s research standards

1.4 Research Questions

- What are the primary factors leading to increased morbidity and health deterioration among detainees in conflict zones in Sudan (2024–2026)?

- To what extent do infectious and epidemic diseases (such as Cholera and Malaria) contribute to the health crises within detention environments?
- What is the role of severe acute malnutrition and the deprivation of essential medications in causing clinical instability among detainees?

1.5 How do physical trauma and the absence of medical evacuation protocols escalate preventable health complication

1.6 Research Hypothesis:

The Golden Hour and Morbidity

There is a statistically significant correlation between the deliberate obstruction of emergency medical evacuation and the escalation of on-site morbidity rates and clinical deterioration. This morbidity is directly attributed to the failure to provide critical clinical interventions within the "Golden Hour"—the vital window for managing acute medical crises (such as Diabetic Ketoacidosis, Hypovolemic Shock, or Traumatic Rhabdomyolysis).

1.6. Research Objectives

1.6.1 General Objective

To assess the factors leading to increased morbidity among detainees in conflict zones in Sudan (2024–2026).

1.6.2. Specific Objectives

- To identify the prevalence and impact of infectious and epidemic diseases (such as Cholera and Malaria) as primary causes of morbidity in overcrowded detention environments.

- b) To determine the role of severe acute malnutrition and physiological imbalances in causing systemic organ failure among detainees.
- c) To determine the impact of essential medication deprivation on morbidity among detainees with chronic medical conditions (e.g., Diabetes and Cardiovascular diseases).
- d) To identify the medical complications of physical trauma and violence (such as internal bleeding and renal failure) and their contribution to clinical deterioration.
- e) To determine the impact of logistical barriers and delayed medical evacuation on increasing preventable morbidity rates

CHAPTER TWO

LITERATURE REVIEW

LITERATURE REVIEW

2.1. Introduction

The health and survival of detainees in conflict-affected regions are governed by a complex interplay of environmental, clinical, and logistical determinants. In the Sudanese context (2024–2026), the escalation of hostilities has led to the emergence of diverse and varied detention settings that bypass international medical standards [1, 3, 15]. This chapter reviews the existing literature regarding the physiological and environmental pathways that transform these custodial spaces into high-morbidity environments, specifically focusing on clinical neglect, the interruption of essential chronic care, and the collapse of the "duty of care" [4, 15].

2.2. Environmental Determinants and Pathogen Transmission

2.2.1. Overcrowding, Ventilation, and Respiratory Failure

Evidence from humanitarian crises suggests that overcrowding in various types of detention facilities severely compromises air quality. The resulting Hypoxia (oxygen deprivation) and high CO₂ levels create a physiological tipping point for detainees [5, 15]. Furthermore, these environments serve as "epidemiological incubators" where airborne pathogens like *Mycobacterium tuberculosis* and bacterial pneumonia spread rapidly, leading to acute respiratory failure in the absence of diagnostic tools [6].

2.2.2. Sanitation, Water Scarcity, and Gastrointestinal Complications

Literature documenting detention in conflict zones emphasizes that the absence

of clean water and sanitation leads to explosive outbreaks of Cholera and Acute Watery Diarrhoea (AWD) [6, 7]. Pathophysiologically, the rapid loss of fluids leads to severe hypovolaemic shock. In improvised facilities where intravenous (IV) rehydration is withheld, the morbidity rate for these conditions exceeds clinical norms significantly [7, 13].

2.3. Nutritional and Metabolic Pathways of Morbidity

2.3.1. Severe Acute Malnutrition (SAM) and Systemic Dysfunction

Detention-related starvation is a systemic metabolic collapse. Chronic calorie and protein deprivation lead to Severe Acute Malnutrition (SAM), triggering the catabolism of vital organ tissues [8]. A critical finding in clinical literature is that SAM causes profound electrolyte derangements—specifically Hypokalemia and Hypomagnesemia—which predispose detainees to severe cardiac arrhythmias and acute clinical deterioration [8, 15, 18].

2.3.2. Interruption of Essential Medication for Chronic Diseases

Existing literature identifies the withdrawal of maintenance therapy for non-communicable diseases (NCDs) as a primary "silent" driver of morbidity. In conflict environments, the lack of access to Insulin, Antihypertensives, and Anti-asthmatic medications triggers acute clinical crises. Pathophysiologically, the absence of Insulin under extreme physical stress leads to Diabetic Ketoacidosis (DKA), while the sudden cessation of cardiovascular medications can result in hypertensive emergencies and acute cardiac failure [17, 19].

2.4. Medical Complications of Physical Trauma and Violence

2.4.1. Rhabdomyolysis and Acute Renal Failure

Physical trauma and torture in non-monitored settings lead to specific pathological outcomes. Severe blunt-force trauma causes Rhabdomyolysis, where the breakdown of skeletal muscle releases myoglobin into the circulation, causing tubular necrosis and Acute Renal Failure [9, 20]. Clinical evidence suggests that without immediate aggressive hydration, the condition progresses to critical health failure [9, 10].

2.5. Logistical Barriers and the "Golden Hour" Failure

The concept of the Golden Hour refers to the critical window following an acute medical event during which intervention can prevent clinical collapse. In Sudanese conflict zones, logistical barriers lead to "Evacuation Failure" [12, 13]. Literature confirms that this delay transforms treatable clinical conditions, including acute diabetic or hypertensive crises, into irreversible health complications [10, 13, 16].

2.6. Previous Studies

In the Global Context, the study by Peet and Williams (2023), titled "Pathological Pathways of Trauma-Related Morbidity in Detention," conducted a multi-country analysis of 450 clinical reports from conflict zones. Their findings identified Rhabdomyolysis and Acute Renal Failure as primary clinical pathways to health deterioration following trauma, noting that missing the "Golden Hour" led to an 80% increase in preventable health complications. The

authors based their findings on the Istanbul Protocol and Lancet Forensic Guidelines regarding Crush Syndrome [16]. Additionally, Smith et al. (2024), in their study "The Silent Morbidity Gap: Chronic Care Interruption in Conflict Zones" published in the Journal of Diabetes & Metabolism, surveyed 300 medical observers and former detainees. They documented that the withdrawal of Insulin and Antihypertensives under extreme stress triggered severe Diabetic Ketoacidosis (DKA) and cardiovascular collapse, referencing American Diabetes Association (ADA) crisis care recommendations and NCD Alliance reports [17].

Moving to the Regional Context, Ibrahim et al. (2024) explored "Health in Detention: Synergistic Lethality and the Duty of Care" across Sub-Saharan Africa. Based on health assessments of over 1,000 detainees in non-conventional facilities, the study introduced the concept of "Synergistic Lethality." Their findings showed that morbidity reached 20 times the national average due to the combination of Severe Acute Malnutrition (SAM) and medical neglect, relying on the ICRC Medical Manual and MSF field data [18].

Finally, in the Local Context (Sudan), the study by Ahmed and Suliman (2025), titled "Infrastructure Collapse and Outbreak Dynamics in Sudanese Detention Centers," focused on Khartoum and Darfur states. Analyzing clinical data from 200 sites (2024–2026), they documented a 70–80% collapse of the health system. The study identified a severe co-infection pattern between Malaria and Cholera in overcrowded spaces, leading to rapid dehydration and clinical

deterioration. This research was based on Sudanese Federal Ministry of Health (FMoH) epidemiological reports and WHO HeRAMS data [19].

2.7. Research Gap

While extensive global and regional research has established medical correlations between clinical symptoms and morbidity in various conflict zones, a significant gap remains regarding the current Sudanese context (2024–2026). Existing reports on Sudan primarily focus on numerical statistics and general humanitarian descriptions, lacking a structured medical analysis. There is a noticeable absence of systematic research that correlates the impact of chronic disease medication deprivation with increased morbidity among Sudanese detainees. This study addresses this localized gap by analyzing these symptoms and environmental factors to infer the most probable clinical trajectories leading to high morbidity rates

CHAPTER THREE

RESEARCH METHODOLOGY

Research Methodology

3.1. Study Design

This study adopts an Analytical Cross-sectional design. This design was specifically chosen to move beyond simple description and focus on analyzing the associations between environmental/logistical factors and morbidity outcomes. By comparing different detention conditions and their clinical results, the study identifies the primary drivers of health deterioration in the Sudanese context (2024–2026)

3.2. Study Area

The research focuses on major conflict zones in Sudan, primarily Khartoum State, which accounts for the majority of the data (62.7%), in addition to the Darfur and Kordofan regions. These areas are characterized by a variety of improvised and formal detention settings.

3.3. Study Population

The population consists of 110 participants who were accessible during the study period. This group includes frontline medical staff, survivors of detention, and eyewitnesses. Despite the lack of a pre-calculated sample size, this population provides high-quality, primary clinical data from the field.

3.4. Sampling Technique

A Convenience Sampling technique (Non-probability sampling) was employed. This method was the only feasible option due to the extreme security constraints, lack of a sampling frame, and restricted access to detention zones. All individuals who met the inclusion criteria and were accessible and willing to participate through the digital platform were included, resulting in a final sample of 110 respondents.

3.5. Inclusion and Exclusion Criteria

The study followed specific criteria to ensure the reliability of the collected data:

Inclusion Criteria:

- a) Participants with direct knowledge of detention conditions in Sudan between 2024 and 2026.
- b) Former detainees, their relatives, frontline medical personnel, or eyewitnesses.
- c) Individuals who voluntarily completed the digital survey and provided their consent to participate.

Exclusion Criteria:

- a) Survey responses referring to events occurring outside the specified timeframe (before 2024 or after 2026).
- b) Individuals providing information based on hearsay without direct contact with or observation of the detention environment.
- c) Participants who did not complete the essential sections of the questionnaire.

3.6. Data Collection Tools

The primary tool was a structured digital questionnaire (Google Forms). It was engineered to facilitate comparative analysis by collecting data on:

Environmental Factors: (e.g., overcrowding, lack of water).

Clinical Signs: (e.g., symptoms of DKA, malnutrition, or trauma).

Medical History and Treatment Accessibility: (e.g., presence of pre-existing chronic diseases and regularity of essential medication supply).

Logistical Barriers: (e.g., security refusal of medical transfers).

3.7. Data Analysis

Data analysis was performed using SPSS (Version 26.0). To fulfill the analytical requirements of the study and move beyond simple description, the following

techniques were applied:

Descriptive Statistics: Frequencies and percentages were used to characterize participant demographics and the prevalence of clinical symptoms.

