The Impact of Ongoing Armed Conflict on Sudan's Healthcare System: A Rapid Review

Data

A. Summary of the reviewed references

1. Nicholas Aderinto

The armed conflict in Sudan has critically exacerbated the country's fragile health system, resulting in significant public health challenges. Key findings include:

Health Facilities: WHO reported 11 attacks on health facilities, impeding access to essential services.

Child Health: UNICEF documented 9 child fatalities and over 50 injuries, with 50,000 severely malnourished children facing heightened risks.

Medical Supply Shortages: Hospitals, such as the MSF-supported South Hospital in El Fasher, face severe shortages of medical supplies, with current stocks sufficient for only three weeks.

Humanitarian Corridor Violations: Violations of UN-established humanitarian corridors compromise aid delivery and civilian safety.

Infectious Diseases: The conflict has disrupted social structures and healthcare infrastructure, increasing the risk of infectious diseases like cholera and typhoid.

Malnutrition: The conflict has worsened malnutrition, affecting an estimated 3 million children under five annually.

Mental Health and Sexual Violence: The conflict has increased the prevalence of PTSD, depression, and conflict-related sexual violence (CRSV), with severe long-term impacts on survivors.

Recommendations:

Strengthen sustainable health systems, including primary care, disease surveillance, and emergency response.

Ensure the provision of essential health services, including mental health care and maternal and child health services.

Address the root causes of conflict, such as poverty, inequality, and political instability, to promote peace and stability.

This review underscores the urgent need for coordinated international efforts to address the public health crisis in Sudan and mitigate the long-term impacts of the conflict.

2. Alhadi Khogali.

Health Service Delivery: The conflict in Khartoum has led to the closure of several hospitals due to RSF occupation, looting, and resource shortages. Critical services such as immunization, nutrition, and emergency surgeries have been suspended, with patients redirected to other states without expanded services to accommodate them.

Medicines and Supply Chain: Hospitals in Khartoum face shortages of essential supplies, including blood and life-saving commodities, exacerbated by the destruction of polio vaccines and looting of aid supplies. Emergency medical supplies have been sent to Port Sudan, but distribution to other states remains unclear.

Human Resources for Health (HRH): Academic institutions have shut down, delaying the production of healthcare professionals. The conflict has forced medical staff to leave hospitals or work under severe conditions, potentially increasing the brain drain of healthcare professionals seeking opportunities abroad.

Health Finance: The conflict has further strained an already challenged healthcare financing system, with rising out-of-pocket expenses and reduced government contributions. The fiscal space is expected to shrink due to infrastructure damage and military spending, though humanitarian partners are seeking additional resources.

Governance: The conflict has exacerbated the health leadership vacuum in Sudan. The FMoH is engaging with health partners to maintain basic services and guide interventions, though decision-making may shift to the state level.

Burden of Diseases: Sudan struggles with high burdens of communicable diseases and malnutrition, which are expected to worsen due to the conflict. The disruption in health services and supply chains will likely increase the burden of noncommunicable diseases and mental health issues, along with spikes in gender-based violence and SRH-related problems.

Humanitarian Response Priorities: Peace is crucial for restoring the health system. Response plans should prioritize essential health services and support safer states receiving displaced populations. Massive coordination between FMoH and international partners is needed, along with empowering local actors and ensuring safety for operating staff and supply routes.

3. Tahra Al Sadig

Key Findings:

Humanitarian Impact:

Pre-war, 15.8 million people required humanitarian assistance; post-conflict, this number surged by 57%.

The conflict has resulted in 12,501 deaths and 26,051 injuries as of December 2023.

Over six million internally displaced persons (IDPs) and 1.57 million refugees in neighboring countries.

Health and Healthcare System:

Extensive damage to healthcare facilities, disrupted supply chains, and a shortage of healthcare professionals.

Outbreaks of communicable diseases like measles, dengue, and cholera due to disrupted public health services.

Significant mental health impacts due to trauma and sustained stress from the conflict.

Specialized Facilities:

Disruption of services at key national health centers, including oncology, tuberculosis, and diabetic centers.

Risk of biological hazards from unsecured specimens at the National Public Health Laboratory.

Refugee Camps and Settlements:

Overcrowded camps with limited services, leading to outbreaks of infectious diseases, malnutrition, and human rights abuses.

Significant pressure on healthcare systems in host countries.

Discussion: The review highlights the urgent need for international intervention and support to address the critical health challenges in Sudan. The findings underscore the importance of a structured disaster management framework to enhance preparedness, response, recovery, and mitigation efforts. Recommendations include the decentralization of healthcare services, community involvement, and international collaboration for effective crisis management and recovery.

Conclusion: The conflict in Sudan has had a devastating impact on public health, with extensive humanitarian, healthcare, and infrastructure challenges. Immediate and sustained efforts are required to mitigate the health crisis and support the recovery and resilience of the affected populations. Further research is recommended to explore specific areas such as healthcare decentralization, the role of volunteering organizations, and the impact on vulnerable populations.

4. Rihab Elsharief

The ongoing armed conflict in Sudan has severely impacted the country's health system, leading to a deepening humanitarian crisis. Key issues include the destruction of healthcare infrastructure at all levels, particularly in conflict zones like Khartoum and Darfur. This has resulted in the displacement of populations and health personnel, shortages of medical supplies,

and financial difficulties due to the loss of economic support. The outbreak of epidemics such as Dengue Fever and Cholera has exacerbated the situation, with high case fatality rates reported. Essential health services, including obstetric care and emergency services, have been widely interrupted, and hospitals face critical shortages of supplies, water, and power.

Financial losses to the health system are estimated at $700 million, further straining an already underfunded sector. The persistence of armed conflict poses a major threat, with potential for further biological, social, health, and economic difficulties. However, opportunities exist for overcoming the health crisis through the implementation of a clear healthcare system enforcement plan in collaboration with health-related sectors and international aid. Strategies from other post-conflict regions, such as decentralization and community healthcare worker adoption, could provide valuable insights for Sudan's healthcare system recovery and reform.

5. Amal Elamin

Humanitarian Crisis

Internally Displaced Persons (IDPs): 6.8 million from 12 out of 18 states; 19% in informal settlements.

External Displacement: 1.5 million displaced outside the country.

Humanitarian Aid: 24.8 million people require aid and protection.

Food Insecurity: 18 million people acutely food insecure, including 4 million children under 5 suffering from malnutrition. Classified as IPC3 (crisis) or IPC4 (emergency), with potential escalation to IPC5 (famine).

Conflict Impact: Armed conflict and organized violence exacerbate the crisis. Reports of extreme hunger and survival measures such as consuming mud and peanut shells.

