

## Higher Education in War-Torn Sudan: Crisis, Resilience, and Reforms

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### Abstract

*The higher education sector in Sudan has faced longstanding structural challenges, including underfunding, poor governance, and inadequate infrastructure, compounded severely by the armed conflict initiated by the Rapid Support Forces (RSF) in April 2023. This study examines the historical development, current crisis, and potential post-war reforms of Sudanese higher education institutions (HEIs). The study is conducted through literature reviews, case studies, and comparative analysis from other conflict-affected regions. Key findings highlight significant challenges such as the destruction of infrastructure, collapse of student welfare systems, worsening human capital flight, digital education disparities, and profound governance and funding issues. The paper identifies pathways for reform, including strengthening research and innovation, diversifying funding mechanisms, leveraging technology for resilience, enhancing faculty and governance structures, and promoting international collaboration. Sudan's HEIs can draw lessons from global conflict-affected higher education systems to build more resilient, inclusive, and adaptive institutions. The study advocates for immediate interventions using technology-driven education solutions and trauma-informed pedagogy, alongside long-term reforms in governance, financing, admissions policies, and quality assurance systems. These strategic efforts are vital for protecting the academic future of Sudanese youth and contributing to broader societal recovery. It also presents a critical opportunity for transforming Sudan's higher education landscape.*

### Keywords

*Sudan, higher education, conflict, displacement, governance, resilience.*

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## **Introduction**

Sudan's higher education sector has historically faced persistent challenges, including chronic underfunding, political interference, deteriorating infrastructure, and limited research capacity. These issues have been significantly worsened by recent conflicts, particularly the outbreak of armed violence initiated by the Rapid Support Forces (RSF) on April 15, 2023. The conflict, concentrated initially in Khartoum, led to widespread displacement, with more than 80% of the state's population forced to flee their homes to escape the hostilities. Displaced populations sought refuge in other parts of Sudan and neighbouring countries such as Egypt, Chad, and Ethiopia. According to the International Organization for Migration (IOM, 2024), the conflict has displaced approximately 8.6 million people, including 6.6 million internally displaced persons and 2 million refugees across borders. The disruption caused by the conflict has further debilitated Sudan's higher education institutions (HEIs). While existing literature examines higher education in conflict zones (Milton & Barakat, 2016; Al-Khansaa Diab, 2024), critical gaps remain in understanding the cumulative burden of decades of instability.

There is also limited knowledge of how these institutions adapt to displacement, resource collapse, and digital disparity, especially compared to other conflict-affected regions such as Ukraine, Syria, Iraq, Yemen, Afghanistan, and Palestine. In light of these critical gaps and current challenges, this paper seeks to: (1) Outline the principal challenges currently facing Sudanese HEIs; (2) investigate the direct and indirect impacts of the armed conflict on the higher education landscape; and (3) analyze adaptive strategies by comparing them with frameworks from Ukraine and Afghanistan, and propose strategic interventions for rebuilding and reforming the sector in the post-conflict era. The structure of this paper includes a historical overview, an analysis of contemporary challenges, and a set of evidence-based actionable recommendations, aimed at fostering resilience and future growth.

## **1. An Overview of Sudan's Higher Education Sector**

### **1.1 Colonial era and early development (1898-1956)**

The British colonial administration introduced formal education in Sudan following their re-occupation in 1898 to fulfil the administration's requirement for a local workforce in education and administration. The Gordon Memorial College was founded in 1902 by the

British colonial authorities, later evolving into the University of Khartoum. This was accompanied by the establishment of various technical schools that eventually developed into the Sudan University of Science and Technology. The Omdurman Scientific Institute, established in 1912 as the first private religious institute, emerged in response to the increasing influence of foreign education and the growing demand for regular religious education in Sudan, adopting the Al-Azhar education system.

### **1.2 Post-independence expansion (1956-1980)**

The Omdurman Scientific Institute later transformed into Omdurman Islamic University in 1965, expanding to encompass various branches of science. In 1955, the Cairo University of Khartoum Branch was founded within the premises of Farouk Secondary High School. Subsequently, several universities and institutes were established in 1971. The Sudan Ministry of Higher Education and Scientific Research was established in 1972 to develop policies, plans, and Programmes for higher education and scientific research and coordinate between governmental and private educational institutions. In 1975, the legislation concerning the supervision of tertiary education was established, forming the National Council for Higher Education. This event represented the inception of a centralized entity for higher education in Sudan. It is tasked with formulating policies and coordinating the activities of educational institutions. A cohesive admissions committee was established for all tertiary institutions to coordinate national admission between and within universities. By 1979, this committee had evolved into an autonomous entity named the Office of Unified Admission (Ali & Hassan, 2015; Mohammad and Rahman, 2020).

### **1.3 Modern era (1980-2023)**

Higher education in Sudan underwent significant expansion from 1980 to 2023, particularly after 1995. This expansion was a response to the growing number of Sudanese students passing high school examinations. The expansion in higher education ran parallel to the surge in population during the same time frame, (escalating from under **25** million in 1997 to approximately **40** million in 2016), alongside the upsurge in GNP per capita, which escalated by more than fourfold within that period (Murdock et al., 2023). The increased demand for higher education access triggered educational reform in the 1990s, leading to a proliferation of Higher Education Institutions (Table 1).

**Table 1:***Comparison between the number of Sudanese HEIs in 1997 and 2024*

Year	Public HEIs		Total	Private HEIs		Total
	Universities	Institutes		Universities	Colleges Institutes Academies	
1997-1998	26	1	27	2	16	18
2021-2024	38	1	39	25	101	126

Public HEIs increased from 26 universities in 1998 to 38 Universities in 2023, and the number of private HEIs is now approaching 126 universities and colleges (Table 1). However, this excessively rapid expansion unfolded at the expense of fundamental and applied research, which inadequately caters to the nation's requirements (Elhadary, 2010). The ongoing conflict has further exacerbated the scenario, placing additional strains on the existing establishments. The historical development of Sudan's higher education system reveals deep-rooted structural challenges that have persisted over time. The roots of Sudan's fragile higher education system trace directly to colonial-era underinvestment, where British administrators established Gordon Memorial College (1902) primarily to train low-level bureaucrats rather than cultivate critical scholarship or research capacity, with limited investment in the holistic advancement of intellectual, social, and civic capacities. This extractive model created path dependencies that persist to this day, including chronic underfunding, which never exceeded 0.3% of GDP compared to a regional average of 1.2% (Federal Ministry of Education, Sudan, 2019), excessive centralization mirroring colonial administrative structures, and curricula disengaged from local development needs.

