



# Epigram from the Sudanese Medical School's Resilience in Wartime

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## Abstract

**Background:** The resilience of universities during wartime refers to their capacity to withstand, adapt to, and recover from the challenges posed by conflict situations. This includes the ability to maintain educational operations, protect academic integrity, safeguard faculty and student welfare, and support community needs despite disruptions. **Aim:** This qualitative research explores the resilience of Sudanese medical schools during wartime, focusing on various aspects of their operational frameworks, including curriculum, staffing, strategic planning, stakeholder support, and student support. **Material and methods:** This research utilizes Google Forms as a data collection tool. The study engaged a diverse sample of stakeholders, including faculty members, administrators, students, and healthcare professionals across different regions of Sudan. Through thematic analysis. **Results and discussion:** the findings highlight the multifaceted challenges faced by medical schools, such as disruptions in educational delivery, faculty shortages, and the impact of violence on student mental health and educational engagement. Nevertheless, the research also uncovers examples of innovative strategic planning and adaptive measures, such as the shift to online learning modalities and partnership development with local and international organizations. Stakeholder support emerged as a critical factor in bolstering institutional resilience, facilitating resource mobilization, and ensuring continuity in educational practices. Ultimately, the study underscores the importance of resilience in medical education amidst conflict, offering insights that can inform policy and practice in similarly affected regions. **Conclusions:** The findings contribute to the broader discourse on educational continuity in crisis contexts, emphasizing the need for adaptive strategies and sustained support for both educators and students during periods of instability.

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## Subject Areas

Education Administration, Educational Technology

## Keywords

Medical Education, Gezira, Sudan, Wartime

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## 1. Introduction

The war in Sudan, which began in April 2023, has disrupted many aspects of life, including higher education. Universities have been destroyed, academic activities halted, and students and faculty displaced. This review explores the extent of these disruptions and the measures taken to ensure the continuity of higher education. The conflict has led to the closure of over 100 universities, with many institutions suffering extensive damage or total destruction [1] [2]. The forced migration of staff and students has resulted in a complete standstill in teaching and research activities [3]. The loss of infrastructure and academic records has further compounded the challenges faced by the higher education sector [3].

During World War II, medical schools in the United States significantly increased their output of trained physicians by accelerating graduation timelines and expanding enrolments. This was achieved by discontinuing summer vacations and compressing the curriculum to graduate students earlier than usual [1]. Similarly, during the COVID-19 pandemic, medical schools worldwide rapidly transitioned to online learning platforms to continue education despite lockdowns and social distancing measures [3].

Medical education faces unique challenges during wartime and disasters. The need to maintain high standards of training and education for medical professionals becomes even more critical as the demand for healthcare services surges.

The resilience of universities during wartime refers to their capacity to withstand, adapt to, and recover from the challenges posed by conflict situations.

### 1.1. Strategies for Maintaining Quality and Resilience

**1) Curriculum Adaptation:** Medical schools have adapted their curricula to meet the immediate needs of wartime and disaster scenarios. For instance, during World War II, special courses were introduced to train medical officers quickly [2]. In modern times, the COVID-19 pandemic saw a shift towards online learning and telemedicine training [4].

**2) Faculty and Resource Management:** The deployment of faculty to frontline services during wars and disasters often leads to staff shortages. Medical schools have managed this by recruiting retired professionals and utilizing adjunct faculty [5]. Additionally, resources such as simulation labs and virtual reality have been employed to supplement traditional hands-on training [6].

**3) Mental Health Support:** The psychological impact of wars and disasters on

students and faculty cannot be overlooked. Institutions have implemented mental health support systems to help cope with stress and trauma [7]. During the COVID-19 pandemic, many schools provided virtual counseling services and peer support groups [8].

**4) Research and Innovation:** Wartime and various other disasters often spur medical research and innovation. Medical schools have contributed significantly to research on war-related injuries, diseases, and pandemic responses [9]. This not only enhances the educational experience but also ensures that the curriculum remains relevant and up to date.

**5) Online Learning:** In response to the physical destruction of universities, some institutions have attempted to shift to online learning platforms. However, this transition has been hampered by limited internet access and technological infrastructure [10].

**6) International Support:** Various international organizations and universities have offered support to Sudanese students and academics. Programs such as the Universities of Sanctuary in the UK have provided opportunities for displaced students to continue their education abroad. [2]

**7) Community-Based Education:** In some regions, community-based education initiatives have been established to provide alternative learning opportunities for students who cannot access formal university education. [11]

During times of conflict and turmoil, the role of medical education expertise in pursuing continuing medical education becomes all the more crucial. Wartime not only poses immense challenges to healthcare systems but also necessitates adaptation and innovation in the field of medicine. In such conditions, the pursuit of knowledge and specialized training becomes imperative for healthcare professionals [12].