Healthcare System Impact

Pre-War Challenges: Underfunded, fragmented, critical workforce shortages, and disparities in care.

Current State: 70% of healthcare facilities in war-affected states closed by end of 2023. Significant closures in Khartoum (58.5%) and Gezira (56.2%) states. Other affected regions include Central Darfur, North Darfur, White Nile, and North Kordofan.

Healthcare Workforce: Critical shortages, unpaid workers, and many leaving the country.

Affordability: Increased financial burden due to looting and poverty.

Health Information Systems: Compromised due to targeted disruptions, impeding data collection and communication.

Emerging Health Challenges

Quadruple Burden of Disease: Transition from double burden (communicable and non-communicable diseases) to quadruple burden (including conflict-related injuries and trauma).

Communicable Diseases: Outbreaks of cholera, measles, dengue fever, chikungunya, and rabies.

Non-Communicable Diseases (NCDs): Increased vulnerability and challenges in accessing medications and treatment.

Conflict-Related Injuries: Significant fatalities and non-fatal injuries, with underreported figures.

Mental Health: Increased burden of trauma and gender-based violence (GBV).

Strategies and Initiatives

WHO Frameworks: Utilization of the Health Systems Resilience Toolkit and other resources.

Global Experiences: Adopting strategies from Lebanon, Syria, Ethiopia, and South Africa.

Local Investments: Community-led efforts, charity kitchens, hospital rehabilitation appeals, and pharmaceutical distribution networks.

Mobile Clinics: WHO-supported clinics providing comprehensive services, including treatments, surgeries, chronic disease management, and maternal and child health services.

Call to Action

Investment in Healthcare: Prioritize investments during the conflict for long-term benefits.

Collaboration: Foster local, bilateral, and multilateral collaboration for resource coordination.

Community-Driven Approaches: Support bottom-up initiatives and enhance local capacities.

Scaled-Up Aid: Deliver direct financial and material support to address immediate needs.

Capacity Building and Technology Transfer: Invest in local healthcare capacity and modernize facilities.

This summary provides a comprehensive overview of the current humanitarian and healthcare crisis in Sudan, highlighting the urgent need for coordinated global and local efforts to address the escalating challenges.

6. Rawa Badri

The World Health Organization (WHO) has identified 20 neglected tropical diseases (NTDs) that primarily affect impoverished communities, perpetuating poverty cycles. Mycetoma, recognized by WHO as an NTD in 2016, is a chronic, disabling inflammatory disease caused by fungi (eumycetoma) or filamentous bacteria (actinomycetoma). Predominantly affecting young adult males in underprivileged areas, it leads to significant tissue damage, disfigurement, and disability if untreated. The disease is endemic in arid tropical and subtropical regions, notably in Sudan, where the Mycetoma Research Centre (MRC) operates. However, the ongoing conflict in Sudan, starting in April 2023, has severely disrupted healthcare services, including the MRC's operations, exacerbating the disease's impact. The conflict has led to massive internal displacement, increasing the risk of mycetoma and other infections. International cooperation and urgent funding are essential to restore healthcare services, protect healthcare workers, and address the significant psychological impact on affected individuals.

7. Muhammad Kabir

The ongoing conflict in Sudan has critically undermined the nation’s healthcare system, which was already underfunded and poorly resourced. The destruction of health facilities, shortages

in medical supplies, and the exodus of healthcare workers have severely disrupted service provision, affecting patients with both acute and chronic conditions. The crisis heightens the risk of infectious disease outbreaks, given the compromised National Public Health Laboratory housing dangerous pathogens. Mental health issues, food insecurity, and malnutrition are escalating, particularly among women, children, and displaced populations. Environmental degradation due to the conflict poses long-term ecological threats. Additionally, global donor fatigue is limiting humanitarian aid, exacerbating the crisis. Recommendations for mitigating these impacts include respecting ceasefire periods, enhancing health infrastructure, implementing disease surveillance, utilizing telemedicine, and addressing malnutrition and mental health needs.

The health system in Sudan is collapsing due to the ongoing conflict.

Destruction of health facilities and shortages in medical supplies are prevalent.

There is a significant risk of epidemics due to the conflict.

Mental health issues are increasing among the displaced population.

Food insecurity is exacerbating malnutrition and health problems.

Environmental damage from the conflict is severe.

Global donor fatigue is impacting humanitarian aid efforts.

Recommendations include ceasefire respect, improved health infrastructure, disease surveillance, telemedicine, and addressing malnutrition and mental health.

8. Hajer Elyas

A study involving 374 internally displaced persons (IDPs) with a response rate of 96.1% revealed significant socio-demographic characteristics and health challenges. Approximately 70% were aged 18–49, 70.9% were female, 66% were married, and 92.8% had no current financial source. Most respondents (78.1%) were originally from Khartoum, and 80% had been displaced for over 10 weeks. The prevalence of non-communicable diseases (NCDs) was

42.5%, with hypertension (44.6%), diabetes mellitus (23.9%), and thyroid disorders (16.3%) being the most common. A significant portion (62.2%) had multiple NCDs. Despite 83% being on long-term medication, only 54.7% adhered regularly due to financial constraints, medication unavailability, and access issues. About 61.4% regularly visited a doctor, primarily in shelter clinics, public hospitals, or private clinics, but 38.6% faced barriers like financial issues and transport difficulties. Only 57.2% received free medical assistance. Data analysis showed significant associations between NCD type and age, gender, residence before displacement, and length of displacement. Continuous healthcare access is crucial for managing NCDs among IDPs.

9. Esra Abdallah

In a study of 58 medical faculties in Sudan, 70.7% were private and 75.9% were located in Khartoum state. It was found that 58.6% of the faculties were attacked, with 70.6% of these being private institutions. Among the attacked faculties, 52.9% were in Khartoum city and 20.6% in Omdurman city. Multiple forms of attacks were reported in 64.7% of cases, with looting (73.5%) and conversion into military bases (67.6%) being the most common. Efforts to restore educational processes were seen in 60.3% of faculties, primarily through online education (48.6%) and collaborations with other universities (8.6%). Among the attacked faculties, 61.8% managed to resume educational activities, compared to 73.7% of non-attacked faculties. The study highlights significant disruptions in medical education due to the conflict, with private institutions being disproportionately affected.

10. Waleed Gibreel

Children in Sudan are experiencing a severe humanitarian crisis due to ongoing conflicts, especially between the Sudanese Armed Forces (SAF) and the Rapid Support Forces (RSF) since April 2023. This conflict has exacerbated poverty, disrupted access to healthcare for two-thirds of the population, and displaced over 4 million children to refugee camps, with 14 million

trapped in their towns and villages. The destruction of infrastructure and restricted movement of aid workers have worsened malnutrition and outbreaks of diseases like measles, cholera, dengue, and malaria, affecting 3.7 million children. Education has been severely disrupted, with over 19 million children out of school as many educational facilities have been destroyed or repurposed. Additionally, children have been recruited as soldiers and have faced significant psychological trauma. The crisis in Sudan is compounded by famine and the global focus on other conflicts, necessitating urgent attention to the plight of Sudanese children.