The modern era, particularly after 1995, witnessed a dramatic surge in higher education institutions (HEIs) in response to rising population numbers. This rapid expansion outpaced the development of critical infrastructure and research facilities. The cumulative effect of expansion along with colonial-era underinvestment created a systemic vulnerability. The 2023 conflict merely exposed these fault lines, as seen when 19th-century campus designs proved indefensible against *crises* and discontinuity without digital contingency plans

## **2. Methodology**

This study adopts an exploratory and descriptive research design to investigate the challenges facing Sudanese Higher Education Institutions (HEIs) during the ongoing conflict and to propose strategies for their recovery and resilience. The methodology comprises three interrelated phases: data collection, case study analysis, and policy analysis.

### **2.1 Data collection**

A systematic approach was employed to gather both qualitative and quantitative data. A structured literature review was conducted using electronic databases, including Scopus, the Web of Science, JSTOR, and Google Scholar. Keywords such as “higher education,” “conflict zones,” “Sudan universities,” “displacement,” and “recovery strategies” were used. Inclusion criteria encompassed peer-reviewed articles, reports by international organisations (e.g., UNESCO, IOM, UNHCR), and grey literature published between 2000 and 2024, focusing on conflict-affected education systems.

Additionally, primary data were collected via questionnaires distributed to a purposive sample of 150 participants, comprising educators, administrators, and students from both public and private universities affected by displacement. Stratified sampling methodology was used. Five representative universities were chosen to capture Geographic diversity specifically, Khartoum and Gezira States, and varied displacement impacts (fully/partially non-operational). Participants eligibility to participate in survey was based on their active affiliation with Sudanese HEIs before and during the conflict initiated in April 2023. The pool of participants was maintained equally between university staff and students. The selection criteria involved systematic sampling from a coded pool of eligible participants, with one participant selected for every third entry on the coded list. To control for potential bias, measures were implemented to prevent students from disproportionately influencing the participant pool. Specifically, the proportion of students residing outside the two target states was capped at 50% of the total eligible participants. The questionnaire included sections exploring infrastructural damage, academic continuity, governance challenges, and perceptions of resilience strategies. Data were collected between October 2023 and April 2024 using secure online platforms (Google Forms). Informed consent was obtained from all participants, emphasising voluntary participation, confidentiality, and the right to withdraw.

## **2.2 Case study analysis**

The second phase focused on five displaced universities: the University of Khartoum, Sudan University of Science and Technology, Al Zaeim Al Azhari University, University of Gezira, and Omdurman Islamic University. These institutions were selected based on three criteria: (i) significant displacement rates following the April 2023 conflict, (ii) historical and strategic importance within Sudan's higher education landscape, and (iii) accessibility of data and stakeholder participation.

## **2.3 Comparative analysis**

A systematic comparative framework was employed to enrich the analysis and identify transferable best practices. Higher education systems from Palestine, Ukraine, Syria, Iraq, Afghanistan, Libya, Somalia, Sri Lanka, and Yemen were reviewed. Comparative criteria included strategies for academic continuity, digital transformation, student and faculty support mechanisms, governance adaptations, and funding resilience. Data were sourced from peer-reviewed literature and institutional reports.

## **2.4 Policy analysis**

The final phase involved a critical review of Sudanese national and institutional policies affecting higher education, both before and during the conflict. Relevant policy documents were sourced from government publications, ministerial decrees, and university communications issued between 1956 and 2024. This multi-phased methodology provides a rigorous and transparent foundation, offering diagnostic insights and prescriptive strategies for rebuilding higher education in conflict-affected Sudan.

## **3. Case Review - Current Challenges Facing Sudanese Higher Education Institutions**

### **3.1 Resource and infrastructure challenges**

Sudanese universities have undergone rapid expansion since the 1990s, often lacking the necessary investment in infrastructure. Many newly established institutions operated with minimal resources, relying on older universities to share libraries, laboratories, teaching hospitals, and classrooms. The conflict that began in April 2023 has severely exacerbated these infrastructural challenges. Reports by Alamin et al. (2024) indicate that nearly all public universities and 73% of private universities in Khartoum have been occupied by

the Rapid Support Forces (RSF). Other regions, such as Gezira, South Darfur, and North Kordofan, have experienced lower rates of university occupation, but the situation remains concerning. The Ministry of Higher Education and Scientific Research has reported that numerous public universities and private colleges have been severely damaged or vandalized, rendering them inoperable. Specifically, four teaching hospitals, multiple libraries, laboratory equipment, vehicles, and valuable research samples have been lost. Al Zaeim Al Azhari University reported that over 40 newly acquired Standard Dental Units were burned to the ground. A particularly devastating trend was the targeted looting and destruction of electrical and low-current installations.

Sudan's National Students Welfare Fund (NSWF), established in 1991, played a key role in supporting low-income students. It provided housing, financial allowances, healthcare, and access to cultural and recreational services. In 2018 alone, 13,000 students received loans, and 40,950 students were granted full sponsorships. However, even then, a deficit of 29,064 housing units existed (NSWF, 2018). The war significantly worsened the situation and led to the Collapse of Student Welfare and Housing Infrastructure. Over 90% of the NSWF's infrastructure across Khartoum, Darfur, and parts of Kordofan was destroyed. This included housing units, transport buses, documents, and furniture. Some facilities were repurposed as military barracks (Al-Mahi, 2023; Salim & Abd Rahman, 2020). The conflict-induced collapse of the student support services is not unique to Sudan. It has also been reported in Iraq, Afghanistan, Syria, Yemen and Nigeria (Ivanenko et al., 2024). In Afghanistan, student services centres were created to provide mental health and student welfare services. These centres, supported by USAID and the World Bank, initially focused on student advising, placement assistance, help with accommodations and other related student issues. The need for dropout prevention and career advising are also significant concerns addressed by these services (Babury & Hayward, 2013). Similar patterns of destruction have been observed in other conflict zones; for instance, after the 2003 invasion of Iraq, 84% of higher education institutions were reported as burned, looted, or destroyed (Milton & Barakat, 2016). In Afghanistan, Kabul University's library, which once held a million volumes, was reduced to only 20,000 books by the mid-1990s (Milton, 2018).

Digital infrastructure, which gained significant momentum during the COVID-19 pandemic, has become a critical component of higher education systems. Research indicates that the pandemic accelerated the adoption of digital learning platforms and

virtual communication tools, prompting universities to invest in online education systems, digital libraries, and remote collaboration technologies.