## 1.2. Algorism of this Study

The main objectives of this study are:

1. To analyze the methods and strategies employed by medical schools to ensure the continuity and quality of education during such periods
2. To explore how medical schools have maintained educational continuity and standards under such challenging conditions.
3. To highlight the resilience and innovation within medical education systems by examining various strategies and adaptations.

## 2. Materials and Methods

### 2.1. Study Design

This study employs a qualitative approach to investigate how Sudanese medical schools are adapting to the challenges posed by conflict, displacement, and resource scarcity. A semi-structured questionnaire was developed to gather insights from faculty, administrators, and students regarding their experiences, institutional

responses, and the long-term implications of ongoing conflict in medical education.

## 2.2. Questionnaire Development

The questionnaire was formulated based on a review of existing literature on resilience in educational settings during conflict and was designed to capture a comprehensive understanding of the participants' experiences. The questionnaire consists of structured sections organized into demographics, impact of conflict, institutional response, support systems, future challenges and strategies, institutional resilience, and personal experiences.

**Demographics:** Three questions were included to outline the role of respondents at the medical school, their affiliation with specific medical schools, and the duration of their association with the institution.

**Impact of Conflict:** Open-ended questions were included to explore the direct impact of conflict on operational and educational aspects.

**Institutional Response:** Questions assessed adaptive strategies, teaching methodologies, and collaborations with external entities.

**Support Systems:** The questionnaire queried the support structures established for students and staff, highlighting the nature of assistance received.

**Future Challenges and Strategies:** Respondents were asked to project potential challenges and strategies for institutional rebuilding.

**Institutional Resilience:** This section focused on identifying successful initiatives that stemmed from the crisis, as well as community-building efforts.

**Personal Experiences and Insights:** Open-ended questions aimed to elicit personal reflections on the effects of conflict on educational experiences and the role of medical education in community healing.

## 2.3. Participant Selection

The target population for this study included students, faculty, and administrative staff affiliated with various medical schools across Sudan. Convenient sampling was used to recruit participants. Inclusion criteria mandated that participants must have been involved with their respective institutions during an ongoing conflict. Exclusion criteria included individuals not affiliated with a medical school in Sudan or those who have not been directly affected by conflict.

## 2.4. Data Collection Procedure

The questionnaire was distributed through online platforms, including email and social media groups associated with Sudanese medical schools, to ensure a wide reach and participation. An electronic format was utilized to facilitate easy completion and submission of responses. Participants were informed of the study's purpose, assurances of confidentiality, and their right to withdraw at any point.

To increase participation, follow-up reminders were sent two weeks post-dis-

tribution. The data collection period lasted for one month.

### **2.5. Data Analysis**

Responses were analyzed using qualitative content analysis. Initial coding was conducted to categorize responses into thematic areas aligned with the questionnaire's sections. This involved an iterative process of reading through responses, identifying recurring themes, and grouping similar ideas. NVivo software was utilized to assist in managing qualitative data and to ensure systematic coding.

Descriptive statistics were applied to demographic data where appropriate. All responses were anonymized to protect participant confidentiality.

### **2.6. Ethical Considerations**

Ethical approval was sought from relevant institutional review boards prior to data collection. Informed consent was obtained from all participants before administering the questionnaire. The study abided by principles of voluntary participation, confidentiality, and the right to withdraw at any time.

## **3. Results**

The total number of universities responding to the research: 20 universities.

The mean duration of closure is: 9.45 months ( $\pm$  4.3 months).

The mean resumption time for commencement of academic activities: 7.1 months ( $\pm$  4.0 months).

The mean number of students per batch is: 196 (range: 40 - 480).

The Percentage of students' absentees: 27% ( $\pm$  11.7%).

The approximate Staff loss percentage: 40% - 50%.

## **4. Discussion and Conclusions**

This study touches on the basic pillars of the pursuit of the resilience of Sudanese medical schools in the current wartime; it includes both the arenas of public and private schools as they are supposed to be equally judged because they form the overall strata of medical education presumably for the nation. The ownership of a medical school and the type of curriculum it follows can significantly impact its resilience during wartime.

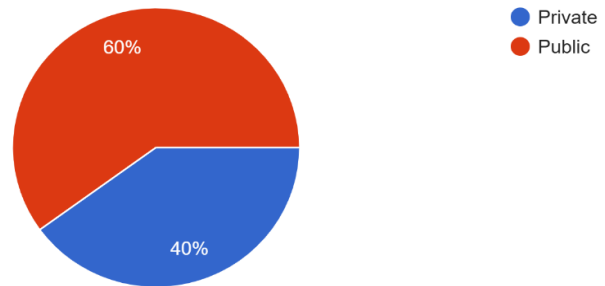
Publicly owned medical schools may have more access to government support and resources, which can be crucial during times of conflict. They might receive funding for rebuilding and maintaining operations, as well as support for students and staff. On the other hand, privately owned institutions might struggle more with financial stability and resource allocation, making it harder to resume normal operations.