11. Emadeldin Hassan

In wartime Sudan, kidney dialysis patients face severe challenges due to the overwhelmed healthcare system. An estimated 8,000 patients require 70,000 dialysis sessions monthly, but the conflict has disrupted medical services, leading to a critical shortage of dialysis supplies and operational centers. Militia violence has further exacerbated the situation by targeting healthcare workers. In Al-Goled, a local hemodialysis center, originally designed for 30 patients daily, now struggles with a 183% increase in patient load due to the conflict, resulting in 13 patient deaths. Efforts by local committees to procure supplies are hindered by bureaucratic barriers. The ongoing conflict has disrupted the supply chain, making it difficult for patients to receive the necessary three weekly dialysis sessions, often securing just one. Government medical insurance covers some costs, but patients must obtain certain medications from private pharmacies, further complicating their care.

12. Ahmed Hassan

The conflict that erupted on April 15, 2023, in Khartoum State, Sudan, between the Rapid Support Forces (RSF) and the Sudanese government has significantly impacted maternal and perinatal health. The war has led to widespread hospital closures, including major maternity hospitals, and has severely disrupted healthcare services. Approximately 2.64 million women and girls of reproductive age require urgent health assistance, with 262,880 currently pregnant

and over 90,000 expected to give birth within three months. The occupation of healthcare facilities by RSF and the resulting healthcare service disruptions have exacerbated adverse pregnancy outcomes and increased maternal and perinatal mortality rates. War-related sexual and gender-based violence (SGBV) has also been reported, with insufficient support for victims. Recommendations to improve maternal and perinatal health include providing essential health services and psychosocial support, building local and national health system capacities, and ensuring accurate information dissemination for future planning. The conflict threatens Sudan's progress toward Sustainable Development Goals, particularly SDG-3 (good health and well-being) and SDG-16 (peace, justice, and strong institutions).

13. Amani Abdelmola

Summary of Antenatal Care and Maternal Mortality in Sudan

Maternal Mortality Trends

2001: 636 deaths per 100,000 live births.

2020: 295 deaths per 10,000 live births.

Global Context: 95% of maternal deaths occur in low and lower-middle-income countries, with Sub-Saharan Africa having the highest maternal mortality ratio (533 deaths per 100,000 live births).

Antenatal Care (ANC) Impact

Direct and Indirect Benefits: Reduces maternal and perinatal morbidity and mortality by identifying and treating pregnancy-related complications.

Key Findings: ANC is crucial for identifying women at risk and ensuring appropriate care levels.

Coverage and Utilization

Global Coverage: 88% of pregnant women access ANC at least once; 66% receive four ANC visits.

Sudan:

2012-2014: 50.7% had at least one ANC visit.

2018-2019: 51.2% had at least one ANC visit.

2021-2022: ANC coverage remains poor, with only 40-41% for the first visit and 25-29% for the fourth visit.

Quality of ANC

Key Issues: Poor quality due to inadequate resources, lack of training, and administrative weaknesses.

Success Stories: Gezira health project reduced maternal mortality from 469 per 100,000 live births in 2005 to 139 in 2019.

Accessibility and Utilization Barriers

Factors: High parity, low education, distance, high transport costs, and socio-demographic characteristics.

Conflict Impact: Armed conflict and political instability severely affect access to and quality of ANC services.

Service Components of ANC

Screening: Early detection of complications, including depression, syphilis, and dental health issues.

Dietary Monitoring: Addressing anemia and nutritional deficiencies.

Vaccination: Tetanus toxoid vaccination coverage is inadequate, with significant disparities based on socioeconomic status.

Counseling and Health Education

Importance: Critical for raising awareness about diet, danger signs, and family planning.

Current Status: Limited counseling and education provided during ANC visits in Sudan.

Impact of Political Instability and Conflicts

Health System: Armed conflicts and political instability have led to the destruction of healthcare infrastructure, affecting maternal and perinatal health outcomes.

Current War: The ongoing conflict severely impacts pregnant women, leading to unsafe deliveries and adverse pregnancy outcomes.

14. Samar Abdelkarim

The conflict in Sudan since April 2023 has severely impacted healthcare professionals emotionally and mentally.

The World Health Organization reported 53 attacks on healthcare providers, resulting in 11 deaths and 38 injuries between April and July 2023.

The conflict has created a hostile and unstable environment, making it difficult for healthcare providers to reach medical facilities safely.

Approximately 65% of the population lacks access to healthcare, and 70%-80% of hospitals in conflict zones are non-functional.

Healthcare providers face scarce resources, crumbling infrastructure, and threats while performing their duties.

Rival forces have detained physicians, detracting them from providing urgent civilian care.

Many healthcare providers are forced to treat severe injuries within their communities with minimal medical setup.

The insecurity has led some healthcare providers to leave for safer zones, causing moral dilemmas and emotional distress.

Sudan faces the largest internal displacement crisis, with around 9.05 million internally displaced persons.

The stress and trauma have led to burnout, anxiety, and other mental health challenges among healthcare providers.

The loss of colleagues and friends has further compounded the emotional impact on doctors.

Even before the conflict, Sudanese healthcare services were struggling with overwhelming workloads and limited resources.

A study showed high levels of emotional exhaustion, decreased professional accomplishment, depersonalization, and burnout among Sudanese healthcare providers before the conflict.

The conflict has intensified shortages of medical supplies, equipment, and personnel.

The Ukrainian Ministry of Health reported the displacement of 1658 healthcare providers due to the ongoing war.

International aid and funding are crucial to support the recovery process for healthcare providers and the nation.

The Sudan Humanitarian Response Plan requires US$2.6 billion, but only 23.5% of the required amount has been provided.

Establishing medical mobile or field units can create safe zones for civilians and support the psychological well-being of healthcare staff.

The conflict in Sudan, ongoing since April 2023, has profoundly affected healthcare professionals' mental well-being and capacity to provide effective medical care. The World Health Organization reported 53 attacks on healthcare providers, resulting in 11 deaths and 38 injuries between April and July 2023. Approximately 65% of the population lacks access to healthcare, and 70%-80% of hospitals in conflict zones are non-functional. Healthcare providers face severe resource shortages, crumbling infrastructure, and threats, exacerbating stress and trauma, leading to burnout and anxiety. Many are forced to treat severe injuries within their communities with minimal resources, while some have been detained by rival forces, detracting from civilian care. Sudan faces the largest internal displacement crisis, with around 9.05 million internally displaced persons. The conflict has intensified pre-existing healthcare challenges, including overwhelming workloads and limited resources. International aid and funding are crucial for recovery, with the Sudan Humanitarian Response Plan requiring

US$2.6 billion, of which only 23.5% has been provided. Establishing medical mobile or field units can create safe zones and support the psychological well-being of healthcare staff.