According to Nour (2011), there is a notable difference in the demand for and impact of information and communication technology (ICT) between public and private universities in Sudan. Private universities generally demonstrate a higher demand for ICT and experience greater benefits from its use, likely due to their higher income levels and better skill sets among staff. The challenges to ICT implementation in Sudanese higher education are multifaceted. They encompass financial, technological, policy, and sociocultural hurdles. The lack of a coordinated national ICT policy, inadequate infrastructure, insufficient financial investment, and limited training facilities hinder efforts to effectively integrate ICT into higher education (Suliman et al., 2008; Nour, 2010). During the ongoing conflict in Sudan, these digital resources have become even more essential, acting as lifelines for maintaining educational continuity, supporting displaced academic communities, and enabling remote instruction when physical access to campuses is no longer feasible. There is a clear disparity among Sudanese universities in their ability to resume online teaching and issue student records and certificates. Many campuses have suffered severe damage, with power systems, computer networks, laboratory equipment, and communication lines being destroyed or dismantled for copper, resulting in a permanent loss of critical infrastructure. The experience of Ukraine demonstrates how ICT can enhance instructional resilience in the face of challenges posed by COVID-19 and war (Marhasova et al., 2023). This serves as a key lesson to be learned from the Ukrainian conflict. In Sudan, universities that invested in ICT and developed their online platforms fared better than others. Less-equipped universities are relying on resources provided by the Association of Sudanese Universities and the Arab Research and Innovation Co-founded Alliances.

In response to the current conflict, online courses have been delivered, and administrative and academic meetings have been conducted using various online and social media platforms such as WhatsApp, Telegram, Zoom, and Google Meet. Efforts are underway to utilise simulation technology to substitute for some practical sessions. The Association of Sudanese Universities is currently leading an initiative to host and operate simulators that will replace a portion of practical activities in fields such as agriculture, medicine, basic sciences, engineering, and computer science. Technology is viewed as one of the major adaptive interventions for universities during the conflict (Al-Khansaa Diab, 2024; Cinkara, 2024; Sahar & Kaunert, 2020; Milton & Barakat, 2016).

### **3.2 Human capital challenges**

There is a particular shortage of teaching staff in the science and technological-oriented colleges, along with poor laboratory setup. Wages and remuneration remain one of the challenges facing academic staff in Sudan. This led to a brain drain of well-trained faculty, preferring employment in neighbouring countries with higher payment scale. The efforts undertaken to enhance wages and remuneration through the issuing of a special law and structure for university professors contributed to some extent to the stability of university professors; however, this law still falls short of fulfilling their ambitions and aspirations. Other significant drivers contributed to brain drain include the unstable political climate, deteriorating teaching and research environments, (Ajeeb, H. A. 2021).

The war in Sudan has exacerbated the situation and led to substantial financial hardship for university faculty, with many experiencing severe income reductions. Since the onset of the conflict, the Ministry of Finance has limited university staff salaries to 60%, with payments delayed by five months. Compounding this issue, the devaluation of the Sudanese Pound has significantly diminished the purchasing power of these wages, making it increasingly challenging for faculty to support their families. Faculty at private universities and institutes have faced layoffs or modified employment terms. Displacement and "brain drain," as academics flee violence, persecution and suffer academic hardship seems to be a common challenge in war zones. It leads to significant losses in human capital in the higher education sector. (Akkad & Henderson, 2024; Russell, 2022; Milton, 2018). Sudanese academia faces displacement and the lack of essential documentation, as many fled without their academic credentials impeding faculty members' efforts to secure new positions. Egyptian and Saudi universities are reluctant to hire Sudanese faculty due to the added costs of providing housing, health insurance, and navigating visa procedures. Presently, only South Sudan and Libya are actively recruiting Sudanese faculty. The displacement has also disrupted faculty members' connections with their academic communities, isolating them from colleagues, students, and their professional networks. In Cambodia, only 87 out of 1009 higher education teaching staff survived the Khmer Rouge regime (Milton, 2018). In Syria, an estimated 30% of academics have left due to the civil war (Akkad & Henderson, 2024).

Universities in conflict-affected areas may face a shortage of qualified staff due to displacement, death, or injury such kind of losses were observed at Jaffna University in Sri Lanka as compared with the universities of Colombo and Kelaniya. Moreover, the

departure of experienced staff can lead to a loss of institutional knowledge, memory, and generational continuity (Russell, 2022). In regions affected by conflict and war, universities have adopted a range of strategic interventions to attract and retain faculty, thereby mitigating the pervasive issue of brain drain and sustaining academic operations. A primary approach involves enhancing job satisfaction and ensuring job security. For instance, in Yemen, faculty retention has been positively influenced by fair labour practices and effective supervisory structures, which collectively contribute to improved job satisfaction and decreased emigration tendencies (Alhebshi, et al., 2025). Another effective strategy has been the leveraging of professional capital and fostering community engagement. In northern Syria, university administrators have addressed security challenges by adapting curricula to local needs and involving communities in educational planning, which has simultaneously promoted peace building and provided psychosocial support, thus aiding faculty retention (Cinkara, 2024). Moreover, universities in Ethiopia have sought to reverse the brain drain by recruiting expatriate faculty and encouraging the return of diaspora academics, strengthening local faculty capacity and development (Worku, 2024). International support mechanisms, such as the Institute of International Education's Scholar Rescue Fund (IIE-SRF), have also played a significant role by offering fellowships to displaced scholars, allowing them to continue their academic careers in safer environments and preventing permanent talent loss from countries like Iraq, Syria, and Ukraine (IIE-SRF, 2024). In Ukraine, higher education institutions have advanced academic mobility, joint and dual degree Programmes, and the creation of secure satellite campuses as means to retain both students and faculty, ensuring educational continuity during crises (Protsyk, 2025).

Students frequently need long commute distances between housing units and classrooms, and there are lack of reliable means of transportation, physical fatigue, and study-related expenses often burden students of poor backgrounds. Security threats became apparent as RSF militants failed to recognize the neutrality of any party, including academics. The displacement of students and staff persisted for some time in response to the expanding war zone and prevailing insecurity. The fatalities consist of several university professors, staff members, and students who perished in bombings and other violent incidents or were specifically targeted (Galil, 2024; Sawahel, 2023). The functional disintegration of higher education institutions led to the interruption of studies for half a million students (Galil, 2024).

With a substantial number of postsecondary students in Sudan and the urgent necessity to protect Sudanese youth from loss and fueling the ongoing conflict, the government advocated for the reopening of universities to resume education in October 2023. It became evident that decisive measures were imperative in the education sector due to heightened dropout rates of students, brain drain of well train faculty, unfavorable economic conditions, deterioration of educational infrastructure, and the destruction of societies. These are direct consequences of conflict in the educational sector, as indicated by Cervantes-Duarte and Fernández-Cano (2016); and Gates et al. (2012).

Universities in Sudan conducted surveys to collect data on displaced students, faculty and possible relocation. Based on these surveys, several cities within and outside Sudan were pinpointed as locations with optimal accessibility and a high concentration of displaced students and faculty, as per Tables 2 and 3.

**Table 2:**

*Cities with a higher number of displaced faculty and students in Sudan*

City	State	Coordinates
Al Qadarif	Al Qadarif State	14°02'N 35°23'E
Kassala	Kassala State	15°45'N 35°43'E
Port Sudan	Red Sea State	19°37'N 37°13'E
Atbara, Shendi	River Nile State	17°43'N 33°59'E ; 16°41'N 33°26'E
Dongola	Northern State	19°10'N 30°28'E
Kosti	White Nile State	13°10'N 32°40'E

Source : Author's own work.