A flexible and adaptive curriculum can greatly enhance a school's resilience. Schools that incorporate online learning, modular courses, and practical training that can be conducted in various settings are better equipped to continue education despite disruptions. Additionally, curricula that emphasize critical thinking, problem-solving, and self-directed learning can help students adapt to changing

circumstances and continue their education independently if necessary.

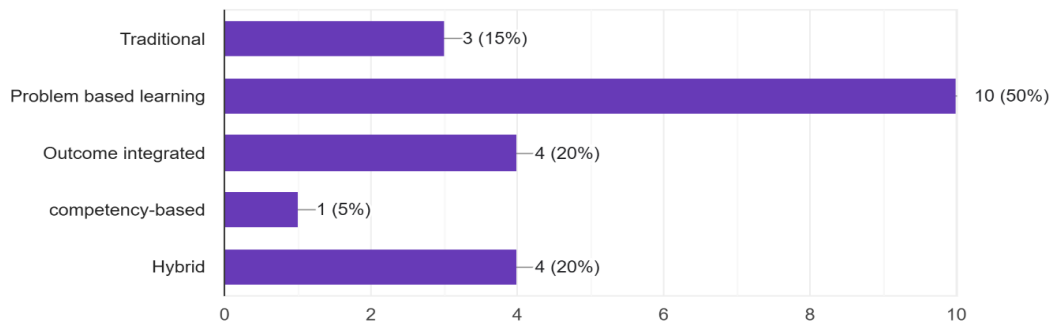
Overall, the combination of strong institutional support and a versatile curriculum can help medical schools maintain their educational standards and support their students and staff during challenging times. **Figure 1** and **Figure 2**. In Sudan, the public schools are underfunded and private schools now face strenuous constraints because of the inability of the students to pay their due to these strenuous conditions.

Ownership of the school  
20 responses



**Figure 1.** Ownership of the school.

The Type of Faculty Curriculum?  
20 responses



**Figure 2.** The type of faculty curriculum.

#### 4.1. The Challenges and the Impact of the War on Medical Schools (Figures 3-5)

The combined effect of the challenges can severely compromise the quality of medical education, leading not only to interruption of learning but also to a generation of healthcare professionals who may be less prepared to meet the demands of their profession. Addressing these challenges requires a concerted effort from governments, educational institutions, and international organizations to provide support and resources to ensure the continuity and quality of medicine.

The direct impact of conflict on the operational and educational aspects of medical schools in Sudan has been profound. Frequent interruptions in academic schedules due to safety concerns, displacement of faculty and students, and damage to infrastructure were common occurrences. These disruptions significantly

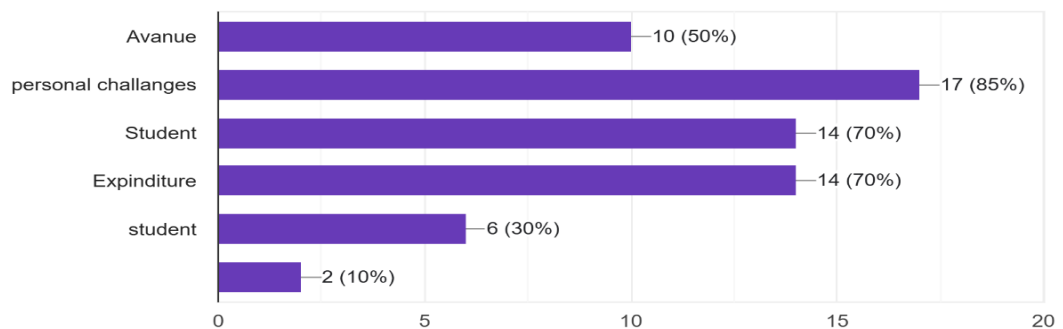
hindered the continuity of education and the overall functioning of the institutions [13]. Additionally, the conflict led to limited access to educational resources, reduced clinical training opportunities, and heightened psychological stress among both students and staff. The lack of stable internet and electricity further exacerbated these challenges, making it difficult to maintain a consistent learning environment [14].

Barely medical schools lost their venues, records, budgetary, and staff and the students were either displaced or refuged or in worse condition besieged under the war hovel.

The ongoing conflict in Sudan has severely affected medical schools, disrupting both operational and educational aspects. The direct impacts include the destruction of infrastructure, loss of faculty and student lives, and displacement of communities. According to Elhaj *et al.* (2021), the conflict has led to a significant drop in student enrollment and a drastic reduction in available resources [15]. Classes are often disrupted, and many institutions have been forced to transition to online learning, which is challenging due to inadequate internet access and power instability. The psychological toll on students and educators is profound, as they navigate the dual pressures of academic commitments and security threats.