15. Mutaz Maawia

The study analyzed the demographic and psychological impacts of the Sudanese conflict on 134 respondents. Key findings include a gender distribution of 32.1% female and 61.9% male, with a significant skew towards younger individuals (44% under 30, 72.4% under 40). Most participants were single (53.4%) and highly educated (99.1% with some college or university education). Employment data showed 32.1% had good-paying jobs, while 29.1% were unemployed or had unsatisfactory salaries. Geographically, 51.5% were in Khartoum State at the conflict's onset. The conflict had a profound impact, with 34.3% reporting loss of a friend or family member and 94.7% noting a negative impact on their family's life. Despite this, 77% did not seek psychological help. Perspectives on Sudan's future were mixed, with 52.2% pessimistic and 40.3% optimistic.

Reliability analysis yielded a Cronbach's alpha of 0.922, indicating strong internal consistency. T-test results showed gender differences in psychological responses: men had higher scores in depression and panic-related symptoms, while women managed stress-related symptoms better. DASS-21 scores indicated extremely severe depression (mean = 29), severe anxiety (mean = 25), and extremely severe stress (mean = 36.8).

The study confirmed significant psychological distress among participants, supporting hypotheses about the mental health impacts of the conflict and gender differences in responses. The findings challenge the Male Warrior Hypothesis and support the Tend-and-Befriend theory. The study emphasizes the need for targeted mental health interventions and integrating mental health support into post-war reconstruction efforts. Limitations include a cross-sectional design, small sample size, and gender imbalance, suggesting the need for further longitudinal research with larger, diverse samples.

16. Sanjay Pattanshetty

This review synthesizes evidence on the impact of conflict on healthcare systems, focusing on attacks on health facilities, personnel, patients, medical transport, and the misuse of health facilities. It examines case studies from Kosovo, Afghanistan, the Democratic Republic of Congo (DRC), and Somalia, and discusses international measures and health diplomacy efforts to mitigate these impacts. The review highlights the need for robust health systems, equitable resource distribution, and effective international cooperation to address and prevent attacks on healthcare in conflict settings.

Context: The health sector in conflict regions faces significant threats, with belligerents using attacks on health as war tactics.

Categories of Attacks: Health facilities, professionals, patients, medical transport, and misuse of facilities.

Kosovo: Systematic targeting of Albanian doctors, misuse of medical facilities.

Afghanistan: Attacks on medical transport and clinics by rebel groups, kidnapping of healthcare staff.

DRC: Government attacks on measles vaccination camps used by rebel groups.

Somalia: Intentional damage to hospitals during Ethiopian occupation.

International Measures:

Legal Protections: International Humanitarian Law (IHL), Geneva Convention, Additional Protocols.

Initiatives: WHO's Attacks on Health Care initiative, Surveillance System for Attacks on Health (SSA).

Resolutions: UNSC Resolution 2286 condemning attacks on healthcare.

Health Diplomacy:

Examples:

USAID's healthcare reconstruction in Afghanistan.

Japan's maternal and child health initiatives in Palestine.

Türkiye's hospital construction in Sudan.

China's medical teams in Africa.

Cuba's global medical missions and training programs.

Role: Health diplomacy as a tool for building resilient health systems and fostering peace.

Challenges and Way Forward:

Equitable Distribution: Addressing vaccine inequity and ensuring inclusive access to healthcare.

Holistic Approach: Implementing Health in All Policies (HiAP) and public-private partnerships.

Local Capacity Building: Training local healthcare providers and community-based approaches for resilience.

SDGs: Integration of SDG 3 (health), SDG 16 (peace), and SDG 17 (partnerships) for resilient health systems.

Case of Sudan: Need for international partnerships and robust health infrastructure.

Lessons from Ukraine: Importance of local community involvement and capacity building.

Systemic Approach: Establishing accountability mechanisms and ensuring data transparency.

Key Points: Attacks on health challenge medical neutrality and require collective action.

Robust health systems and international cooperation are essential for addressing and preventing healthcare attacks in conflict settings.

17. Judith Natukunda

Armed conflicts significantly impact public health beyond direct combat-related fatalities, contributing to high rates of preventable diseases, malnutrition, and inadequate access to essential services such as water, sanitation, hygiene (WASH), and healthcare. Evidence

indicates that interventions like providing clean water, improving sanitation, and ensuring vaccination coverage can reduce morbidity and mortality, particularly among children under five. For instance, a study in a Malawi refugee camp demonstrated reduced diarrhea incidence with improved water access (Roberts et al., 2001). Immunization programs have been successful globally but remain underutilized in conflict zones, leaving children vulnerable to vaccine-preventable diseases (Ismail et al., 2020). Nutritional interventions in war-affected regions show promise in addressing acute malnutrition and associated health issues (Carroll et al., 2017). These measures align with Sustainable Development Goal 6, aiming for sustainable water and sanitation management, and could significantly improve health outcomes in conflict-affected populations, such as those in Sudan.

18. Iman Ahmed

Impact of Conflict on Cancer Services in Sudan: A Systematic Review Reference

Background: The conflict in Sudan has severely disrupted cancer services, particularly following the collapse of services in Khartoum and the subsequent spread of conflict to other regions.

Patient Displacement:

Patients dispersed to Wad Medani, Shendi, Atbara, El-Gedarif, Kassala, Port Sudan, Sinnar, Kosti, Merowe, Dongola, and Halfa.

Cancer centers in Wad Medani, Merowe, Shendi, and El-Gedarif experienced nearly double the number of patients.

Pediatric patient load at the NCI quadrupled, leading to overcrowding and high turnover due to increased mortality and displacement.

Healthcare Infrastructure Damage:

NCI in Wad Medani was attacked, resulting in evacuation and nonfunctional status.

Loss of critical equipment and services in Khartoum and Wad Medani, including LINAC machines, cobalt-60 EBRT machines, and brachytherapy machines.

RSF militia attack on CMSF in Khartoum resulted in a $500 million loss in medical stocks.

Economic and Accessibility Challenges:

Eldaman Oncology and Radiotherapy Center in Merowe is a private, costly facility, difficult to access due to dangerous travel routes.

Many patients unable to afford treatment and travel costs due to economic hardship exacerbated by the conflict.