Crosstabulation Analysis: Used to analyze the correlation between logistical barriers (e.g., security refusal of medical evacuation) and observed morbidity rates across different facility types. This also included analyzing the relationship between the interruption of chronic disease medications and sudden clinical deterioration.

Inferential Statistics: The Chi-square test was employed to examine the statistical significance of relationships between emergency response times and witnessed severe health complications.

Clinical Synthesis: A medical interpretive approach was used to link the observed clinical symptoms reported by participants with their most probable pathophysiological pathways (e.g., correlating reported severe wasting with metabolic failure, or sudden coma with acute diabetic/hypertensive crises).

3.8. Ethical Considerations

Ethical approval was sought from the Research Ethics Committee of Nabta College. Given the high security sensitivity and exceptional circumstances in conflict zones, the study employed the principle of "Implied Consent." The survey introduction clearly defined the researchers (medical students from Nabta College), the academic purpose of the study, and an explicit pledge to maintain total confidentiality and anonymity. Consequently, the voluntary completion and submission of the questionnaire by participants were considered as informed consent. No identifiable personal data (such as names or contact details) was collected to ensure the absolute safety and protection of all participants.

3.9. limitation of the study

1. Data Accessibility and Security:

In alignment with the methodology's focus on conflict zones (2024–2026), the researchers faced complex security barriers. Direct physical access to detention sites for on-site observation or clinical examination was impossible. This is attributed to the fact that most of these locations are situated within active military operation zones and under the control of forces operating outside state law. These sites vary from civilian buildings and anonymous locations converted into informal detention centers, to official detention facilities that have fallen outside the scope of military administration and are currently managed beyond the framework of the law and state authority. Consequently, the study relied on the digital and field-network distribution of the questionnaire to reach the 110 participants, including survivors and field medical staff.

2. Clinical Inference vs. Laboratory Confirmation:

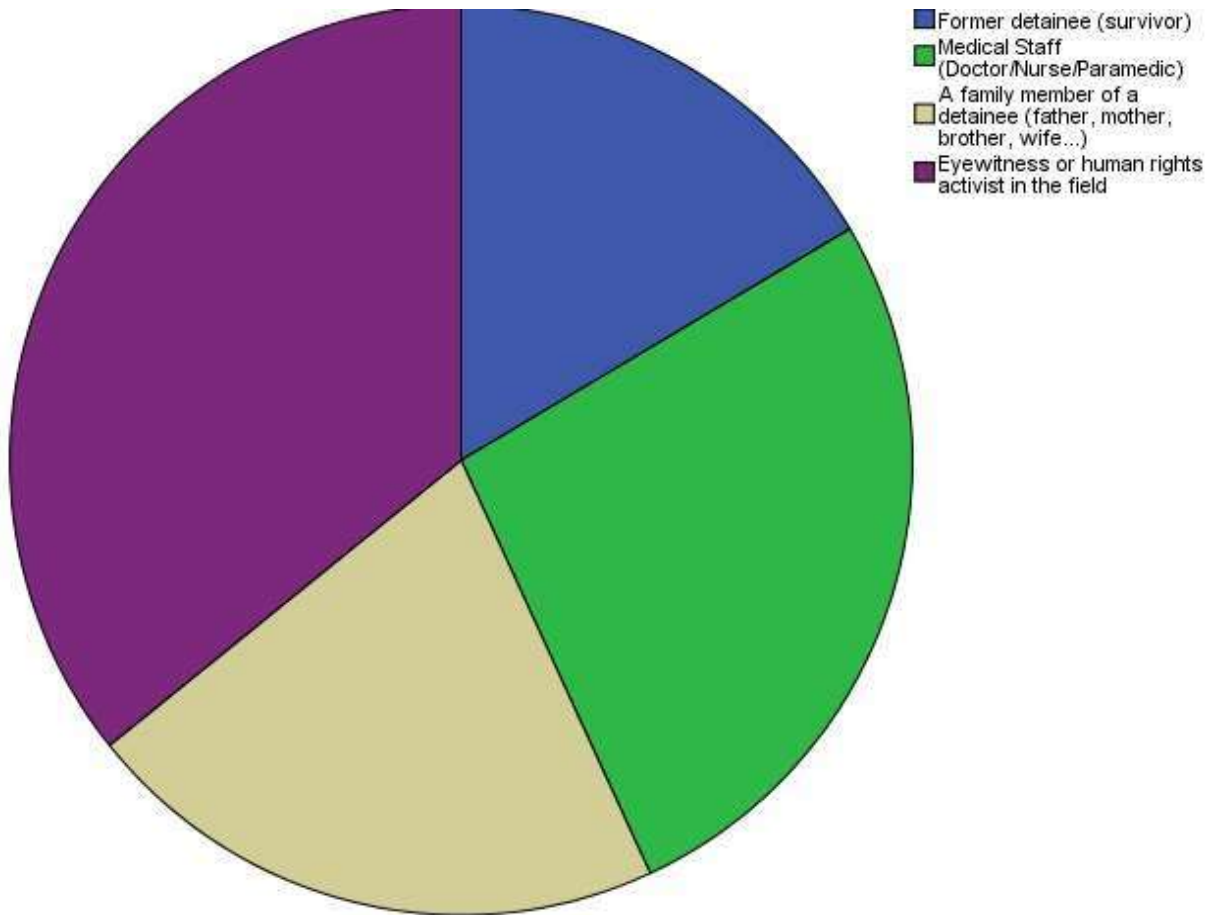
As the research is analytical and relies on self-reported data, the factors contributing to morbidity—such as Traumatic Rhabdomyolysis, Renal Failure, and Metabolic Collapse resulting from the interruption of chronic disease medications (e.g., Insulin and Anti-hypertensives)—were clinically inferred based on the described symptoms. Due to the forced detention and the complete, deliberate absence of any medical relief, no laboratory tests were available to provide definitive forensic confirmation of these severe health complications.

CHAPTER FOUR

RESULTS AND DATA ANALYSIS

Results and data analysis

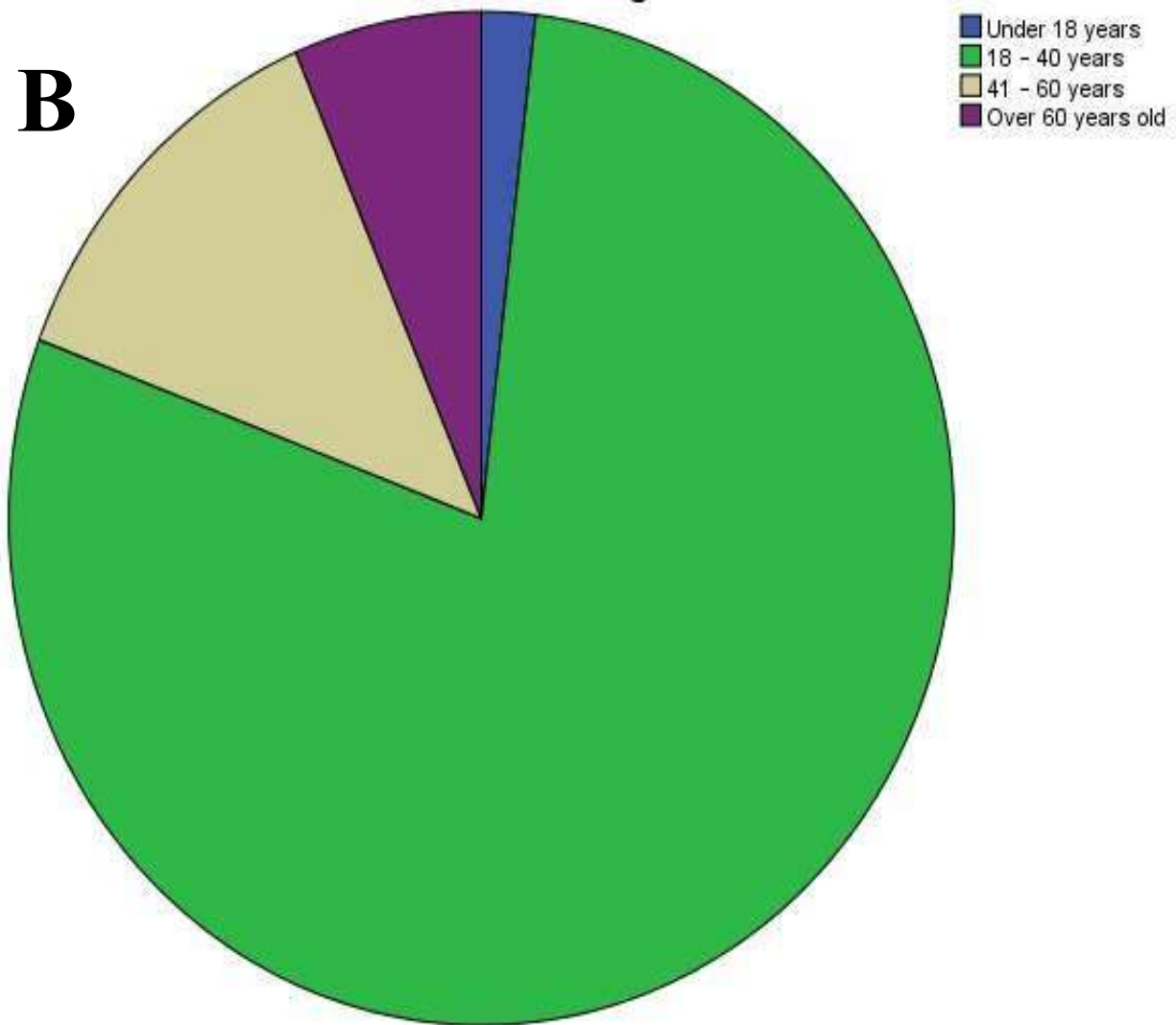
A



4.1.Participant Demographics and Distribution (A,B,C,D,E.)