Cities in Table 2, were identified as cities with many internally displaced faculties, students and better internet connectivity. Local universities in these cities provided full support and shared their resources with the displaced universities' academia. Cities outside Sudan having high number of displaced academia are identified as per Table 3., with Cairo coming on the lead, followed by cities in the Kingdom of Saudi Arabia. Major cities within the Kingdom of Saudi Arabia were identified as cities with large, displaced communities and can easily be accessed from other Arabian Gulf Countries with smaller students' numbers. Cities such as Adre, Chad; Asmara, Eretria; Juba, South Sudan; and Addis Ababa, Ethiopia, represent transit cities for displaced academia, mainly in their

way to the Arabian Gulf Countries, Uganda and Europe. Each university has unique data with different weights, but they all agree on the cities summarized in Tables 2 and 3.

**Table 3:**

*Countries and cities with a higher number of displaced faculty and students*

Cities	Country
Cairo	Egypt
Riyadh, Jeddah, Medina	Kingdom Saudi Arabia
Juba	South Sudan
Kampala	Uganda
Dubai	United Arab Emirate
Doha	Qatar

Source: Author's own work.

It was evident that security, accessibility, number of students, number of faculty, availability of supporting infrastructure and efficient internet connectivity are the primary determinants for establishing and commencing academic activities in and outside conflict zones. A report by Elgadal and Glade (2024) highlights extensive challenges faced by displaced Sudanese faculty and students due to the 2023 conflict. Financial burdens are significant, with housing and university tuition fees rising in Cairo, making it difficult for students lacking family or external financial support to continue their studies. In Egypt, strict visa restrictions further complicate matters, with many students struggling to secure entry or seek human traffic across the border. In Uganda, degree equivalency processes, force students to repeat previously completed courses. Additionally, while South Sudanese students receive tuition waivers, other Sudanese students face prohibitive registration fees, with limited scholarship options available. For those in advanced stages of their education, such as third to fifth-year students, limited access to transcripts often means starting degrees from scratch in a new country. Internally displaced students often face further barriers such as the cost involved with housing and travelling to testing centers.

### 3.3 Financial and resources challenges

The higher education institutions (HEIs) in Sudan face significant underfunding, which poses a major challenge. These institutions rely on funding from student fees, government subsidies through a monthly grant, and various projects. However, the rapid expansion of the HEIs has not been met with a corresponding increase in funding, mainly due to limited

government resources. Public HEIs in Sudan receive funding from the Ministry of Finance through a grant, which amounts to 0.2% of the national budget and approximately 2.1% of public expenditure, (Mohammad et al., 2020). Alternative funding methods, such as self-generated revenue from tuition fees, face various challenges, particularly during collection, due to the difficult economic conditions, many Sudanese families face. Additionally, due to the Darfur peace agreement, many students are exempt from contributing to the university's financial resources, (Abbas, 2015).

The economic challenges, including currency devaluation and the rising cost of education, have forced institutions to explore alternative approaches to address budget shortfalls. Some higher education institutions have turned to supplementary investments and banking finance. However, many have encountered obstacles, such as the inability to secure guarantees for banking finance due to laws prohibiting the use of government assets as collateral in commercial bank finance, (Mohammad & Rahman, 2020). Furthermore, political instability and conflicts have further strained the education system, resulting in a high dropout rate among international students and a significant decline in international student enrollment. These students previously provided substantial foreign currency income that supported university operational and growth expenses. Currently university struggling with limited budget, especially in covering costs related to student training. This has forced universities to request extra fees to cover teaching, training, and examination expenses amid the armed conflict in Sudan. Similar impact on funding was reported in Syria. For instance, the conflict in Syria and the economic crisis led to the collapse of the Syrian Lira and underfunding of the higher education sector, resulting in budgetary constraints for universities and low or irregular salary payments to teachers (Tozan, 2023) and (Shaban, 2020). In Afghanistan, the two most critical problems facing the Ministry of Higher Education (MoHE) in setting future directions for mental health are the acute shortage of qualified mental health workers and the shortage of funds. This occurs against a backdrop of significant student growth with relatively flat funding (Babury & Hayward, 2013). Yemen's higher education institutions also suffer from a shortage of financial resources and bad usage of the available resources, with government funds and tuition fees often consumed as operating expenses (Al-Haimi et al., 2017). Similar challenge has been reported in Gaza (Jebril, 2018) and in Ukraine by Gresha et al. (2023) and Porkuian, et al. (2024).

Universities are encouraged to mobilize their own resources and diversified sources of finance, such as direct financing grants from companies and banks, as well as

education trust funds and special investment funds .Performance-based contracts or competitive funds is a strategy used in some European, US, and a limited number of Arab universities such as Egypt, Jordan and kingdom of Saudi Arabia, to promote cost-efficient spending. In Egypt, the Science and Technology Development Fund (STDF), established in 2007, is a prime source of scientific research funding. The STDF provides competitive funding Programmes related to governance, such as the "National Challenges Programme," "Faculty for Factory," and "Demand Driven Projects", (Badran et al., 2020). In Jordan, the government is advocated as the main source of funding for higher education, alongside the mobilization of diverse resources. A Scientific Research and Innovation Support Fund also exist to support and expand scientific research and innovation (Badran et al., 2022).

### **3.4 Academic and research challenges**

Although the number of Sudanese academic staff has grown over the past two decades, student-faculty ratios are exceedingly high. The student-faculty ratio in Sudanese universities is another important quality assurance indicator. According to a report by Abdalla (2016), the ratio varies significantly between universities and is reported as an average of around 42:1. This ratio exceeds international standards, imposing significant constraints on student-faculty interactions and undermining the overall quality of educational experiences within the classroom. Universities focused more on teaching-oriented activities at the expense of other university's missions. A typical academic supervisor has to supervise more than twenty Masters and PhD students, teach in both private/public universities, and serve as a consultant. Consequently, universities and staff members are deprived of the opportunity to conduct meaningful research, eventually impacting authorship and contribution to career and self-advancement.