#### The major challenges in the curriculum management

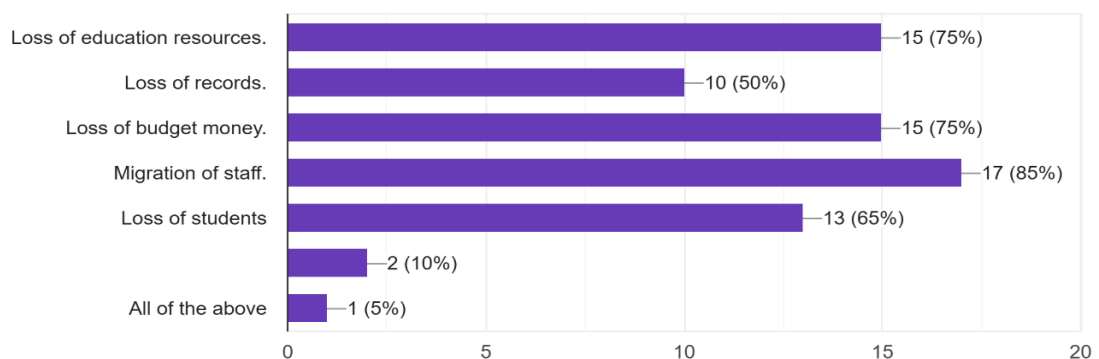
20 responses



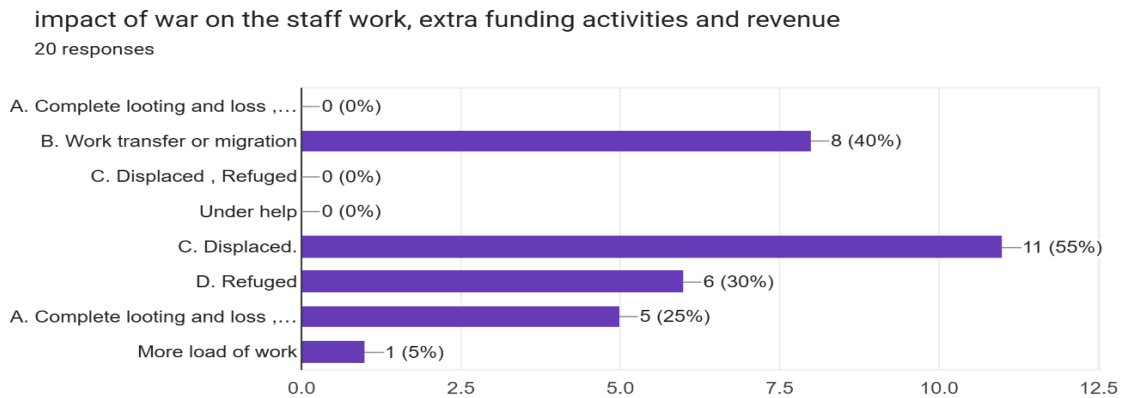
**Figure 3.** The major challenges in the curriculum management.

#### Major war insults on the faculties

20 responses



**Figure 4.** Major war insults on the faculties.

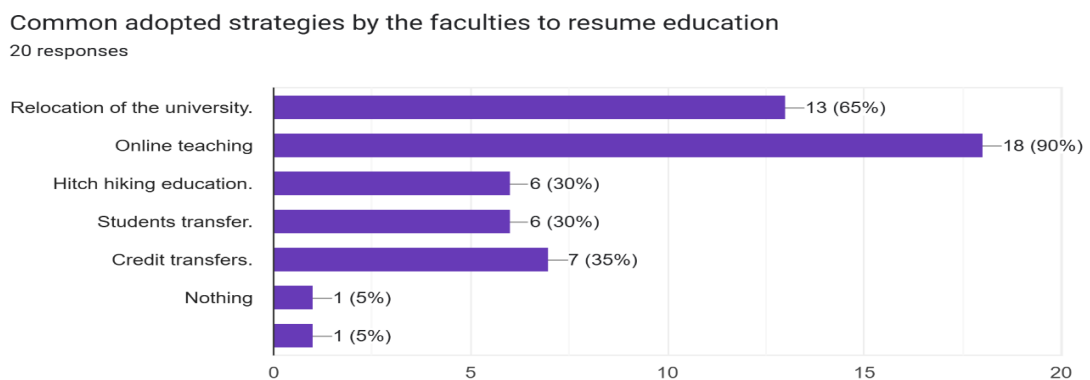


**Figure 5.** Impact of war on the staff work, extra funding activities and revenue.

### 4.2. Institutional Strategies to Overcome the Challenge of War (Figures 5-8)

The responses of Sudanese medical schools to recent challenges highlight their commitment to maintaining high standards of medical education and preparing future healthcare professionals for the evolving landscape of healthcare. By establishing new centers, embracing online learning, revising curriculum policies, and implementing cost-sharing funding mechanisms, these institutions are not only fostering a more resilient education system but also working towards strengthening the overall healthcare infrastructure in Sudan. As these efforts continue to evolve, they hold the potential to pave the way for a brighter future in medical education and health outcomes in the region. (Figures 4-8)

