RESEARCH ARTICLE

THE PERCEIVED VARIATIONS IN CLINICAL TRAINING AMONG BATCH 25 AND 26 MEDICAL STUDENTS AT UMST AND THEIR EXPERIENCES IN RWANDA OR TANZANIA, COMPARED TO PRE-WAR TRAINING IN SUDAN

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Abstract: **Background:** Clinical training is crucial in shaping medical students' competencies. The ongoing conflict in Sudan has disrupted traditional training pathways, necessitating adaptation and relocation of training programs of the University of Medical Sciences and Technology (UMST) faculty of Medicine to Tanzania and Rwanda. This study investigates the perceived variations in clinical training among Batch 25 and 26 medical students from UMST, comparing their experiences in Rwanda and Tanzania to pre-war training in Sudan. **Objectives:** The study aims to identify the differences in clinical training experiences across the countries (Sudan, Tanzania and Rwanda), assess the impact of war-displacement on students' well-being, and provide an insights into the challenges and benefits encountered during training a of war-displaced medical students. **Methods:** This comparative cross-sectional study involved 211 medical students from Batches 25 and 26 at UMST. Data were collected through an online structured questionnaire, focusing on sociodemographic characteristics, training quality, challenges, well-being, satisfaction, and experiences in clinical rotations. Statistical analysis was conducted using SPSS version 26. Comparative analyses conducted using t-tests, chi-square tests, and ANOVA to identify significant differences, and results were organized in forms of tables and figures. **Results:** 62% of the participants were females and 38% were males, 79% were age group (22-24),54% trained in Tanzania (batch 25) and 46% trained in Rwanda (batch 26). The study found that, in Sudan, 89.1% of students reported better history-taking skills, while 87.8% of batch 26 in Rwanda had better experiences with SOAP notes. Regarding interpreting lab and radiological results, 74.5% of batch 26 preferred Rwanda. In Tanzania, 55.8% of batch 25 had better lab and clinical skills experiences. Student satisfaction was higher in Sudan (48.8%), and 61.1% rated the medical knowledge provided by doctors as excellent, compared to 12.3% in Tanzania and Rwanda. Favoritism was witnessed by 61.1% of respondents in Tanzania and Rwanda, with 48.8% reporting racism. Language barriers significantly affected 77% of students in Tanzania and 75.5% in Rwanda. Gender differences showed 79.4% of females had better clinical examination experiences in Sudan, and males were more likely to receive translation services (31.3%). **Conclusion:** This research reveals significant differences in clinical training for UMST's Batch 25 and 26 students, with pre-war Sudan excelling in fundamental skills and Tanzania and Rwanda better in lab and radiological interpretation. Challenges like favoritism, racism, and language barriers, particularly for female students, affected training, though these experiences fostered personal and professional growth. The study emphasizes the need for improved language services, structured programs, and better support for displaced medical students.

Keywords: Clinical training, medical education, war-displaced medical students, well-being, Tanzania, Rwanda.

INTRODUCTION

Clinical training is an indispensable element of medical education, providing students with crucial hands-on experience in real healthcare settings]1]. The quality and context of clinical training can greatly influence the competence and preparedness of future medical professionals[2]. A breakdown in civic activity during violent insecurity can lead to the delay, reduction or cessation of education and training programs in medicine [3]. Such disruptions affect not only those currently studying but also those on the brink of graduation or already in practice [4[.

Given the often significant health needs of conflict-affected populations, a failure to continue training and graduation of medical students in-country represents a double hit: a stagnation or reduction in national medical workforce capacity due to the reduced availability of qualified doctors, who are fluent in regional languages and sensitive to cultural norms; and an economic loss due to the sums of (often public) money invested in their training which have not resulted in medically qualified doctors ready to practice [5] .

In high-income countries, medical students often benefit from advanced medical technologies and well-

resourced training facilities. Conversely, in low and middle-income countries, clinical training is often constrained by limited resources and differing disease burdens. Studies have shown that clinical training quality directly affects the competency and readiness of medical graduates to handle real-world medical challenges 6,7[. This disparity is further exacerbated in conflict-affected regions, where the education system is under immense strain. For instance, in Ukraine, the ongoing war has caused significant disruptions to medical education. Both students and faculty have faced restrictions and changes to their work and study environments, leading to increased workloads, mental stress, and financial difficulties. The quality of healthcare education has been severely threatened, with schools, faculty, and students struggling to maintain standards amidst these challenges. Themes such as disruption of teaching, international cooperation, and concerns over the future of medical professionals have emerged, highlighting the profound impact of conflict on medical education 8[.

In the African context, medical schools face unique challenges, including high patient loads, limited resources, and varying degrees of political stability 9[. These challenges are particularly evident in countries like Sudan, where the ongoing civil war has severely impacted both the healthcare system and educational infrastructure. A descriptive cross-sectional study conducted across medical schools in Khartoum, Darfur, and Kordofan. During a three-month period of intense conflict, many medical schools within these zones were subjected to attacks, highlighting the vulnerability of educational institutions during times of war. This situation underscores the urgent need for intervention from the Ministry of Higher Education to provide leadership, support, and oversight to ensure the continuity of the educational process in medical schools across the country 10[.

Private medical schools, which formed a significant portion of the study, were frequently targeted during the conflict, with several being repurposed as military bases or subjected to looting. Despite these severe disruptions, many of the affected schools demonstrated resilience by restoring the educational process through online learning and collaboration with other institutions. This adaptation illustrates the determination of these institutions to continue providing education under challenging circumstances, although the overall quality and stability of medical education in conflict zones remain gravely threatened 11[.

1.2. PROBLEM STATEMENT:

Clinical training is critical for developing medical students' practical skills and competencies. The civil war in Sudan has disrupted the healthcare and educational systems, forcing institutions like UMST to relocate their clinical training programs to Tanzania and Rwanda. In this context, the problem statement arises

from that this displacement has introduced new challenges and contexts for medical students, yet there is limited research on the effects of this relocation. This research addresses the perceived variations in the quality and scope of clinical training experienced by UMST medical students in Sudan, before the war, and Tanzania (Batch 25), and Rwanda (Batch 26) after the war. It investigates differences in training quality, the impact of war and relocation on clinical skills, knowledge, and attitude, challenges and benefits of each training environment, and variations in attendance, language barriers, doctors and students' interactions, training methods, schedule, and student well-being. It also compares the pre-war clinical training in Sudan with the post-war training experiences in Tanzania and Rwanda which is essential to identify the pros and cons of each environment

1.3. JUSTIFICATION:

This study is crucial as it addresses the significant gap in the literature on the effects of conflict-induced relocations on medical education. The findings, while directly applicable to UMST, have broader implications for other medical institutions facing similar challenges globally. This research is justified by the urgent need to adapt and improve clinical training programs amidst major disruptions, filling existing knowledge gaps, and enhancing the quality and consistency of medical education worldwide. The results will offer valuable insights for educational institutions, policymakers, and the broader medical community, ensuring that future healthcare professionals are well-equipped to meet their professional demands.

1.4. RESEARCH QUESTION:

What are the perceived differences in the quality and scope of clinical training among Batch 25 and Batch 26 UMST medical students between their pre-war training in Sudan and post-war training in Tanzania and Rwanda?

1.5. RESEARCH HYPOTHESES:

1.5.1 Null hypothesis (H0): There is no significant difference in the perceived quality of clinical training by Batch 25 and Batch 26 medical students of UMST between their pre-war training in Sudan and their post-war training in Tanzania and Rwanda.

1.5.2 Alternative hypothesis (HA): There is a significant difference in the perceived quality of clinical training by Batch 25 and Batch 26 medical students of UMST between their pre-war training in Sudan and their post-war training in Tanzania and Rwanda.

1.6. OBJECTIVES:
1.6.1. General Objective:

To assess and compare the perceived variations in clinical training among Batch 25 and Batch 26 medical students of UMST who received their training in Sudan before the war, and in Tanzania and Rwanda after the war.

1.6.2. Specific Objectives:
1.   To compare the clinical training variables between Sudan before the war and Tanzania and Rwanda after the war, as perceived by Batch 25 and Batch 26 medical students of UMST.
2.   To compare the perceived quality and scope of clinical training received by Batch 25 and Batch 26 across Sudan, Tanzania, and Rwanda.

3.   To identify specific challenges and benefits of clinical training in Rwanda and Tanzania as perceived by Batch 25 and Batch 26 medical students.
4.   To assess and compare the overall well-being of Batch 25 and Batch 26 medical students during their clinical training in Sudan, Tanzania and Rwanda.
5.   To compare the influence of independent variables (age, gender, batch and country of post-war clinical training) on the perceived quality of clinical training.

RESULTS AND OBSERVATIONS:
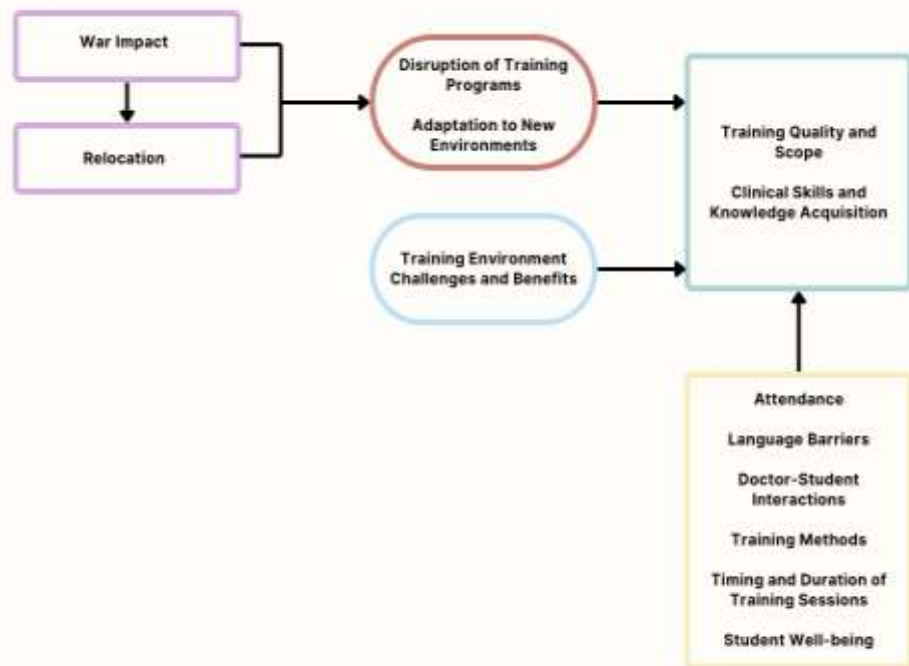
CONCEPTUAL FRAMEWORK

Figure 1: Conceptual framework

The **War Impact**, which represents the direct effect of the civil war in Sudan influences moving the clinical training programs to Tanzania and Rwanda (**Relocation**), this leads to a new set of challenges and opportunities. These factors collectively impact the **Training Quality and Scope** across different geopolitical contexts (Pre-war Sudan, Post-war Tanzania, and Post-war Rwanda) and the **Clinical Skills and Knowledge Acquisition** which evaluates outcomes of clinical training in terms of practical skills, theoretical knowledge, and overall competence. **Training Environment Challenges and Benefits** act as moderators, influencing how well students adapt to new training contexts and how effectively training is delivered and received. **Disruption of Training Programs** and students' ability of **Adaptation to New Environments** post-relocation are mediators explaining the pathways through which the war impact and relocation influence the training quality and student outcomes. Variables like **Attendance**, **Language** **Barriers**, **Doctor-Student Interactions**, **Training Methods**, **Timing and Duration of Training Sessions**, and mental health of students during their training and overall **Student Well-being** help isolate specific influences on the dependent variables (Training quality and scope and Clinical skills and knowledge). This conceptual framework aligns closely with the research objectives and questions by exhibiting relations between key variables such as training quality, skills acquisition, and the impact of geopolitical disruptions.

LITERATURE REVIEW
Wars profoundly impact higher education in conflict zones. Displacement of medical students due to war results in significant psychological distress, with emotions like anger, anxiety, hopelessness, and hope being prevalent, especially among females and students geographically close to conflict regions. The long-term effects on education and cultural integration highlighting the need for evidence-based policies and

comprehensive support systems for affected students and faculties [**Error! Reference source not found.Error! Reference source not found.Error! Reference source not found.**].

A survey conducted in Ukraine by Anja *et al.* in 2022, analyzed 239 responses from students, faculty, and staff of medical schools, using a mixed-methods approach. The study revealed significant disruptions due to war. Disruption of teaching, increased workload, mental stress, financial restrictions, non-war related needs, international cooperation, quality of education, and prospects of future professionals are the eight themes identified from the thematic analysis of the survey and interviews. 86% of faculty and staff, 69% of students had experienced restrictions or changes to their work or study due to the war **Error! Reference source not found.**].

