



(REVIEW ARTICLE)



## The effect of armed conflict on public health and strengthening of healthcare system during and post -armed conflict in Sudan

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### Abstract

**Background:** Armed conflict has catastrophic effect on public health and overall wellbeing including casualties during war, long lasting physical and psychological effects, the reduction in human and financial resources which available to meet social needs and creation of setting in which violence is primary domain this issues clearly appeared in Sudan since conflict between Sudan army force and Rapid response force in 15th of April 2023.

**Methodology:** This review aimed to reflect the effect of armed conflict on public health especially vulnerable groups and create plan for reform of collapsed health system during and after war in Sudan. Comprehensive review for previous related article using Pub -med, Google scholar Lancet and records from Federal and Local Ministry of Health in Sudan was done. Also SWOT analysis for current complexes was done to detect problems and achieve solutions.

**Results:** The study reflects the effect of armed conflict on public health in countries suffered from war. The vulnerable populations those sufferings during war are elderly, children, neonates and women. SWOT analysis for current situation in Sudan reflects devastating effect of war in healthcare system. The study also offering a plan for strengthening of healthcare system which build on decentralization policy, Innovation related to community healthcare workers (CHWs) adoption and health-financing system strengthens.

**Conclusion:** Strengthening of healthcare systems after disasters is an urgent concern, especially in countries that have experienced armed conflict due to great impact on public health. However, since few studies have been conducted concerning this topic in Sudan, further research is recommended.

**Keyword:** Armed Conflict; Sudan; Healthcare System; Public Health; Strengthening.

### 1. Introduction

In literature war has been defined as an armed conflict conducted by nation- state's or civil war and armed action by a clandestine group against government or an occupying force. War has direct and indirect impact on public health. Direct effect as increasing in morbidity and mortality. Effect of war may be physical, psychological, social and sexually assaulted .Many soldiers return from military areas with posttraumatic stress disorder"(1).".

Natural disaster may be classified as following, biological, geophysical and climate related. Armed conflict is a major cause of injury and death word widein a form of battlefield, but also health consequences from the displacement of populations, the breakdown of health and social services and the heightened risk of disease transmission"(2).".

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Armed conflict is a major cause of injury and death worldwide, but we need much better methods of quantification before we can accurately assess its effect.

Armed conflict between warring states and groups within states have been major causes of ill health and mortality for most of human history. Conflict obviously causes deaths and injuries on the battlefield, but also health consequences from the displacement of populations, the breakdown of health and social services and the heightened risk of disease transmission. Despite the size of the health consequences, military conflict has not received the same attention from public health research and policy as many other causes of illness and death. In contrast, political scientists have long studied the causes of war but have primarily been interested in the decision of elite groups to go to war, not in human death and misery.

Gezira State is one of states that had been affected by war in Khartoum in Healthcare which decline for a lot of reason.

### **1.1. Effect of War on Public Health**

Furthermore, armed conflict has wide range effect on general public health including trauma; mental health disturbance, non-communicable diseases (NCDs), child health deterioration, sexual malefaction, reproductive and maternal health, and infectious diseases outbreak. Armed conflict damages health directly through fighting, and indirectly through wider socioeconomic effects. Health outcomes are influenced by pre-existing population health, demographics and access to appropriate healthcare"(2)."

### **1.2. Vulnerable groups of population during War**

On the other side, vulnerable populations those sufferings during war are elderly, children, neonates and women"(2)". Armed conflict can affect women and children health directly through violence or indirectly by malnutrition, physical injuries, infectious diseases, poor mental health, and poor sexual and reproductive health, but major systematic evidence is sparse, hampering the design and implementation of essential interventions for mitigating the harms of armed conflicts "(3)".

