Original Article

The Impact of the COVID-19 Pandemic on Reconstructive Surgery and Training Programs in Sub-Saharan Africa: A Cross-Sectional Survey

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ABSTRACT

Background: In Sub-Saharan Africa, which already faces challenges due to a lack of surgeons and facilities, the COVID-19 pandemic could significantly disrupt surgical activities and training programs. "2nd Chance", a non-governmental organization providing training program to enhance local reconstructive surgery capacity in this region since 2015, could play a crucial role in addressing these issues. We aimed to investigate the impact of the COVID-19 on the activity of sub-Saharan African reconstructive surgeons collaborating with "2nd Chance" organization and evaluate its effect on the organization's training programs.

Methods: In the course of 2022, an online cross-sectional survey was conducted among reconstructive surgeons working in sub-Saharan African countries and collaborating with "2nd Chance". The survey consisted of 57 questions covering demographics, impacts of COVID-19 on personal life, clinical and training activities.

Results: Of 469 surgeons eligible for the study, 240 were included and 51 responded. The impact of COVID-19 was felt personally in terms of health and stress. Clinical activities were severely affected, with some reporting higher mortality due to surgical cancellations and delays. Regarding training, there was a shift from practical to theoretical learning, though overall impact was moderate. One-third of participants were able to attend "2nd Chance" workshops. Among the 17 planned workshops, 9 were successfully conducted, and 4 of them exclusively featured African trainers.

Conclusion: The COVID-19 pandemic had substantial consequences on reconstructive surgery in sub-Saharan Africa, impacting more clinical practices than training programs. Collaboration between African and European trainers proved essential during the pandemic. In future pandemics, South-South collaborations should be prioritized.

KEYWORDS
COVID-19, Training; Reconstructive surgery; Sub-Saharan Africa

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INTRODUCTION

In 2015, The Lancet Commission on Global Surgery reported lack of surgery as a global burden, with regions such as sub-Saharan Africa being even more severely affected[1,2]. The COVID-19 pandemic has caused significant changes in surgical activities and training programs in sub-Saharan Africa[3,4].

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Reconstructive surgery is a sub-specialty all the more severely affected, with many countries in sub-Saharan Africa having less than one surgeon for every hundred thousand patients and part of the surgical activities are done by non-surgeon physician and clinicians[5].

Surgical non-governmental Organizations such as "2nd Chance" (https://2nd-chance.org/en/home/) aspire to disseminate knowledge, cultivate a sustainable cadre of proficient reconstructive surgeons, and collaborate closely with the College of Surgeons of Eastern, Central and Southern Africa and West African College of Surgeon (COSECSA & WACS)[6] as contributors to training programs since 2015. There are recognized to positively contribute to the global surgical care in low and middle incomes country[7]. Their primary focus is on sub-Saharan Africa, with training workshop aimed at expanding local medical capabilities. These surgical missions involve training surgeons in new techniques, emphasizing peri-operative safety practices for anesthesiology teams and operating room staff, and providing funding for surgical equipment and patient procedures[8]. Like many other organizations, 2nd Chance's trainer teams are traditionally composed of Western experts in reconstructive surgery, with extensive and long-standing experience in the pathologies encountered in low and middle-income countries, as well as young African surgeons who have graduated in reconstructive surgery[9,10].

To date, over 550 surgeons have collaborated with 2nd Chance organization since 2012, either as participants in workshops or as instructors. The educational model of the workshop is a theoretical and practical approach based on surgical mentoring, where a learner operates under the close supervision of an expert during several days of surgical activities[8].

Reflecting the broader challenges encountered by the reconstructive surgery training program in sub-Saharan Africa amidst the COVID-19 pandemic, this study had two objectives:

(1) Investigating the influence of the COVID-19 pandemic on the practices and the training of sub-Saharan African doctors and trainees collaborating with the organization "2nd Chance".

(2) Evaluating the impact of the pandemic on the training of surgeons operating in sub-Saharan Africa organized by "2nd Chance".

METHODS

Study design and data collection

An online cross-sectional survey was designed to get information from the trainees and graduated surgeons working in reconstructive surgery in sub-Saharan countries.

Study population

All surgeons who have ever collaborated with the "2nd Chance" association since 2015, representative of both surgeons currently in training and those who have already graduated and practicing reconstructive surgery, were considered. The inclusion criteria encompassed surgeons practicing in sub-Saharan Africa, with no distinction based on specialty, gender, age, institution, or years of practice. By answering the questionnaire, the surgeons gave consent for the processing of their data, which were anonymous. A digital online questionnaire based on SurveyMonkey platform was sent in May 2022 to all available email addresses of association's mailing list. In June 2022 a reminder announcing the survey deadline was sent again.

