


REVIEW

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Access to specialist plastic surgery in rural vs. Urban areas of Africa

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Abstract

Introduction Plastic surgery is an essential yet underdeveloped field in many African nations, especially in rural areas. The demand for plastic surgery is increasing, but differences in access to respective services between rural and urban domiciles remain ever existent, despite the exponentiation of trauma, burns, and congenital disorders. According to this review, urban areas have access to better facilities and specialized surgeons, while rural areas frequently lack infrastructure, educated healthcare personnel, and medical resources. This review compares the quality and accessibility of plastic surgery services in African rural and urban settings in order to determine the variables influencing said differences in access.

Methods This literature review was performed using electronic search databases comprising PubMed/MEDLINE, Google Scholar, and Africa Journals online (AJOL). Regional medical journals were also reviewed using keywords and associated Boolean operators pertaining to “plastic surgery”, “plastic surgery in rural” and plastic surgery in urban” by selecting studies based on their relevance and content quality. Studies focusing on plastic surgery in Africa were included. A total of 37 articles were analyzed to provide insights into the disparities between rural and urban access to plastic surgery services in Africa. Studies not focusing on plastic surgery were excluded.

Results The review highlighted significant disparities in access to plastic surgery services between Africa’s rural and urban areas. Rural areas usually lack medical resources, specialized surgeons, infrastructure, while urban areas have access to better facilities and specialized surgeons. Urban regions not only hail more training opportunities for surgeons but also foster further specialized facilities, greater training options, access to modern surgical equipment, sterile facilities and advanced instruments, contributing to clinical and surgical excellence alongside patient satisfaction and outcomes. However, there is a scarcity of qualified plastic surgeons in rural regions, including antiquated technology and a dearth of resources and expertise. Besides, socioeconomic variables that hinder said indifference between rural and urban areas, such as poverty, education, money, and cultural attitudes, precipitated limited access to critical surgical intervention in rural populations.

Conclusion Further research should be done on how plastic surgery services differ in urban and rural areas. Availability of financial expertise and specialists who can provide specialized care in rural settings is recommended. To enhance patient outcomes, the implementation of technological innovation, improved healthcare infrastructure, and effective training initiatives should be implemented in rural Africa. Also, in the field of plastic surgery, emphasizing the use of telemedicine and mobile surgical units may aid universal healthcare for residents in rural domiciles.

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Significant progress towards ensuring equitable access to high-quality plastic surgery in rural Africa may be achieved through these initiatives.

Keywords Plastic surgery, Rural healthcare, Urban healthcare, Surgical care access

Introduction

In recent years, there has been growing international interest in expanding access to plastic surgery in underdeveloped nations. However, their need for these services in African countries remains largely not met, which contributes to high rates of mortalities and morbidities [1]. Plastic surgery play an important role in addressing different medical needs such as burns, trauma, and congenital disorders which account for 11% of patients who may require plastic surgery intervention. A plastic surgeon is defined as a medical doctor who has completed specialized training in reconstructive and cosmetic surgical procedures to address functional impairments, injuries, or aesthetic concerns [1]. In Tanzania for instance, cases requiring plastic surgery services account for approximate 16% of population in rural hospitals. Burns attribute as the primary cause of high demand in plastic surgery. In Mozambique, burns account for 19.1% of cases in the emergency departments [2] these highlight the critical need for plastic surgical services to manage complications such as reduction of iatrogenic scar formation, osteomyelitis, and to repair cleft lip and palate.

Despite the rising demand globally, the field of plastic surgery remains underdeveloped in many African regions, such as Nigeria. In Nigeria, mass media is playing a vital role by highlighting both positive and negative impacts of plastic surgery. In terms of its negative impacts, media has played a role in reporting the death of celebrities due to cosmetic procedures [3, 4]. Moreover, due to the shortage of trained plastic surgeons practicing in Nigeria, non-healthcare professionals tend to intervene when a case is deemed of a plastic surgery nature, leading to poor clinical outcomes [1]. In Nigeria, only one plastic surgeon was available for 1.5 million persons, illustrating the urgent the factors that are actively discouraging surgeons to specialize in plastic surgery. Further, a study demonstrated that Nigeria does not have an association that regulates the practice of plastic surgeons like that of developed countries, an observed deficiency in plastic surgeons exposed due to a lack of training and financial capacity [5]. Grimes et al. (2011) found that the highest number of surgeries pertaining to plastic intervention were performed in urban settings rather than in rural districts, whereby disparities between central and district hospitals in the number of operations performed was exhibited. The lack of regulatory bodies for plastic surgery, insufficient training opportunities, and limited

financial resources further exacerbate the shortage of qualified surgeons in Nigeria and across sub-Saharan Africa (SSA).