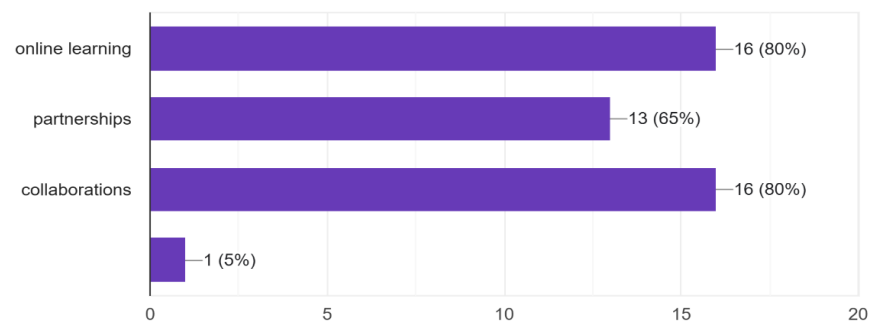
In response to the crisis, medical schools in Sudan have employed adaptive strategies to maintain educational continuity. Institutions have modified their teaching methodologies, integrating remote learning options and flexible curricula to accommodate the realities of wartime (Ahmed *et al.*, 2022) [16]. Collaborations with international organizations, such as the World Health Organization (WHO) and non-governmental organizations (NGOs), have been crucial in providing resources and training for faculty on digital teaching methods [17]. These partnerships have allowed institutions to share best practices and improve educational delivery amidst the challenges.



**Figure 6.** Common adopted strategies by the faculties to resume education.

## The New teaching strategies, Methods and/ or Technologies Utilized

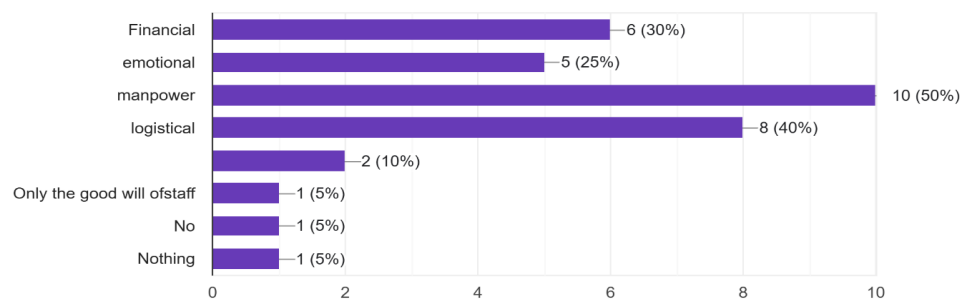
20 responses



**Figure 7.** The new teaching strategies, methods and/or technologies utilized.

## The Types of Support System Received by the Faculties

20 responses



**Figure 8.** The types of support system received by the faculties.

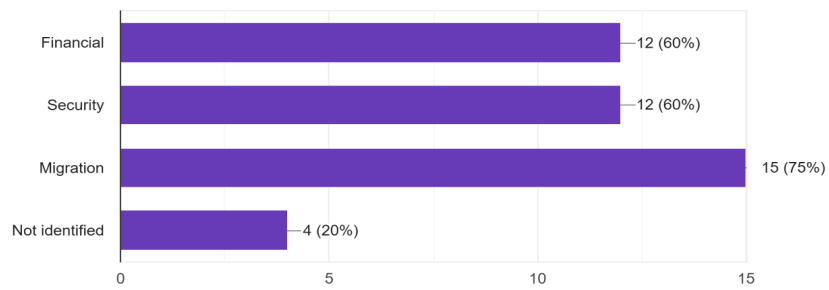
### 4.3. Students, Staff Support Systems (Figures 8-12)

A robust student support system is a fundamental component of medical education, serving as a crucial pillar in the academic, emotional, and social development of medical students. These support systems are designed to address various challenges that students may encounter throughout their education, including academic pressures, mental health concerns, financial difficulties, and personal challenges. However, despite the recognized need for these systems, many medical schools have historically failed to provide adequate support frameworks, even in times of crisis, such as wartime periods. Despite the problem of funding, medical schools never turned a blind eye to their students with subsidiary fees or waving of fees, mental support, malleability of regulations, and consolidation of the education staff support, which was not tangible.