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## **2. Methodology**

This review aimed to reflect the effect of armed conflict on public health especially vulnerable groups and create plan for reform of collapsed health system during and after war in Sudan. Comprehensive review for previous related article in Arabian, African and Asian countries which had been suffering from armed conflict was done using Pub –Med, Google Scholar, Lancet and records from Federal and Local Ministry of Health in Sudan. Also SWOT analysis for current complexes depending on records from Ministry of Health was done to detect problems and achieve solutions.

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## **3. Findings**

### **3.1. Consequences of Armed Conflict: SWOT analysis for Sudan current health situation**

The ongoing armed conflict in Sudan has resulted in a deepening humanitarian crisis with significant implications for the country's health system"(4)".

Destruction of healthcare facilities infrastructure at primary, secondary and tertiary level especially at zones of conflict (Khartoum-Darfur) states, internal and external displacement of population and health personnel, shortage of medical supplies including life rescuing drugs, financial difficulties due to loss of economical supports, outbreak of epidemics (Dengue fever and Cholera)in addition to flare-up of preexisting endemic diseases and escalating violence against health personnel. According to records from Ministry of Health, Gadariff state, the most affected state by epidemic reflect that case fatality for Cholera and Dengue Fever is 5.2% -1.3% respectively.

Widespread interruption of essential health services, including obstetric care, emergency services, and dialysis. Financial losses to the health system are estimated at \$700 million, impacting an already underfunded sector"(4)".

Furthermore, hospitals and medical facilities face the imminent threat of shutdown due to critical shortages of medical personnel, supplies, water, and power, as well as the risk of further attacks. Injured or ill civilians are unable to access hospitals due to the dire circumstances "(5)".

In Khartoum state, hospitals face shortages of blood, transfusion equipment, intravenous fluids, medical supplies, and other life-saving commodities shortages of water, electricity, fuel, and food for patients "(6)".

Major threat that can flare-up more difficulties is persistence of this armed conflict which may end with more biological, social, health and economical difficulties. Also external displacement of competent health personnel is another devastating threat. But till now, Sudan has wide spread range of opportunities to overcome the health crisis by creating clear, applicable healthcare system enforcement plan in collaboration with all health related sectors.

5.5% of population displaced since April 2023, 1.265 had been killed, 8.396 injured due to direct effect of armed conflict and 6, 177 due to indirect. Also 70% of healthcare facilities in conflict zone out of services. Measle susceptible cases are 4.123 with 107 deaths with high incidence rate in White Nile state, clinical Malaria 736.507 case with 22 deaths "(7)".

Now, contributing factors to indirect effect to armed conflict in Sudan include absence of Health Insurance for Citizens, all essential drugs not available.

### **3.2. Previous Armed Conflicts effect on Public Health: Experience from Others**

#### *3.2.1. When taking the effect of Armed Conflict between Russian and Ukraine(Asian area)*

On public health and population displacement, Ukraine has suffered a dramatic escalation of a humanitarian, health, and environmental emergency, spurring the most rapid forced population movement within Europe since World War 2. 1–3 By Aug 10, 2022, there had been 12 867 civilian casualties in Ukraine, including 5401 deaths; more than 6 million people had registered as refugees in Europe alone; and an estimated 6· 6 million people had been internally displaced. The war damaged the infrastructures, with alteration access to energy, water, food, sanitation and hygiene, waste management, health care, education, housing, transport, and agricultural and industrial products with great hazards of environmental contamination, including toxic chemical releases resulting from damage to industrial facilities, with concerns about nuclear hazards "(8)".

The United Nation Estimations reflect 7,155 conflict-related civilian deaths with 11 662 people injured in one year"(9)".

#### *3.2.2. The impact of War on Public Health in Mozambique (African Area)*

Obvious attacks on economic and civilian targets have included the health services, leading to closure of 48% of the primary health care network. This armed conflict has resulted in displacement of over 3,000,000 persons and an estimated 494,000 excess childhood deaths between 1981 and 1988, with estimated 200,000 children have been separated from their families or orphaned; many children have also witnessed atrocities and suffered violence"(10)".