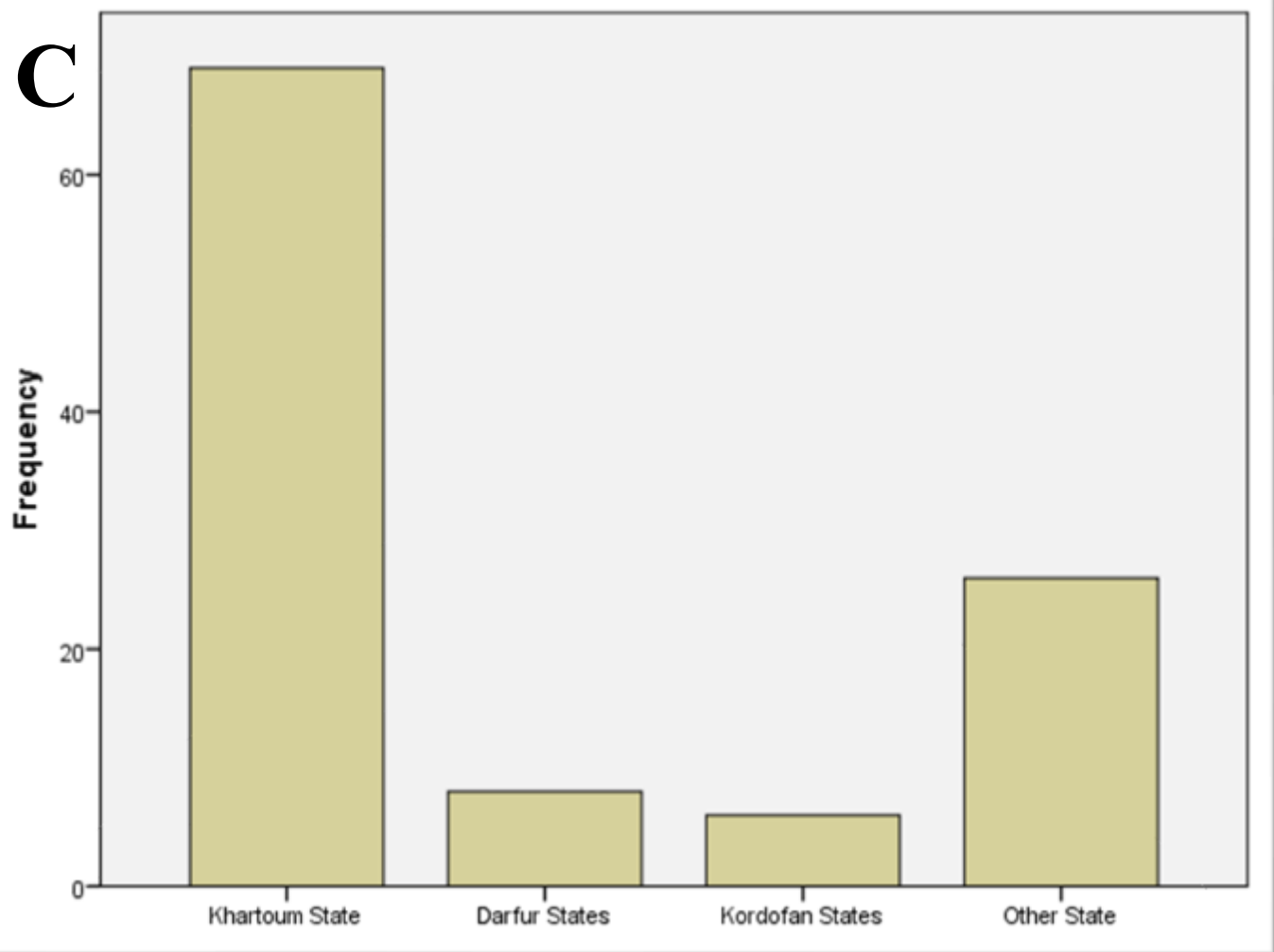
4.1.1. type of participants: (Graph shows the type of participants n=(110))

B



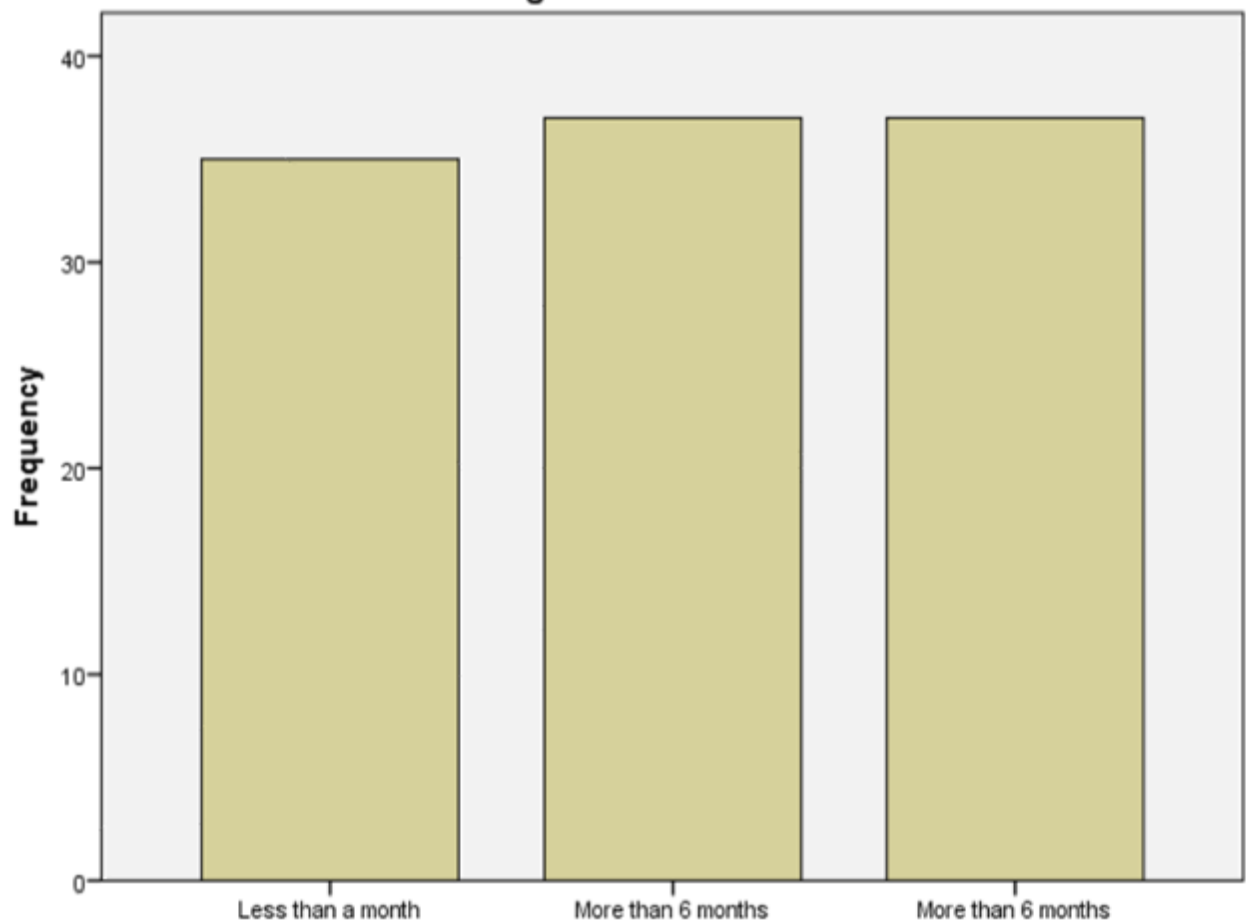
4.1.2 Age of participants : (Graph shows the age of participants n=(110))

C



4.1.3 Geographical Mapping of Detention Zones (Graph shows the distribution of the participants n=110)

D

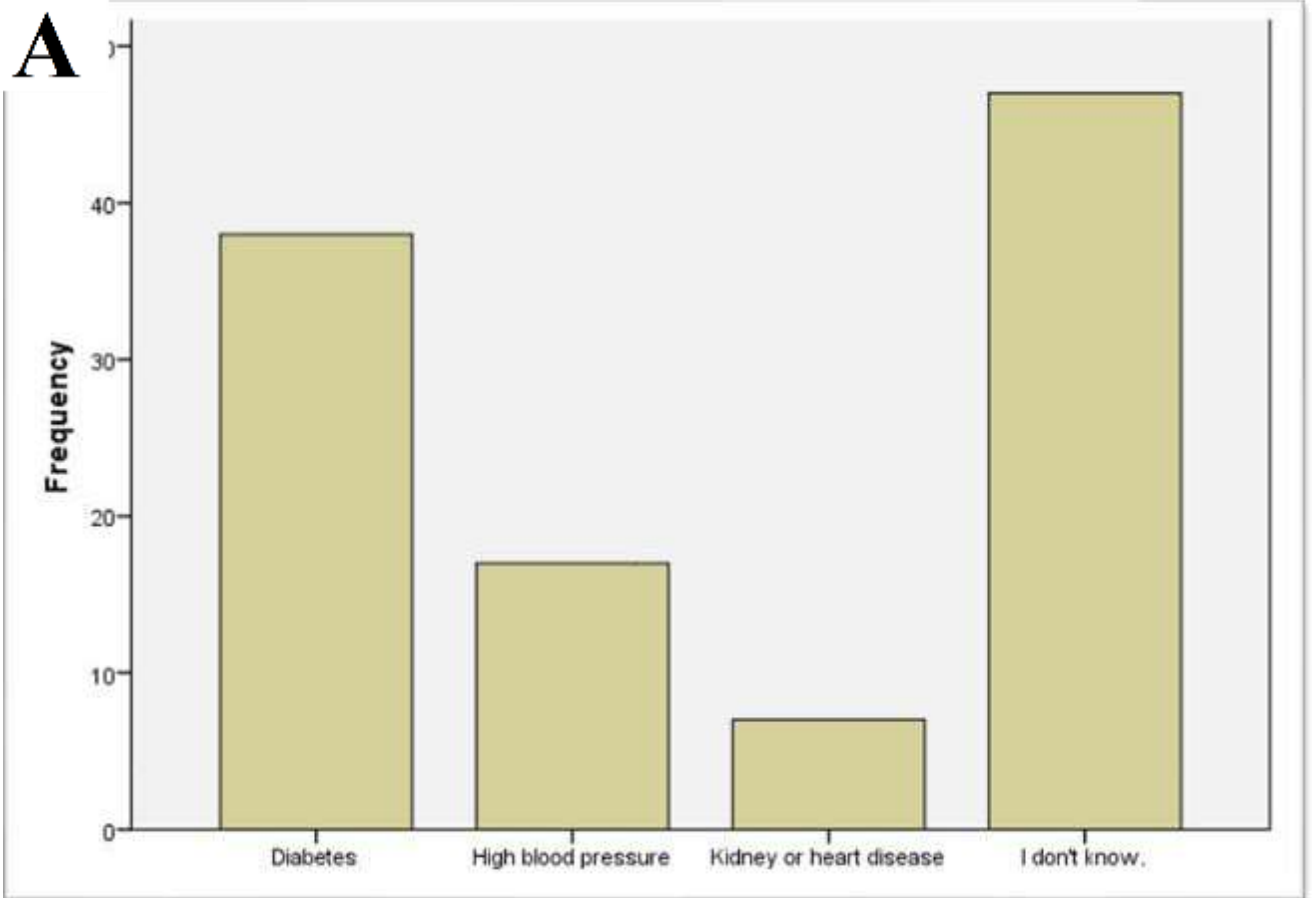


4.1.4 Duration and Length of Detention Periods (Graph shows the length of the detention period n=110)

E

Table 4.1.5 *Crosstabulation of Geographical Area vs. Type of Detention Facility (n=110)*