To support students and staff during these tumultuous times, several medical schools have established robust support systems. These include mental health services, financial aid programs, and academic counseling (Abdelrahman *et al.*, 2023) [18]. Additionally, peer support networks have been created to foster a sense of community and shared experience among students. Some institutions have also implemented emergency relief funds to assist those directly affected by the conflict, ensuring that students can continue their education despite financial hardships [19].

cause of the current education lag of the students

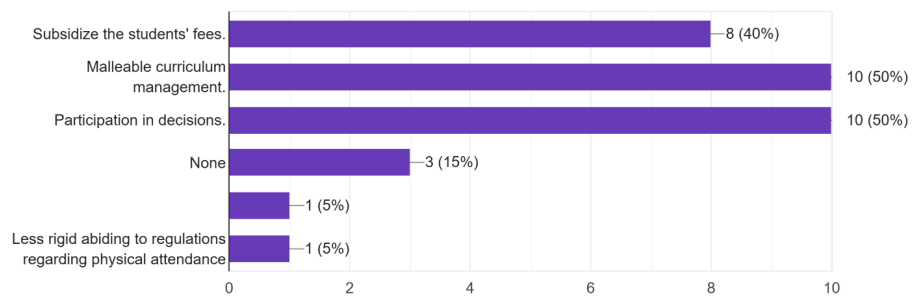
20 responses



**Figure 9.** Cause of the current education lag of the students.

Mitigating Policy and Support for the Students

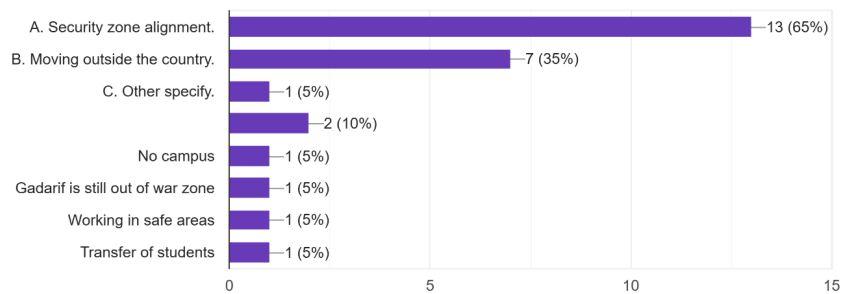
20 responses



**Figure 10.** Mitigating policy and support for the students.

The Adopted Security Measures Done for The Students

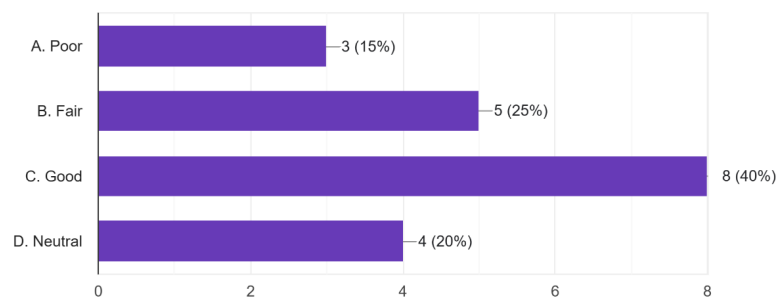
20 responses



**Figure 11.** The adopted security measures done for the students.

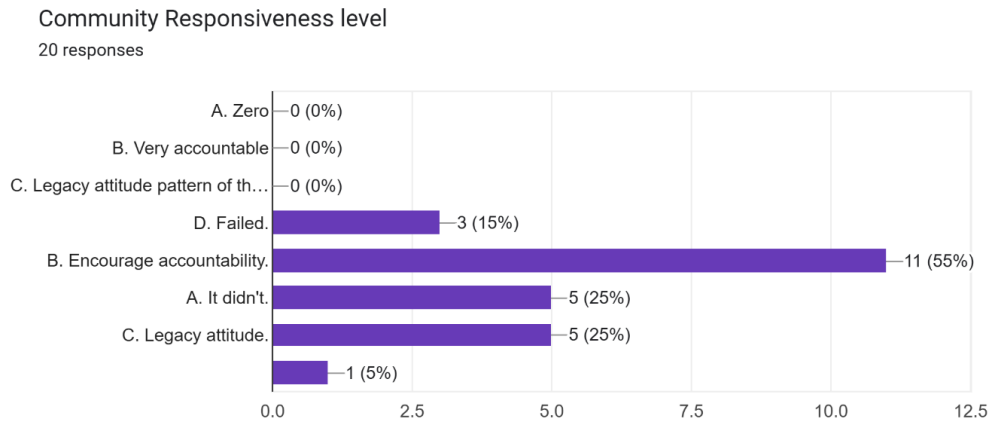
Grading of the Current Staff Accountability