This review seeks to compare the availability and quality of plastic surgery services between rural and urban areas in Africa to identify the factors contributing to such disparities in access and to offer insights into practical solutions that can bridge the gap in access, including policy recommendations, the potential role telemedicine play and the need for targeted training. It explores the unique challenges faced in rural regions such as lack of medical equipment, insufficient sterilization and infection control, and medical staff shortages which may result in subpar patient care [1]. by examining the current landscape of plastic surgery in Africa.

By defining the purpose and scope of this review, we hope to establish a structured narrative that guides the reader through various subtopics, from the specific barriers in rural healthcare systems to innovative strategies that could increase access to quality plastic surgery services across all regions of Africa. Although this review paper primarily focuses on original research, we believe that this review provides a valuable foundation for future studies and initiatives aimed at improving surgical care access in under-resourced areas.

Methods

This literature review was performed using electronic search databases comprising PubMed/MEDLINE, Google Scholar, and Africa Journals online (AJOL). We also reviewed regional medical journals using keywords and associated Boolean operators pertaining to “plastic surgery”; “plastic surgery in rural” and plastic surgery in urban” by selecting studies based on their relevance and content quality. A total of 37 articles were analyzed to provide insights into the disparities between rural and urban access to plastic surgery services in Africa.

Inclusion criteria

Studies were selected based on their focus on plastic surgery in rural and urban Africa regions. Selection was based on studies that provide detailed information on factors affecting access to specialist plastic surgery. Only papers written in English were included to maintain reliability.

Exclusion criteria

Studies that did not specifically address plastic surgery or focused on unrelated medical fields were excluded from this review. Articles that lacked sufficient detail on plastic surgery services in African settings, or that were deemed irrelevant to our focus on rural and urban disparities, were also omitted.

Results

Availability and current state of plastic surgery services in Africa

According to a study by Guzman et al. (2018), inpatient beds in the plastic surgery department of Hospital Central de Maputo (HCM) were not curtained off, and there was a lack of appropriate ventilation equipment, a lack of medical surgical instrumentation, a lack of antibiotics, analgesia, and nutritional supplements, as well as a limited protocol in infection control and hygiene. Additionally, the study depicted that there was no available sedation in the operating room, where sutures for small wounds were performed without sedation in some instances. In 2018, HCM only possessed three plastic surgeons whereas in Mozambique, there were six resident plastic surgeons. Of these, four were working in the capital and the others in the central and north regions of the country [1].

In SSA, many countries exhibit a shortage of plastic surgeons. Less than one plastic surgeon is accounted for every 100,000 individuals. For instance, in Zambia, with a population of approximately 19 million as of 2024, there is only one resident plastic surgeon, highlighting the critical shortage of specialized care in the region. Uganda with a population of approximately 46 million, has three plastic surgeons, and Nigeria, with over 223 million people, has seventy-two. Lack of training, location, finances, and local preferences might all be contributing factors to the shortage of medical personnel. Furthermore, it may be the result of inadequate medical attention and a shortage of reconstructive surgical subspecialties [2]. According to Truche et al. (2021), while five plastic surgeons were identified as practicing full-time in rural regions, many of the 36 surgeons participated in the study also reported providing periodic visiting services to these areas, therefore, this underscores the reliance on itinerant surgical care to address rural needs [6]. According to Semer et al. (2010), the unequal distribution of surgeons nationally is one of the great issues facing African domiciles. Although, rural areas warrant much more plastic surgical interventions than urban areas, most of which prefer to practice in urban rather than rural areas. Cosmetic surgery has been observed to be more accepted in urban than in rural areas, especially among the upper

social classes. This may be attributed to a dearth of community awareness, religion beliefs, social taboos, financial deprivation, and absence of a cosmetic surgical society that may enhance one's perception circumventing cosmetic surgeries [7].