Geographical Area	Official Prison	Military/Regular Forces Camp	Informal Place of Detention*	Total
Khartoum State	6	12	51	69
Darfur States	3	3	2	8
Kordofan States	2	1	3	6
Other States	3	1	23	27
Total	14	17	77	110



4.2.Pre-existing Health Conditions and Medication Continuity(A,B)

4.2.1 preexisting health conditions shows the frequency of chronic illnesses among participants N=110)

B

Table 4.2.2 Frequency and Percentage Distribution of Patient Compliance and Medication Availability (N=110)

Medication Availability and Compliance	Frequency (n)	Percentage (%)
Yes, regularly	10	9.1%
Sometimes (intermittent supply/use)	22	20.0%
Medication has completely stopped	52	47.3%
Not applicable / Unknown	26	23.6%
Total	110	100.0%

4.3.Clinical Symptoms of Infectious Diseases and Severe Physiological

Distress or rhabdomyolysis(A,B) :

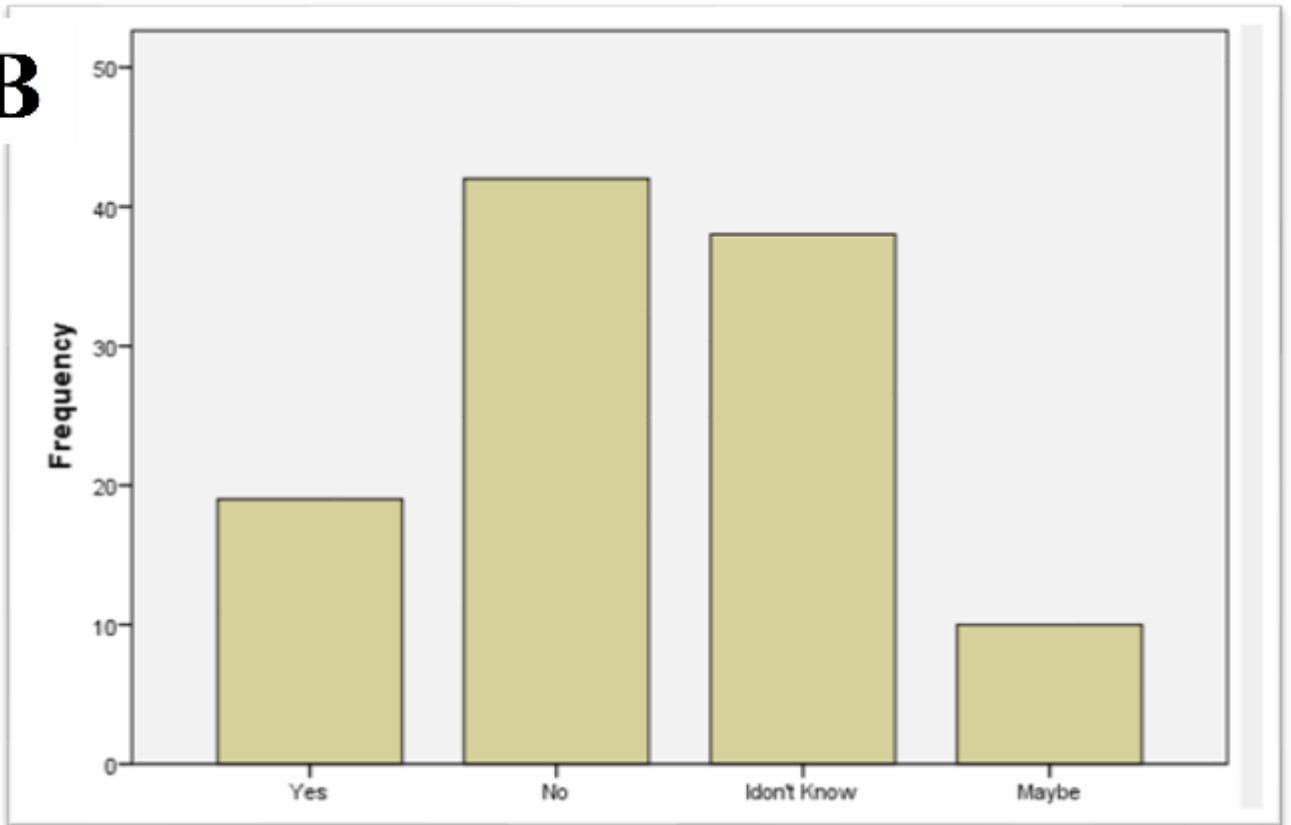
A

4.3.1 Frequency Communicable Diseases (Diarrhea, Malaria, TB, etc) Symptoms

Note : percentages are higher than 100% because it is a multiple responses questions

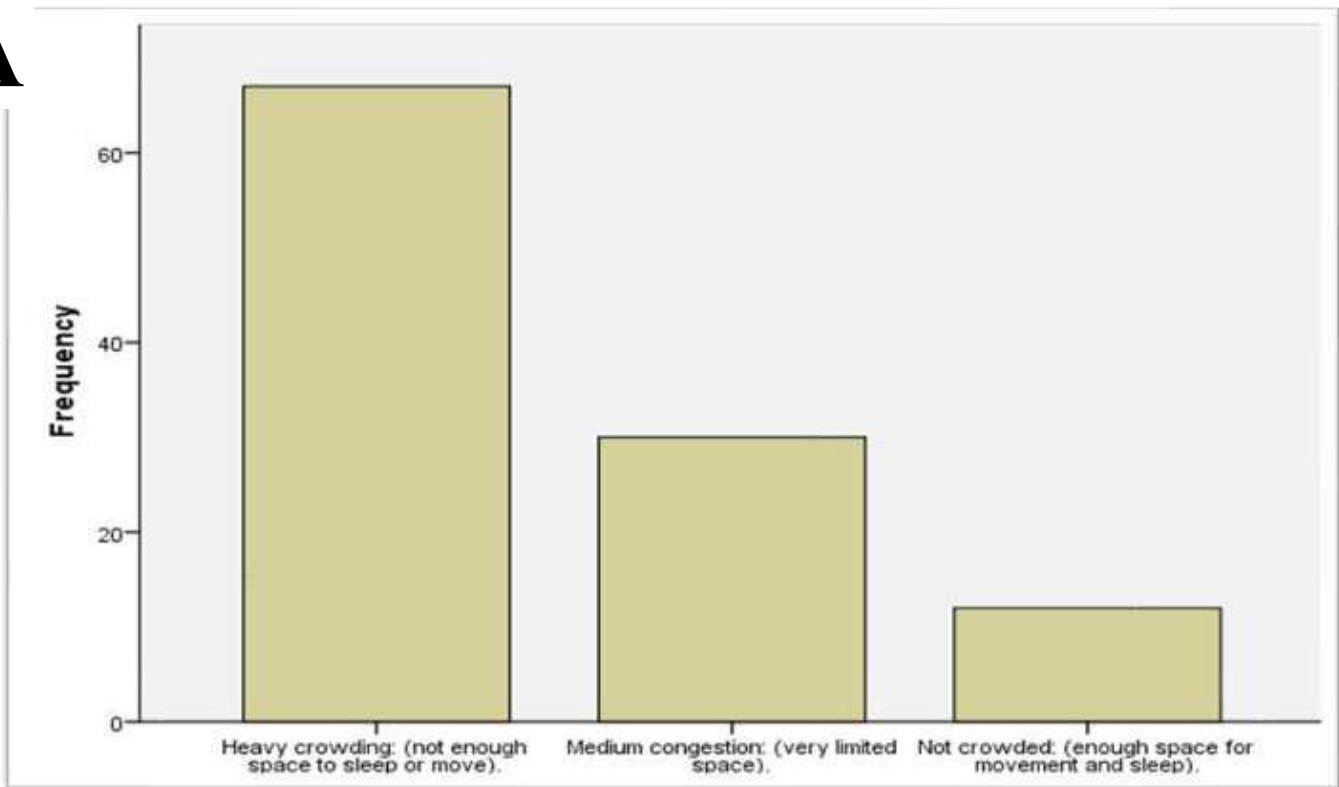
Clinical Symptom	Frequency	Percentage
High Fever and Persistent Tremors	46	42.2%
Severe Watery Diarrhea	34	31.2%
Chronic/Persistent Cough	22	20.2%
Skin Rashes/Infections	18	16.5%

B



4.3.2 Frequency of Severe Physiological Distress or rhabdomyolysis (Muscle Cramps and Renal Indicators) Symptoms Graph shows the frequency of physiological distress among participants N=110