20 responses

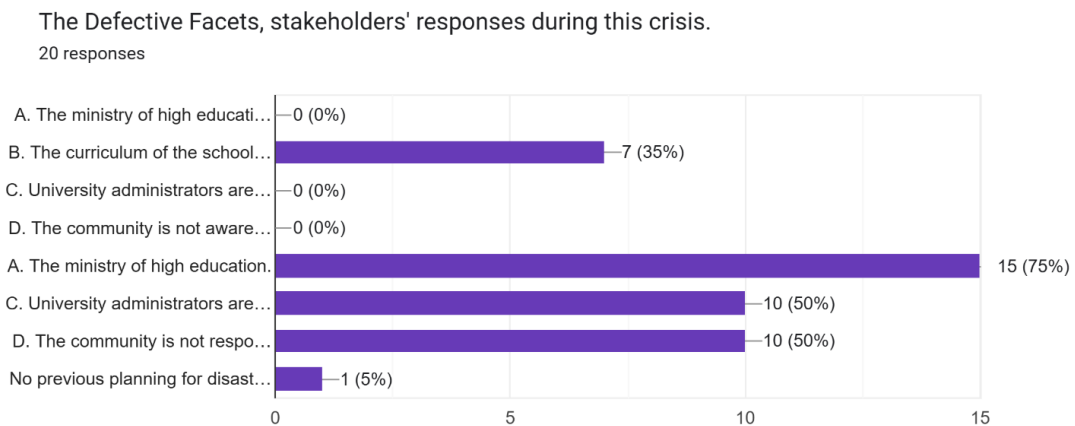


**Figure 12.** Grading of the current staff accountability.

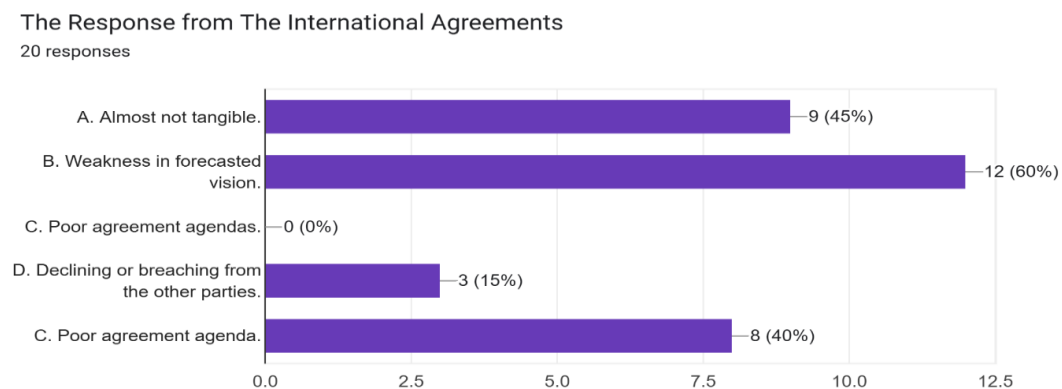
### 4.4. Staff, Community, Stakeholders, and the Institutional Community Support (Figures 11-15)



**Figure 13.** Community responsiveness level.



**Figure 14.** The defective facets, stakeholders' responses during this crisis.



**Figure 15.** The response from the International Agreements.

The ongoing conflict in Sudan has highlighted a significant failure among various stakeholders and we mean by the stakeholders the government, the administrations, the owners, shareholders, and the community leaders in medical education, including community leaders, medical education institutions, non-governmental

organizations (NGOs), and international partners. Despite the urgent humanitarian needs arising from the war, there has been a noticeable lack of effective coordination and action directed towards supporting medical schools and healthcare education in Sudan during these challenging times.

First and foremost, the role of the medical education community has been called into question. Universities, which should be at the forefront of training the next generation of healthcare professionals, have often struggled to adapt to the rapidly changing circumstances created by the conflict. There has been insufficient collaboration between Sudanese universities and international institutions, which could have facilitated resource sharing, knowledge transfer, and the procurement of vital assistance. The failure to establish and maintain these connections has left medical schools without critical support, such as educational materials, faculty training, and infrastructure development.

Additionally, NGOs, which typically play a crucial role in providing humanitarian aid and support, have also faced challenges. The lack of a cohesive strategy and coordinated efforts to address the needs of medical education during wartime has hindered the ability to deliver much-needed assistance effectively. While these organizations are often capable of providing immediate relief, their long-term focus on building resilient educational systems has been insufficient.

International memorandums and partnerships between Sudanese universities and the global academic community have also fallen short. There is a pressing need for these agreements to be revisited and strengthened, ensuring that they are not only formalities but also actionable plans that can mobilize resources, share best practices, and foster innovation in medical education.

To rectify these failures, it is essential for stakeholders to come together and devise a comprehensive strategy aimed at supporting medical education in conflict-ridden regions.

Despite the adversities, several successful initiatives have emerged from the crisis, demonstrating the resilience of Sudanese medical schools. Innovative solutions, such as mobile clinics and telemedicine services, have been developed to enhance healthcare delivery in conflict zones (Elhaj *et al.*, 2021) [15]. Community-building efforts, including health awareness campaigns and local partnerships, have fostered trust and collaboration between medical institutions and the communities they serve. These initiatives not only improve health outcomes but also reinforce the role of medical education in societal healing.