Healthcare Workforce and Supply Chain Issues:

Overworked and exhausted staff, severe shortages of medicines and supplies.

Attacks on healthcare facilities have led to suboptimal working conditions and forced triage based on scarcity.

Fluctuating availability of cancer treatment in Port Sudan, with an unsustainable supply chain.

International Response and Recommendations:

International response has been minimal, with little support or action plans.

Urgent need for international and regional collaboration to support Sudanese cancer patients and healthcare providers.

Proposal to boost regional cancer centers and establish an airbridge for evacuating affected children.

Call for coordinated efforts from organizations like WHO, UNICEF, and AORTIC to prioritize assistance to Sudanese patients with cancer.

Conclusion: The conflict in Sudan has led to a significant disruption in cancer care services, resulting in poor patient outcomes and increased mortality. There is an urgent need for international support and coordinated efforts to address the crisis and ensure continuous care for cancer patients.

19. Mudather Elnoor

This study highlights the devastating impact of the ongoing civil war on health services in Sudan. Since April 15, 2023, 70% of hospitals and primary care facilities have been closed for over six months, leading to shortages of critical supplies and endangering thousands of patients. The study details the gender ratio of patients affected by chronic disorders and infectious diseases, with 51.8% females and 48.2% males. The violent attacks on medical facilities have severely affected the lives of children, elderly, and patients with cancer, renal failure, and other chronic illnesses. In Gadaref state, 42.2% of patients died from dengue fever and cholera, followed by Khartoum at 19%. Infectious diseases accounted for 66.7% of deaths, with cardiovascular disorders, nephropathy, diabetes mellitus, and cancer following. The majority of casualties were working-class individuals aged 50 and older. The International Federation of Red Crescent Societies and WHO have warned of a potential collapse of the health system if the conflict continues. The study also notes severe food shortages, economic collapse, and high rates of child malnutrition. Additionally, the takeover of a National Public Health Laboratory in Khartoum poses significant risks due to improper handling of hazardous biological materials. Further research is needed to address the environmental and public health impacts of bodies dumped in the streets and River Nile.

20. Amna Khairy

Impact of Forced Displacement and Engagement of SFETP Residents and Graduates in Public Health Responses

Study Overview: This study examines the impact of forced displacement on the distribution and engagement of Sudan Field Epidemiology Training Program (SFETP) residents and graduates during an armed conflict.

Key Findings:

Distribution Changes:

Pre-conflict: 67% of states had SFETP presence, concentrated in Khartoum (34%).

During conflict: Increased to 72% of states, with displacement from Khartoum, South Darfur, and West Darfur.

Post-conflict: Distribution shifted to central, eastern, and northern regions; new presence in North Kordofan.

Engagement in Public Health Responses:

Active engagement: 91% of residents and 73% of graduates during the conflict.

Key roles included leadership, planning, coordination, surveillance, outbreak investigations, risk communication, and WASH interventions.

Leadership and Coordination:

72% of SFETPs led public health emergency responses.

Example: Comprehensive demographic and health profiling in Gedaref state.

Surveillance and Outbreak Response:

One-third supported surveillance activities; established EWARS at Egypt entry points.

25% conducted outbreak investigations, notably addressing acute watery diarrhea.

Needs Assessment:

50% conducted rapid needs assessments focusing on health, nutrition, and food security.

Risk Communication:

28% involved in promoting disease prevention and conducting educational sessions.

Discussion:

Forced displacement caused significant shifts in SFETP distribution, with a notable concentration in central states.

Despite displacement, 84% of SFETPs contributed to crisis response, highlighting gaps in formal deployment and retention.

The study underscores the need for improved planning in deploying SFETP alumni and enhancing data utilization for decision-making.

Future studies should address training gaps in both technical and nontechnical skills essential for crisis response.

Conclusion: The SFETP played critical roles in public health response during the conflict, despite challenges in distribution and retention. Enhanced planning and training are needed to optimize their deployment and effectiveness in future crises.

21. Amira Mohamed

Title: Impact of Conflict on Child Health and Nutrition in Sudan: A Systematic Review

Abstract: This systematic review examines the pervasive impact of conflict on child health and nutrition in Sudan, particularly following the escalation of violence in April 2023. The conflict has led to significant increases in internally displaced persons (IDPs) and refugees, with severe ramifications for children. Key findings indicate that children in conflict zones endure extreme violence, malnutrition, inadequate healthcare, and psychological trauma. The collapse of Sudan's healthcare system is highlighted by the situation at Elbuluk Hospital in Khartoum, the only operational pediatric hospital, which has seen a doubling of admissions and a significant rise in severe acute malnutrition (SAM) fatality rates. The review underscores the compounded effects of economic instability, food insecurity, and disrupted social structures on child health. It calls for urgent interventions to improve food aid, local agricultural practices, healthcare infrastructure, and adherence to International Humanitarian Law (IHL) to ensure the protection and well-being of children in conflict-affected regions.

Key Points:

Conflict Impact: The conflict in Sudan, particularly since April 2023, has led to the highest global numbers of IDPs and refugees, severely affecting children's health and nutrition.

Health and Nutrition: Children face extreme violence, malnutrition, lack of healthcare, and psychological trauma. The SAM fatality rate at Elbuluk Hospital doubled from 6% to 12% between August 2023 and March 2024.

Healthcare System: The conflict has critically compromised healthcare delivery due to the destruction of facilities, theft of supplies, and security concerns, leading to substandard care and untreated diseases.

Food Insecurity: Sudan is experiencing severe food insecurity, with 18 million people facing acute shortages, exacerbated by economic instability and disrupted trade routes.

Recommendations: Urgent need for improved food aid, support for local agriculture, reconstruction of healthcare infrastructure, and enforcement of IHL to protect civilians and ensure effective humanitarian aid delivery.

Conclusion: The ongoing conflict in Sudan has had a devastating impact on child health and nutrition. Addressing these challenges requires coordinated efforts to improve food security, healthcare access, and adherence to humanitarian laws to mitigate the adverse effects on vulnerable populations.

22. Mona Mahmoud

Chemotherapy drug availability in Sudan during wartime showed significant fluctuations and shortages, impacting treatment outcomes for cancer patients. Various drugs experienced intermittent supply or complete absence, highlighting the challenges in maintaining consistent drug supply chains. The shortages led to increased morbidity, mortality, and psychological distress among patients. Efforts to mitigate these issues include alternative procurement channels, international collaborations, and improved inventory management. However, persistent challenges such as insecurity, logistical constraints, and inadequate funding remain. Addressing these requires resilient policies, emergency preparedness, and international

cooperation to ensure continuous drug access and alleviate the socioeconomic and psychological burdens on patients.

