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Editorial

Confronting Challenges and Proposed Solutions for the Sudan Immunization Program Amid Ongoing Armed Conflict

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Sudan is the third-largest country in Africa, covering an area of 1.882 million square kilometers. Spread across 18 states with Khartoum as capital, Sudan has an overall population of 40,782 million people. Since mid-April 2023, the country has been facing a major national conflict, resulting in violations of common freedom, widespread violence, internally displaced people, and deaths. The effects of sanctions over the last several decades, the decline of hard currency, and the uncontrolled inflation rates insult the damaged country. This economic weakness and monetary instability will adversely affect the healthcare system. [1]

The Expanding Program on Immunization (EPI) in Sudan was laid in 1976, only two years after the EPI was sent off by the World Health Organization (WHO), with the expectation of covering the entire globe [2]. Figure **1** illustrates the Sudanese EPI structure.

Due to the ongoing military conflict in Sudan, access to and use of the immunization processes are severely affected. The central and sub-national cold chain allocations are partially or entirely abolished. Since last June, the EPI director assembled a core team in Wad-Madni, Aljazeera state, to quickly assess the situation and formulate an emergency plan for the cold chain, routine vaccination, service provision, surveillance, and monitoring. The team takes into account the fact that road safety and conflicts are widespread in some regions, and to improve performance, Sudanese states are

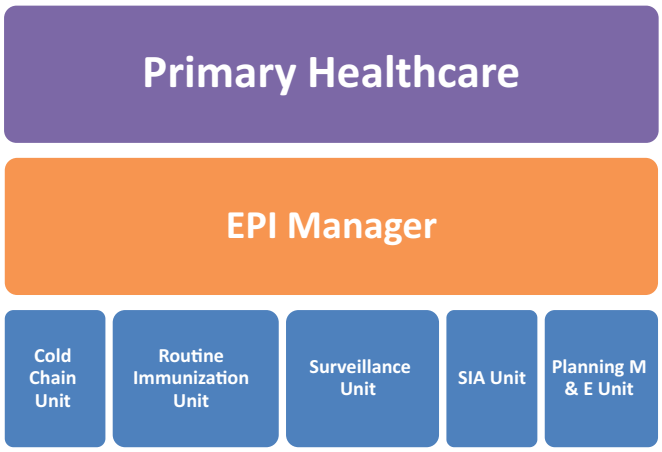

Figure 1: Sudan EPI structure. EPI, extended program on immunization; SIA, supplementary immunization activity; M and E, monitoring and evaluation.

classified as inaccessible, partially accessible, and accessible states. The EPI teams and their partners achieved real success by ensuring and maintaining good supplies to and from accessible states and reaching out to further inaccessible and partially accessible states. This strategy provides smooth service delivery in most areas, particularly in the major conflict areas (Khartoum and Darfur). This strategic approach has notably facilitated service delivery, particularly in conflict zones like Khartoum and Darfur, warranting acknowledgment and praise for the efforts of the EPI and its collaborators. This editorial aims to illuminate the hurdles faced by the EPI and preempt analogous situations in other conflict-ridden countries, such as Iraq, Syria, Yemen, and South Sudan [3].

1. Challenges Faced By the Sudanese EPI During the War

1. **The budget constraints:** War results in low federal spending plans for healthcare management use, and the medical system is at risk of disintegration due to the massive number of isolated individuals. The turnover of vaccines and the lack of stock support are essential elements of the EPI affected by the allocated budget, and now the deserved salaries of vaccinators are a significant challenge that could lead to the collapse of all the efforts mentioned above. If EPI partners do not intervene temporarily, a disaster will occur that will affect all children in Sudan (who are the victims).

2. **The Cold Chain disruptions:** The Central Cold Chain in Khartoum was unable to meet the requirements due to the demands of electricity and power, which were affected by the war. The EPI team and its partner (UNICEF) made great efforts to maintain Central Cold Chain functioning; however, the obstacles were lack of

security and complex transportation to reach it. Most vaccines were transported to safe places. The sub-national cold chains in the western, central, and southern Darfur States have also been closed and are not ideal for the storage of vaccines. Likewise, the lack of vehicles with refrigerators, the lack of the transport fleet, and the unfortunate quality of the streets influence sufficient circulation [4].

3. **The health facilities interruptions:** Most essential medical services need clinical equipment and infrastructure [5].

4. **Human resources:** Due to security weaknesses and funding problems, the number of medical workers in the district is rapidly declining. The lack of skilled and prepared well-being workers to handle vaccines for the population, regardless of adequate vaccine storage areas and transport limitations, will hinder progress [6].

5. **Overcrowding and hygiene challenges:** These factors exacerbate the burden of infectious diseases such as tuberculosis (TB), cholera, dengue fever, and hepatitis [7].

6. **Communication deficiencies:** Inadequate communication channels impede effective partnership promotion and hinder observation and assessment processes [8].

2. Proposed Solutions

1. **Establishment of identification systems:** Establishing a group system is essential to recognize many displaced individuals, who generally have no official records due to the war and could, therefore, be lost despite the contrary effort during vaccination. Identification systems can be achieved by bringing in defaulters and motivating new people with the help of educated and displaced community leaders.

2. **Risk Communication and Community Engagement (RCCE):** RCCE is an essential method of building a solid healthcare system, ensuring value for all, and addressing the needs of the population, especially underserved groups such as displaced people, refugees, and rural communities. Some of the critical components of the plan are the ability to engage local communities through the media, non-legislative associations, schools, and local legislators in safe states to promote successful coordinated efforts and use techniques to support conventions on disease prevention [9].

3. **Financial support:** Adequate government and donors funding for the immunization program should cover cold chain maintenance and vaccinator salaries. While full-scale reconstruction of obliterated medical facilities remains improbable amid ongoing conflict, establishing a partial yet robust cold chain system prioritizing vaccination seems a feasible interim solution.

4. **Human resource development:** It is vital to recruit (through various media) and prepare (through workshops and advice) volunteers and healthcare workers across Sudan with sustainable retention and compensation systems. Human resources are the cornerstone of EPI's progress.

5. **Engagement of NGOs and local governments:** Encouraging the involvement of global non-governmental organizations (NGOs) operating in Sudan and local governments in secure regions can ensure sustained support and service maintenance.

3. Conclusion

The prevailing military conflict in Sudan poses formidable challenges to the immunization process, potentially fueling the resurgence of vaccine-preventable diseases and escalating child mortality. Addressing deficiencies in the cold chain system becomes pivotal in extending vaccination coverage to internally displaced populations. Motivating EPI partners to navigate financial and logistical obstacles while devising prompt solutions is crucial to implementing EPI initiatives.

4. Acknowledgements

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