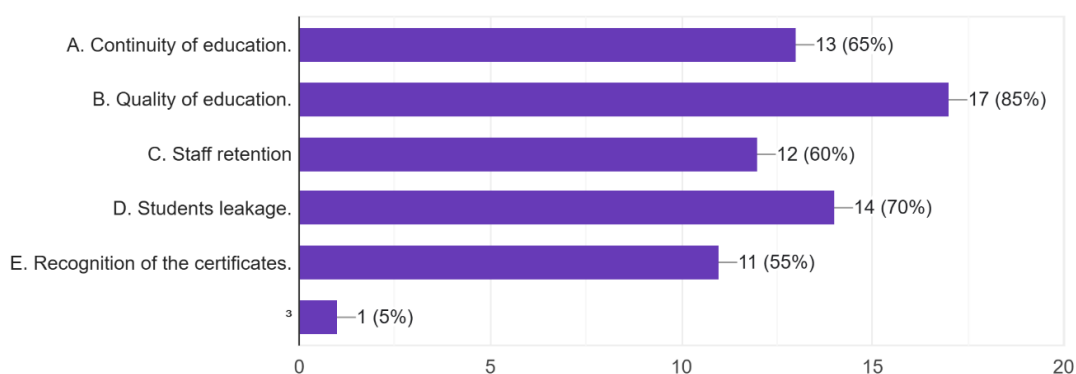
#### **4.5. Expected Future Challenges and Strategies (Figure 16)**

Continuity of medical Education (ME) in Sudan faces a myriad of challenges that significantly affect the quality and accessibility of medical training. These challenges include funding constraints, quality assurance, accreditation processes, staffing issues, venues and student retention. Each of these factors can have profound implications on the overall effectiveness of medical education and, by extension, the quality of healthcare delivery in the country.

Looking forward, Sudanese medical schools face numerous challenges, including the need for infrastructural rebuilding and restoring academic standards. The ongoing instability may hinder recruitment of qualified faculty and deter prospective students (Nour *et al.*, 2023) [20]. Strategies for rebuilding include strengthening partnerships with international academic institutions for knowledge exchange and resource sharing, as well as implementing resilience training programs for staff and students [21]. Emphasis on community involvement in the rebuilding process may also enhance institutional sustainability.

the expected major challenges in the future for the faculties

20 responses



**Figure 16.** The expected major challenges in the future for the faculties.

#### 4.6. Personal Experiences and Insights

Despite these challenges, the legacy of faculty in maintaining educational standards and advancing ME in Sudan remains vital. Dedicated educators who are passionate about medical teaching and mentorship play a crucial role in shaping the next generation of healthcare professionals. Their commitment to providing a high-quality education and sharing their expertise contributes significantly to the overall improvement of medical services in the country, especially during wartime. Faculty members often serve as role models, instilling values of lifelong learning and excellence in their students.

Furthermore, faculty engagement in research and community outreach helps to foster a culture of innovation and relevance, tying medical education closely to the needs of the population. Active involvement in ME initiatives can help bridge the gap between academia and practical healthcare, ensuring that medical professionals remain competent and updated in their fields.

Personal reflections from students and faculty reveal the profound impact of conflict on educational experiences. Many have expressed feelings of uncertainty and anxiety, yet they also highlight their resilience and determination to continue their studies and serve their communities (Ahmed *et al.*, 2022) [16]. The role of medical education in community healing is emphasized, as graduates often return to serve in their home regions, providing much-needed healthcare and support. This cycle of care not only addresses immediate health needs but also contributes

to long-term stability and recovery within affected communities (Nour *et al.*, 2023) [20].

The resilience of universities during wartime refers to their capacity to withstand, adapt to, and recover from the challenges posed by conflict situations. This includes the ability to maintain educational operations, protect academic integrity, safeguard faculty and student welfare, and support community needs despite disruptions. War often leads to resource scarcity, infrastructure damage, and displacement, prompting universities to innovate and implement strategic measures to ensure continuity of learning and research. The concept emphasizes the importance of flexible governance, resource mobilization, and the role of partnerships with local and international organizations. [21]-[25]

## 5. Conclusions

The findings from this study did illuminate the excellent resilience and strategies of Sudanese medical schools in the face of conflict-related challenges, contributing to a broader understanding of how medical education can adapt to such contexts. Insights gained from this study depicted the future practices and policies aimed at enhancing educational continuity in conflict-affected regions.

It is quite clear the staff of these medical schools bears over all energies to resume and maintain perfect medical education despite the odds.

The ability of medical schools to maintain the quality of education during wartime and disasters is a testament to their resilience and adaptability.

It was found that the methods used were leveraging curriculum adaptations, resource management, mental health support, and innovative learning strategies. These institutions have ensured that the training of future medical professionals remains robust and effective.

## Conflicts of Interest

The authors declare no conflicts of interest.

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