#### *3.2.3. Impact of Gulf War on Iraq Child Health: Arabian Area*

Armed conflict in Iraq increased mortality rate among under five children by three fold, with 46,900 children deaths between January and August 1991"(11)".

And presence of depleted uranium (DU) in the Iraqi food chain, Cancer and birth defects are most associated with radioactive pollution"(12)".

#### *3.2.4. Another Arabian variant for Armed Conflict is Yemen,*

March 2015, increasing in child and maternal mortality rate with malnutrition "(13)".

With high risk of neonatal morbidity and mortality among immigrant women "(14-15)".

#### *3.2.5. Armed Conflict in Syria: Arabian Area*

The most complex humanitarian emergencies in history is related to Syrian Civil War since 2011, Almost 20% of the children were internally displaced, and 5% had deceased or missing parents. More than half of school-aged children had no access to education. The study revealed that Idled and Lattakia were at greater risk of having unmet public health needs. Younger children were at greater risk of having an incomplete vaccination state "(16)".

### **3.3. The Post War Public Health effect of Armed Conflict in Sudan**

Widespread destruction of infrastructures, livelihoods motherhood, displacement, violence and collapse of the healthcare system with targeting of healthcare facilities and personnel seem to be key components of the war. To avert

worsening conditions, an immediate intervention is needed to be delivered to rehabilitate the healthcare delivery system and infrastructure.

### **3.4. Plan for Healthcare System Strengthening and Reforming**

Plan for recovery of healthcare system should be started from now and going on. Improved collaboration between political scientists and experts in public health and health related sectors with community participation for redistribution of available resource will benefit measurement, prediction, and prevention of conflict related health problems. From comprehensive review of strength and reform policy, Kosovo reform strategy may help in Sudan situation. The corner stone of the policy will be PHC through strengthening of Family Medicine Practice which acts as gate keeper to secondary and tertiary level.

The following are main strengthening and reform directions:

- Detachment of the Ministry of Health from direct programmes implementation by decentralization the day to day operation of healthcare facilities to district and local level.
- At future, the major task of Ministry of Health is set policies, provide strategies management.
- Adopt and promote modern management principles.
- Provide sustainable and equitable health care financing mechanism"(17)."

Another experience which reflect strategies adopted by 5 sub-Saharan Africa countries: Mozambique, Rwanda Ethiopia, Eritrea and Angola to rebuild their healthcare systems after armed conflict. Main points of strengthening strategies are:

- Health systems decentralization.
- Innovation related to community healthcare workers (CHWs) adoption.
- Health-financing system strengthening to overcome major barrier of increasing the number of facility-based deliveries."(18)."

### *Abbreviation*

- SWOT Strengths, Weakness, Opportunities and Threats.
- CHWs Healthcare workers.
- NCDs Non-communicable diseases.
- PHC Primary Health Care

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## **4. Conclusion**

Conflict related death and injury are major contributors to the global burden of disease.

Information systems break down during conflict, leading to great uncertainty in the magnitude of mortality and disability. The World Health Survey may provide a reliable and valid basis for assessing conflict related mortality and disability. Forecasting models may provide a plausible basis for assessing risk of conflict and thus prevention. Improved collaboration between political scientists and experts in public health would benefit measurement, prediction, and prevention of conflict related death. Armed conflict had devastating effect on public health, healthcare system and strengthening of health systems during and after disasters is an urgent concern to prevent healthcare system collapse, especially in countries that have experienced armed conflict due to great impact on public health. However, since few studies have been conducted concerning this topic in Sudan, further research is recommended and authors set up health policy depending on experiences from other areas suffered war and show success. Also more reliable data are needed to quantify the health effects of armed conflict. Better forecasts of war are also needed to enable public health workers to prepare for refugee problems and the numerous other public health consequences and to inform foreign policy. Reducing the uncertainties of life by providing better forecasts of war directly improves the human condition.

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## **Compliance with ethical standards**

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