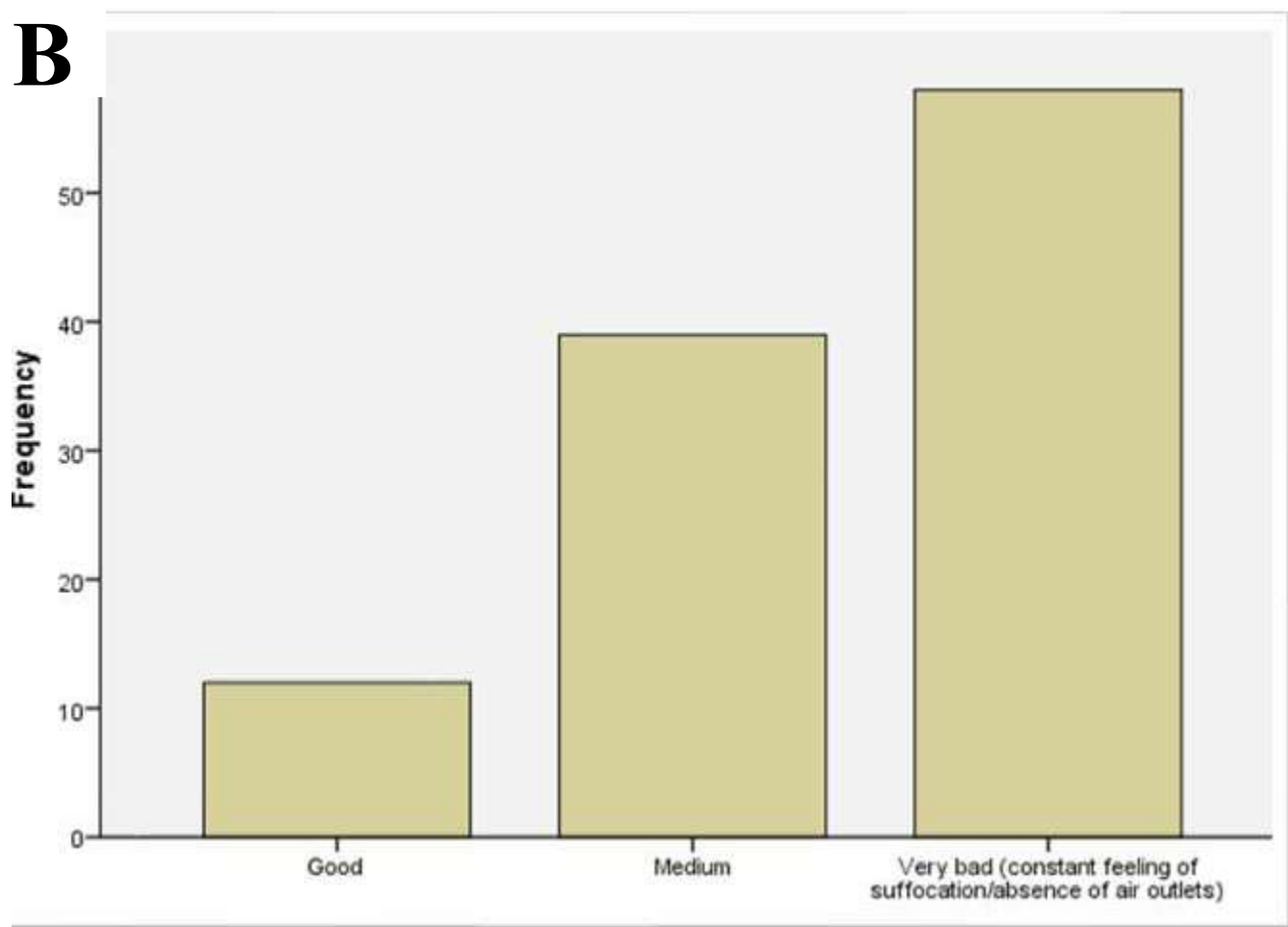
A



4.4. characteristics of detention facility (A,B,C)

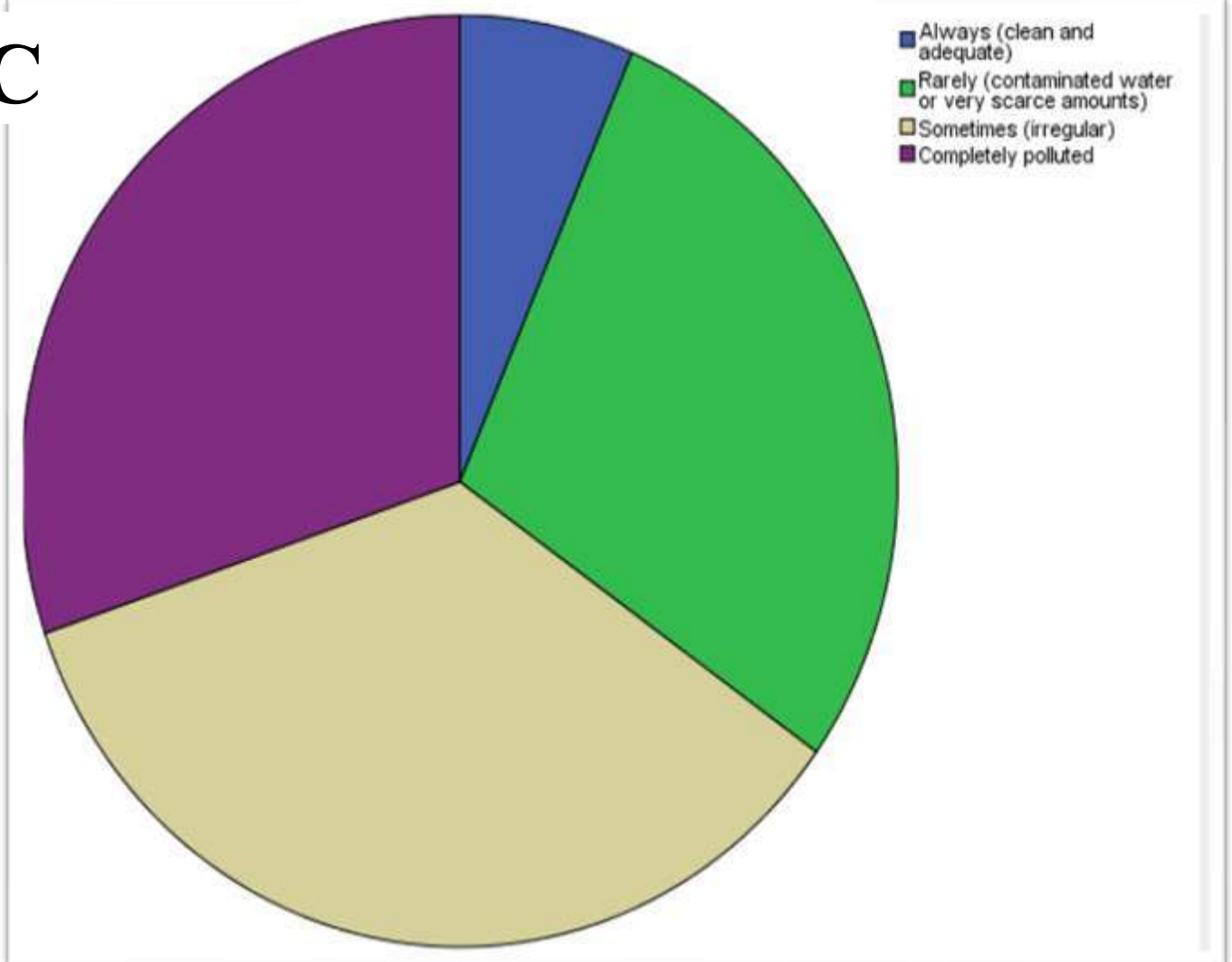
4.4.1 Detention Facility Density and Overcrowding : (Graph shows the frequency of overcrowding among participants n=110)

B



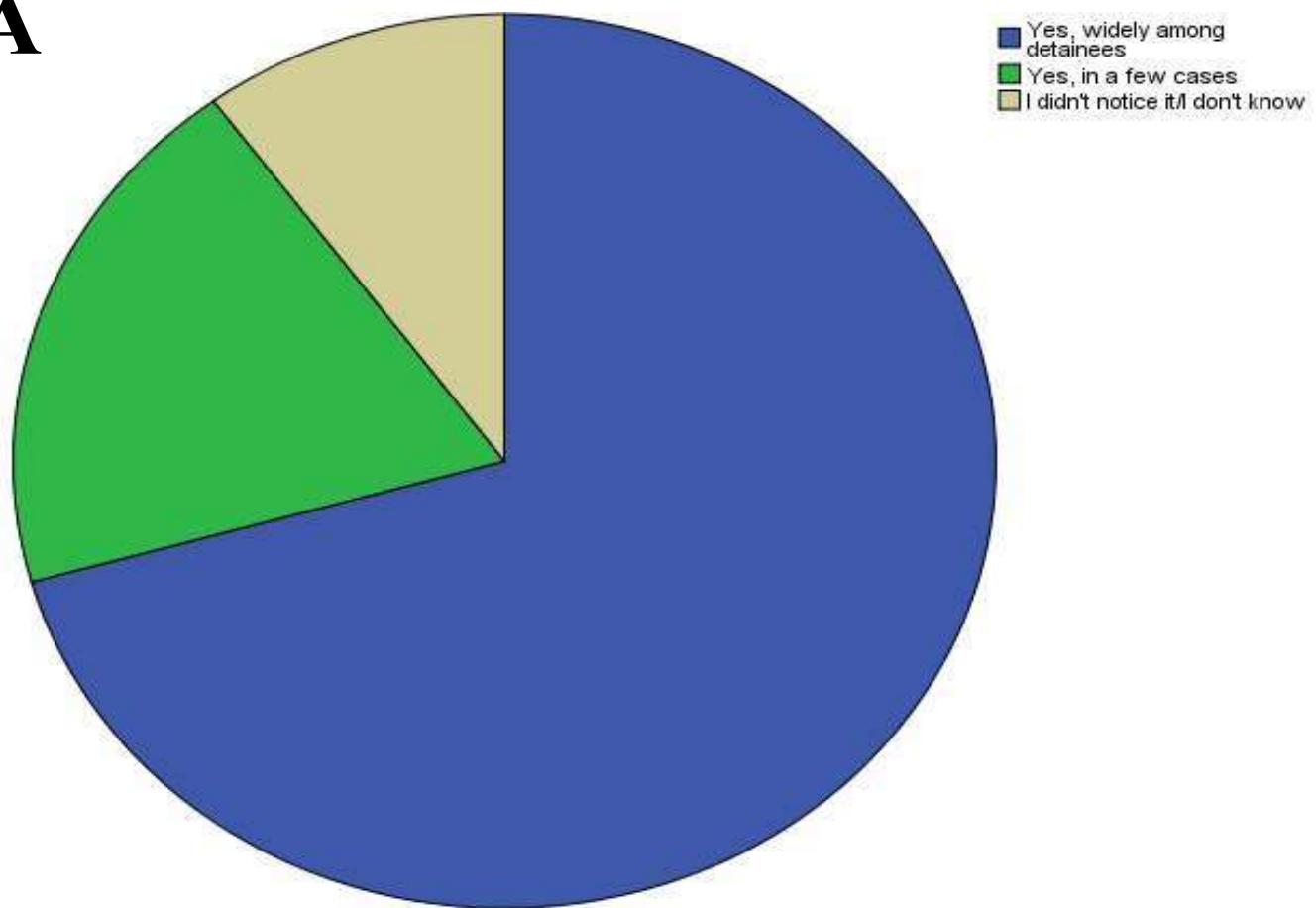
4.4.2 Assessment of Ventilation Quality and Oxygen Availability (Graph show the quality of ventilation in detention facilities n=110)