Conceptual framework and survey

The development of the survey questionnaire was done according to the epidemiological data of COVID19 in Africa up to September 2021, as well as interviews regarding feelings related to the impact of COVID19 on surgical training and personal and professional lives of African surgeons attending a workshop organized by "2nd Chance" in March 2022. The questionnaire consists of 57 questions, including yes or no responses, as well as multiple-choice options. It covered five themes: demographics data, the impact of COVID-19 on personal life, on professional life, on training and on 2nd Chance's activities.

Measurement tools

Data extracted from SurveyMonkey platform presented descriptively without statistical analysis, categorized according to the five themes described earlier.

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Data of "2nd Chance" activity for reconstructive surgery training workshops during the pandemic period from March 2020 to March 2022 were collected: planned, canceled, postponed, or organized workshops.

RESULTS

Among the 469 surgeons in the initial sample who could potentially participate in the study, 240 were considered eligible, and 51 completed the survey (Figure 1). Of the respondents, 70% were male, with the majority falling in the age range of 25 to 35 years (60%). Out of the 44 Ethiopian surgeons on the mailing list, 12 responded to the survey (26.7%, followed by Tanzania 5 on 32 (15.6%) and Nigeria 4 on 9 (44%) and Uganda 4 on 9 (44.4%) (Figure 2). Representant from 8 countries did not respond to the survey.

In terms of specialization, there were 25 surgeons practicing reconstructive surgery, 19 in general surgery, 3 in pediatric surgery, 2 in gynecology and obstetrics, 1 in ENT surgery, and 1 in orthopedic surgery. Out of the 51 respondents, 39 (75%) were enrolled in a reconstructive training program. Some were in their initial 3 years of general surgery, while others were in the final 2 years. The remaining 13 (25%) had already completed their training. All participants have been impacted in one way or another by COVID in their personal lives, both in terms of health and stress (Table 1a).

The impact of COVID-19 on clinical activities was substantial, with 35% of surgeons expressing concerns about increased mortality due to surgery

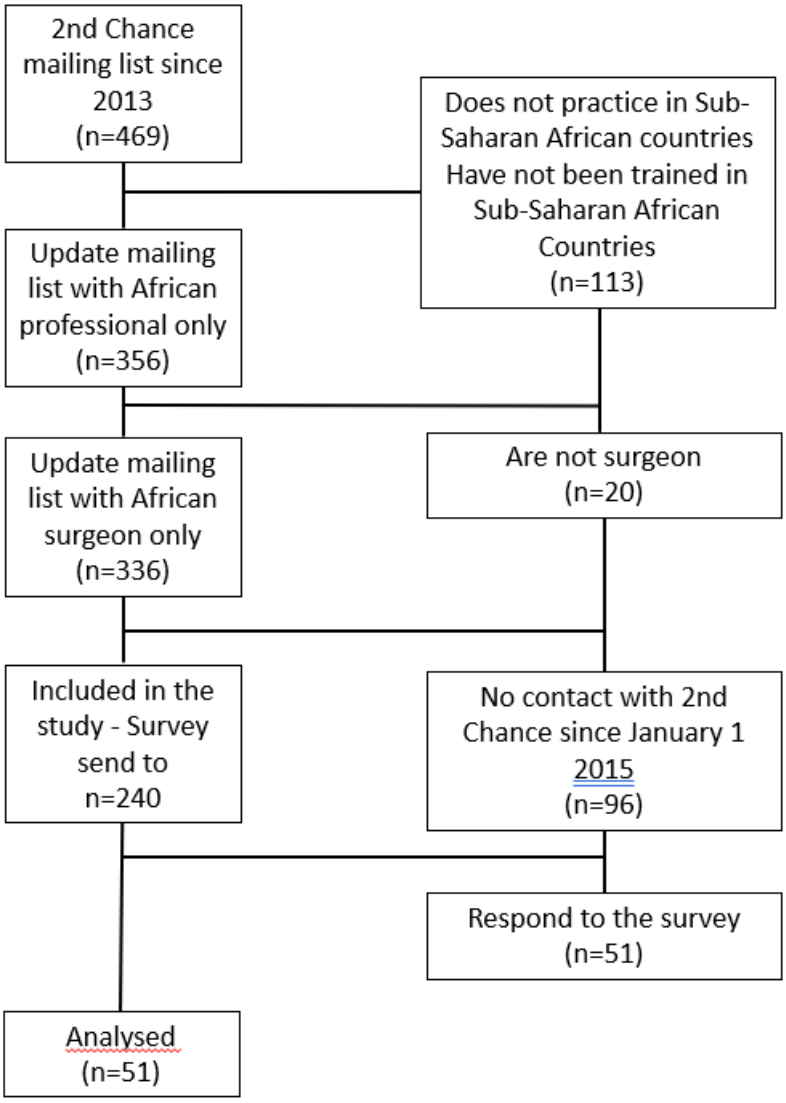


Figure 1: Flow chart of the participants included in the study.