Albutt et al. (2019) stated the many common challenges faced by private and not-for-profit organizations. These comprise the shortage of healthcare professionals, limited transportation, and hospital capacity, medical expenditure, and lack of cooperation between different medical specialties (see Table 1). In many cases, between private and public sectors, the private counterpart employs a higher number of healthcare workers, are generally smaller, and better equipped than public sectors [8]. For example, in Kenya, public and private health sectors are well developed. However, patients are pursuing cosmetic surgeries abroad. The reason behind that may be a lack of specialists and poor marketing pertaining to esthetical procedures performed in Kenya [9].

Quality of plastic surgery services and comparison with urban access

Despite similar qualifications, there exists a huge disparity in training and expertise between rural and urban plastic surgeons in Africa (see Fig. 1) [18]. Patients in urban Africa are more likely to have access to better skilled plastic surgeons who are capable of performing complex procedures because highly trained surgeons tend to gravitate towards urban areas where there is access to professional development opportunities and funding for sub-specialty programs are more robust (see Fig. 1) [18, 19]. Conversely, although while burn injuries, trauma, and other conditions requiring plastic surgeons are common in rural Africa, the quality of plastic surgical interventions performed there is negatively impacted by a lack of specialist training or, in some circumstances, by the complete lack of plastic surgeons [1, 17].

Another significant determinant of quality plastic surgery services in Africa is the availability of infrastructure and modern equipment. Generally, urban hospitals are equipped with better operating rooms, imaging devices as well as sterilization units, which are all enhanced factors towards improvement of quality in plastic surgeries they provide [1, 20]. Surgeons at the urban hospitals benefit from access to the latest technology including specialized tools such as laser devices, endoscopy instruments, and microsurgery kits which allows them to perform intricate plastic surgery procedures (see Table 2). These include neural or blood vessel reconstruction with greater accuracy and minimal risk of complications [21].

In contrast, hospitals in rural Africa are typically underfunded and may need outdated equipment or techniques to carry out their plastic surgery procedures often

Table 1 Geographic distribution of plastic surgery facilities in Africa (Rural vs Urban), focusing on the availability of plastic surgery services

Availability of plastic surgery services				
Region	Urban areas	Rural areas	Service availability gap	References
North Africa	High availability in major cities like Cairo, Tunis	Very low, limited to regional clinics, often none in remote areas	Large gap due to lack of infrastructure and specialists. < 1 specialist per 100,000 population in rural regions	[10]
West Africa	Moderate to high in cities like Lagos, Accra, Dakar	Low, with only basic surgical services, plastic surgery rarely available	Significant gap, especially in rural Nigeria (1 surgeon per 1.5 million people), and Ghana (severely limited rural access)	[11–14]
East Africa	High in Nairobi, with specialized centers	Minimal to non-existent, especially in rural Kenya	Major gap due to lack of facilities and resources. Rural regions often rely on periodic visiting surgeons	[14, 15]
Southern Africa	High availability in Johannesburg, Cape Town	Very low, mostly absent in remote rural regions	Substantial gap due to geographic isolation. In South Africa, 72 surgeons serve a population of 223 million, most in cities	[16]
Central Africa	Low to moderate in capitals like Kinshasa	Extremely low, often no facilities in rural or forested areas	Severe gap, with less than one surgeon per 100,000 population across most rural areas due to limited infrastructure	[8, 17]