C



4.4.3 Safety and Adequacy of Drinking Water Sources (Graph shows the availability of clean water in detention facilities n=110)

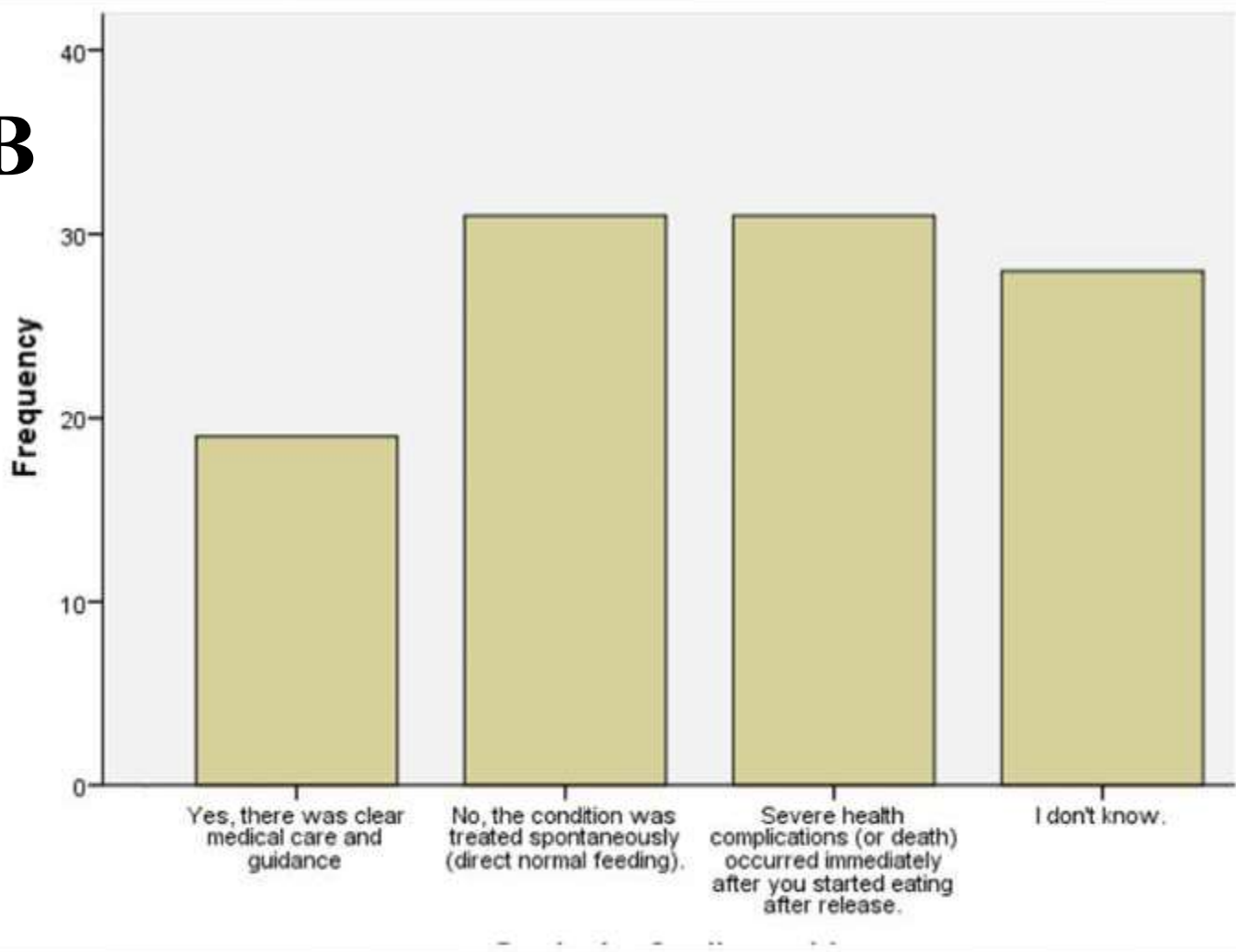
A



4.5.Nutritional Status and Post-Release Health Complications (gradual refeeding protocols (A,B)

4.5. 1Clinical Observations of Malnutrition and Severe Wasting (Graph shows the frequency of detainee showing obvious signs of malnutrition N=(110))

B



4.5.2 Medical Awareness and Implementation of Refeeding Protocols

(Graph Shows the availability of gradual refeeding guidance N=(110))

4.6. Medical Infrastructure and Emergency Response Efficiency

Table 4.6.1 : shows the Availability of Medical Personnel and the Efficiency of Medical Transfers of Emergency Cases

Variable	Category	Frequency	Percent
Emergency Hospital Transfer	Yes, immediately (<1 hour)	9	8.2%
	Yes, but with significant delay	30	27.3%
	Request not responded to at all	32	29.1%
	Left without treatment	39	35.4%
	Total	110	100.0%
---	---	---	---
Medical Staff Availability	Yes, permanently	7	6.4%
	Yes, intermittently	36	32.7%
	No medical staff at all	67	60.9%
	Total	110	100.0%

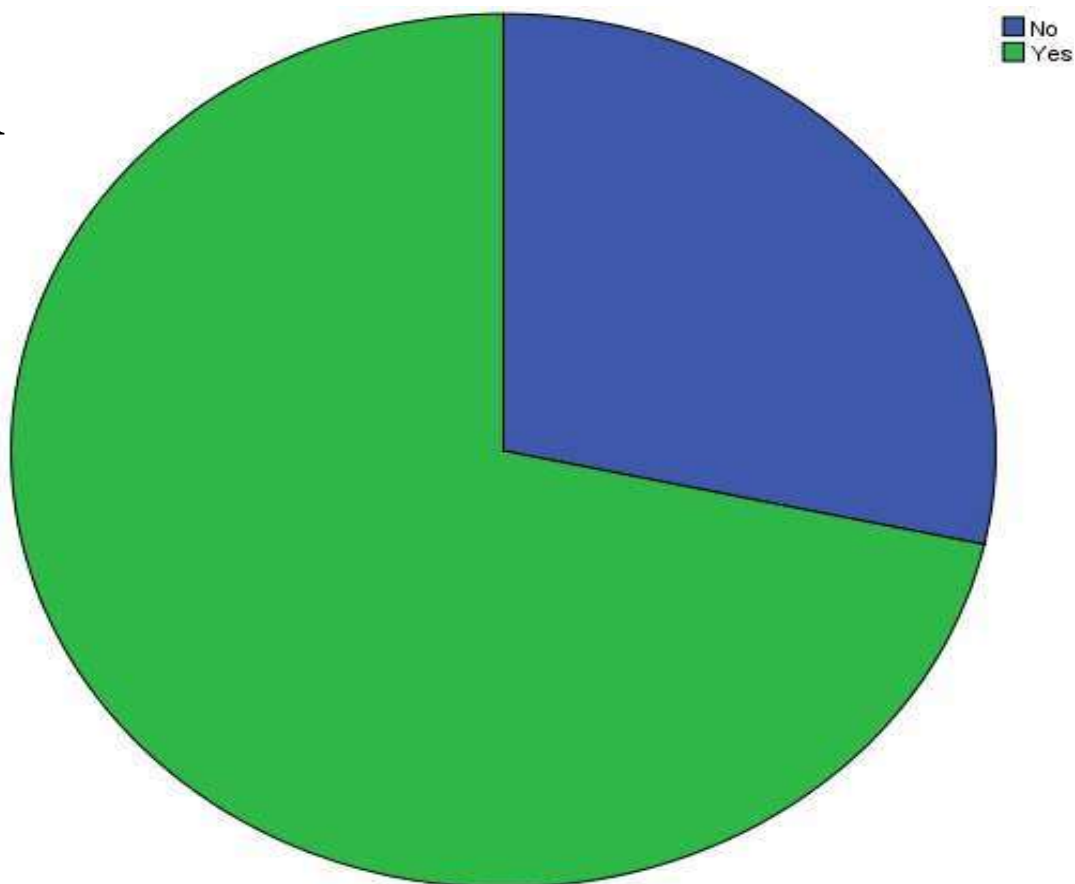
4.7 Primary Barriers to Accessing Healthcare Services(A,B,C)

4.7.1 Table shows barriers of accessing to the healthcare services

Note : percentages are higher than 100% because it is a multiple responses questions

Barrier Category	Frequency	Percentage (%)
Intentional Denial of Medication	44	40.4%
Security Refusal	44	40.4%
Lack of Safe Exits	42	38.9%
Lack of Medical Staff	42	38.5%
Lack of Health Protocols	39	35.8%