Most of the academic research in Sudan is in the form of master's theses or PhD dissertations. Faculty members cannot dedicate time to independent research due to the high demand for higher education, leading universities to prioritize teaching. The lack of funding and technical support for development-oriented research has compounded the challenge. In response to these challenges, several funding Programmes were implemented in 2019-2022 to boost research quality and improve researchers' satisfaction. These funding Programmes included funding research across various categories such as individual researchers, researcher networks, multidisciplinary

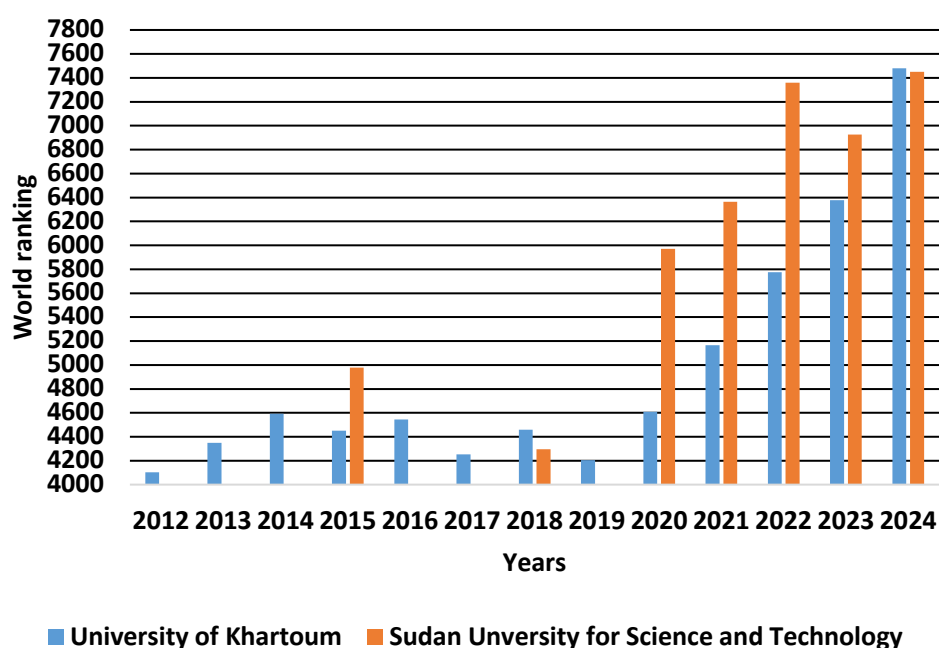
research, and international research partnerships. Several initiatives are devoted to supporting research and technological incubators, laboratory infrastructure and centres of excellence. However, the funding remains below expectations, and certain issues must be addressed beforehand. Many universities must develop a comprehensive research strategy with well-defined goals and plans. Most ongoing research is not fully aligned or linked with national developmental goals or priorities. Weak publications, migration and absence of coordination with key government agencies and research beneficiaries are among the challenges facing research in Sudan (Abu Al Gookh, 2015).

Security concerns have made securing research and personnel funding increasingly challenging, as fewer institutions can finance research or are willing to undertake the associated risks due to resource constraints. The war has also led to the displacement of many university faculties and the discontinuation of their research due to the loss of resources and data. Many lost their libraries, papers, and laptops during the displacement. Although this displacement led to the discontinuation of research but also provided opportunities for others to publish their research papers and books in writing. Most peer-reviewed journals in Sudan follow traditional classical procedures with low use of technology, only a few journals follow a manuscript management system for scholarly publishing. The expansion of the journals and publications is limited by the discontinuation of the regional office of the ISSN International Centre in Sudan to issue ISSN and ISBN registration numbers. The prolonged conflict has created a significant gap in knowledge and resources, which will inevitably impede progress and academic activities.

University ranking is among the key performance indicators that assess the quality of universities academic and research excellence. Sudanese universities strive to implement quality assurance principles, develop new and improving teaching plans, attract relevant specialists, and publish scientific research in peer-reviewed international journals. Most public universities still need to be listed in major ranking networks such as the THE World University Rankings, Q.S. World University Rankings, and Academic Ranking of World Universities. There is a shy presence for few universities in ranking organisations such as Scimago Institutions Rankings and Webometrics. The presence mainly confined to organizations having information collection mechanisms based on data mining for research output from third parties or universities websites. Sudanese universities are not following any comprehensive strategy to increase their visibility worldwide.

On March 06 2024, Scimago Institutions Rankings ranked Sudan University of Science and Technology as the highest-ranking university in Sudan, ranked in position 3686 worldwide. In 2023, URAP World Ranking ranked the University of Khartoum in position 2077 worldwide. In 2023, Webometrics published its results, listing 14 universities from Sudan. Khartoum University and Sudan University of Science and Technology continue to show consecutive appearances in Scimago Institutions Rankings since 2012 and 2015 respectively and up to date. Examining Scimago Institutions Rankings over twenty years, as in Figure 1, revealed that none of these two universities has significantly improved ranking since listing. A tremendous steep deterioration in ranking occurred from 2020 onwards.

**Figure 1:** World rankings of the two top universities of Sudan 2012-2024



Most universities in Sudan offer carbon copies of each other in terms of Programmes. Their Programmes lack a curriculum that addresses global and international competitive markets. According to the national admission guideline (MoHESR 2020), several universities were not able to fill the planned seats in specific colleges, such as the College of Education and College of Agriculture, even though the entrance percentage was set to 50%.

The ongoing war in Sudan is severely undermining the quality of education across the country, leading to significant disruptions in the curriculum. The absence of consistent

teaching is preventing students from acquiring critical foundational knowledge. Many skilled educators have left the country, resulting in a shortage of qualified teaching staff. Additionally, digital learning tools are becoming increasingly scarce. This situation will have long-term academic consequences, potentially forcing an entire generation of youth to miss out on higher education opportunities. Unless serious efforts are made to maintain studies in safe areas, improve student-faculty interaction, and provide adequate practical training, the higher education standards in Sudan will be severely affected. Similar impacts were noticed in several affected war zones. War in Syria has resulted in a severe deterioration in the quality of education, leading to students graduating without the necessary knowledge or skills (Tozan, 2023).

### **3.5 Governance and policy challenges**

Higher education governance in Sudan has historically been highly centralized, with the Ministry of Higher Education and Scientific Research (MOHESR) exercising strong control over, appointments of university leadership, Curriculum standardization, quality assurance, admission quotas and tuition structures. Poor governance can seriously hinder a university's progress, resulting in significant lost opportunities or missed targets. Good governance cannot also compensate for poor management in universities. Many university management staff, including some of those in leadership positions, are sometimes rather under-informed about governance matters.

This is due to a lack of exposure to the operation of a university, either as a member or by attending meetings or due to abrupt changes in university management teams. As a result of the increase in the number of affiliated colleges and students, the burden of administrative functions of universities has significantly increased, and the focus on good governance and management has been diluted. The absence of compulsory training in governance and management that qualifies for top administrative positions, along with the abrupt changes in administrations during turbine political changes in 1990 and 2019, have critically impaired the progress of Sudanese universities. The higher education system in Sudan struggled with over-centralization, bureaucratic structures, and the need for more accountability and transparency.

Higher education in Sudan has a long history of interaction with politics. Institutions were affected by the political climate and played a role in instigating political changes. The Alumni Conference, formed in 1938, was the first documented body formed by college graduates. It started as a social and cultural interface for graduates of high

schools in Sudan, but it soon called for granting the Sudanese the right to self-determination and Independence. The involvement of graduates and undergraduates in politics continued after Independence, and the University of Khartoum significantly influenced the uprising of October 1964. This led to the downfall of the first military regime of General Ibrahim Abboud. This interaction extended to campus life in tertiary and secondary education. In-campus ideological conflicts between right-wing and left-wing parties and between democrats and totalitarians had their toll on university administration and campus life.