This study examines the availability and supply frequency of chemotherapy drugs in Sudan during wartime, highlighting significant fluctuations and shortages. Group 1 drugs like Avastino 100 and Cisplatin 450 showed substantial and complete absences respectively, while others like Cyclophosphamide 200 had intermittent supply. Group 2 drugs such as Docetaxel 20 maintained consistent availability, whereas Doxorubicin10 and Epirubicin50 were completely absent. Group 3 drugs including Irinotecan 100g had consistent supply, but Melphalan was entirely unavailable. Group 4 and 5 drugs exhibited varied availability, with some like Velcade and 5-Fu250 maintaining 100% supply on certain dates, while others faced shortages.

The impact of these shortages on cancer patients was profound, leading to compromised treatment outcomes, increased morbidity and mortality rates, and significant psychological distress. Efforts to mitigate these shortages included alternative procurement channels, international collaborations, and improved inventory management. However, challenges such as insecurity, logistical constraints, and inadequate funding persisted. The study underscores the need for resilient policies, emergency preparedness, and international cooperation to ensure continuous drug access and alleviate the socioeconomic and psychological burdens on patients.

23. Khadija A. Khalil

The study involved 642 participants, focusing on adults who were internally displaced, refugees, or nondisplaced. The response rate was 55.7%, with 76.3% women and a median age of 22. Most participants were Muslims. Pre-war, 20.2% had monthly incomes ≥ 400,000 SDG, which dropped to 8.6% post-war, while those earning ≤ 50,000 SDG increased from 16.5% to 43.5%. Satisfaction with living conditions was linked to PTSD severity, with 36.6% showing clinically significant PTSD symptoms. Refugees had higher depressive symptoms, with factors

like age, dissatisfaction, unemployment, female gender, and single status contributing to depression. Traumatic events varied by displacement type, with refugees facing more severe family separation and housing destruction. The study highlights the need for targeted mental health interventions and improved living conditions for affected populations. Limitations include the lack of prewar mental health data and nonprobability sampling. Future research should explore the lived experiences of displaced individuals to better tailor interventions.

24. Amera Elzubeir

Sudan has been embroiled in conflict for over two decades, with recent escalations between the Sudanese Armed Forces and the Rapid Support Forces leading to an all-out war in April 2023. This conflict has exacerbated the already dire humanitarian situation, with millions displaced, hundreds killed, and thousands wounded. The health care system is in crisis, with most hospitals closed or non-functional, and essential supplies running out. Infectious disease outbreaks and lack of basic services further threaten lives. Aid efforts are hampered by safety concerns, and the country faces severe shortages of food, water, and medical supplies. The international community is urged to provide aid and support to prevent further catastrophe.

25. Amre Nasr

The armed conflict in Sudan, which began in April 2023, has devastated the healthcare system, causing shortages in medical supplies and personnel, and increasing trauma cases. Medical research and education have been severely impacted, with a significant drop in research output and disruption of academic activities. Recovery efforts should focus on rebuilding infrastructure, ensuring medical supplies, providing psychological support, and leveraging international aid and collaborations. Recommendations include relocating research centers to safe areas, enhancing international partnerships, and utilizing e-learning platforms to maintain educational continuity.

26. Shawn Andrea

The Sudan Emergency ECHO program, initiated in response to the April 2023 hostilities, leveraged an existing remote healthcare education network established during the COVID-19 pandemic. This network, managed by the Sustainable Development Response Organization (SUDRO) and linked through Telegram, enabled rapid deployment of emergency care training to over 5,000 healthcare workers. Collaborating with Project ECHO and WHO EMRO, the program adapted quickly to emerging needs, using local experts and culturally relevant content. Despite challenges, including modest use of a virtual consult service, the program effectively expanded its reach and demonstrated the benefits of using established digital networks for emergency education in crisis settings. Future initiatives should focus on enhancing bidirectional information sharing and implementing formal evaluation tools from the outset.

27. Ebrahim M Ebrahim

SWOT Analysis of Sudanese Health Services System (HSS)

Strengths:

Skilled younger workforce and adequate health workers.

Long-term and short-term strategic health plans.

Free primary health care and emergency services.

Active international health agencies and NGOs.

Enhanced human resource policies and health sciences academies.

Weaknesses:

Lack of clear implementation and evaluation mechanisms.

Poor data quality and fragmented health information system.

Insufficient postgraduate training and poor geographical distribution of health workers.

Low health spending and inefficient resource utilization.

Inequitable distribution of healthcare facilities and poor referral system.

Opportunities:

Recent political commitments and decentralization.

External funding opportunities and international partnerships.

Economic growth and health system reform initiatives.

Threats:

Economic sanctions and instability.

High attrition of well-trained medical officers.

Outdated health legislations.

28. Malaz Hassan

The study examines the impact of the April 25th war on hemodialysis patients in Sudan, involving 316 participants (63.9% males, 36.1% females). Post-war unemployment rose to 74.7%, and income sources shifted to family and friends. Healthcare access scores were generally high, except for affordability. Many patients received reduced dialysis sessions, and over half experienced anxiety and severe depression, linked to internal displacement. The study recommends a ceasefire for medical aid delivery, stronger advocacy, emergency funds, healthcare worker training, and telemedicine services. Limitations include convenience sampling and exclusion of the most affected regions.

29. Fatima Bashir

Sudan's health financing faces major challenges from poor governance, revenue models, high self-financing payments, and fragmented funding. The NHIF primarily relies on compulsory contributions from civil servants and the Ministry of Finance, leading to disparities between states. External donor funds are crucial but create fragmentation. Service provision is broad but inefficient, resulting in high out-of-pocket expenses. Recommendations include reforming NHIF, developing a blended revenue system, engaging communities for enrolment, defining informal and poor populations, pooling funds for emergencies, strengthening policy

implementation, building state-level capacity, improving partner coordination, and ensuring strong governance.

30. Sali Hafez

The Nuba Mountains demonstrate the critical role of communal support and traditional practices in maternal care during conflict. Despite limited formal healthcare, women rely on community unity, local knowledge, and NGO efforts. The study advocates for integrating these communal practices with formal healthcare to enhance maternal health outcomes.

B. Findings

Governance: Exacerbation of the health leadership vacuum in Sudan.

Healthcare System Impact: Extensive damage, disrupted supply chains, and a shortage of healthcare professionals.

Health Facilities: 11 attacks on health facilities reported by WHO, hindering access to essential services.

Health facilities: WHO reported 11 attacks on health facilities, impeding access to essential services.

Health service delivery: Closure of several hospitals in Khartoum due to RSF occupation, looting, and resource shortages.

Healthcare system collapse: 70% of facilities in war-affected states closed by end of 2023.