Similarly, a cross-sectional study conducted in 2015, by Barnett-Vanes *et al.* of Iraqi medical students and institutions, through an electronic survey, found that ongoing conflict severely impaired educational attainment and training quality, with many students intending to leave the country after graduation. Five out of eight medical schools reported medical student educational attainment being impaired or significantly impaired; 4 felt the quality of training medical schools could offer had been impaired or significantly impaired due to conflict. A total of 197 medical students responded, 62% of who felt their safety had been threatened due to violent insecurity **Error! Reference source not found.**]. In another paper, Barnett-Vanes had also discussed how limited evidence base hinders informed decision-making in medical education **Error! Reference source not found.**].

A pre-post comparative intervention study conducted in 2021, in Germany, at the Medical Faculty of the University of Heidelberg aimed to investigate the effects of training communication skills during the performance of procedural skills (taking blood samples from a silicone model), before and after the communication skills training in international and local students. 50 medical students registered for the study, 15 of them international and 35 local students. The results showed that international medical students did not perform as well as their local counterparts in the pre- and post-examinations. Both groups improved their performance significantly, whereby the international students improved more than their local counterparts in terms of their communication performance, assessed via binary checklist **Error! Reference source not found.**].

Likewise, in 2020, a cross-sectional study conducted to investigate the opinions of China-educated international medical students (IMSs) towards the medical curriculum and the impact of Chinese language capability on their clinical studies. A self-administered questionnaire was circulated to the final-year IMSs during graduation time from May to July 2019 in four universities in China. Results revealed that out of 209 valid responses, of which 76.1% were satisfied with the quality of medical education, 71.3% believed they had acquired sufficient clinical skills to begin a residency program. And it also showed that Chinese speaking skills and communication initiatives were found to be critical factors in influencing students' clinical experiences and competence. Collectively, these results indicate that the curriculum for IMSs in China should be more problem-based and community-engaged to improve IMSs' learning experiences and preparation for community deployment **Error! Reference source not found.**]·

In their cross-sectional study, in 2023, Alfakhry *et al.* examined the current state of medical education in Syria using the Dundee Ready Educational Environment Measure (DREEM) inventory. A total of 1774 students completed the DREEM form. The findings reveal significant shortcomings in the learning environment, particularly in areas such as learning, atmosphere, academic self-perception, and social self-perception. These deficiencies are more pronounced among clinical-stage students compared to their pre-clinical counterparts (P ≤ 0.001). The study concludes that if these issues are not addressed, the competence of the healthcare workforce will continue to deteriorate, potentially leading to an exodus of medical students from Syria due to the negative learning environment **Error! Reference source not found.**].

In 2022 Ali *et al.* conducted a qualitative case study in Saudi Arabia. 22 medical students from 5 different nationalities participated, they attended four focus group discussions, following a brief regarding the concept of the challenges that language barriers pose. It found that non-native medical students perceived language barriers as obstacles to meaningful clinical experiences. They identified implications for clinical learning environment, professionalism, empathy, and patient care **Error! Reference source not found.**].

At a cross-sectional study from Syria, conducted in 2017, Al Saadi *et al* investigated the psychological impact of conflict on medical students. Through an anonymous online questionnaire using the Depression, Anxiety and Stress Scale (DASS-21), in addition to other questions. 350 students were included. Prevalence of depression, anxiety and stress was 60.6%, 35.1%, and 52.6%, respectively. Depression and anxiety were more likely in females and those with "intermediate" or "insufficient" personal income. Stress was lower in fifth-year compared to second-year students. The study revealed that a significant proportion of students experienced severe psychological distress, with common symptoms including anxiety, depression, and

PTSD (post-traumatic stress disorder). This distress was primarily attributed to the ongoing conflict, which disrupted their educational environment and created uncertainty about their future careers. The study also highlighted that the psychological burden was exacerbated by inadequate support systems and the lack of mental health resources [**Error! Reference source not found.**].

In local context, Esra *et al*. conducted a descriptive cross-sectional study across 58 medical schools in Sudan during a period of conflict revealed that more than half of the schools were attacked, yet many managed to restore educational processes through online learning and collaboration with other institutions. They collected data on attacks between April 15, 2023, and July 15th 2023, using online data collection form. The results of the study showed that 58.6% of these medical schools were attacked. Private schools were the most frequently attacked since it constituting the majority of the study sample. Looting occurred in 73.5% of the attacked faculties, while 67.6% of them were converted into military bases. Despite these challenges, 60.3% of the schools in the conflict zone managed to restore the educational process through online learning and collaboration with other institutions. This descriptive study on attacks against medical schools in Sudan underscores the vulnerability of educational institutions in conflict zones **Error! Reference source not found.**].

STUDY DESIGN
It was a comparative cross-sectional study.
STUDY AREA
This study was conducted at the University of Medical Sciences and Technology (UMST), Faculty of Medicine, originally located in Khartoum, Sudan, and later dispersed across countries like Tanzania and Rwanda. Given the geographic distribution of the participants, the study was carried out online. The UMST began as a private, non-profit making educational Academy, in Khartoum, Sudan in 1996. UMST was established by Professor Mamoun Homeida as a medicine faculty it then expanded to 14 undergraduate faculties, namely, Medicine, Dentistry, Pharmacy, Medical Laboratory Sciences, Radiological Sciences, Anaesthesia, Nursing Technology, Engineering, Computer Science and Information Technology, Business Administration, Economics Social and Environmental Studies, Mass Communication, and Law. It also has a School of Nursing Technology and offers 14 Master's degree programs, four PhD programs and four postgraduate diplomas. It became a full university in 2007. [25-27]

STUDY POPULATION
The study population included medical students from Batch 25 (who received post-war training in Tanzania) and Batch 26 (who received post-war training in Rwanda) of UMST.

Inclusion Criteria:
Those included were medical students from UMST who were enrolled in Batch 25 and Batch 26 and had received pre-war training in Sudan as well as post-war training in Tanzania or Rwanda.
Exclusion Criteria:
Those excluded were students who were not enrolled in Batch 25 or Batch 26 of UMST and those who had not received pre-war training in Sudan and post-war training in Tanzania or Rwanda.

SAMPLING
Sampling Technique:
Simple random sampling technique was used. First, the sample size was calculated from the total number of Batch 25 and Batch 26 students (using the equation below). Then, the participants for each batch were calculated according to the weight of the batch. The total number of students in each batch was divided by the total number of students in both batches, and this ratio was multiplied by the total sample size. For each batch a simple random sampling technique was employed to select participant. A list from the administration containing the students' names and the assigned numbers was used. A random number generator was employed to pick the calculated number of students one by one.

Sample Size:
The total number of medical students from Batch 25 and Batch 26 is 384, with 218 students in Batch 25 and 166 students in Batch 26.
The sample size (195 students, 111 from batch 25, and 84 from batch 26) was calculated using the equation of known population number.
The equation of known population number used is as follows:

$$n = N/(1 + N * e2)$$

N = 218 + 166 = 384
N x e square = 384 x 0.0025 = 0.96
n = 384/1+0.96 = 384/1.96 = 196
Ratio from batch 25 from sample size = 218/384 x 196 = 111
Ratio from batch 26 from sample size = 166/384 x 196 = 84

Where :

- n= the size of the sample

Which is the total number of students participating in this study= 195

- N= the size of the population

Which is the total number of students enrolled in batch 25 and batch 26 in the faculty of medicine at the university of medical sciences and technology = 384

- e=is the margin of error which is equal to 0.05 or 5 %

Data collection tools:

The data was collected through a structured questionnaire designed to capture information on the perceived quality of clinical training, challenges faced, and overall educational experiences (see appendices). The questionnaire was meticulously developed based on a comprehensive literature review, ensuring it was refined and aligned with the research objectives. It included relevant independent variables such as the impact of war, training relocation (pre-war in Sudan, post-war in Tanzania, post-war in Rwanda), students' gender, age, and batch. The dependent variables encompassed the perceived quality of clinical training, clinical skills acquisition, and challenges faced, including overall well-being, attendance, language barriers, interactions with doctors, training methods, and timing. This process was conducted under the supervision of my doctors. The survey was distributed online via a secure platform, and participants were invited to complete it within a designated time frame.

DATA MANAGEMENT AND ANALYSIS
3.6.1 Data Management

Data was collected through a questionnaire shared online via a Google Form. WhatsApp phone numbers for the coordinators of each batch (25 and 26) were obtained. The Google Form was then sent to the coordinators via WhatsApp, who forwarded it to their respective batch groups. An individual from each batch was assigned to ensure that the students from their batch complied with answering the questionnaire.

Data was stored securely with passwords and was regularly backed up to prevent data loss. Access to the data was restricted to authorized personnel. It was stored in electronic formats to facilitate analysis. After the project's completion, the data was archived in an institutional data server.

3.6.2 Data Analysis

The collected questionnaire responses were copied into an Excel spreadsheet. The data was then cleaned by deleting responses with missing information. Data was entered and managed using computer software, and it was analyzed using SPSS (Statistical Package for the Social Sciences), version 26. Frequencies, percentages, means, and standard deviations were used to summarize the data. Comparative analyses were conducted using t-tests, chi-square tests, and ANOVA to identify significant differences between the groups. Impact assessments were performed through regression analysis, and qualitative responses were thematically analyzed. The data was then presented using tables and pie charts.

ETHICAL CONSIDERATIONS

1- Ethical clearance was obtained from the University of Medical Sciences and Technology (UMST) Ethics Committee (see appendices).

2- Informed consent was obtained from all participants before they participated in the online questionnaire. The consent form explained the study's purpose and procedures, assured participants of their confidentiality, and emphasized the voluntary nature of their participation. Participant data was protected by maintaining strict confidentiality and data security measures, including ensuring that data was anonymous or pseudonymous to prevent identification.

RESULT

The study analyzed responses from an online questionnaire sent to all members of Batch 25 and Batch 26 medical students at UMST. Of those reached, 211 consented to participate, 15 declined, and the remaining did not respond.
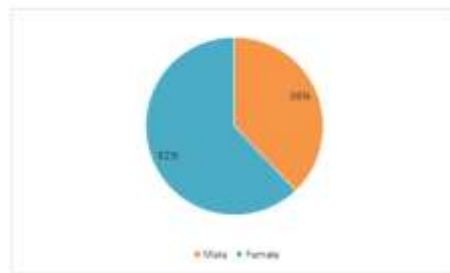
The Sociodemographic Data:

*Figure 2: **Gender distribution***
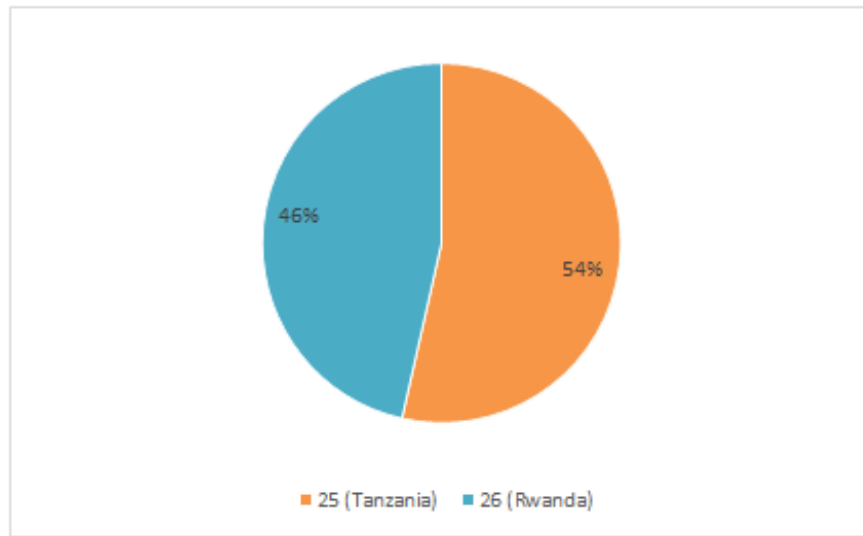
*Figure 3: **Batches and country of post war training***

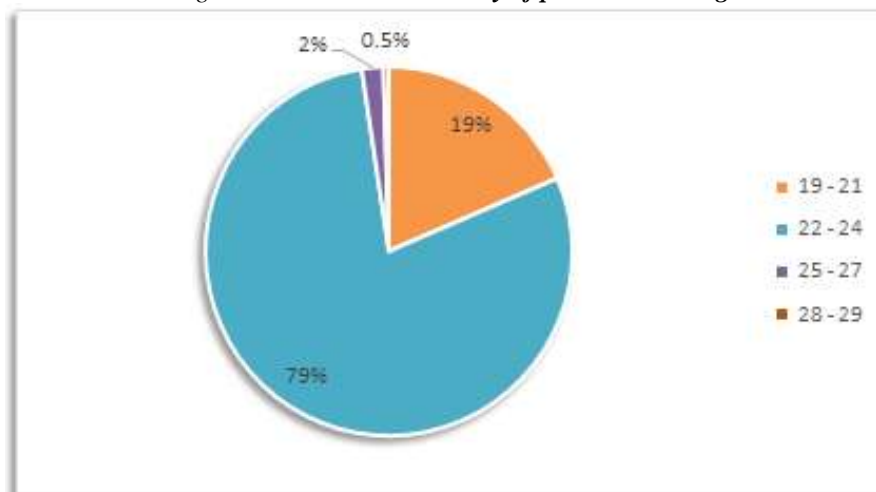*Figure 4: **Age distribution***

Summary:

Regarding gender, there were 131 females (62.1%) and 80 males (37%). **Regarding age**, 39 students (18.5%) were aged 19-21, 167 students (79.1%) were aged 22-24, which was the largest age group, and 4 students (1.9%) were aged 25-27. **Regarding the batch and country of post-war training,** 54% were from Batch 25, who completed their clinical

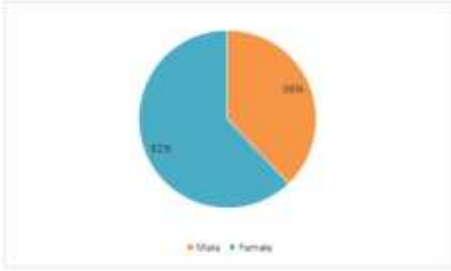training in Tanzania, while 46% were from Batch 26, who trained in Rwanda (

Figure 2**, Figure 3, Figure 4).**

The Data on Variations in Clinical Rotation Hospitals in Sudan, Tanzania, and Rwanda:

Figure 5: **Number of clinical rotation hospitals in Sudan**
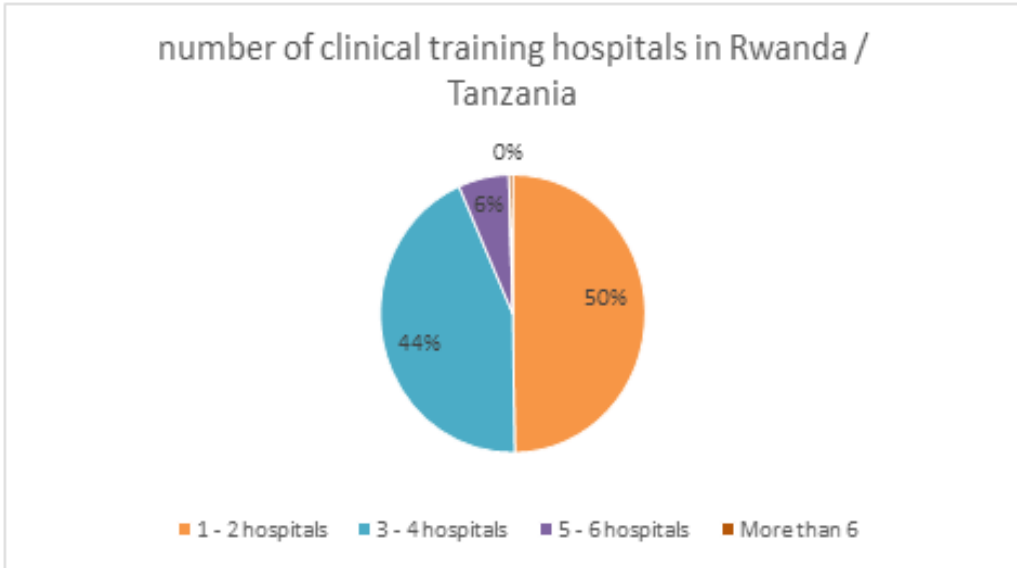
Figure 6: **Number of clinical rotation hospitals in Rwanda and Tanzania**

SUMMARY

In Sudan, the majority of students rotated through 4-6 hospitals (45%) or 7-9 hospitals (32%). A smaller percentage of students rotated through 1-3 hospitals (9%), 10-14 hospitals (9%), and more than 15 hospitals (5%) (**Figure 5).** In contrast, in Tanzania and Rwanda, most students rotated through fewer hospitals, with 50% rotating through 1-2 hospitals, 44% through 3-4 hospitals, and the remaining 6% through 5-6 hospitals (**Figure 6**).

When students asked to identify the best hospitals for clinical rotations, in Sudan, students frequently cited Military Hospital, Bahri Hospital, Gaafar Ibn Ouf Hospital, Khartoum Hospital, and Bashair University Hospital. In Rwanda, the

most frequently mentioned hospitals were Rwanda Military Hospital, University Teaching Hospital of Kigali, and King Faisal Hospital, while in Tanzania, Muhimbili Hospital and Temeke Hospital were the most commonly mentioned.

The data on the relationship between the country of post-war training and various clinical skills:

Table 1: **Better skill practice in different settings (Sudan /Tanzania /Rwanda)**

Better opportunities to practice following skills		Batch and post-war training country		P value	Chi square
		25 Tanzania	26 Rwanda		
		Count (N %)	Count (N %)		
Taking thorough history	Sudan	92 (81.4%)	96 (98.0%)	.001	14.790
	Tanzania/ Rwanda	10 (8.8%)	1 (1.0%)		
	The same in both	11 (9.7%)	1 (1.0%)		
	I didn't have the opportunity	0 (0.0%)	0 (0.0%)		
writing SOAP notes	Sudan	65 (57.5%)	10 (10.2%)	.000	70.426
	Tanzania/ Rwanda	35 (31.0%)	86 (87.8%)		
	The same in both	12 (10.6%)	1 (1.0%)		
	I didn't have the opportunity	1 (0.9%)	1 (1.0%)		
Performing thorough clinical examination	Sudan	74 (65.5%)	77 (78.6%)	.129	5.673
	Tanzania/ Rwanda	27 (23.9%)	14 (14.3%)		
	The same in both	10 (8.8%)	7 (7.1%)		
	I didn't have the opportunity	2 (1.8%)	0 (0.0%)		
lab and radiological results interpretation	Sudan	45 (39.8%)	20 (20.4%)	.003	14.111
	Tanzania/ Rwanda	56 (49.6%)	73 (74.5%)		
	The same in both	11 (9.7%)	5 (5.1%)		
	I didn't have the opportunity	1 (0.9%)	0 (0.0%)		

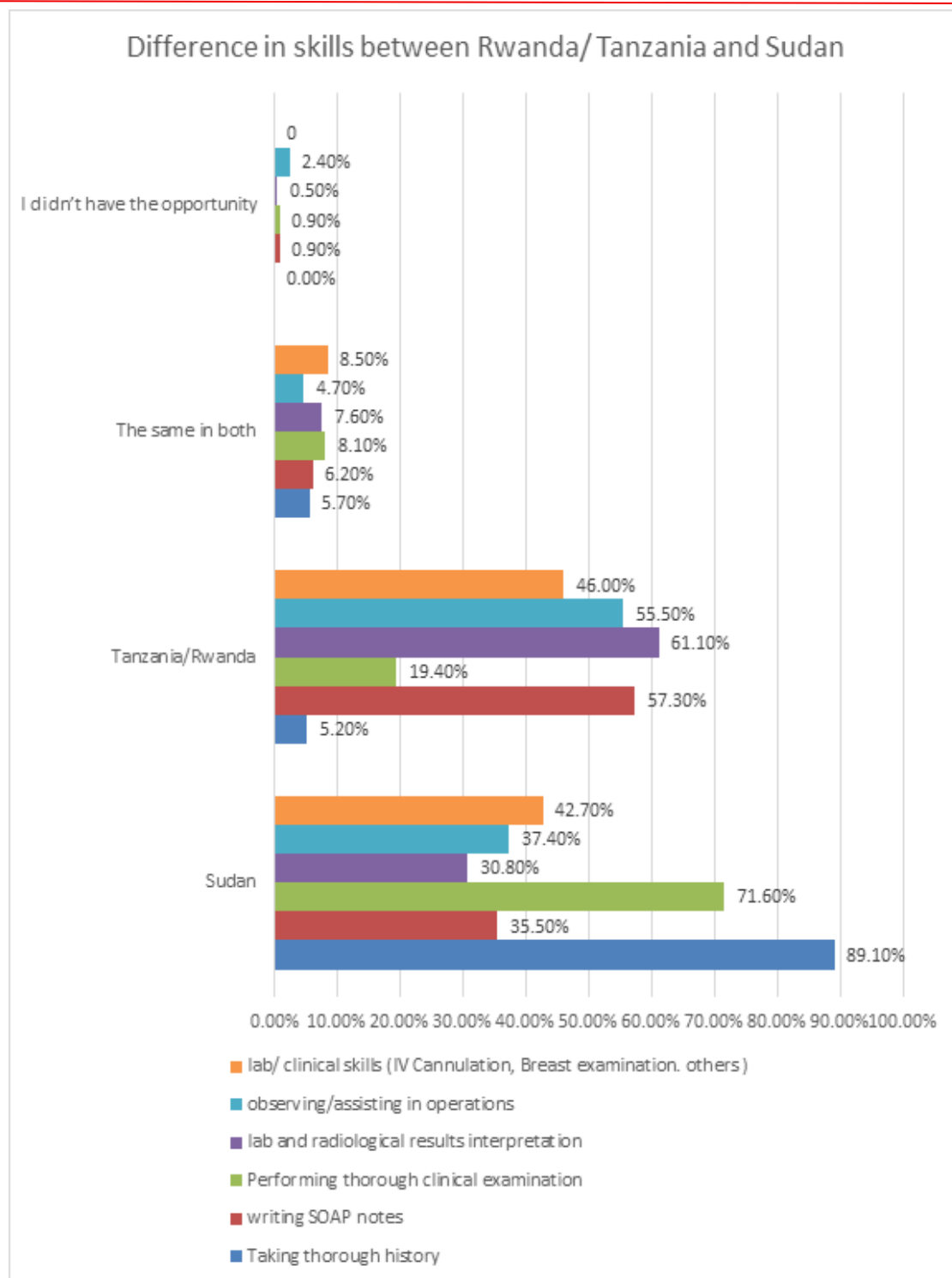|					
observing/assisting in operations	Sudan	37 (32.7%)	42 (42.9%)	.357	3.236
	Tanzania/ Rwanda	69 (61.1%)	48 (49.0%)		
	The same in both	5 (4.4%)	5 (5.1%)		
	I didn't have the opportunity	2 (1.8%)	3 (3.1%)		
lab/ clinical skills (IV Cannulation, Breast examination... others)	Sudan	36 (31.9%)	54 (55.1%)	.001	17.514
	Tanzania/ Rwanda	63 (55.8%)	34 (34.7%)		
	The same in both	13 (11.5%)	5 (5.1%)		
	I didn't have the opportunity	1 (0.9%)	5 (5.1%)		

Figure 7: **Better skill practice in different settings**

Summary:

Table 1Error! Reference source not found. shows significant differences in opportunities to engage in fundamental clinical practices. There was a strong relationship between the country of post-war training and various clinical skills, such as taking good history, writing SOAP notes, lab and clinical skills, and interpreting lab and radiological results (P = 0.005) . **Regarding history-taking,** Respondents from Batch 25 who trained in Tanzania reported a more favorable experience (8.8%) compared to those from Batch 26 who trained in Rwanda (1%). However, the majority from both batches indicated a better experience with the training conducted in Sudan, with 81.4% from Batch 25 and 91% from Batch 26 favoring it. **For writing SOAP notes**, 87.8% of Batch 26 preferred the training conducted in Rwanda over that in Sudan, which only 10% favored. Conversely, 57.5% of Batch 25 found the training in Sudan to be better, while 31% preferred the training in Tanzania. Only 10.6% of Batch 25 viewed the training experiences in both locations as equivalent. **For lab and clinical skills,** 55.8% of Batch 25 reported better experiences in Tanzania compared to Sudan,

while 55.1% of Batch 26 had better experiences in Sudan. **Overall,** the ability to take comprehensive patient histories and conduct clinical examinations was notably higher in Sudan, with rates of 89.1% and 71.6% respectively, compared to Tanzania and Rwanda. In contrast, the ability to write a SOAP note and to assist or observe in operations was higher in Tanzania and Rwanda, with rates of 57.4% and 55.5%, respectively, compared to Sudan, as shown in

Figure 7.