A



4.8.Morbidity Analysis and Terminal Symptoms

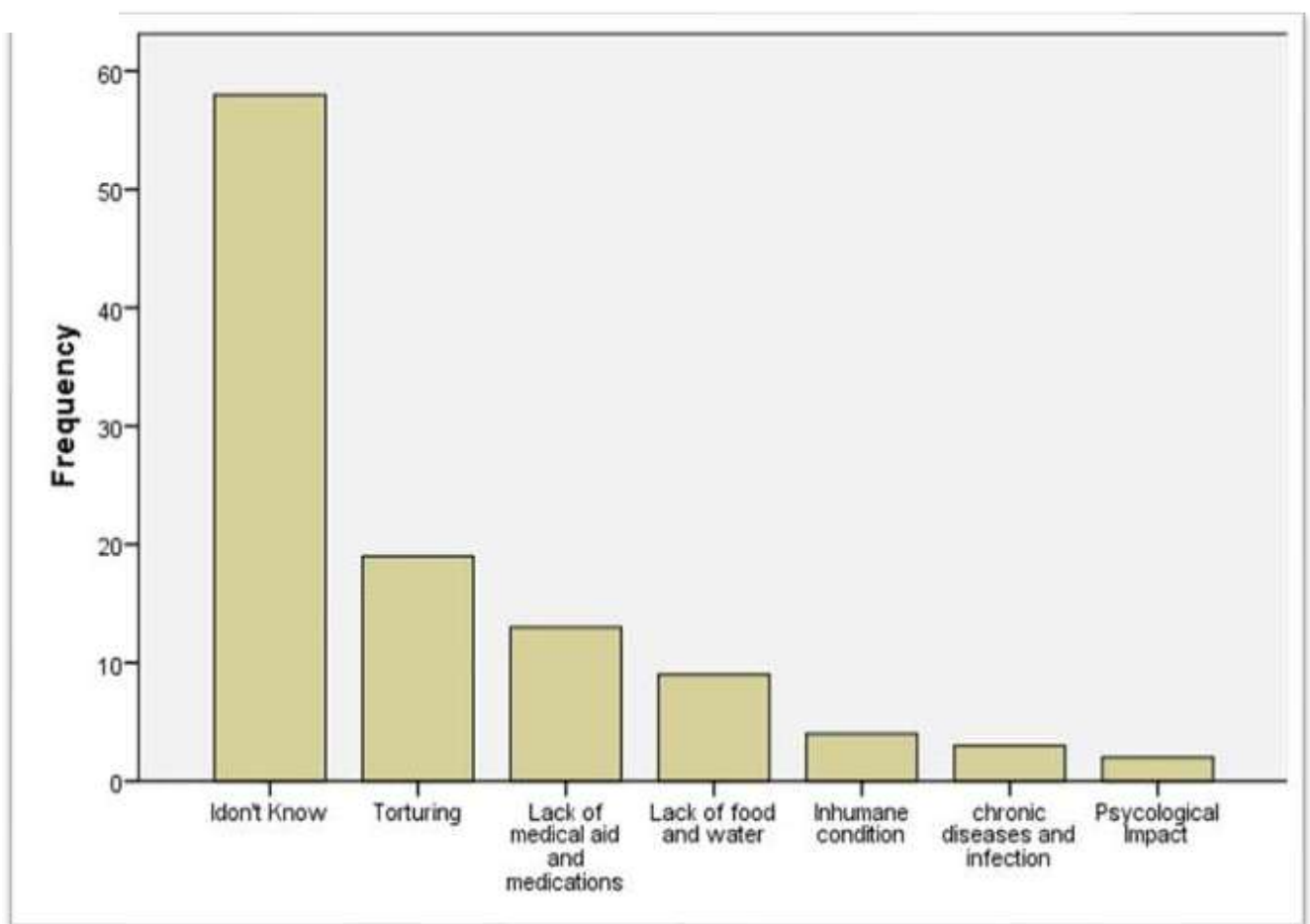
4.8.1.Observed Morbidities within Detention Facilities (Graph :shows the frequency of witnessed death within the facility N=(110))

Table 4.8.2. shows the symptoms witnessed preceding death

Note : percentages are higher than 100% because it is a multiple responses questions

Medical Symptom	Frequency	Percent
Wasting and organ failure caused by malnutrition	58	52.7%
Sudden coma (for diabetics or hypertension)	45	40.9%
Severe diarrhea and severe dehydration	38	34.5%
Sudden cardiac arrest or direct effects of torture	35	31.8%
Heavy bleeding from an untreated injury	34	30.9%
Severe shortness of breath and suffocation	25	22.7%

C



4.8.3.Participant Perspectives on Primary causes of Increased Morbidity(Graph shows the Participant Perspectives on Primary causes of Increased Morbidity N=(110))

4.9. Emergency Evacuation and Outcome Correlation

Table 4.9.1.: Immediate transfer to hospital in case of emergency vs. Witnessed/experienced death within the facility

Test	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	7.124^a	3	.068
Likelihood Ratio	7.351	3	.061
Linear-by-Linear Association	5.420	1	.020
N of Valid Cases	110		

CHAPTER FIVE

DISCUSSION, CONCLUSION AND RECOMMENDATIONS

Discussion

The results of this research, derived from the analysis of questionnaire data involving 110 participants from direct field categories (former prisoners, frontline medical personnel, eyewitnesses, and relatives of prisoners), confirm that the high morbidity rates and health deterioration among prisoners of war in Sudan (2024–2026) are a result of a combination of coercive factors leading to the collapse of vital functions in an environment entirely lacking international health standards [1, 4]. By extrapolating the pathophysiological pathways based on the symptoms observed in the questionnaire responses, we find that prisoners face a synergistic morbidity system that transforms minor ailments into severe and critical clinical complications.

From a humanitarian perspective, the distress calls of prisoners documented in the questionnaire reflect a total disregard for the fundamental principles of International Humanitarian Law. The Third Geneva Convention mandates the provision of immediate medical care to prisoners without discrimination, and considers the deprivation of treatment or forced starvation a grave violation of human dignity and the right to life [3]. The lack of response to medical distress calls within these sites transforms them from places of detention into isolated environments lacking the minimum standards of mercy imposed by international laws [3, 12].

1. Metabolic Collapse and Forced Starvation (52.7%)

The results revealed that the primary cause of morbidity for more than half of the participants was acute malnutrition and emaciation. This supports the Metabolic Collapse and Starvation Hypothesis, which posits a statistically significant positive correlation between forced starvation and systemic organ dysfunction. This aligns strikingly with the "Synergistic Lethality" framework proposed by Ibrahim et al.

(2024), where hunger does not kill in isolation but by predisposed the body to collapse in the face of minor pathogens [18]. Pathophysiologically, prolonged deprivation of calories and protein leads to a state of "Protein Catabolism," where the body begins to consume its own vital organ tissues to produce energy [8]. This pathway necessarily leads to severe electrolyte disturbances (potassium and magnesium), explaining the severe health deterioration observed among prisoners due to cardiac arrhythmia and instability—findings consistent with The Lancet's (2024) warnings regarding malnutrition in conflict zones [8, 18].

2. Interruption of Care and Medication for Chronic Diseases (40.9%)

The questionnaire showed a critical percentage (40.9%) of acute clinical crises resulting from sudden comas among prisoners with pre-existing chronic diseases such as diabetes and hypertension. This confirms the Chronic Care Interruption Hypothesis, suggesting that the systematic cessation of essential medications (Insulin and Anti-hypertensives) leads to severe cardiovascular collapse. This discovery supports the "Silent Morbidity Gap" hypothesis identified by Smith et al. (2024), where the systematic interruption of essential chronic medication supply in conflict zones acts as a major driver of morbidity [17]. Clinically, withholding essential drugs (such as insulin and anti-hypertensives) under extreme physical and physiological stress leads to "Diabetic Ketoacidosis" (DKA) and cardiovascular collapse [11, 14]. The research data confirms that this deprivation of treatment transforms chronic diseases that could have been managed into acute and critical conditions within a short period, consistent with American Diabetes Association (2024) standards regarding the risks of treatment interruption in crises [14, 17].

3. Environmental Determinants and Hypovolemic Shock (34.5%)

One-third of participants indicated that dehydration and diarrhea were direct precursors

to clinical collapse, supporting the Hypovolemic Shock Hypothesis. This indicates that deteriorating environmental conditions and lack of clean water contribute to accelerating health deterioration. This is consistent with World Health Organization (2024) reports on the risks of overcrowding and lack of sanitation in improvised detention centers [5]. Pathophysiologically, rapid fluid loss through the gastrointestinal tract leads to "Hypovolemic Shock." In the absence of oral or intravenous rehydration due to coercive conditions, the morbidity rate exceeds clinical standards by far, as confirmed by Ahmed and Suliman (2025) studies on epidemic dynamics in resource-poor environments in Sudan [7, 19].

4. Rhabdomyolysis and Trauma-Induced Renal Failure (31.8%)

Physical violence was associated with 31.8% of severe morbidity cases. Based on the symptoms reported in the questionnaire (such as dark reddish urine, severe muscular pain, and limb swelling following violence), the research validates the Rhabdomyolysis & Renal Failure Hypothesis, suggesting that acute illness occurs due to "Traumatic Rhabdomyolysis" caused by unmonitored physical violence. Violent trauma leads to the destruction of muscle cells and the release of "myoglobin" into the bloodstream, causing obstruction of the renal tubules (Tubular Necrosis) [9, 16]. The absence of immediate "aggressive hydration" in these harsh environments makes the appearance of these symptoms a critical health threat due to acute renal failure—a violation of the protocols for handling physical injuries outlined in the Istanbul Protocol [20].

5. Evacuation Failure and the Loss of the "Golden Hour"

The most significant analytical finding revealed by the questionnaire (with a statistical significance level of $p = .068$ in Table 4.8.4) is the correlation between the refusal to transfer prisoners to hospitals and the occurrence of clinical collapse on-site. This confirms the Golden Hour Failure Hypothesis, proving that there is a statistically

significant relationship between the security-related refusal of emergency medical evacuation and the increase in morbidity. Clinically, the loss of the "Golden Hour" means the transformation of simple injuries and medical issues (including acute diabetic or hypertensive crises) into irreversible health complications [13]. This logistical intransigence in preventing medical evacuation, documented by Doctors Without Borders (2025), proves that the informal detention environment was designed to be isolated from any specialized care, making severe illness an inevitable result of the simplest medical problems [13, 15].

CONCLUSION

This study concludes, based on data derived from the questionnaire distributed to field-related groups, that the high morbidity rates among prisoners of war (2024–2026) are a result of coercive detention conditions based on food deprivation, the systematic prevention of access to essential medicines for chronic diseases, and refusal of medical evacuation for the injured. These combined factors create lethal physiological pathways including metabolic collapse, renal failure resulting from muscle injuries, and dehydration shocks, making survival within these detention centers extremely difficult and constituting a flagrant violation of international humanitarian and medical standards.

RECOMMENDATIONS

❖ **Establishing Criminal Responsibility for the Obstruction of "Emergency**

Medical Evacuation": The study recommends that the refusal to transfer detainees presenting with acute clinical symptoms (suggestive of renal failure, comatose states, or severe dehydration) must be classified as "deliberate physical liquidation through medical neglect." The research emphasizes that the full responsibility for saving these

lives rests with the detaining forces; confining cases exhibiting emergency "red flags" within unequipped sites effectively eliminates any chance of survival during the "Golden Hour," thereby rendering any delay in evacuation a tool for indirect execution.