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Figure 2: Geographical distribution of surgeons who responded to the survey.

cancellations and delays. Moreover, all surgeons were convinced that the pandemic has deterred patients from seeking medical care at the hospital (Table 1b).

Forty-three surgeons (82%) mention that specific guidelines to control the COVID19 infection risk have been proposed by the institution they work with regarding patient care, procedures, and protective equipment in the context of the pandemic. However, 29 surgeons (56%) were not satisfied with these measures. Thirty-nine responders (73%) report that some surgeries could not be carried out due to COVID-19 and 44 (83%) report delays in patient care.

Regarding anesthesia procedures, 45 (84%) of surgeon's report impact on their activity due to specific requirements for anesthesia in the context of COVID-19 for the following reasons: lack of protective equipment for anesthetists, lack of resources to conduct safe anesthesia for patients and fear of anesthetists.

The impact on the training was not as significant, thanks to alternative methods of training; although all respondents reported a decrease in surgical activity (Table 2a). More than a third of the fellows were able to attend a training workshop organized by "2nd Chance" (Table 2b).

Out of the 17 workshops initially planned between March 2020 and March 2022, a total of 8 were ultimately canceled. This includes 2 cancellations during the first European wave, 2 during the second European wave in 2020, and 3 in 2021. These cancellations were due to either the African or European situations not allowing for the safe organization of the workshops. Finally, 9 workshops were successfully held by 27 trainer surgeons, including 20 African surgeons trained by "2nd Chance" and graduated of WACS or COSECSA. Notably, 4 out of these 9 workshops had a training team consisting exclusively of African surgeons (Table 2c).

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Table 1: Impact of COVID-19 on reconstructive surgeons

a.	**Impact of COVID-19 on the private lives of surgeons**	**N**	**%**
•	Number of surgeons who must undergo COVID-19 testing	51	100.00
•	Number of surgeons experienced a positive test for COVID-19	27	52.94
•	Number of surgeons experienced asymptomatic form of COVID-19	9	17.65
•	Number of surgeons experienced mild to moderate form of COVID-19	16	31.37
•	Number of surgeons experienced severe form of COVID-19	2	3.92
•	Number of surgeons experienced critical form of COVID-19	0	0.00
•	Number of surgeons that received vaccination	47	92.16
•	Number of surgeons experienced stress related to COVID-19 situation	36	70.59
b.	**Impact of COVID-19 on the Professional lives of surgeons.**		
•	Number of surgeons experienced a negative impact on professional activities	46	90.20
•	Number of surgeons experienced a decrease of income	35	68.63
•	Number of surgeons experienced unsafe professional condition related to COVID-19	36	70.59
•	Number of surgeons experienced cancelation & delay of surgery	39	76.47
•	Number of surgeons suspected higher mortality of patient related to cancelation and delay	18	35.29
•	Number of surgeons convinced of additional suffering for patient	32	62.75
•	Number of surgeons convinced that pandemic discourage patient to come at the hospital	51	100.00

Table 2: Impact of COVID-19 on reconstructive surgeons and on the activities of the 2nd Chance organization in the context of reconstructive surgery training

a.	**Impact on surgeons in training**	N	%
•	Number of surgeons experienced a shift from practice to reading	19	36.54
•	Number of surgeons experienced a decrease of practice surgery	32	61.54
•	Number of surgeons experienced an alternative learning method available	46	88.46
•	Number of surgeons experienced no disruption of training program	47	90.38
•	Number of surgeons experienced delayed exam	26	50.00
b.	**Effect on the workshops organized by the non-governmental association 2nd Chance**		
•	Number of surgeons attended the workshop organized by the non-governmental association	20	38.46
•	Number of surgeons unable to attempt due to pandemic:	32	61.54
➢	Due to Country restrictions	29	55.77
➢	Due cancelation of workshop	17	32.69
➢	Due to Personal concern about pandemic	13	25.00
c.	**Effect of the pandemic on 2nd Chance's operational activities and workshops**	**Number of workshops**	
•	Number of 2nd Chance's workshop planned for March 2020-March 2022	17	
•	Number of Workshops that took place while adhering to COVID-19 constraints	9	
•	Number of Workshop canceled	8	
➢	Due to Travel bans within Europe for health reasons	4	
➢	Due to Travel bans within Africa for health reasons	4	
•	Workshops where African replaced Europeans trainers	4	

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DISCUSSION

This study generally shows that the pandemic had a negative impact on the clinical practice of the respondents, mainly by making working conditions insecure and stressful and by reducing their income. Three-quarters also reported surgery cancellations and delays, leading to increased suffering and mortality.