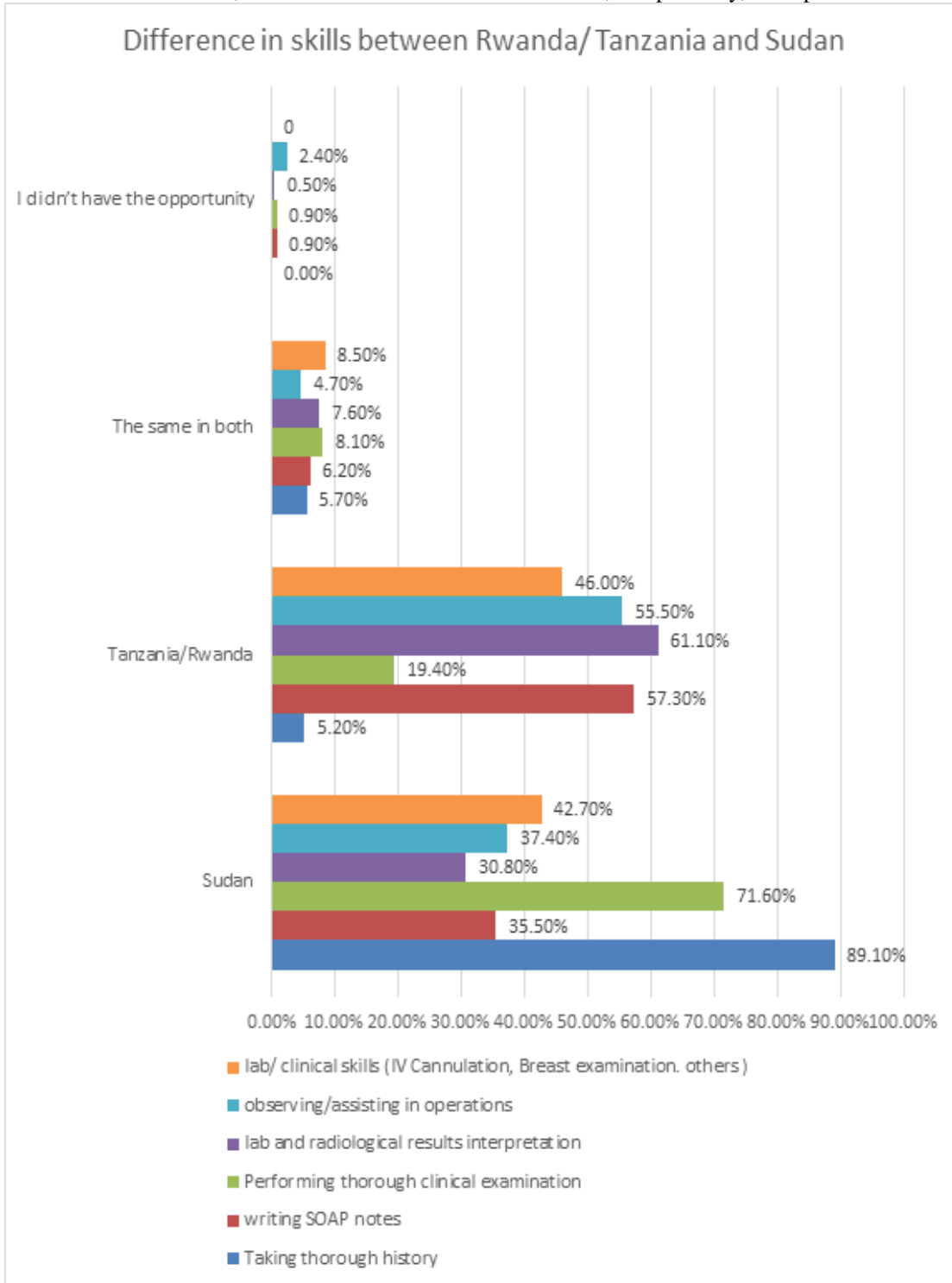**The data on students' first exposure to practice specific clinical skills Across Sudan, Tanzania, and Rwanda:**

Table 2: **Opportunity to practice lab/clinical skills**

First opportunity to practice the following lab or clinical skills		Count (N %)
IV cannula	Sudan	118 (55.9%)

	Tanzania/Rwanda	60 (28.4%)
	I didn't have the opportunity in either	33 (15.6%)
Taking blood sample / IV infusion	Sudan	109 (51.7%)
	Tanzania/Rwanda	62 (29.4%)
	I didn't have the opportunity in either	40 (19.0%)
Vital signs measuring (BP, temperature, pulse, SPO2)	Sudan	90 (42.7%)
	Tanzania/Rwanda	113 (53.6%)
	I didn't have the opportunity in either	8 (3.8%)
Suturing	Sudan	82 (38.9%)
	Tanzania/Rwanda	104 (49.3%)
	I didn't have the opportunity in either	25 (11.8%)
Chest tube insertion	Sudan	41 (19.4%)
	Tanzania/Rwanda	63 (29.9%)
	I didn't have the opportunity in either	107 (50.7%)
Plaster of Paris placement	Sudan	33 (15.6%)
	Tanzania/Rwanda	61 (28.9%)
	I didn't have the opportunity in either	117 (55.5%)
Urinary catheterization	Sudan	47 (22.3%)
	Tanzania/Rwanda	97 (46.0%)
	I didn't have the opportunity in either	67 (31.8%)
Breast examination	Sudan	103 (48.8%)
	Tanzania/Rwanda	76 (36.0%)
	I didn't have the opportunity in either	32 (15.2%)
Rectal and vaginal examination	Sudan	39 (18.5%)
	Tanzania/Rwanda	104 (49.3%)
	I didn't have the opportunity in either	68 (32.2%)
PAP smear	Sudan	32 (15.2%)
	Tanzania/Rwanda	65 (30.8%)
	I didn't have the opportunity in either	114 (54.0%)
ECG interpretation	Sudan	95 (45.0%)
	Tanzania/Rwanda	92 (43.6%)
	I didn't have the opportunity in either	24 (11.4%)
Lab results interpretation (CBC, RFT ... etc.)	Sudan	95 (45.0%)
	Tanzania/Rwanda	106 (50.2%)
	I didn't have the opportunity in either	10 (4.7%)
Otoscopy	Sudan	118 (55.9%)
	Tanzania/Rwanda	60 (28.4%)
	I didn't have the opportunity in either	33 (15.6%)
Ophthalmoscopy	Sudan	120 (56.9%)
	Tanzania/Rwanda	63 (29.9%)
	I didn't have the opportunity in either	28 (13.3%)

Summary:

Table 2 demonstrates the students' first opportunity to practice specific clinical skills. 55.9% of students first practiced IV cannulation in Sudan compared to 28.4% in Tanzania and Rwanda. Similarly, taking blood samples and IV infusion were first practiced in Sudan by 51.7% of students compared to 29.4% in Tanzania and Rwanda. In contrast, skills like suturing and urinary catheterization were more commonly first practiced in Tanzania and Rwanda, with 49.3% and 46.0% of students, respectively. In Sudan, these skills were first practiced by 38.9% of students for suturing and 22.3% for urinary catheterization.

The Data Comparing Student Satisfaction and Perceived Quality of Clinical Training in Sudan, Tanzania, and Rwanda:

Table 3: **Satisfaction about training**

| Satisfaction about clinical training		Count (N%)
Level of satisfaction with clinical training in Sudan	Satisfied	103 (48.8%)
	Neutral	43 (20.4%)
	Unsatisfied	65 (30.8%)
Level of satisfaction with clinical training in Tanzania	Satisfied	30 (26.54%)
	Neutral	41 (36.28%)
	Unsatisfied	42 (37.16%)
Level of satisfaction with clinical training in Rwanda	Satisfied	26 (26.53%)
	Neutral	37 (37.75%)
	Unsatisfied	35 (35.71%)
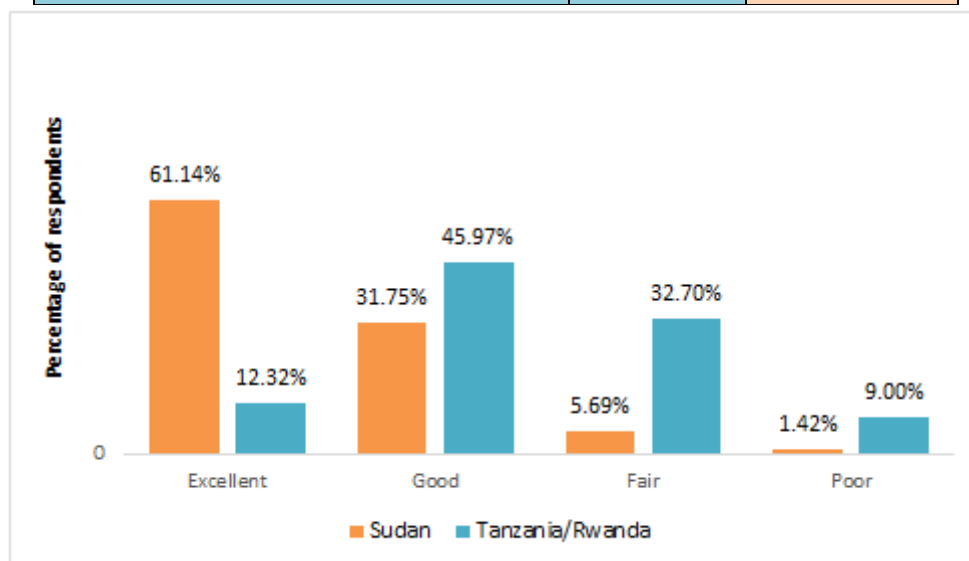
Figure 8: **Quality of medical education provided by doctors (Sudan and Tanzania/Rwanda)**

Summary:

Student satisfaction with their training varied across different locations. In Sudan, nearly half of the respondents (48.8%) reported a high level of satisfaction with their clinical training, while 20.4% were neutral, and 30.8% were unsatisfied. In contrast, satisfaction levels were lower in Tanzania and Rwanda, with 26.54% and 26.53% of respondents, respectively, expressing satisfaction. In Tanzania, 36.3% of respondents were neutral, and 37.2% were unsatisfied, while in Rwanda, 37.8% were neutral, and 35.7% were unsatisfied. Overall, Sudan had the highest level of satisfaction, whereas Tanzania and Rwanda had higher levels of neutrality and dissatisfaction **(Table 3).**

As shown in **Figure 8**, 61.1% of students rated the quality of medical knowledge provided by doctors in Sudan as excellent, while only 12.3% rated it the same in Tanzania and Rwanda. Additionally, 46.0% of students rated the quality of education in Tanzania and Rwanda as good, compared to 31.8% in Sudan. Furthermore, 32.7% of students rated the quality of education in Tanzania and Rwanda as fair, while only 5.7% did so in Sudan. Lastly, 9.0% of students rated the quality as poor in Tanzania and Rwanda, compared to just 1.4% in Sudan.

The Data on Perceived Favoritism and Racism in Clinical Training Across Tanzania and Rwanda
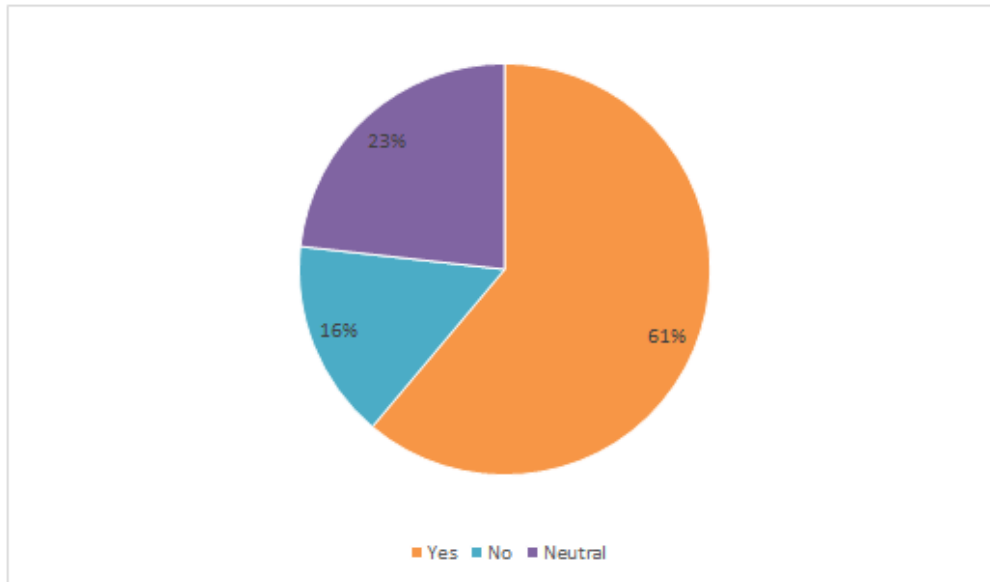

Figure 9: **Experiencing favoritism in Tanzania and Rwanda**
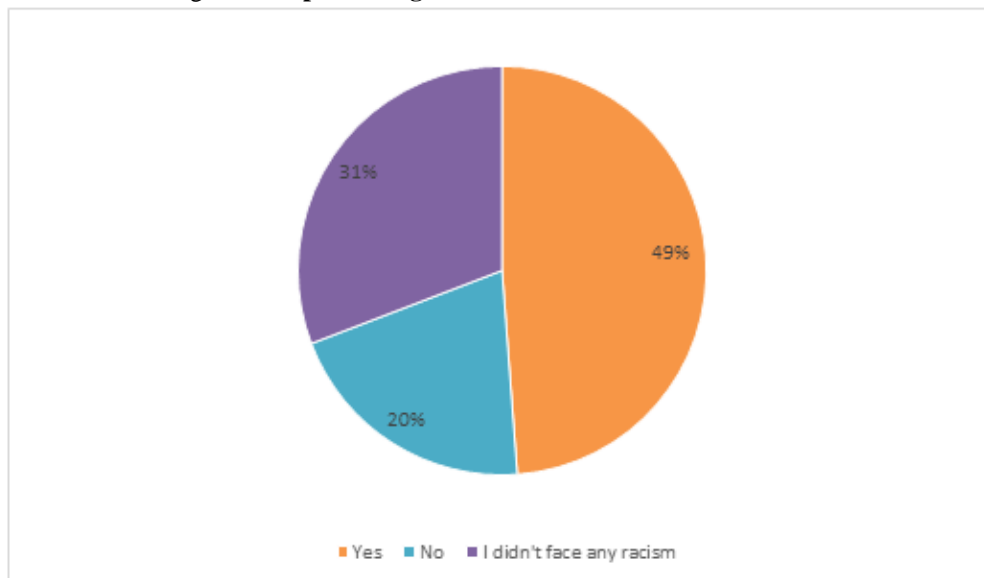
Figure 10: **Racism from staff affect students clinical training**

Summary:

The results presented in **Figure 9** and **Figure 10** highlight the perceived favoritism and racism experienced by medical students during their clinical training in Tanzania and Rwanda. 61.0% of students reported experiencing favoritism from doctors towards local students, while 16.0% did not experience it and 23.0% were neutral. Regarding racism from staff and its impact on clinical training, 49.0% of students reported that racism affected their training, 20.0% experienced racism but felt it had no impact on their training, and 30.8% did not encounter any racist behavior.