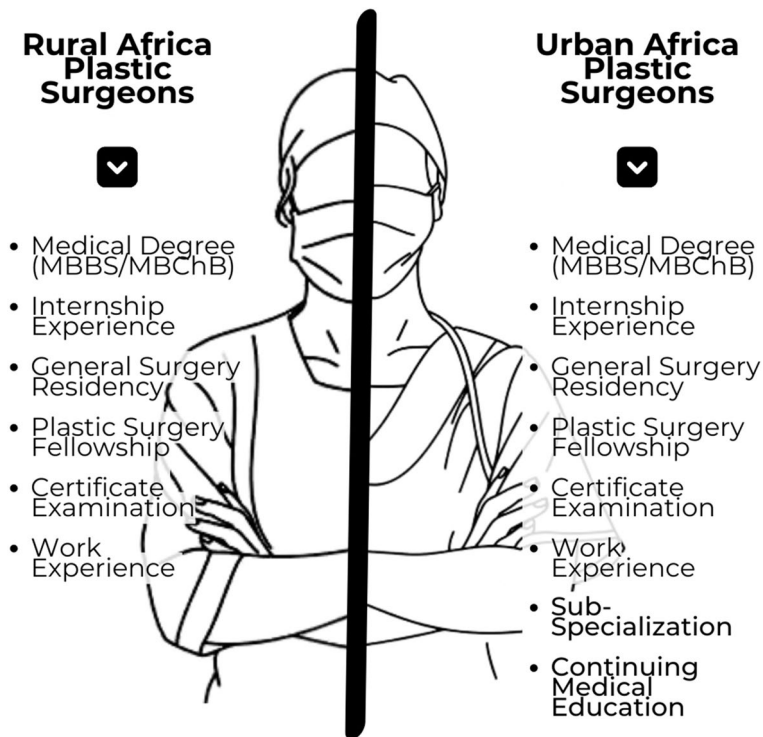


Fig. 1 Training levels of plastic surgeons in rural vs. Urban settings

sacrificing quality care in the process (see Table 2) [19]. This forces patients to make do with whatever alternative option is available or be transported over a long distance to get the required treatment [1].

It is also important to recognize patient satisfaction as a key metric to validate quality of service. Patients for plastic surgery in urban Africa hospitals generally show better satisfaction as the post-operative care systems allow

Table 2 Comparison of infrastructure and equipment in rural vs. Urban plastic surgery centers

	Urban Plastic Surgery Centers	Rural Plastic Surgery Centers
Operating Rooms	Equipped with state-of-the-art tools	Equipped with basic tools
Imaging Devices	High-resolution imaging	Outdated imaging devices
Sterilisation Units	Fully operational	Often outdated or inadequate
Specialized Tools	Microsurgery kits, laser devices, etc.	Unavailable
Emergency Facilities	Well-established and functional	Patient often require to be transferred

for better monitoring which ensures faster recovery time while rural Africa hospitals on the other hand, often lack the resources to do the same, giving more room for post-surgery complications and negatively impacting patient satisfaction [1]. Furthermore, patients are more likely to be given more comprehensive detail about their procedures, potential risks and expected outcomes in urban hospitals relative to rural hospitals, which is very important in managing patient expectations and satisfaction as well [22].

Factors contributing to disparities between urban and arural areas

Low-income-countries such as those in Southern Africa face a serious challenge due to the disparities in access to healthcare between rural and urban areas (see Fig. 2). The root causes and the factors contributing to this challenge

are many and may be documented in various health-care fields [23]. Plastic surgery is one of these fields that is marked by significant imbalance in services between rural and urban areas and driven by socioeconomic and cultural factors as well as policy and healthcare system challenges. Based on a study published in July 2022 to assess plastic and reconstructive surgery in Malawi, socio-economic factors such as education, costs, and accessibility highly affect the availability of plastic surgery services [24]. For example, patients heading to hospitals from rural areas to receive plastic surgery service such as for congenital anomalies and burns have to face the challenges of high transportation costs and unserviceable roads (see Fig. 2) [24].

Additionally, a lack of education and medical literacy is considered to be a barrier for receiving plastic surgeries and related care where for example traditional first