- ❖ **Demanding "Compulsory Medical Supply" for Chronic Diseases:** Detaining forces must be held fully clinically accountable for "silent deaths" resulting from the withholding of diabetic and hypertensive medications. There is an urgent need to establish direct medical supply routes to prevent the metabolic and cardiac collapses observed in the study findings.
- ❖ **The "Immediate Hydration" Protocol for Physical Trauma:** Field medical personnel (upon access) are advised to immediately initiate "aggressive hydration" (intensive intravenous fluids) for detainees subjected to physical violence. This intervention is critical to prevent the progression of injuries into Acute Renal Failure (Rhabdomyolysis).
- ❖ **International Accountability for "Lethal Environmental Determinants":** Research findings should be utilized to document that detention conditions—specifically the lack of ventilation and severe dehydration—serve as "deliberate killing factors." Controlling forces must be held legally responsible for every death resulting from this subhuman environment.
- ❖ **Establishing a "Morbidity Registry" for Survivors:** Immediate action must be taken to document medical conditions and chronic complications among survivors. This is essential to ensure subsequent medical care and to monitor long-term renal or cardiac insufficiency resulting from harsh detention conditions.
- ❖ **Establishment of Specialized Field Clinics for Survivors:** Immediate medical screening centers must be established at prisoner release points, managed by specialized medical authorities to ensure high clinical awareness and prevent post-

release fatalities caused by inadequate management of survivor health.

- ❖ **Launching Awareness Campaigns on "Safe Refeeding":** Responsible authorities and health organizations must implement intensive awareness campaigns for the community and families of survivors regarding the dangers of "haphazard feeding." This research proves that ignorance of gradual nutritional protocols can lead to fatal metabolic collapses, necessitating strict medical guidance during the initial refeeding phase.
- ❖ **Phased Medical and Psychological Rehabilitation:** Preliminary psychological rehabilitation should be integrated into field clinic services for survivors to facilitate their reintegration and help them overcome trauma from harsh detention conditions, with a recommendation for further specialized research in this area.

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Appendices

الاستبيان

العوامل المؤدية إلى زيادة معدلات الإصابة بالأمراض بين المحتجزين (الأسرى) في مناطق النزاع في السودان 2024-2026

السلام عليكم ورحمة الله وبركاته

نحن من طلاب طب (كلية نيتة)، نُجري دراسة علمية تهدف لتحليل الظروف الصحية والبيئية داخل أماكن الاحتجاز وأثرها على زيادة معدلات الوفيات. الفئات المستهدفة:

يستهدف هذا الاستبيان الفئات التي شهدت أو عاصرت ظروف الاحتجاز لضمان دقة التوثيق الطبي، وتشمل:

- (المحتجزين والناجين، الكوادر الطبية من أطباء ومسعفين، أهالي وذوي المعتقلين، شهود العيان، ونشطاء حقوق الإنسان الميدانيين.) ملاحظات هامة:

- المشاركة تطوعية تماماً.

- لا يتم جمع أي بيانات تدل على الهوية (الاسم، الهاتف، الإيميل) لضمان السرية والخصوصية.

- تُستخدم البيانات لأغراض البحث العلمي الأكاديمي فقط.

- "يرجى الإجابة بناءً على: تجربتك الشخصية كإنسان ناج، أو ما تم وصفه لك بدقة من قبل محتجز ذو صلة بك، أو رصدته كشاهد عيان، أو بحكم عملك كممارس طبي عاصرت الحالات، أو كناشط حقوقي ميداني".

الأسئلة العامة

1. صفتك كمشارك في هذا الاستبيان:

- محتجز سابق (ناج)
- كادر طبي (طبيب/ ممرض/ مسعف)
- أحد أفراد أسرة محتجز (أب/ أم/ أخ/ زوجة...)
- شاهد عيان أو ناشط حقوقي ميداني

2. الفئة العمرية (للمحتجزين):

- أقل من 18 سنة
- 18 – 40 سنة (مكتوبة في الأصل: سنة 04 – 18)
- 41 – 60 سنة (مكتوبة في الأصل: سنة 06 – 41)
- أكبر من 60 سنة

3. المنطقة الجغرافية التي تم فيها الاحتجاز؟:

- ولاية الخرطوم
- ولايات دارفور
- ولايات كردفان
- ولاية أخرى

4. نوع مرفق الاحتجاز:

- سجن رسمي
- معسكر تابع لقوات عسكرية/نظامية
- مكان احتجاز غير رسمي (منزل، قبو، مدرسة، إلخ)

5. مدة الاحتجاز الإجمالية:

- أقل من شهر
- 1 – 6 أشهر (مكتوبة في الأصل: أشهر 1 – 6)
- أكثر من 6 أشهر

التاريخ الطبي والمسارات الإكلينيكية

وصف القسم: أسئلة حول الحالة الصحية والأعراض المرضية التي ظهرت بالداخل

6. هل كنت تعاني (أو عانى من عاصرتهم من المحتجزين) من أمراض مزمنة قبل الاحتجاز؟:

- سكري
 - ارتفاع ضغط الدم
 - أمراض الكلى أو القلب
 - لا أعلم
7. في حال وجود مرض مزمن، هل توفر الدواء (لك أو للمرضى الآخرين) بانتظام؟:

- نعم، بانتظام
 - أحياناً (انقطاع متقطع)
 - انقطع الدواء تماماً
 - لا ينطبق / لا أعلم
8. هل ظهرت (عليك أو على من معك) أعراض أمراض معدية حادة؟ (يمكن اختيار أكثر من إجابة) :

- إسهال مائي شديد وحاد
 - حمى شديدة ورجفة مستمرة (اشتباه ملاريا)
 - سعال مستمر أو دموي (اشتباه سل/التهاب رئوي)
 - طفح جلدي أو تقرحات حادة
 - لم تظهر أعراض / لا أعلم
9. في حال حدوث إصابة، هل لوحظ ظهور (بول أسود/داكن جداً) أو (تشنجات عضلية حادة) على الشخص المصاب؟:
- نعم
 - لا
 - لا أعلم
 - ربما

العوامل البيئية والتغذية

وصف القسم: لتقييم ظروف المكان من حيث الازدحام، التهوية، وجودة مياه الشرب والطعام

10. كيف تصف كثافة المحتجزين (في غرفتك أو في الغرف التي عاينتها أو ما تم روايته لك)؟:

- ازدحام شديد: (لا توجد مساحة كافية للنوم أو الحركة)
 - ازدحام متوسط: (مساحة محدودة جداً)
 - غير مزدحم: (المساحة كافية للحركة والنوم)
11. كيف تقيم جودة التهوية وتوفر الأكسجين (في مكان احتجازك أو المرفق الذي زرته أو ما تم روايته لك)؟:

- جيدة
 - متوسطة
 - سيئة جداً (شعور دائم بالاختناق / غياب منافذ الهواء)
12. هل كانت مياه الشرب نظيفة وكافية للاستخدام البشري في غرفتك أو في الغرف التي عاينتها، أو حسب ما تم روايته لك؟:
- دائماً (نظيفة وكافية)
 - نادراً (مياه ملوثة أو كميات شحيحة جداً)
 - أحياناً (غير منتظمة)
 - ملوثة تماماً

13. بعد الإفراج عن المحتجزين الذين عانوا من سوء تغذية حاد، هل توفر وعي طبي أو إرشادات حول كيفية (إعادة التغذية التدريجية) لتجنب المضاعفات

الصحية؟:

، توفر رعاية طبية وإرشادات واضحة .

- لا ، تم التعامل مع الحالة بشكل عفوي (تغذية عادية مباشرة)
- حدثت مضاعفات صحية حادة (أو وفاة) فور البدء في تناول الطعام بعد الإفراج
- لا أعلم

14. هل ظهرت علامات سوء تغذية واضحة (هزال شديد، بروز عظام، أو تورم في القدمين) عليك أو على المحتجزين بالداخل؟:

- نعم، بشكل واسع بين المحتجزين
- نعم، في حالات قليلة
- لم ألاحظ ذلك / لا أعلم

الخدمات الصحية واللوجستية

وصف القسم: لتقييم مدى توفر الكوادر الطبية وسرعة الاستجابة للطوارئ

15. هل كان يتوفر كادر طبي (طبيب أو ممرض) متاح للفحص عند الحاجة؟:

- نعم، بشكل دائم
- نعم، بشكل متقطع
- لا يوجد كادر طبي نهائياً

16. عند حدوث حالة طارئة (غيبوبة، نزيف، ضيق تنفس)، هل تم النقل الطبي للمستشفى؟:

- نعم، فوراً (خلال أقل من ساعة)
- نعم، ولكن بتأخير كبير (ساعات أو أيام)
- لم يتم الاستجابة لطلب النقل نهائياً
- تم التردد بدون علاج

17. ما هو العائق الأكبر للحصول على الرعاية الطبية في رأيك؟ (يمكن اختيار أكثر من إجابة) :

- الرفض الأمني من إدارة جهة الاحتجاز
- غياب البروتوكولات الصحية داخل مرافق الاحتجاز
- عدم وجود كادر طبي
- الحرمان المتعمد من الأدوية المنقذة للحياة .
- عدم توفر ممرات آمنة منعت الكوادر الطبية من الوصول للمحتجزين

الوفيات المشاهدة

وصف القسم: توثيق حالات الوفاة المشاهدة والأعراض التي سبقتها مباشرة

18. هل شهدت أو عاصرت (أو واصلك علم موثق ب) حالة وفاة واحدة أو أكثر داخل المرفق؟:

- لا
- نعم

19. بناءً على المشاهدات أو المعلومات الموثقة، ما هو العارض الطبي الأبرز الذي سبق الوفاة مباشرة؟ (يمكن اختيار أكثر من إجابة) :

- إسهال حاد وجفاف شديد
- هزال وفشل أعضاء ناتج عن سوء التغذية
- توقف قلب مفاجئ أو آثار تعذيب مباشر
- نزيف حاد ناتج عن إصابة لم تُعالج
- غيبوبة مفاجئة (لمرض السكرى أو الضغط)
- ضيق تنفس حاد واختناق

20. من وجهة نظرك الشخصية، ما هو العامل "الأكثر مساهمة" في زيادة الوفيات داخل هذا المرفق؟ (سؤال اختياري)

- (مساحة للإجابة النصية المفتوحة)