The Data Comparing Student Engagement and Communication with Staff Across Sudan, Tanzania, and Rwanda

Figure 11: Communication with staff, interaction with students, competition and team work in Tanzania and Rwanda compared to Sudan
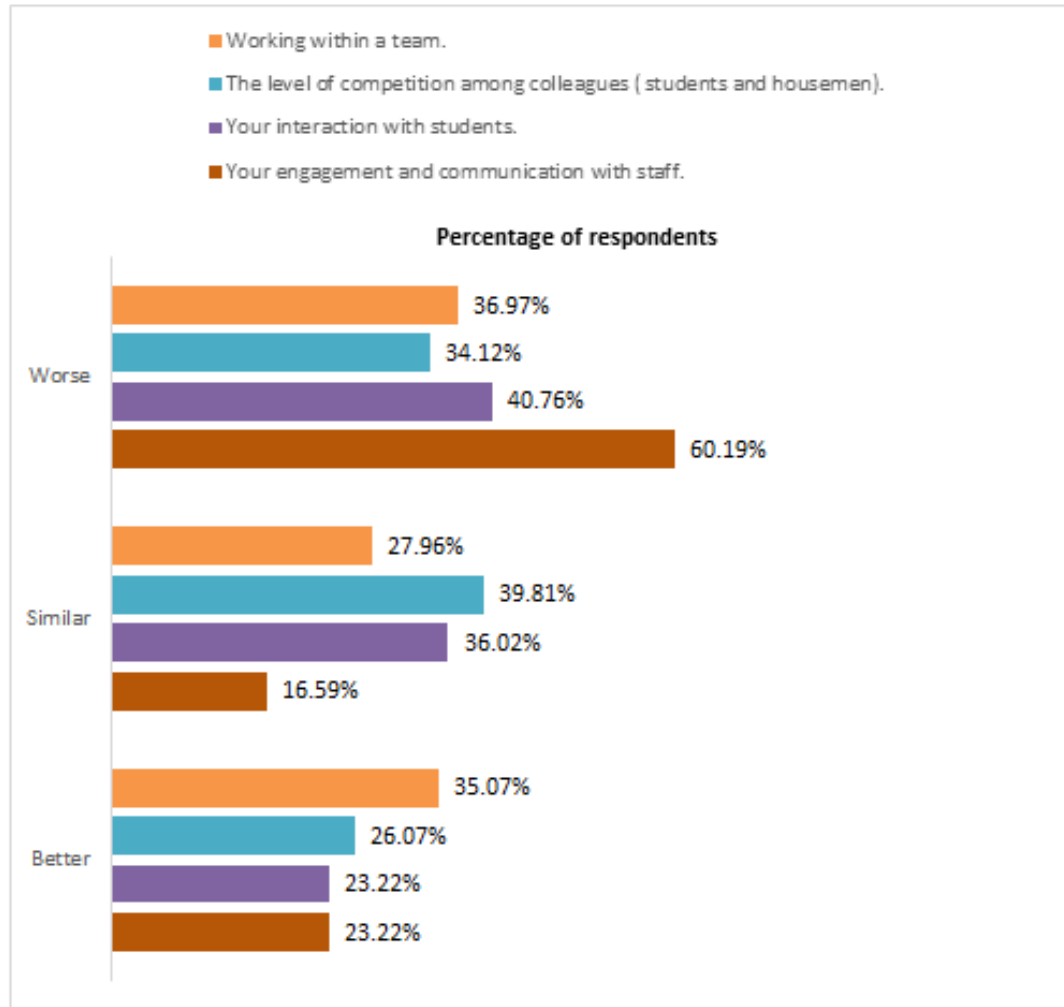
Summary:

Figure 11 illustrates students' perceptions of their engagement and communication with staff, peers, and teamwork in Tanzania and Rwanda compared to Sudan. A majority of students (60.2%) rated their engagement and communication with staff as worse in Tanzania and Rwanda, while only 23.2% found it better, and 16.6% considered it similar to Sudan. Interaction with fellow students was also viewed less favorably, with 40.8% rating it as worse, 36.0% as similar, and 23.2% as better. Regarding competition among colleagues, 39.8% of students perceived it as similar, 34.1% as worse, and 26.0% as better in Tanzania and Rwanda. When it came to working within a team, 37.0% of students perceived it was worse, 35.1% believed it was better, and 28.0% saw no difference compared to their experiences in Sudan.

The Data on the Impact of Language Barriers and Translation Services in Clinical Training Across Tanzania and Rwanda
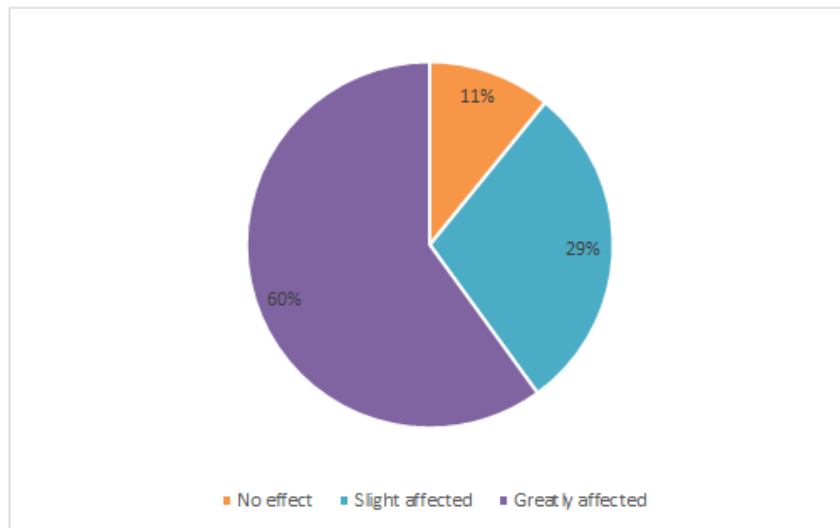
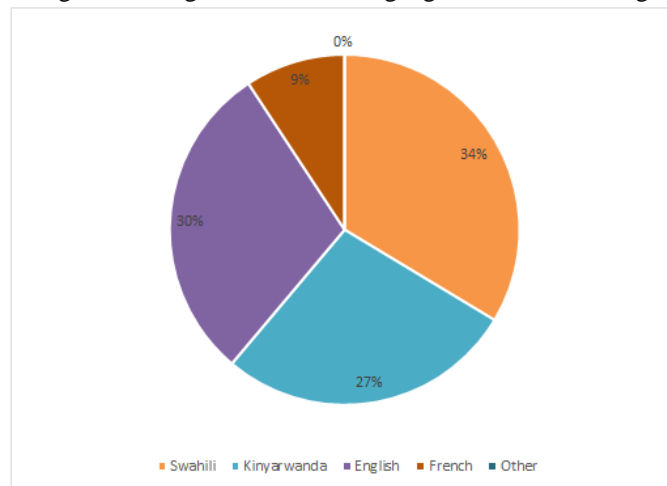Figure 12: Negative effect of language barrier on training

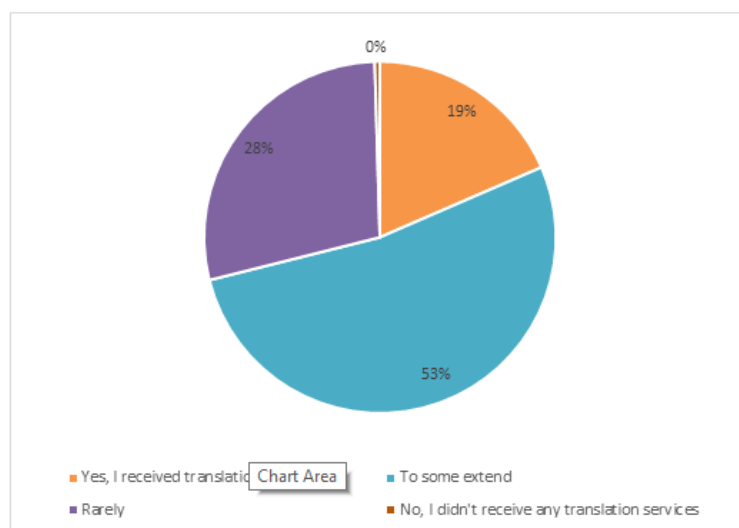Figure 13: **Primary language used in Tanzania and Rwanda**

Figure 14: **Receiving translation services during training**

Summary:

Language barriers were a significant issue, with 60.0% of students reporting a negative impact on their clinical training, 29.0% noting a slight effect, and 11.0% experiencing no effect **(Figure 12).** During their clinical training in Tanzania and Rwanda, 55.0% of students encountered Swahili and 45.0% encountered Kinyarwanda as the primary languages used by patients, while English was used by 30.0% and French by 9.0% (**Figure 13**). Although translation services were provided, they were only somewhat consistent; 52.6% of students received translation assistance to some extent, 18.5% received consistent translation services, and 28.0% rarely received translation (**Figure 14**). When asked about who provided translation services during their clinical training, students were able to select multiple sources. the majority indicated that fellow students from the host countries were the primary providers, with 89.1% reporting assistance from them. Doctors and nurses were also significant sources, with 65.4% and 63.0% of students, respectively, receiving translation help from them. Intern doctors assisted 56.9% of students, and 33.2% relied on patients' family members. Only 1.9% received translation from professional translators.

The Data on Clinical Training Attendance, Benefits and Schedule Changes in Sudan Compared to Tanzania and Rwanda

Table 4: **Clinical rounds attendance and its schedule**

Attending clinical rounds and its schedule		Count (N %)
Feel of obligation to attend rounds even when it didn't seem necessary (Sudan)	Always	87 (41.2%)
	Sometimes	75 (35.5%)
	Rarely	44 (20.9%)
	Never	5 (2.4%)
Feel of obligation to attend rounds even when it didn't seem necessary (Tanzania and Rwanda)	Always	75 (35.5%)
	Sometimes	94 (44.5%)
	Rarely	35 (16.6%)
	Never	7 (3.3%)
To what extent do you think attending rounds was beneficial for your learning and development in Sudan?	Beneficial	196 (92.9%)
	Neutral	12 (5.7%)
	Not beneficial	3 (1.4%)
To what extent do you think attending rounds was beneficial for your learning and development in Tanzania and Rwanda?	Beneficial	120 (56.9%)
	Neutral	44 (20.9%)
	Not beneficial	47 (22.3%)

In your opinion, what was the average number of hours of active training per day in Sudan?	1 hour or less	16 (7.6%)
	2 - 4 hours	151 (71.6%)
	4 - 6 hours	37 (17.5%)
	6 - 8 hours	3 (1.4%)
	8 - 10 hours	4 (1.9%)
In your opinion, what was the average number of hours of actual training per day in Tanzania and Rwanda?	1 hour or less	41 (19.4%)
	2 - 4 hours	87 (41.2%)
	4 - 6 hours	59 (28.0%)
	6 - 8 hours	23 (10.9%)
	8 - 10 hours	1 (0.5%)

Summary:

Table 4 illustrates students' attendance, perceived benefits from clinical rounds and training hours . In Sudan, 41.2% of students felt obligated to attend rounds always to meet attendance requirements, and 35.5% felt this obligation sometimes, despite not finding them necessary. In Tanzania and Rwanda, 35.5% felt this obligation always, and 44.5% felt it sometimes. The perceived benefit of attending rounds was notably higher in Sudan, with 92.9% of students viewing them as beneficial, compared to 56.9% in Tanzania and Rwanda. Regarding the perception of active training hours per day, in Sudan 71.6% of students reported 2-4 hours, 17.5% reported 4-6 hours, and only 7.6% reported 1 hour or less. In contrast, in Tanzania and Rwanda, 41.2% of students perceived 2-4 hours, 28.0% perceived 4-6 hours and 19.4% perceived 1 hour or less.
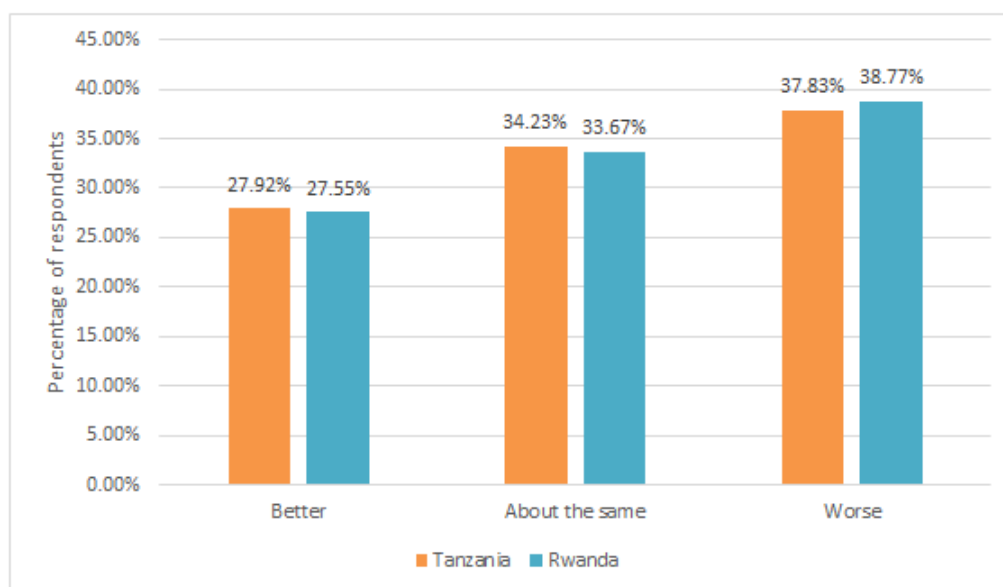
Figure 15: **Attendance policy in Tanzania /Rwanda compared to Sudan**
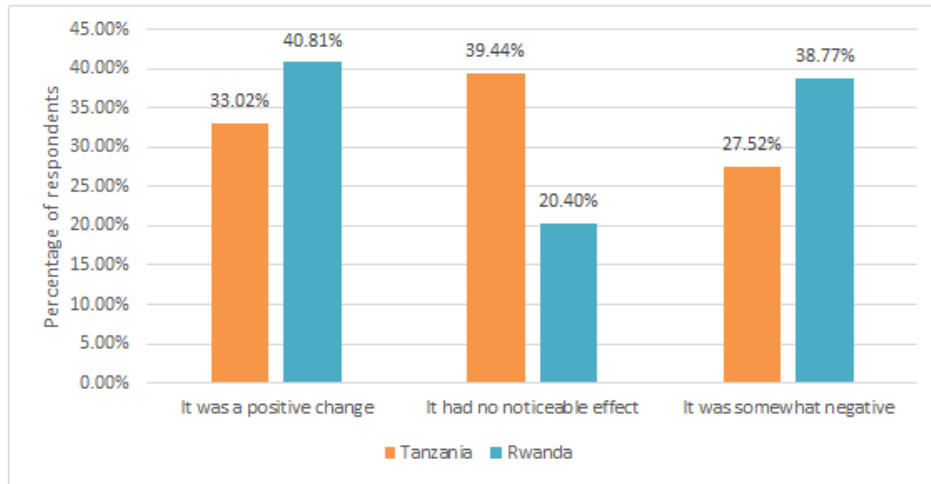
Figure 16: **Effect of variation in schedule on clinical training**

Summary:

The majority of students from both batches rated the attendance policy as worse in Tanzania (37.8%) and Rwanda (38.8%) compared to Sudan, with similar proportions rating it the same in these locations (34.2% in Tanzania and 33.7% in Rwanda). Conversely, some students viewed the policy more positively in Tanzania (27.9%) and Rwanda (27.6%) **(Figure 15)**. Regarding schedule variations, 40.8% of students in Rwanda perceived it as a positive change, while 38.8% saw it as negative, and 20.4% felt it had no effect. In Tanzania, 39.4% of students reported no noticeable effect, 33.0% saw it as positive, and 27.5% considered it negative **(Figure 16)**.
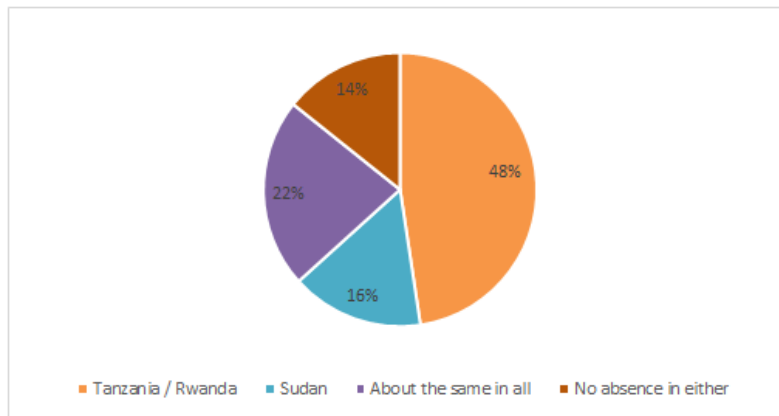
Figure 17: **Absence from rounds in different countries**
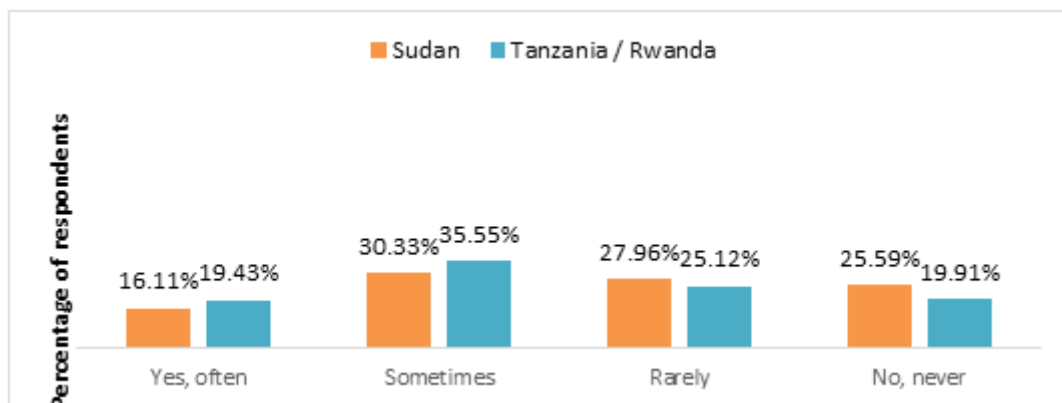
Figure 18: **Negative effect of transportation challenges to the attendance**

Summary:

Figure 17 illustrates that 48% of students skipped rounds more frequently in Tanzania and Rwanda compared to just 16% in Sudan. 22% of students skipped rounds in all locations to the same extent, while 14% did not skip rounds in either setting. When asked about their reasons for absence, students frequently cited unbeneficial rounds, traffic, sickness, the need to study for exams, and lenient attendance policies as common factors across all countries. In Sudan specifically, additional reasons included the hospital's distant location and a general lack of motivation. In Tanzania and Rwanda, racism and discrimination from doctors, language barriers, and inadequate translation were also significant reasons for skipping rounds. The data in Figure 18 reveals that transportation challenges affected attendance at clinical training sessions, both in sudan and in Tanzania and Rwanda. In Sudan, 46.4% of respondents reported that transportation issues were often (16.1%) or sometimes (30.0%), while 53.6% reported being rarely (28%) or never (25.6%) affected. In comparison, in Tanzania and Rwanda, 54.9% of respondents were sometimes (30.3%) or often (19.4%) affected, while 45% were rarely (25.1%) or never (19.9%) affected.

The Data on Ethical Consideration and Attitude Towards Patient Care During Clinical Training in Sudan Compared to Tanzania and Rwanda

Table 5: **Ethical consideration and sympathy towards patients**

Ethical consideration and sympathy towards patients		Count (N%)
In which setting do you feel there is greater emphasis on admiring and loving patient care during training?	More in Sudan	95 (46.3%)
	More in Tanzania / Rwanda	38 (18.5%)
	The same in both	65 (31.7%)
	Not applicable	7 (3.4%)
How did your ethical considerations in patient care and the value placed on human life differ between your experiences in Rwanda / Tanzania and Sudan?	Improved	65 (32.2%)
	No difference	124 (61.4%)
	Decreased	13 (6.5%)

Summary:

Table 5 illustrates the perceptions of ethical considerations and sympathy towards patients during clinical training in Sudan compared to Tanzania and Rwanda. The data shows that 46.3% of students felt there was a greater emphasis on patient care in Sudan, while 18.5% believed this emphasis was stronger in Tanzania and Rwanda. A significant portion of students (31.7%) perceived no difference between the two settings. Regarding ethical considerations and the value placed on human life, 61.4% of students reported no difference between their experiences in both regions. However, 32.2% indicated an improvement in their ethical considerations during their time in Tanzania and Rwanda, while 6.5% felt it had decreased.

The Data Comparing Living Conditions and Overall Well-Being During Clinical Training in Sudan Compared to Tanzania and Rwanda
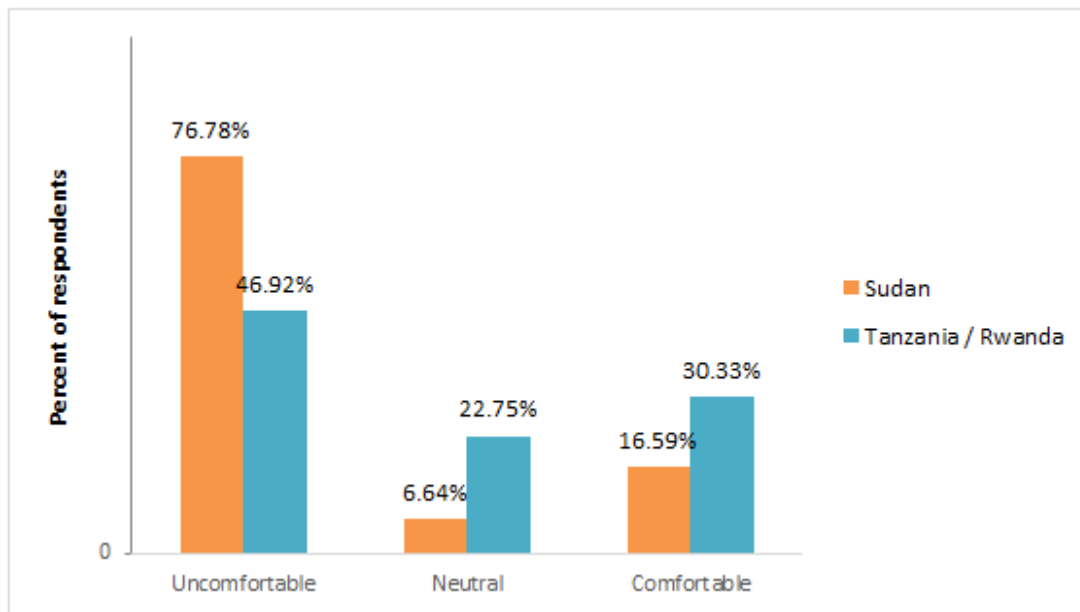
Figure 19: Living conditions during clinical training
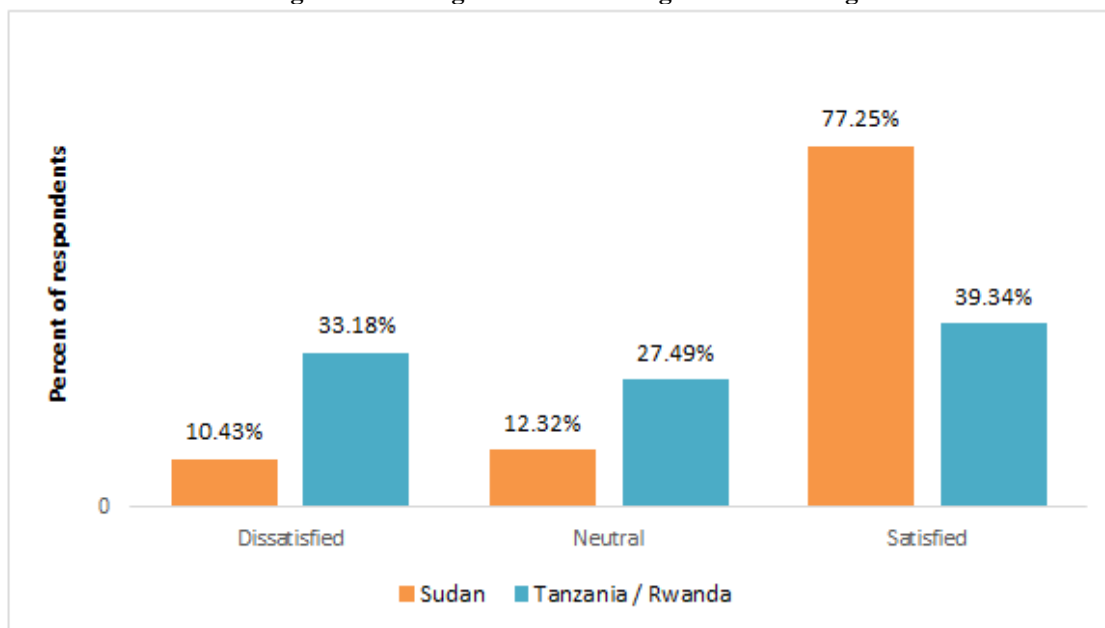
Figure 20: **Satisfaction with well - being during clinical training**

Summary:

The data in **Figure 19** and **Figure 20** compare students' living conditions and overall well-being satisfaction during their clinical training in Sudan versus Tanzania and Rwanda, respectively. In Sudan, although a significant majority (76.8%) reported uncomfortable living conditions, a large proportion (77.3%) were still satisfied with their overall well-being, with only 10.4% expressing dissatisfaction. Conversely, 16.6% found their living conditions comfortable. In Tanzania and Rwanda, 46.9% reported discomfort in living conditions, while 30.3% found them comfortable. Regarding well-being, 39.3% were satisfied, and 33.1% were dissatisfied.