Higher education in Sudan is among the sectors that enjoy greater transparency and strict academic regulation, making it one of the least politically influenced bodies in Sudan. However, many incidents were recorded for political interference and imbalances during 1990-2020. Increasing interference of politicians in the management of higher education jeopardizes the autonomy of HEIs. Higher education should remain a beacon for change without jeopardizing or interfering with the academic and administrative processes. Inclusion, tolerance and freedom of speech should be the culture advocated among students. Students should conduct their activities without interfering with the regular class schedule.

Quality Assurance poses a significant challenge in present-day Sudan. Sudan took an early initiative to establish a Higher Authority for Evaluation and Accreditation in 2003, positioning it as an essential element of the National Council for Higher Education and Scientific Research. The central goals of this authority are to promote the culture of quality assurance and accreditation and develop criteria and standards for the evaluation and accreditation. The authority develops national frameworks, principles, guidelines, and benchmarks for implementing quality assurance at both institutional and Programmatic levels in Sudanese universities.

Similar bodies for coordination were formed in individual universities to execute quality assurance mechanisms. Regrettably, the setup did not lead to any significant changes in these institutions. Neither ranking nor teaching or research environment was significantly changed. The main driving push for quality assurance came from the professional societies in Sudan, particularly the Sudan Medical Council and Sudan Engineer's Council, due to regulations related to professional practice within and outside the country. According to a study by Abdallah (2016), there is a quality gap between intended and actual quality assurance practices within all Sudanese universities.

The number of students who sit for Sudanese higher school certificates each year is increasing dramatically. In 1980, only 60,000 students sat for the Sudanese Certificate School examination, compared to 215,172 in the year 2021 (MoHESR, 2020). The percentage of females enrolled in higher education among males jumped from 16 per cent in 1975 to 53 per cent, approaching 60 per cent in 2003 (El Tom, 2003). This may be due to population growth, growing awareness, and increased citizen demand for access to higher education. This rapid increase in student enrollment has led to an increase in graduates each year. Due to the problems plaguing higher education, many graduates are of poor quality, limiting their prospects of securing employment. Students increasingly prefer to enrol in medical colleges. In contrast, many colleges of applied sciences, particularly those in agriculture and education, struggle with attracting students and meeting the minimum admission percentages. In Sudan, central admission into public universities is a hallmark of the country's highly centralized higher education governance system.

This system, coordinated through the General Administration for Admission, Evaluation, and Authentication of Certificates, which operates under the Ministry of Higher Education and Scientific Research (MOHESR), plays a pivotal role in shaping access to higher education. Below is an overview of how the system functions and its implications. Enrollment policy depends on national unified competition on a merit basis for the available planned seats in each university under the general public quota. The competition also includes Private admission, foreign students' admission special quota for less developed states, Peace process quota for Darfur and quota for Technical Education and Diplomas. Higher education employees and pensioners compete for an extra 25% quota. Since the eruption of war in April 2023, there has been no batch sat for Sudan Secondary certificates until recently on December 27, 2024, which necessitates a sort of admission regulation and calendar during the second quarter of 2025. The consequence of the absence of regular admission in Sudanese universities along with persistent emigration and a drop in student enrollments depletes local knowledge and hinders post-conflict rebuilding, (Al-Khansaa Diab, 2024; Milton, 2013).

Governance can be delivered through a mix of "business model" and "traditional model. The choice of an appropriate governance model is demanding and varies based on national context, institution type, historical legacy, and other cultural, political, and economic factors, (Badran et al., 2020). In Sudan, we need to restructure governance through a mixed model that balances modern, performance-based approaches with the

values and structures rooted in local traditions. Such a hybrid governance framework can help address the complex challenges facing higher education in Sudan, especially in the aftermath of prolonged conflict. The university should be rearranged according to the intended role, historical context and merits. By integrating accountability, transparency, and strategic planning from the business model with the community engagement and contextual sensitivity of traditional models, institutions can become more resilient and responsive. This approach will not only enhance institutional effectiveness and diversity but also rebuild public trust and align educational outcomes with national development priorities.

#### **4. The Way Forward**

The challenges facing higher education in conflict zones require an integrated and immediate response that combines innovative technologies, temporary pedagogical reforms, adjustments to academic regulations, and changes to assessment policies. It is crucial to enhance the resilience of educational institutions during times of war and crisis. These institutions must be capable of understanding and swiftly responding to emergencies to ensure continuity in education (Assefa et al., 2023; Sharifian & Kennedy, 2019; Rajab, 2018). The proposed action plans align with the Education in Emergencies (EiE) standards as outlined by UNESCO (2023) and UNESCO (2024), as well as with successful interventions documented in various studied cases around the globe that are relevant to the context of Sudan. These intermediate action plans include the following:

#### **4.1 Intermediate action plan**

##### ***4.1.1 Administrative and leadership plans***

##### **4.1.1.1 Activate crisis-cell and continuity plans**

Establishing strong system-level leadership and coordination mechanisms through a dedicated crisis cell is a critical immediate intervention. The crisis cell's role is to manage and make continuity-of-operations plans. The set-up should include coordination mechanisms at both ministerial and University levels to coordinate emergency responses and safeguard academic continuity.

#### **4.1.1.2 Damage and needs assessments (DNAs)**

Conduct rapid DNAs for campuses, laboratories, and other educational facilities to prioritize safe reopening, guide phased resumption of teaching, and allocate resources effectively.

#### **4.1.1.3 Information systems for education in emergencies (EiE)**

Major obstacles facing Sudanese Universities during the current conflict are the absence of accurate data to build an effective response. UNESCO, along with Education Cannot Wait, NORCAP, and SIDA is launching a project to strengthen institutional education information systems for data-driven Education in Emergency (EiE) and resilience to crises UNESCO, (2023b). Systematically gather and update data on the damages, safety status, displacement locations, internet accessibility, and availability of teaching materials and aids for both students and faculty members.

#### **4.1.1.4 Adaptive administrative restructuring**

Reconfigure University administrative structures, appointments, and assigned responsibilities in line with the availability, location, and capacity of faculty and staff who are able to contribute during the crisis. This represents one of the most effective adaptive measures implemented in Sudanese universities to accommodate the varying availability of faculty members and administrators.