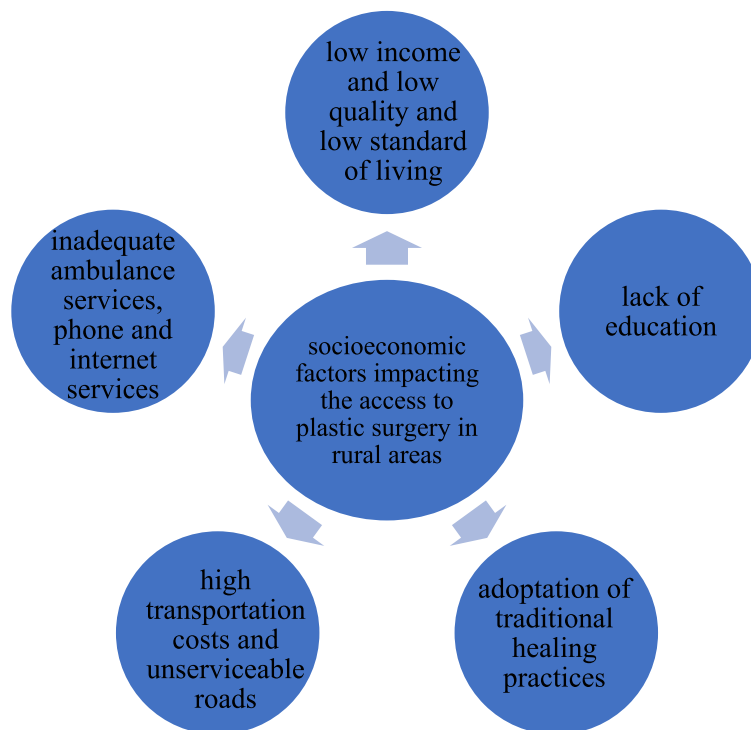


Fig. 2 Socioeconomic factors influencing access to plastic surgery in rural African areas

aid practices will be done for burns or traditional healer practitioners are reached to manage some cases (see Fig. 2). These practices are mainly seen in rural areas thus the authors have suggested increasing public awareness and outreach in these areas [24]. Rural areas also suffer from inadequate ambulance services, phone and internet services mainly due to the low incomes and low standards of living [25]. On the other hand, residents of the urban areas where specialized care centers are present are less likely to face challenges related to incomes and costs of travel [26]. Moreover, individuals living in urban areas have better education and opportunities of obtaining health information resources in comparison to those living in remote rural areas [27]. This increases the disparities in access to plastic surgery between rural and urban areas of Africa.

In addition, policies and healthcare system challenges can contribute to such disparities. Rural settings in South Africa suffer from lack of proper medical equipment and resources which affects both patients' treatments and training of healthcare professionals. Besides, shortage of staff including specialists is another factor that affects the quality of health care services (see Table 3) [25]. All these factors are influencing access to plastic surgery services. To add to this, in a study done by Truche et al. (2021), most of the identified plastic surgeons that responded to the survey were working in urban areas in comparison to rural areas in low-income-countries including the African Region [6]. This reflects the fact that medical professionals are highly concentrated in urban areas which leads to a discrepancy in access to plastic surgery between rural and urban areas (see Table 3). In terms of governmental policies, there is indeed a lack of appropriate policies to reinforce rural health services such as lack of training and medical insurance coverage in addition to inadequate infrastructure including electricity and water services [25].

Cultural issues are also a factor that play a role in healthcare inequality [25]. In the rural region, due to cultural norms and to the lack of education would affect

the uptake of orthodox health services and as a results patients can refer to traditional healers or domestic first aid practices to treat burns for example or any case that requires a plastic surgery. All these factors can explain the discrepancy in access and availability of plastic surgery between rural and urban areas of Africa (See Fig. 2).

Pontential innovative solutions and recommendations

To improve surgical care, developing training programs for healthcare workers, reducing patient medical costs, reinforcing travel amenities to facilitate transportation to regional hospitals, and installing community awareness are all warranted. Better working circumstances for affected personnel, training opportunities, and suitable hospital facilities meant that plastic interventions were being carried out by qualified healthcare professionals in the metropolitan homes of sub-Saharan Africa (SSA). In many cases, non-physicians with less training experience perform similar procedures in remote hospitals that lack diagnostic technology, surgical surplus, and suitable accommodation. Furthermore, non-professionals in rural locations are sometimes faced with delayed renovations, which frustrates and depresses them [26]. According to a study by Banda et al. (2019), there was insufficient care provided both peri- and post-operatively. This lack of healthcare personnel, surgical equipment, and patient monitoring is causing emerging nations to face a dismal outlook. It is advised that medical professionals and surgeons receive the appropriate training to enhance perioperative care. Healthcare practitioners should also be aware that plastic surgeons may perform certain surgeries locally with the assistance of other medical specialties, such as extremity replantation [28].

Telemedicine is a service that has been pivotal in fostering the abilities of healthcare providers to effectively take care of people without being where the patient is stationed at (see Fig. 3). It is defined as a whole collection of deliverables depicted to enable patients and their physicians via utilization of telecommunicating and electronic information technologies [29]. Telemedicine includes a

Table 3 Key policy and systemic challenges affecting plastic surgery services in rural and urban African areas. Source: Created by Rawan Nouredine based on Ngene et al., 2023