Specialized facilities: Disruption at key national health centers and risk of biological hazards.

Specialized facilities: Disruption of services at key national health centers.

Healthcare workforce: Critical shortages, unpaid workers, and many leaving the country.

Human resources for health (HRH): Shutdown of academic institutions delaying the production of healthcare professionals.

Medical supply shortages: Severe shortages in hospitals like MSF-supported South Hospital in El Fasher, with stocks sufficient for only three weeks.

Medical supply shortages: Hospitals like the MSF-supported South Hospital in El Fasher face severe shortages, with supplies sufficient for only three weeks.

Medicines and supply chain: Hospitals in Khartoum face shortages of essential supplies, including blood and life-saving commodities.

Child health: nine child fatalities and over 50 injuries documented by UNICEF; 50,000 severely malnourished children at heightened risk.

Child health: UNICEF documented 9 child fatalities and over 50 injuries.

50,000 severely malnourished children are at heightened risk.

Child health and nutrition: Severe impact on children with high malnutrition rates and disrupted healthcare access.

Impact on child health and nutrition: Severe ramifications for children, with a significant rise in severe acute malnutrition (SAM) fatality rates.

Humanitarian corridor Violations: Violations compromise aid delivery and civilian safety.

Humanitarian corridor violations: Violations of UN-established humanitarian corridors compromise aid delivery and civilian safety.

Humanitarian impact: 15.8 million pre-war requiring aid surged by 57% post-conflict; 12,501 deaths and 26,051 injuries as of December 2023.

Humanitarian impact: Pre-war, 15.8 million people required humanitarian assistance; post-conflict, this number surged by 57%.

Conflict resulted in 12,501 deaths and 26,051 injuries as of December 2023.

Over six million internally displaced persons (IDPs) and 1.57 million refugees in neighboring countries.

Infectious diseases: Increased risk of diseases like cholera and typhoid due to disrupted healthcare infrastructure.

Infectious diseases: Increased risk of cholera and typhoid due to disrupted social structures and healthcare infrastructure.

Burden of diseases: High burden of communicable diseases and malnutrition expected to worsen.

Quadruple burden of disease: Increased burden of communicable, non-communicable diseases, conflict-related injuries, and trauma.

Malnutrition: Worsened malnutrition affecting an estimated 3 million children under five annually.

Malnutrition: An estimated 3 million children under five affected annually.

Mental health and sexual violence: Increased prevalence of PTSD, depression, and conflict-related sexual violence.

Mental health and sexual Violence: Increased prevalence of PTSD, depression, and conflict-related sexual violence (CRSV).

Mental health: High levels of PTSD, depression, and severe stress among displaced populations.

Mental health impact: High levels of PTSD, anxiety, and depression among the population and healthcare providers.

Displacement: Over 6 million internally displaced persons (IDPs) and 1.57 million refugees in neighboring countries.

Impact of forced displacement: Significant shifts in the distribution and engagement of SFETP residents and graduates during the conflict.

Refugee camps: Overcrowded with limited services, leading to disease outbreaks and malnutrition.

Refugee camps and Slsettlements: Overcrowded camps with limited services leading to outbreaks of infectious diseases and malnutrition.

Cancer services: Significant disruption, patient displacement, and severe shortages of treatment supplies.

Impact of conflict on cancer services: Severe disruption of cancer services, particularly in Khartoum and other regions.

Chemotherapy drug availability: Significant fluctuations and shortages impacting treatment outcomes for cancer patients.

Communal support in maternal care: The critical role of communal support and traditional practices in maternal care during conflict.

Health finance: Rising out-of-pocket expenses and reduced government contributions strain the healthcare financing system.

Health financing challenges: Major challenges from poor governance, revenue models, high self-financing payments, and fragmented funding.

Economic impact: Financial losses estimated at $700 million, further straining the healthcare sector.

Emerging Health Challenges: Outbreaks of cholera, measles, dengue fever, chikungunya, and rabies.

Strategies and initiatives: WHO frameworks and global experiences from other countries.

Call to action: Investment in healthcare, collaboration, community-driven approaches, and scaled-up aid.

International response: Urgent need for international support and coordinated efforts to address the crisis.

Recommendations: Strengthen health systems, ensure essential services, address conflict root causes, and enhance international cooperation.

C. Findings summary

The ongoing conflict in Sudan has had a profound and multifaceted impact on the country's healthcare system, exacerbating existing vulnerabilities and creating new public health challenges. The destruction of health facilities, severe shortages of medical supplies, and the displacement of healthcare professionals have critically undermined service delivery. This has led to significant disruptions in essential health services, including immunizations, maternal and child health care, and emergency surgeries.

The conflict has also heightened the risk of infectious diseases such as cholera, typhoid, measles, dengue, and malaria due to the breakdown of public health infrastructure and services. Malnutrition rates have surged, affecting millions of children under five, while mental health issues, including PTSD and depression, are on the rise among both the general population and healthcare providers.

The humanitarian crisis is further compounded by violations of humanitarian corridors, which impede the delivery of aid and compromise civilian safety. The healthcare financing system is strained by reduced government contributions and rising out-of-pocket expenses, exacerbated by economic instability and military spending.

The study highlights the critical need for international intervention and support to address these challenges. Strengthening sustainable health systems, ensuring the provision of essential health services, and addressing the root causes of conflict are paramount. The review underscores the importance of coordinated global efforts, community involvement, and robust health diplomacy to mitigate the long-term impacts of the conflict and support the recovery and resilience of Sudan's healthcare system.

Future research should focus on specific areas such as healthcare decentralization, the role of volunteering organizations, and the impact on vulnerable populations. Additionally, strategies from other post-conflict regions could provide valuable insights for Sudan's healthcare system recovery and reform.

The armed conflict in Sudan has severely impacted the country's healthcare system, creating significant public health challenges. Key issues include:

Health Facilities: Multiple attacks on health facilities have greatly impeded access to essential medical services.

Child Health: The conflict has led to child fatalities and injuries, with severely malnourished children facing heightened risks.

Medical Supply Shortages: Hospitals are experiencing severe shortages of medical supplies, with some having only a few weeks' worth of stock left.

Humanitarian Corridor Violations: Violations of established humanitarian corridors are compromising aid delivery and civilian safety.

Infectious Diseases: The disruption of healthcare infrastructure has increased the risk of outbreaks of diseases like cholera and typhoid.

Malnutrition: The conflict has exacerbated malnutrition, affecting millions of children under five annually.

Mental Health and Sexual Violence: There is an increase in PTSD, depression, and conflict-related sexual violence, with long-term impacts on survivors.

Health Service Delivery: Many hospitals have closed due to occupation, looting, and resource shortages, suspending critical services.