### ***4.1.2 Adaptive academic regulations and adjustments***

#### **4.1.2.1 Recovery of students' records**

This is a critical process and a lifeline for educational continuity, mobility, and long-term recovery. The destruction of universities, displacement of populations, and loss of personal belongings during armed conflict create a serious risk of academic identity loss. Without timely recovery or reconstruction of records, students may face irreversible barriers to education, employment, and professional licensing. Backups on physical servers, cloud servers, and paper documents are the first emergency line. In extreme cases, recovery of records through multiple sources and several verification methods that include alternative evidence of learning, such as teacher attestations or digital learning records. Previously, a photograph from the board for semester records, previously issued certificate or self-declaration, sworn statements, or partial documentation, subject to later verification (UNHCR, 2023). Such exceptional measures have been applied in limited contexts in Sudan, where conventional recovery was not possible.

#### **4.1.2.2 Temporary academic regulations and adjustments**

In response to the challenges posed by conflict, Sudanese universities implemented several academic adjustments that proved to be successful, aimed at sustaining educational continuity. These included temporarily withholding strict enforcement of regulations related to attendance, enrollment, prerequisite completion, and academic probation. Flexible enrollment and attendance policies were introduced, allowing students to participate without penalty despite irregular attendance caused by displacement, safety concerns, or connectivity issues. Assessment practices shifted toward continuous assessment and project-based evaluation, reducing reliance on high-stakes examinations. The academic calendar was modified by shortening semesters from the standard 15 weeks to a 12-week semester and, in some cases, offering condensed or accelerated courses to minimize disruption. Remote and hybrid learning alternatives were adopted, enabling participation for students unable to be physically present. In certain instances, institutions permitted students to complete a full year of study, covering the equivalent of two semester courses, before sitting for examinations. This approach provided students with greater opportunities to engage in learning while allowing colleges additional time to prepare for examinations and issue academic records, thereby mitigating the impact of interrupted semester schedules.

#### **4.1.2.3 Pedagogical reforms**

Pedagogical reforms should be designed to ensure education remains continuous, relevant, and inclusive despite the challenges posed by conflict. Flexible teaching methods, such as short semesters, regional meet-ups, or supervised learning pods in nearby safe locations, can be implemented. These strategies should balance synchronous and asynchronous engagement to accommodate displaced or mobile students effectively. Curricula should emphasise higher-order thinking skills through case studies, problem-solving scenarios, and critical thinking exercises to promote deep learning. Furthermore, content should incorporate themes of peacebuilding, conflict resolution, and resilience-building to address the contextual needs of learners in war-affected regions.

#### **4.1.2.4 Assessment policy**

Assessment methods should also be diversified to include open-book exams, project-based assessments, and portfolios, collectively capturing progress and mastery over time.

#### **4.1.2.5 Decentralized micro-sites / dispersed classes**

To reduce concentration risk when main campuses are targeted—a practice documented in the cases of Gaza and Syria (Barakat & Milton, 2021; Al-Hazaa et al., 2024)—

Sudanese universities have adopted a decentralized approach to resuming studies. This strategy considers factors such as safety conditions, internet connectivity, and the distribution of staff and student populations (Table 2).

#### ***4.1.3 A parallel support system***

It is essential to provide digital literacy training for both students and educators. Educators must also be trained to recognise and address trauma among students affected by conflict. Additionally, the provision of emotional and mental health resources, alongside mentorship Programmes, is critical to fostering resilience and adaptability among learners and educators in challenging conditions. Such support mechanisms are indispensable for maintaining the quality and inclusivity of education in war-affected zones.

#### ***4.1.4 Collaboration & Partner university hosting pathways***

Triggering collaboration ties with universities in safe areas and in countries with a high number of displaced academia. The collaboration should prioritise developing an exchange programme and provide facilities for practical sessions and exams. These efforts will ensure that all students have access to education and skills training, even amid conflict, as education is crucial for personal development and post-conflict reconstruction.

#### ***4.1.5 Technological interventions***

Technological solutions represent a critical immediate intervention for sustaining higher education during crises. A primary focus is the expansion and enhancement of distance learning to compensate for the absence of physical interaction. Immersive technologies such as Virtual Reality (VR), simulators, and Augmented Reality (AR) can replicate practical experiences and foster deeper engagement. Artificial intelligence (AI) applications, including virtual tutors and chatbots that emulate teacher–student interactions, further improve accessibility and instructional quality.

### **4.2 Post-war reforms and action plan**

Understanding the reality and landscape of higher education post-war is essential for better planning. Universities in Sudan will face a unique set of challenges, including the destruction and theft of infrastructure such as libraries, laboratories, ICT infrastructure and vehicles. This will be coupled with a massive brain drain, diminished savings, budget constraints and poor university enrolments. On the other hand, this war has presented higher education in Sudan with great opportunities for reforms and community

engagement during the peace-building process. It can pave the way for fundamental changes in approach or underlying assumptions that have long slowed down higher education in Sudan. In line with global frameworks on *Education in Emergencies* (UNESCO, 2023a, 2023b, 2024) and the *INEE Minimum Standards* (2024), this strategic plan outlines actionable reforms under six priority areas to restore and transform higher education in the post-war context.

#### **4.2.1 Resource and infrastructure challenges**

The main objective of these actionable plans is to restore, decentralize, and climate-proof higher education infrastructure while ensuring continuity during future crises and include the following;

##### **4.2.1.1 Conflict-Resilient Campus Network**

To establish multiple satellite campuses and learning hubs in safer regions to reduce concentration risk, as documented in similar approaches in Gaza and Syria (Barakat & Milton, 2021; UNESCO, 2023a).

##### **4.2.1.2 ICT Backbone Reconstruction**

Implement a phased plan for broadband, solar-powered digital labs, and redundant backup servers to ensure uninterrupted teaching and research (UNESCO, 2024).

##### **4.2.1.3 Shared Resource Consortia**

Enable inter-university sharing of high-cost facilities through cloud-based scheduling and usage tracking.

##### **4.2.1.4 Emergency Infrastructure Protection Protocols**

Train university staff in asset safeguarding, digital archiving, and rapid relocation of essential equipment.

#### **4.2.2 Human capital challenges**

The main objectives of this actionable plan are to retain, protect, and rebuild Sudan's academic workforce with regional and international collaboration, and these include the following.

##### **4.2.2.1 Faculty retention package**

Provide hardship allowances, housing subsidies, and hazard insurance for academic staff in high-risk zones (INEE, 2024).

##### **4.2.2.2 Diaspora engagement program**

Establish structured visiting scholar schemes and virtual teaching programs for Sudanese academics abroad (Worku, 2024).

#### **4.2.2.3 Credential rescue & digital portfolios**

Create a centralised, cloud-based academic credential vault to prevent loss of records during crises (UNESCO, 2023b).

#### **4.2.2.4 Faculty development & MHPSS support**

Offer training in pedagogy, digital teaching, and research, combined with mental health and psychosocial support services (UNESCO, 2024).

#### **4.2.2.5 Strategic recruitment from neighbouring countries**

Develop bilateral agreements for temporary faculty exchange with universities in Egypt, Ethiopia, South Sudan, and the Gulf states.