Challenge	Rural Areas	Urban Areas
Lack of resources	Limited availability of proper medical material and surgical equipment	Better access to technologies and materials
Shortage in professionals	Shortage of trained surgeons and nurses	Areas of concentration of healthcare professionals and specialists
Lack of medical insurance coverage	Most are poor with low-income class and no insurance	Better insurance plans
Lack of infrastructure	Lack of electricity and water services, lack of ambulances and poor communications	Better services and faster access to clinics

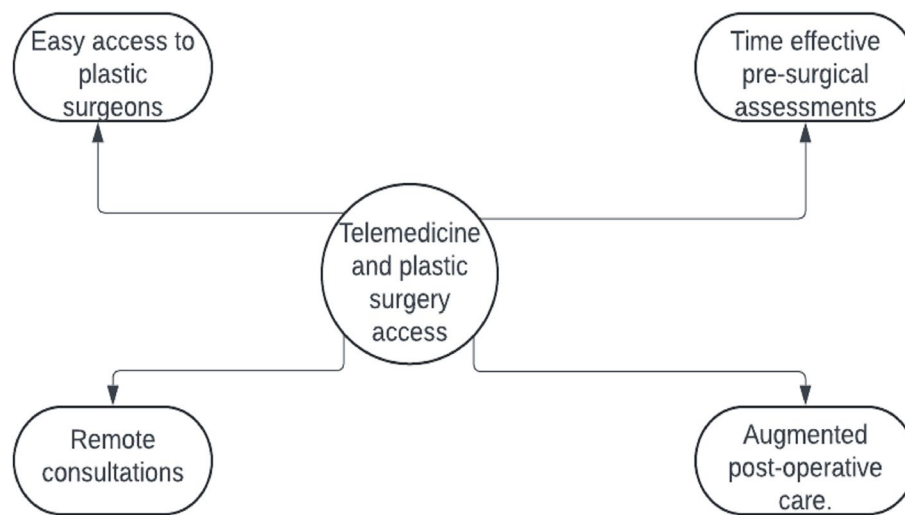


Fig. 3 A figure illustrating how telemedicine can enhance access to plastic surgery

broad range of applications both within and across medical specialties from a simple telephone to robots that can be conducted by surgeons many miles away from the operating rooms (see Fig. 3) [30]. During the novel coronavirus disease 2019 (COVID-19) pandemic telemedicine proved to be a reliable health-related service and its utilization was also adopted in the plastic surgery field in activities such as new patient consultations, pre-operative planning and post-operative follow-up [31]. Various disparities in access to health care between patients from urban and rural have been well documented, and the rising of telemedicine into the play has enabled the reduction of such disparities as patients from both urban and rural areas can have access to a diverse group of medical and surgical specialists [32].

An approximate population of 25 million persons in the United States do not have access to a plastic surgeon which results in sub-optimal care for the patients [33]. As an intervention to enhance the access to plastic surgery in urban areas, the implementation of mobile plastic surgery units has proven to be beneficial. Mobile plastic surgery units same as the mobile health clinic can be defined as a custom-built motor vehicle that travels to different communities providing healthcare services for instance plastic surgery services in this case [34]. There are various stories that depict the success in the use of mobile units to improve access to surgical care in rural areas, for instance the study that was done in Central India reports that over 4,317 patients with cleft lip/palate and post-burn contractures were well treated as an initiative of 60 mobile plastic surgery camps that took place in that region showcasing the role of mobile plastic surgery units [35].

Many surgeons reside in the urban healthy areas and this creates a gap in access to surgical care that in turn brings about maldistribution. To tackle this issue of inequity in access to surgical care, there is need for training local surgeons and involvement of well-trained plastic and reconstructive surgeons in rural areas. Various initiatives promoting the education of local medical professionals equips them with necessary skills, outreach programs for trained plastic surgeons enhance the sharing of knowledge and skill development, and fellowship programs foster enhanced training and expertise in rural areas, thus reducing the surgical disease burden [36]. Advancement of technology worldwide also stands as a pivotal strategy that can be used to enhance and promote trainings and expertise skills sharing through utilization of virtual training programs that would act as a link connecting plastic surgery experts from high income countries to trainees in low-income countries which can be regarded as underprivileged regions in the aspect of plastic surgery. These virtual training programs can utilize technologies like virtual and augmented reality since these technologies have proven to be superior to in-person trainings for both clinical skill acquisition and patient specific health outcomes [37].