The Association of Country of Post-War Training with various challenges

Table 6: Cross Tabulation of Language Barriers, Schedules, Transportation, and Hospital Absences by Batch and Post-War Training Country

		Batch (post-war clinical training country)			
		25 (Tanzania)	26 (Rwanda)	P value	Chi square
		Count (N %)	Count (N %)		
To what extent did language barrier issues negatively affect your training	No effect	7 (6.2%)	8 (8.2%)	.005	14.674
	Slight effect	19 (16.8%)	16 (16.3%)		
	Greatly affected	87 (77%)	77 (75.5%)		
How did the variation in schedules between different countries affect your clinical training experience?	It was a positive change	36 (33%)	40 (40.8%)	.005	14.722
	It had no noticeable effect	43 (39.4%)	20 (20.4%)		
	It was a negative change	30 (27.5%)	38 (38.8%)		
Did transportation challenges in Tanzania or Rwanda affect your attendance negatively?	Yes, often	12 (10.6%)	29 (29.6%)	.007	12.104
	Sometimes	44 (38.9%)	31 (31.6%)		
	Rarely	32 (28.3%)	21 (21.4%)		
	No, never	25 (22.1%)	17 (17.3%)		
In which country did you experience more absences from hospital?	Tanzania / Rwanda	61 (54.5%)	39 (39.8%)	.170	5.025
	Sudan	17 (15.2%)	16 (16.3%)		
	About the same in all	21 (18.8%)	26 (26.5%)		
	No absence in either	13 (11.6%)	17 (17.3%)		

Summary:

Error! Reference source not found. highlights significant associations between the country of post-war clinical training and various challenges, including language barriers, schedule variations, and transportation issues. For language barriers, those who studied in Tanzania experienced a more significant negative effect, 77% of respondents reported being greatly affected, compared to 75.5% in Rwanda. The chi-square test confirmed this association with a p-value of 0.005. Regarding schedule variations, Rwanda respondents had a more positive experience, with 40.8% reporting a positive change compared to 33% in Tanzania. Conversely, 20.4% of Rwanda respondents noticed no effect, whereas 39.4% of Tanzania respondents reported no noticeable effect. This difference was statistically significant, with a p-value of 0.005. Transportation challenges were more pronounced for Rwanda respondents, with 29.6% often affected compared to 10.6% in Tanzania. The chi-square test for this issue yielded a p-value of 0.007. In terms of absences from hospitals, the data did not show a significant difference between countries. In Tanzania, 54.5% of respondents reported experiencing more

absences compared to 39.8% in Rwanda, with a smaller portion noting absences were about the same or nonexistent in both countries.**The association between gender and various aspect of clinical training and experiences.**

Table 7: **Cross-Tabulation between Gender and clinical skills practice**

Better opportunities to practice following skills		Gender		P value	Chi square
		Male	Female		
		Count (N %)	Count (N %)		
Taking thorough history	Sudan	67 (83.8%)	121 (92.4%)	.087	4.894
	Tanzania and Rwanda	5 (6.3%)	6 (4.6%)		
	The same in both	8 (10.0%)	4 (3.1%)		
	I didn't have the opportunity	0 (0.0%)	0 (0.0%)		
writing SOAP notes	Sudan	30 (37.5%)	45 (34.4%)	.943	.388
	Tanzania and Rwanda	44 (55.0%)	77 (58.8%)		
	The same in both	5 (6.3%)	8 (6.1%)		
	I didn't have the opportunity	1 (1.3%)	1 (0.8%)		
Performing thorough clinical examination	Sudan	47 (58.8%)	104 (79.4%)	.015	10.470
	Tanzania and Rwanda	23 (28.7%)	18 (13.7%)		
	The same in both	9 (11.3%)	8 (6.1%)		
	I didn't have the opportunity	1 (1.3%)	1 (0.8%)		
lab and radiological results interpretation	Sudan	25 (31.3%)	40 (30.5%)	.630	1.732
	Tanzania and Rwanda	47 (58.8%)	82 (62.6%)		
	The same in both	8 (10.0%)	8 (6.1%)		
	I didn't have the opportunity	0 (0.0%)	1 (0.8%)		
observing/assisting in operations	Sudan	30 (37.5%)	49 (37.4%)	2.821	.630
	Tanzania and Rwanda	43 (53.8%)	74 (56.5%)		
	The same in both	6 (7.5%)	4 (3.1%)		
	I didn't have the opportunity	1 (1.3%)	4 (3.1%)		
Lab and clinical	Sudan	29 (36.3%)	61 (46.6%)	.126	5.728

skills (IV Cannulation, Breast examination. others)	Tanzania and Rwanda	37 (46.3%)	60 (45.8%)		
	The same in both	11 (13.8%)	7 (5.3%)		
	I didn't have the opportunity	3 (3.8%)	3 (2.3%)		

Table 8: **Cross-Tabulation between Gender and satisfaction with clinical training**

How satisfied are you with your training ?		Gender			
		Male	Female		
		Count (N %)	Count (N %)		P value	Chi square
In Sudan	Unsatisfied	35 (43.7%)	68	51.9%	.230	5.617
	Neutral	17 (21.3%)	26	19.8%		
	Satisfied	28 (35%)	37	28.2%		
In Tanzania and Rwanda	Unsatisfied	25 (31.3%)	31	23.6%	.683	2.286
	Neutral	29 (36.3%)	49	37.4%		
	Satisfied	26 (32.6%)	51	38.9%		

Table 9: Cross-Tabulation between Gender and quality of education

Country			Male	Female	P value	Chi square
			Count (N%)	Count (N%)		
Sudan	how would you rate the overall quality of education provided by different doctors?	Excellent	45 (56.3%)	84 (64.1%)	.482	2.463
		Good	27 (33.8%)	40 (30.5%)		
		Fair	6 (7.5%)	6 (4.6%)		
		Poor	2 (2.5%)	1 (0.8%)		
Tanzania and Rwanda	how would you rate the overall quality of education provided by different doctors?	Excellent	17 (21.3%)	9 (6.9%)	.008	11.698
		Good	37 (46.3%)	60 (45.8%)		
		Fair	22 (27.5%)	47 (35.9%)		
		Poor	4 (5.0%)	15 (11.5%)		

Table 10: **Favoritism and racism between genders**

		Gender		P value	Chi square
		Male	Female		
		Count (N %)	Count (N %)		
Did you experience favoritism by doctors towards the country's students	Yes	40 (50.0%)	89 67.9%	.007	10.008
	No	20 25.0%	13 9.9%		
	Neutral	20 25.0%	29 22.1%		
Did racism from staff affect clinical training?	Yes	24 30.0%	79 60.3%	.000	26.995
	No	15 18.8%	28 21.4%		
	I didn't face any racism	41 51.2%	24 18.3%		

Table 11: *Receive of translation and language barrier between genders*

		Gender				P value	Chi square
		Male		Female			
		Count.	(N %).	Count.	(N %).		
Did you receive translation services during clinical training?	Yes	25	31.3%	14	10.7%	.001	16.330
	To some extend	37	46.3%	74	56.5%		
	Rarely	17	21.3%	43	32.8%		
	No	1	1.3%	0	0.0%		
To what extent did language barrier negatively affected your training	No effect	8	10%	7	5.4%	.316	4.728
	Some effect	13	16.3%	22	16.8%		
	Greatly affected	59	73.8%	102	77.9%		

*Table 12: **Clinical round attendance and its schedule between genders***

		Gender				P value	Chi square
		Male		Female			
		Count.	(N %).	Count.	(N %).		
In Sudan did you feel obligated to attend rounds even if it didn't seem necessary?	Always	26	32.5%	61	46.6%	.230	4.313
	Sometimes	34	42.5%	41	31.3%		
	Rarely	18	22.5%	26	19.8%		
	Never	2	2.5%	3	2.3%		
In Tanzania and Rwanda did you feel obligated to attend rounds even if it didn't seem necessary ?	Always	30	37.5%	45	34.4%	.900	.584
	Sometimes	34	42.5%	60	45.8%		
	Rarely	14	17.5%	21	16.0%		
	Never	2	2.5%	5	3.8%		
In Sudan to what extent attending rounds was beneficial for your learning and development?	beneficial	73	91.3%	123	93.9%	.500	2.364
	Neutral	5	6.3%	7	5.3%		
	Not beneficial	2	2.5%	1	0.8%		
In Tanzania and Rwanda to what extent rounds was beneficial for your learning and development?	beneficial	57	71.3%	63	48.1%	.013	12.683
	Neutral	14	17.5%	30	22.9%		
	Not beneficial	9	11.3%	38	29.0%		

*Table 13: **Living conditions and well-being satisfaction between genders***

		Gender				
		Male	Female		P value	Chi square
		Count (N %)	Count (N %)			
How comfortable were your living conditions during your clinical training in Sudan?	Uncomfortable	70 (75%)	10 (77.8%)		.300	4.877
	Neutral	7 (8.8%)	7 (5.3%)			
	Comfortable	13 (16.3%)	22 (16.8%)			
How comfortable were your living conditions during your clinical	Uncomfortable	38 (47.5%)	61 (46.5%)		.984	.381
	Neutral	19 (23.8%)	29 (22.1%)			

training in Tanzania and Rwanda?	Comfortable	23 (28.8%)	41 (31.3%)		
Overall, how satisfied were you with your well - being during your clinical training in Sudan?	Dissatisfied	7(8.8%)	15 (11.4%)	598	2.764
	Neutral	7 (8.8%)	19 (14.5%)		
	Satisfied	66 (82.5%)	97 (74.1)		
Overall, how satisfied were you with your well - being during your clinical training in Tanzania and Rwanda?	Dissatisfied	20 (25.1)	50 (38.2%)	.004	15.536
	Neutral	16 (20.0%)	42 (32.1%)		
	Satisfied	44 (55%)	39 (29.7%)		

Summary:

The data in (

Table 7**)** to **(Table 13)** reveal several significant associations between gender and various aspects of clinical training and experiences. A strong relationship was found between performing thorough clinical examinations and gender, with both males and females reporting better experiences in Sudan; however, females had a much higher percentage of positive experience performing clinical examination, with 79.4% reporting better skill practice compared to 58.8% of males (p=0.015) (

Table 7**).** In terms of quality of education in Tanzania and Rwanda, males were more likely to rate it as excellent, with 21.3% of males versus 6.9% of females giving this rating (p=0.008). This contrasted with the ratings for Sudan, where the gender difference was not significant (p=0.482) **(Table 9).** Significant gender differences were also found in perceptions of favoritism and racism. Females were more likely to observe favoritism by doctors towards the country's students, with 67.9% of females noting this compared to 50.0% of males (p=0.007). Additionally, females reported being more affected by racism, with 60.3% indicating they were affected by racism compared to 30.0% of males (p=0.000) **(Table 10).**

Regarding translation services, a higher percentage of males received translation services during clinical training (31.3% of males compared to 10.7% of females; p=0.001) (

Table 11**).** Moreover, attending clinical rounds in Tanzania and Rwanda was deemed more beneficial by males, with 71.3% of males finding them very beneficial compared to 48.1% of females (p=0.013) (

Table 12**).** Satisfaction with overall well-being in Tanzania and Rwanda showed significant gender differences, with males more likely to be satisfied overall. Specifically, 55% of males were satisfied with their well-being during clinical training in Tanzania and Rwanda compared to 29.7% of females (p=0.004). These findings underscore notable gender disparities in clinical training experiences and perceptions across different post-war training countries **(Table 13)**

Summary:

The data in **Table 14** reveals significant differences in clinical skills practice across age groups, particularly in writing SOAP notes (p value 0.000). Younger students, aged 19-21 and 22-24 reported higher engagement in writing SOAP notes in Tanzania and Rwanda, with 82.1% and 51.5% participation respectively, versus 17.9% and 40.1% in Sudan. Notably, 100% of students aged 28-29 in Tanzania/Rwanda engaged in writing SOAP notes, while none did i

The association between age groups and clinical training.