### ***4.2.3 Financial and resource challenges***

The Objective of these action plans is to diversify funding streams, optimise resource use, and ensure transparent governance.

#### **4.2.3.1 Finance and infrastructure recovery fund**

To address the severe post-war financial and infrastructure crises facing Sudanese universities aftermath of war, a recovery and infrastructure fund should be established at the national and university level, supported by blended financing from government allocations, private sector contributions, international donors, and innovative self-generated income streams. Given that government resources will be limited and reconstruction priorities widespread, universities must diversify funding through tuition restructuring, alumni and philanthropic donations, corporate sponsorships, research grants, commercial ventures, international student recruitment, intellectual property commercialization, and public-private investment in private colleges. Islamic endowments (*waqf*) can provide sustainable capital for long-term investments.

#### **4.2.3.2 Performance-based budgeting**

Allocate funds based on cost-efficiency, research impact, and graduate employability (INEE, 2024).

#### **4.2.3.3 Public-private training partnerships**

Engage industries in co-funding sector-specific labs, internships, and applied research.

#### **4.2.3.4 Digital cost efficiency**

Expand blended learning to reduce operational costs while ensuring quality. Expand on online and continuing education programs.

#### **4.2.3.5 Student support fund**

Reinstate the National Students Welfare Fund to provide housing, stipends, and tuition waivers for conflict-affected students. The National Students' Welfare should adopt new

models to support disadvantaged students without undermining institutional financial sustainability. Strategic industry partnerships and the inclusion of successful entrepreneurs on university boards can enhance innovation, strengthen societal linkages, and unlock additional revenue opportunities, ultimately reducing dependency on government subsidies and improving resilience.

#### ***4.2.4 Academic and research challenges***

The objective of these action plans is to restore academic quality, address staffing shortages, and align research with national recovery priorities. The plans include the following;

##### **4.2.4.1 Curriculum renewal & skills alignment**

Update curricula to meet post-conflict labor market needs, with emphasis on agriculture, engineering, health sciences, and climate adaptation.

##### **4.2.4.2 National research recovery agenda**

Fund multidisciplinary projects tied to reconstruction needs (e.g., water, food security, public health).

##### **4.2.4.3 Student–faculty ratio reduction**

Employ teaching assistants and adjunct faculty, including graduate students and diaspora academics, for immediate relief.

##### **4.2.4.4 Digital & open science platforms**

Expand e-libraries, open-access journals, and research repositories to compensate for lost physical resources (UNESCO, 2024).

##### **4.2.4.5 International research partnerships**

Join regional and global consortia to secure funding, mentorship, and technology transfer.

#### ***4.2.5 Governance and policy challenges***

The objective of this action plan is to establish a decentralized, transparent, and crisis-resilient governance framework.

##### **4.2.5.1 Hybrid governance model**

Combine performance-based management with community representation to balance efficiency and inclusivity.

##### **4.2.5.2 Decentralized decision-making**

Empower university councils with authority over admissions, staffing, and partnerships in coordination with the Ministry of Higher Education.

#### **4.2.5.3 Quality assurance reform**

Strengthen accreditation bodies with post-crisis standards and digital monitoring systems (UNESCO, 2023b).

#### **4.2.5.4 Emergency education legislation**

Enact a Higher Education Emergency Act to formalize crisis protocols for relocation, remote learning, and credential protection.

#### **4.2.5.5 Data-driven policy**

Develop a real-time higher education crisis dashboard integrating data on enrollment, infrastructure, faculty, and outcomes (UNESCO, 2023b).

#### **4.2.5.6 Reform admission policy**

It should be reformed in favor of the least developed states, considering a higher percentage ratio for local enrollment. This will help candidates from these states have more access at the state level and reduce costs associated with student movement and living in other states. This will eventually build the capacity of these states and create a good understanding of their challenges. Subsidize, unified federal admission should be confined to well-equipped universities with varying percentages based on criteria such as historical significance, research output, ranking and accreditation.

#### **4.2.5.7 Revised student intake and program realignment**

The anticipated decline in enrollment and increased dropout rates during the war should be leveraged to reform higher education expansion, programs, and admission policies. Data from 2020–2022 show that many programs, particularly in agriculture and education, recorded zero intake or had entrance thresholds as low as 50%, reflecting poor planning and expansion unrelated to market needs. Given the weak infrastructure of these programs, this moment presents an opportunity to consolidate resources, merge low-enrollment programs, and develop research-oriented universities offering advanced degrees to better align with national priorities.

#### **4.2.5.8 Revise university status**

Including ownership, governance and jurisdiction and align it with the admission quota and type accordingly.

### ***4.2.6 Cross-cutting priorities***

The objective of these interventions is to integrate safety, gender equity, inclusion, and climate resilience into all reforms. These interventions include the following;

#### **4.2.6.1 Campus safety & protection protocols**

Implement emergency evacuation routes and early warning systems (UNESCO, 2023a).

#### **4.2.6.2 Gender equity & inclusion**

Provide safe transport, harassment reporting systems, childcare facilities, and targeted scholarships for marginalized students.

#### **4.2.6.3 Climate resilience**

Integrate green building standards in reconstruction and embed climate adaptation in curricula.

#### **4.2.6.4 Digital inclusion**

Ensure technology is low-bandwidth compatible, mobile-friendly, and accessible to students with disabilities.

#### **4.2.6.5 Community engagement & peace building**

Use universities as platforms for reconciliation, civic engagement, and cultural preservation.

### **Conclusion**

The insights derived from the relocation and recovery experiences of displaced universities and academic institutions are essential for evaluating their sustainability and shaping public policies and strategies for advancing higher education in Sudan. These universities must address two key priorities: responding to immediate challenges to resume educational and research operations and establishing frameworks for their long-term growth and development.

Immediate adaptive strategies include embracing digital education, adopting innovative pedagogical approaches, and providing enhanced support services to ensure continuity. Meanwhile, long-term strategic interventions focus on fostering institutional growth through infrastructure rebuilding, reinforcing quality assurance mechanisms, promoting knowledge production, advancing international collaboration, and strengthening efforts in peace-building and community engagement. These efforts must be supported by comprehensive policy reforms and governance adjustments to facilitate sustainable recovery. Such interventions have been shown to catalyze both institutional recovery and societal transformation in conflict-affected regions (Al-Khansaa Diab, 2024; Porkuian et al., 2024; Akkad & Henderson, 2024; Greshta et al., 2023; Shaban, 2020; Milton, 2013).

However, the lack of longitudinal analysis for the long-term outcomes of such recovery strategies remains a barrier to fully realizing their potential (Couch, 2018;

Babyesiza, 2012). Despite the challenges faced by Sudanese Higher Education, there is potential for the sector to emerge stronger through targeted reforms and strategic investments. Policymakers, educational institutions, and international partners must collaborate and take decisive action to revitalize higher education in Sudan.

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