Discussion

This review has highlighted the disparities in access to plastic surgery services between rural and urban areas in Africa, underscoring the broader challenges faced in providing healthcare to underserved regions. The access to the plastic surgery services in rural Africa is limited by a range of socioeconomic and cultural factors, including inadequate education, professional shortages, lower

income levels, insufficient funding, and a lack of essential infrastructure and medical equipment. Establishing well-equipped surgical centers is crucial, but these initiatives must coincide with and come after primary healthcare infrastructure expenditures, which serve as the cornerstone for long-term gains in specialized medical services.

Addressing these multifaceted challenges requires a deliberate, multi-pronged approach to ensure equitable access to care. One of the strategies that could help retain plastic surgeons in rural areas is providing economic and career incentives. Providing financial incentives such as rural hardship allowances and housing subsidies could make rural practice more attractive. In addition to that, providing opportunities such as continuing education and professional advancement, would play an important role in retaining talent in rural areas. Urban surgeons usually create subspecialties because of their greater access to cutting-edge technology, a more varied patient base, and more chances for professional advancement, even if board-certified plastic surgeons in rural and urban locations have comparable credentials.

Rural surgeons must be prepared to handle a range of healthcare requirements by receiving both generalist and specialized training in order to address this imbalance. Providing funding for healthcare infrastructure in rural areas is essential. This could be done by establishing well-equipped surgical centers with adequate medical supplies, reliable power sources as well as improved transportation would support a sustainable healthcare environment that facilitates providing plastic surgery services in African rural areas. Other strategies that can help in having plastic surgery services in rural areas as it is in urban areas is task-sharing and training for general surgeons. By providing training on basic plastic surgery techniques, this could help to meet urgent needs in rural areas and enable general surgeons to perform necessary plastic surgeries, where specialist services are not available. Such task-sharing initiatives should be supported with robust oversight and mentorship to maintain high standards of care. Furthermore, since telemedicine and mobile surgical units can facilitate the work in this field, it is essential to develop it more in the needed areas to improve the patient's outcomes. Telemedicine can facilitate pre- and post-operative consultations, enhance diagnostic accuracy, and provide real-time support for rural practitioners. Also, a collaboration among plastic surgeons in urban and rural regions to ensure a better understanding of the complex procedures. In addition to that, involving partnerships with international training bodies, including the development of an African Plastic Surgery College could facilitate training, mentorship,

and resources for surgeons practicing in rural settings, hence, facilitate establishment of an African Plastic Surgery College. This initiative could also foster research and innovation tailored to the unique challenges faced in low-resource settings, ensuring that solutions are context-specific and sustainable.

Limitations of the review

While this review provides valuable insights; it is limited by several factors. First there is limited or incomplete data between urban and rural areas, which can limit the comparison of the availability of plastic surgery services among the regions. The studies included in our review can differ in the quality, where some studies might be of high quality, while others of low quality with a small sample size or outdated data. Also, our review might have excluded some regions due to the geographic variation, with a possibility of bias since each country in the African region might have a distinguished healthcare system and plastic surgery terms' implementations among the urban and rural areas, which can constraint the comparison between the two. Moreover, since the plastic surgery field can cover many aspects, such as reconstruction or cosmetics, it might have been a bit hard to specify the covered aspect in each comparison between urban and rural areas in our review. Future research should focus on narrowing these gaps by incorporating more robust data collection methods, region-specific analyses, and an emphasis on actionable solutions tailored to different African contexts.

Conclusion

In conclusion, it is highly recommended to accomplish more studies to focus on the disparity of plastic surgery services between urban and rural areas. The access to specialized care such as professionals and fundings should be achieved in rural regions. A better infrastructure, a more advanced technology, and good training programs should be implemented in the rural African regions to improve the patient care. Moreover, a focus on the telemedicine and mobile surgical units in the plastic surgery field can facilitate the patient's access to all the necessary services. By prioritizing these efforts, significant strides can be made toward equitable access to quality plastic surgery services across Africa.

Abbreviations

HCM	Hospital Central de Maputo (HCM)
AJOL	Africa Journals online (AJOL)
MBBS	Bachelor of Medicine, Bachelor of Surgery degree
MBChB	Bachelor of Medicine, Bachelor of Surgery degree
COVID-19	Coronavirus diseases of 2019

Supplementary Information

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Supplementary Material 1

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Ethics approval and consent to participate

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Consent for publication

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Competing interests

The authors declare no competing interests.

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