Table 14: ***Cross-Tabulation between age groups and clinical skills practice***

Better opportunities to practice following skills		Age groups				P value	Chi square
		19 - 21	22 - 24	25 - 27	28 - 29		
		Count Column N %	Count Column N %	Count Column N %	Count Column N %		
Taking thorough history	Sudan	38 97.4%	146 87.4%	3 75.0%	1 100.0%	.302	7.212
	Tanzania/Rwanda	1 2.6%	9 5.4%	1 25.0%	0 0.0%		
	The same in both	0 0.0%	12 7.2%	0 0.0%	0 0.0%		
	I didn't have the opportunity	0 0.0%	0 0.0%	0 0.0%	0 0.0%		
writing SOAP notes	Sudan	7 17.9%	67 40.1%	1 25.0%	0 0.0%	.000	38.795
	Tanzania/Rwanda	32 82.1%	86 51.5%	2 50.0%	1 100.0%		
	The same in both	0 0.0%	13 7.8%	0 0.0%	0 0.0%		
	I didn't have the opportunity	0 0.0%	1 0.6%	1 25.0%	0 0.0%		
Performing thorough clinical examination	Sudan	30 76.9%	117 70.1%	3 75.0%	1 100.0%	.834	5.004
	Tanzania/Rwanda	8 20.5%	33 19.8%	0 0.0%	0 0.0%		
	The same in both	1 2.6%	15 9.0%	1 25.0%	0 0.0%		
	I didn't have the opportunity	0 0.0%	2 1.2%	0 0.0%	0 0.0%		
lab and radiological results interpretation	Sudan	8 20.5%	56 33.5%	1 25.0%	0 0.0%	.905	4.100
	Tanzania/Rwanda	28 71.8%	97 58.1%	3 75.0%	1 100.0%		
	The same in both	3 7.7%	13 7.8%	0 0.0%	0 0.0%		

	I didn't have the opportunity	0 0.0%	1 0.6%	0 0.0%	0 0.0%		
observing/assisting in operations	Sudan	14 35.9%	64 38.3%	1 25.0%	0 0.0%	.856	4.744
	Tanzania/Rwanda	22 56.4%	92 55.1%	2 50.0%	1 100.0%		
	The same in both	2 5.1%	7 4.2%	1 25.0%	0 0.0%		
	I didn't have the opportunity	1 2.6%	4 2.4%	0 0.0%	0 0.0%		
lab/ clinical skills (IV Cannulation, Breast examination... others)	Sudan	19 48.7%	69 41.3%	2 50.0%	0 0.0%	.180	12.849
	Tanzania/Rwanda	17 43.6%	78 46.7%	1 25.0%	1 100.0%		
	The same in both	1 2.6%	17 10.2%	0 0.0%	0 0.0%		
	I didn't have the opportunity	2 5.1%	3 1.8%	1 25.0%	0 0.0%		

DISCUSSION

The circumstances of clinical education can significantly impact the proficiency and readiness of healthcare practitioners 19[. Attacks on educational institutions lead to looting, conversion into military bases, and disruptions in the educational process, in addition breakdowns in civic activity during violent insecurity can indeed have detrimental effects on education and training programs in medicine 20[. Medical students who relocate for training, face distinct challenges and opportunities compared to their counterparts who receive their medical training in their home countries 21[. Exposure to different healthcare systems, teaching methodologies, and clinical environments can greatly influence their competencies and perspectives 22[. Students from Sudan who have trained in Rwanda or Tanzania, for instance, may encounter variations in clinical practices, resources, and educational approaches that contrast sharply with their pre-war training experiences in Sudan. This war intermediated relocation can lead to a diverse set of skills and knowledge, potentially enhancing their medical education 23[. However, it also presents the need to adapt to new cultural and systemic contexts, which can be both enriching and challenging. Understanding these perceived variations in clinical training is crucial for assessing the overall impact on the medical students' preparedness and future contributions to healthcare.

This research explores the perceived variations in clinical training among Batch 25 and Batch 26 medical students from the University of Medical Sciences and Technology (UMST) who received their training in pre-war Sudan, post-war Tanzania and Rwanda, revealed notable differences. A significant majority of students reported better opportunities to practice taking thorough history in Sudan (89.1%) compared to Tanzania and Rwanda (5.2%) (p < 0.001). Similarly, the ability to perform clinical examinations was perceived to be better in Sudan (71.6%) than in Tanzania and Rwanda (19.4%) (p < 0.001). These results suggest that Sudan, before the war, provided more comprehensive clinical training in terms of fundamental medical skills. Moreover, the familiarity with the local healthcare framework in Sudan provided students with unique insights and practical knowledge that were less emphasized in Rwanda and Tanzania. Despite these challenges, 61.1% of students reported better lab and radiological results interpretation skills in Tanzania and Rwanda compared to Sudan (30.8%) (p < 0.05).

However, only 12.3% of students rated the quality of medical knowledge provided by doctors in Tanzania and Rwanda as excellent, compared to 61.1% in Sudan, indicating a significant drop in the perceived education quality (p < 0.001). These results highlight the impact of relocation on the perceived quality of medical education. In similar context, studies from Ukraine, Iraq, Sudan, and Syria, detailed how conflict disrupts teaching and affects educational quality and

continuity 5, 8, 11, 16[. A study by Wilkinson et al. examined the impact of learning environment disruption on medical students after series of earthquakes in New Zealand 24[, also found that unexpected disruption occurred close to exams had a greater impact on the students' assessment performance. Studying the effect of disturbed learning environment provide a comparative backdrop for examining how different environments and experiences, such as those in Rwanda and Tanzania after the war and in Sudan before the war, influence clinical training outcomes. In Syria, Alfakhry et al. conclude that learning environment shortcomings, if not addressed, can deteriorate the competence of the healthcare workforce 16[.

Clinical training in Tanzania and Rwanda presented unique challenges. Approximately 61.1% of students observed favoritism towards local students, and 48.8% reported experiencing racism, which significantly affected their training experience (p < 0.001). Female students constituted 62.0% of respondents, and they reported higher instances of experiencing racism and favoritism, which affected their training experience more than their male counterparts. Students also reported challenges such as transportation issues, with a significant association found between Batch 26 students who trained in Rwanda and transportation challenges compared to those in Tanzania (p = 0.007).

Language barriers were also a significant issue. Swahili, Kinyarwanda, and English were the primary languages used for communication in Tanzania and Rwanda. About 60% of the students reported that language barriers had negatively impacted their training, complicating interactions with patients. Students from Batch 25, who studied in Tanzania, were more affected by the language barrier (p = 0.005). Our research underscored how linguistic barriers, stemming from different first languages and cultural backgrounds, can lead to misunderstandings and reduced satisfaction among abroad medical students. These findings are consistent with previous studies conducted in Saudi Arabia, Germany and China, where non-native students did not perform as well as their local counterparts] 14, 15, 17[. Effective communication in healthcare is essential for providing quality patient care. We can improve the overall educational experience for displaced students, by addressing language training and enhancing interaction within clinical training programs. Despite these challenges, the experience also offered opportunity for personal and professional growth as students adapted to new environments and improved their language skills. This mirrors findings from Barnett-Vanes' study on Iraqi medical students, where conflict-induced relocations posed significant challenges but also provided valuable learning experiences 5[. Pearson's correlation test revealed no statistically significant correlation between age and the perceived quality of training, likely because most respondents were within the 22-24 age range,

suggesting that age within this narrow range does not significantly influence students' perceptions of training quality. Notably, the relationship between gender and performing clinical examinations varied significantly (p = 0.01). In Sudan, both genders reported better opportunities to practice certain clinical skills, but females had a much higher percentage of performing clinical examination (79.4%) compared to males (58.8%). Contrariwise, in Tanzania and Rwanda, males were more likely to rate the quality of medical knowledge provided by the doctors as excellent (21.3%) compared to females (6.9%) (p= 0.008). Both genders significantly affected by the language barrier issues, but males (31.3%) received translation services more than females (10.7%) (p = 0.001), indicating a gender disparity in support. Additionally, males found clinical rounds beneficial for their learning and development and were more likely to be satisfied with their well-being during clinical training in Tanzania and Rwanda (55% compared to 29.2% of females, p = 0.004). These findings suggest that while relocation posed significant challenges, it also facilitated growth and adaptation, yet the support systems in Tanzania and Rwanda may have been more accessible to males, influencing their overall experience more positively.

Batch 26 had fewer training days per week in Sudan (3 days) compared to Rwanda (5 days) because of their progression from semester7 to smemster8, while batch 25 had the same number of training days per week in Sudan and Tanzania (5 days). Variations in schedules between different countries affected the clinical training experiences of the students (p = 0.005). Most of batch 26 students (40.8%) reported that the changes in schedules had a positive impact on their clinical training compared to 33% of batch 25. This indicates that for a significant portion of students, the new schedules offered in different countries were beneficial; possibly providing better structure or more effective learning opportunities. Conversely, a substantial proportion of the students felt that the schedule changes had negative effect on their clinical training experience (38.8% of batch 26 and 27.5% of batch 25). The significant difference in the perceptions of schedule changes between the two batches painted that the variations in schedules between different countries had differing impacts on students' clinical training experiences, with some students adapting positively while others encountered difficulties. Understanding these differences can help in designing better-suited schedules for displaced students in future training programs.

The only significant relationship found between age group and practicing clinical skills was with writing SOAP notes (p = 0.000). Students when trained in Tanzania and Rwanda were more likely to engage in writing SOAP notes compared to Sudan, particularly in the younger age groups (19-24), 82.1% of the (19-21) age group and 51.5% of the (22-24) age group reported

writing SOAP notes in Tanzania and Rwanda. 100% of older students, age group (28-29) engaged in writing SOAP notes outside Sudan compared to none in Sudan. This could suggest differences in curriculum focus or opportunities provided in different training locations, with older students in Tanzania and Rwanda possibly receiving more practical experience in this area.

It is important to note that batch 25 and batch 26 were performing different semesters back in Sudan and followed different training curriculums in Tanzania and Rwanda. The training program of the 4th year differs from that of the final year, which makes direct comparisons between the two batches imprecise. This difference in academic stages and curricula is one of the limitations of this research, as it complicates the analysis of training experiences and outcomes between the two groups. Students recommended several improvements to enhance their clinical training experiences. Key suggestions included improving language and translation services, increasing the availability of Sudanese doctors, reducing long hours, and focusing more on clinical training. They emphasized the need for more cooperative and respectful doctor-student interactions, structured programs, and better integration into clinical activities. Enhancing student support by providing better living conditions, safe transportation, and accommodations for foreign students was also highlighted. Additionally, students called for balancing long hours with theory-focused days, improving university-hospital communication, clear expectations, and more workshops on clinical skills.

CONCLUSION

In conclusion, this research highlights the significant variations in the clinical training experiences of Batch 25 and 26 medical students from UMST when comparing their training in Sudan to that in Rwanda and Tanzania. The majority of participants were females (62.1%) and aged 22-24 (79.1%). Most students were from Batch 25, who trained in Tanzania (54%). Sudan, before the war, offered superior training in fundamental medical skills and was perceived to have a higher quality of education, while Tanzania and Rwanda provided better training in interpreting lab and radiological results. More students reported satisfaction with their overall well-being in Sudan (77.3%) compared to Tanzania and Rwanda (39.3%). However, challenges such as favoritism, racism, and language barriers—particularly for female students—hindered patient interactions and training experiences. Although males were more likely to receive translation services, female students performed more clinical skills. Age did not significantly affect the quality of clinical training, likely because most students were within the narrow 22-24 age range. The only notable difference was that both younger (19-24 years old) and older (28-29 years old) students had more opportunities to practice specific clinical skills, particularly writing SOAP notes, compared to those aged 25-27years old. Additionally,

students in Rwanda faced more transportation challenges, which negatively affected their attendance, while those in Tanzania struggled more with language barriers. Despite these difficulties, the experience in Tanzania and Rwanda contributed to both personal and professional growth for the students. The study highlights the need for improved language services, structured programs, and better support for displaced medical students to enhance clinical training in conflict-affected and international settings.

6.2. RECOMMENDATIONS

In the framework of this study, we would like to propose the following recommendations:

To University Administration:

1. Strengthen policies to address higher instances of racism and favoritism, ensuring that every student, especially women, feels fairly treated and supported.

2. Design training schedules that balance clinical hours with theoretical learning, and ensure that any schedule changes are communicated clearly and promptly to students.

3. Implement language training and provide translation services to help relocated students overcome communication and cultural challenges during their clinical training, and adapt better to their new training environments.

To Policy Makers:

1. Encourage collaborations between universities in different countries to provide more comprehensive clinical training opportunities for relocated Sudanese medical students. This will help in understanding the impact of different healthcare systems and training environments.

2. Fund studies that consider factors like healthcare infrastructure and political stability. This will help create a clearer picture of the challenges students face and guide more effective policies.

To Students:

1. Join in longitudinal studies that track how different training environments impact your career over time. Your participation can make a big difference in shaping better training programs for future students.

2. Take advantage of support services, like language help and translation, to make your experience smoother. and report any instances of discrimination or favoritism to ensure they are addressed promptly.

For the Future:

1. Future studies should include a larger sample size to enhance the representativeness and reliability of the findings. Collaborating with more cohorts and other universities could help achieve this.

2. Conduct longitudinal studies to observe the long-term effects of different training environments on students' professional development and career trajectories. This will provide deeper insights into the lasting impact of clinical training variations.

3. Continue to work on making training programs more inclusive and comprehensive, ensuring that all

displaced medical students receive the high-quality education they deserve.

Implementing these recommendations will address the identified challenges and enhance the clinical training experience for medical students from conflict-affected regions. By focusing on improving training quality, addressing language and cultural barriers, and fostering inclusive environments, stakeholders can better support displaced medical students and improve overall educational outcomes. Future research should continue to explore these areas to refine and optimize training programs globally.

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