Human Resources for Health (HRH): The conflict has forced many healthcare professionals to leave, worsening the brain drain.

Health Finance: The conflict has strained healthcare financing, increasing out-of-pocket expenses and reducing government contributions.

Governance: The conflict has created a health leadership vacuum, further complicating the provision of basic services.

Burden of Diseases: The disruption has worsened the burden of communicable and non-communicable diseases, along with mental health issues and gender-based violence.

Humanitarian Response Priorities: Peace, coordinated international efforts, and empowering local actors are crucial for restoring the health system.

The impact of armed conflict on Sudan's healthcare system

The ongoing armed conflict in Sudan has significantly deteriorated the already fragile healthcare system, leading to severe public health challenges. The destruction of infrastructure, displacement of populations, and shortages of medical supplies and personnel have created a multifaceted crisis. Key points for discussion:

Health facilities and accessibility:

WHO reports of attacks on health facilities highlight the dangerous environment for healthcare providers and patients. How can international bodies ensure the protection of healthcare infrastructure in conflict zones?

The occupation and looting of hospitals have forced many to close, redirecting patients to other states. What strategies can be implemented to maintain essential health services in such disrupted environments?

Child health and malnutrition:

UNICEF’s documentation of child fatalities and injuries, along with the heightened risks for severely malnourished children, underscores the critical need for targeted interventions. How can humanitarian organizations effectively address child health needs amid ongoing conflict?

With 3 million children under five affected by malnutrition annually, what long-term strategies can be developed to combat malnutrition in conflict-affected regions?

Medical supply shortages:

The severe shortages of medical supplies in hospitals, as reported by MSF, indicate a dire need for improved supply chain management. What are potential solutions to ensure a steady flow of medical supplies to conflict zones?

How can international partnerships and aid organizations better coordinate to mitigate the impacts of supply shortages?

Mental health and sexual violence:

The increase in PTSD, depression, and conflict-related sexual violence (CRSV) calls for robust mental health support systems. What role can local and international mental health professionals play in providing support to affected populations?

How can we address the long-term psychological impacts of the conflict on survivors of sexual violence?

Infectious diseases and public health:

Disruptions in healthcare infrastructure have led to increased risks of infectious diseases like cholera and typhoid. What measures can be taken to strengthen disease surveillance and response systems in conflict zones?

How can community-based approaches be leveraged to improve public health outcomes in the absence of formal healthcare structures?

Governance and health system resilience:

The conflict has exacerbated the health leadership vacuum in Sudan, complicating governance and decision-making. What governance models can be adopted to ensure continuity and resilience in health service delivery during conflicts?

How can decentralization and community involvement enhance the resilience of the healthcare system?

International and humanitarian response:

The need for coordinated international efforts is crucial to address the public health crisis. How can global health organizations and humanitarian partners better collaborate to support Sudan's healthcare system?

What lessons can be learned from other conflict-affected regions to improve the effectiveness of humanitarian responses in Sudan?

Future Directions and Research:

Further research is recommended to explore specific areas such as healthcare decentralization and the impact on vulnerable populations. What are the priority research areas that need immediate attention to inform policy and intervention strategies?

How can data collection and health information systems be improved in conflict settings to support evidence-based decision-making?

Addressing these complex issues requires a multi-faceted approach involving local communities, national authorities, and international partners. Sustainable solutions must focus on both immediate relief and long-term resilience to rebuild and strengthen Sudan's healthcare system amidst ongoing conflict.

Summary of the main findings

Issue	**Description**
Health Facilities	11 attacks on health facilities reported by WHO, hindering access to essential services
Child Health	9 child fatalities and over 50 injuries documented by UNICEF; 50,000 severely malnourished children at heightened risk
Medical Supply Shortages	Severe shortages in hospitals like MSF-supported South Hospital in El Fasher, with stocks sufficient for only three weeks

Humanitarian Corridor Violations	Violations compromise aid delivery and civilian safety
Infectious Diseases	Increased risk of diseases like cholera and typhoid due to disrupted healthcare infrastructure
Malnutrition	Worsened malnutrition affecting an estimated 3 million children under five annually
Mental Health and Sexual Violence	Increased prevalence of PTSD, depression, and conflict-related sexual violence
Healthcare System Impact	Extensive damage, disrupted supply chains, and a shortage of healthcare professionals
Humanitarian Impact	15.8 million pre-war requiring aid surged by 57% post-conflict; 12,501 deaths and 26,051 injuries as of December 2023
Displacement	Over 6 million internally displaced persons (IDPs) and 1.57 million refugees in neighboring countries
Specialized Facilities	Disruption at key national health centers and risk of biological hazards
Refugee Camps	Overcrowded with limited services, leading to disease outbreaks and malnutrition
Healthcare System Collapse	70% of facilities in war-affected states closed by end of 2023
Quadruple Burden of Disease	Increased burden of communicable, non-communicable diseases, conflict-related injuries, and trauma
Child Health and Nutrition	Severe impact on children with high malnutrition rates and disrupted healthcare access

Cancer Services	Significant disruption, patient displacement, and severe shortages of treatment supplies
Mental Health	High levels of PTSD, depression, and severe stress among displaced populations.
Healthcare Workforce	Critical shortages, unpaid workers, and many leaving the country
Economic Impact	Financial losses estimated at $700 million, further straining the healthcare sector
International Response	Urgent need for international support and coordinated efforts to address the crisis
Recommendations	Strengthen health systems, ensure essential services, address conflict root causes, and enhance international cooperation

SWOT Analysis of Sudanese Health Services System (HSS)

Strengths: Skilled younger workforce and adequate health workers. Long-term and short-term strategic health plans. Free primary health care and emergency services. Active international health agencies and NGOs. Enhanced human resource policies and health sciences academies.	**Opportunities**: Recent political commitments and decentralization. External funding opportunities and international partnerships. Economic growth and health system reform initiatives.
Weaknesses: Lack of clear implementation and evaluation mechanisms.	**Threats**: Economic sanctions and instability.

Poor data quality and fragmented health information system. Insufficient postgraduate training and poor geographical distribution of health workers. Low health spending and inefficient resource utilization. Inequitable distribution of healthcare facilities and poor referral system.	High attrition of well-trained medical officers. Outdated health legislations.

D. Recommendations

Strengthen sustainable health systems, including primary care, disease surveillance, and emergency response.

Ensure the provision of essential health services, including mental health care and maternal and child health services.

Address the root causes of conflict, such as poverty, inequality, and political instability, to promote peace and stability.

Enhance international cooperation and support to address the healthcare crisis in Sudan.

These findings underline the urgent need for coordinated international efforts to mitigate the public health crisis and support the recovery and resilience of the affected populations in Sudan.

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