These observations align quite well with what has been previously described worldwide regarding the overall impact on clinical practice and income[3,4,11]. However, the increase in mortality and the fear of coming to the hospital are much more nuanced in the literature, with some confirming this impression[12,13] while others describe a less severe impact on overall health in sub-Saharan Africa than expected by forecasts and concerns[14-16].

In the all world, reconstructive surgery has been considerably impacted by COVID-19 pandemic with a nearly complete stop in the elective surgery whatever the cause was (fear of Covid contamination, restriction of resources, priority of health care)[17-21].

The perception of a very negative impact of the pandemic by reconstructive surgeons may be partly related to the fact that their activity is mostly non-urgent. The treatment of wounds, congenital malformations, and burn scar contractures can often be postponed. On the other hand, concerning emergency treatments in the field of reconstructive surgery in sub-Saharan Africa, it almost exclusively involves the treatment of acute burns, which, even outside the pandemic context, is known to not always be available, for example, early debridement[15,22]. Even though the data remains limited, it appears that emergency surgery for acute burn cases was neither more nor less performed during the pandemic in sub-Saharan Africa[15]. These two scenarios indicate that reconstructive surgeons likely feel more impacted by the pandemic than others. This is confirmed by the fact that all the responding surgeons believed that the pandemic discouraged patients from coming to the hospital, while in reality, basic public health services (women's and child health) have been relatively well maintained in sub-Saharan Africa[13].

In our study, the majority of respondents from sub-Saharan Africa who are engaged in collaborative work with the "2nd Chance" organization in reconstructive surgery perceived a widespread negative impact of the pandemic more on their professional activities than on the training programs.

The effects of the COVID-19 pandemic on the healthcare systems in sub-Saharan Africa are likely more nuanced than in the wealthier parts of the world, without necessarily experiencing a catastrophic decrease or a complete collapse, as initially feared[16]. Our study on reconstructive surgery aligns with this observation. The effects of the pandemic, as previously described, include delays in care, surgical cancellations, and reduced consultations. One-third of the study participants believe that these effects have increased patient mortality.

The effects of the pandemic on reconstructive surgery training were more in terms of form than substance, with delays in exams. In fact, only 10% of surgeons reported a halt in training, while for all others, it was more about a change in the ways of learning[23,24], with a shift towards the more theoretical side at the expense of practice, which is almost in line with what is described in the literature[3,4].

Supplementary training in reconstructive surgery provided by surgical NGOs is structured and recognized as effective in low and middle-income countries[25]. These collaborations were severely impacted by COVID, with over 70% less activity during the pandemic[26,27].

Despite travel restrictions and entry challenges in some African and European nations, nearly 50% of the planned 2nd Chance organization's workshops were held, and approximately 40% of the respondents were able to participate. In this context of thorough planning and monitoring, training workshops were often conducted by replacing European instructors with their African counterparts. It should be noted that over 75% of the surgical workforce consisted of African surgeons, which only accelerated the process of incorporating young graduates into the circle of trainers. In this, it can easily be said that the pandemic allowed skipping steps and saved time for this young generation of surgeons.

The response rate in this study was low and may introduce some response bias[28]. While it's known that response rates tend to be lower in web-based surveys compared to in-person and written ones, it's worth noting that African healthcare professionals are generally considered excellent respondents, with an average response rate of approximately 77.5% ± 16.0%[29]. In our study, no email responsiveness metrics were measured, so there's no evidence to suggest that all potential participants received the information. One could also argue that political instability in certain regions, stress, an atmosphere of anxiety, and the overall complex situation related

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to the pandemic may be responsible for the low participation. Therefore, the results may suffer from a lack of evidence, although fundamentally, they still provide an image of the pandemic's impact on some of these surgeons especially.

Regarding the timing of the sharing of the questionnaire and the collection of data, most of the countries targeted by the survey were in the phase of reopening and lightning measures related to COVID-19. It is reasonable to think that certain answers, especially those concerning the experience of stress, would have varied if the questionnaire had been submitted earlier during the health crisis.

CONCLUSION

The pandemic has impacted reconstructive surgeons in sub-Saharan Africa to a similar extent as their colleagues worldwide, with possibly a greater perception of poor patient outcomes than described in the literature. Training programs in reconstructive surgery seem to have been less disrupted than expected, with a temporary shift from practical to theoretical teaching through alternative technologies (webinars, telemedicine), as seen worldwide. Practical training activities through workshops organized by the "2nd Chance" organization have been relatively well maintained, mainly due to strong collaboration between African and European trainers. The pandemic accelerated the process of replacing predominantly European surgical teams with predominantly African teams. In case of new pandemics, South-South collaborations will be favored as soon as possible.

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CONFLICT OF INTEREST

The authors declare that there is no conflict of interests.

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