Clinical and Experimental Optometry

ISSN: (Print) (Online) Journal homepage: www.tandfonline.com/journals/tceo20

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To cite this article: Uchechukwu Levi Osuagwu, Tuwani Rasengane, Godwin O Ovenseri-Ogbomo, Naomi Nsubuga, Pirindhavellie Govender, Thokozile I Metsing, Sylvester Kyeremeh, Khathutshelo Percy Mashige, DIakité Daoudu, Bernadine Ekpenyong, Stephen Ocansey, Osamudiamen McHillary Ogiemudia, Obialo Iwunze Osigwe, Joseph Afonne, Andrew Wekesa, Oforbuike Onyebuchi Ike, Cynthia Odoemena, Precious Ngozi Uwagboe, Edith Daniel-Nwosu, Isaura Ilorena d'Alva Brito dos Santos, Andrew Uma Omaka & Kovin Shunmugan Naidoo (02 Feb 2025): Mapping the landscape of optometric education in Sub-Saharan Africa, Clinical and Experimental Optometry, DOI: 10.1080/08164622.2024.2446473

To link to this article: https://doi.org/10.1080/08164622.2024.2446473

Published online: 02 Feb 2025.

CLINICAL AND EXPERIMENTAL OPTOMETRY
https://doi.org/10.1080/08164622.2024.2446473

RESEARCH

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Mapping the landscape of optometric education in Sub-Saharan Africa

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ABSTRACT

Clinical relevance: Advancements in optometric education are essential for addressing the global burden of visual impairment by ensuring a well-trained workforce capable of delivering quality eye care services.

Background: The number of optometry schools in Sub-Saharan Africa has significantly increased since 2000, reflecting a growing awareness of the role of optometry in addressing the burden of vision impairment. This report provides a comprehensive overview of the current status, challenges, and opportunities within optometry education in the region.

Methods: A cross-sectional survey was conducted from April 28 to 31 May 2024. Data were collected from 32 out of 39 optometry schools across 12 Sub-Saharan African countries, yielding a response rate of 82.1%. Heads of optometry schools provided information on student enrolment, graduates, academic staffing, curriculum, and technological resources through a standardised Excel spreadsheet.

Results: Over 75% of the schools were established post-2000, with Nigeria accounting for over 40% of them. Student enrolment numbers ranged from 50 students in Zimbabwe to 3,945 in Nigeria. The curricula varied significantly from 3-year Bachelor degrees (BSc) to 6-year Doctor of Optometry (OD) degrees, with five countries offering postgraduate training. Key challenges included inadequately qualified academic staff, low staff-to-students ratio, and a lack of government recognition and regulation. The use of Learning Management Systems (LMS) was inconsistent, with Moodle being the most commonly used platform.

Conclusion: The expansion of optometry education in Sub-Saharan Africa represents a positive development, enhancing the eye health workforce. However, to fully realise the potential of these developments, the implementation of standardised educational frameworks, enhanced regulatory support, and increased investment in developing faculty and technological resources are essential. Collaboration and knowledge-sharing across countries can further strengthen optometric education and practice, thereby reducing the burden of visual impairment in the region.

ARTICLE HISTORY
Received 25 July 2024
Revised 16 December 2024
Accepted 17 December 2024

KEYWORDS
Africa; education; eye care services; optometry; Sub-Saharan Africa; training

Introduction

Optometric education in Africa has evolved significantly since the establishment of the first institution in 1930 in South Africa[1] with an increase in the number of optometry schools in Sub-Saharan Africa since then. This evolution of optometric education in Africa highlights the increasing recognition of eye care as an integral component of primary health and acknowledges the significant burden of visual impairment and blindness in Africa. Cataracts, refractive errors, and glaucoma are the leading causes of visual impairment,[2] and their impact is exacerbated by limited access to eye care services and inadequate human resources.

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Many African countries face challenges such as insufficient resources, inadequate training facilities, and a shortage of qualified professionals, all of which hinder the provision of optometric service.[2,3] Despite these challenges, recent advancements in educational infrastructure, policy initiatives, and international collaborations are making significant progress in addressing these issues. These efforts are fostering the development of a more robust and comprehensive framework for optometric education across the African continent.[4]

Optometric education continues to evolve in Sub-Saharan Africa, marked by the establishment of new optometry programs in 12 countries. Most recently, during the African Council of Optometry (AFCO) meeting in Uganda in September 2024, it was announced that a new optometry program has been established in the Democratic Republic of Congo. Optometric education in Africa encompasses a diverse array of training programs, ranging from certificate courses to doctoral degrees and fellowship programs.[5,6] These programs are designed to equip students with the knowledge and skills needed to conduct comprehensive eye examinations, diagnose and manage ocular diseases, prescribe corrective lenses, and provide preventive eye care at different level of competencies.[7]

The establishment of graduate programs in optometry also provides an opportunity for equipping students with knowledge and skills to engage in research to advance vision science. Curricula often integrate theoretical and practical components to ensure graduates are well-prepared for clinical practice. Despite progress, challenges persist, including disparities in educational standards across countries, limited funding for optometry programs, lack of sufficiently trained faculty, and limited opportunity for continuous professional development.[8–10] Furthermore, the integration of optometry into national healthcare systems varies widely, impacting the ability of optometrists to practice to the full extent of their training.[6,11]

This paper aims to provide a comprehensive overview of optometry education in Sub-Saharan Africa, focusing on its current state, progress, challenges, and opportunities for future development, to help understand the status of optometry education in institutions in the African region.

Methodology

Study design

A cross-sectional survey was conducted, involving the heads of optometry schools in the Sub-Saharan Africa region as participants. Representatives from 15 optometry schools attended a meeting by the Center for Eye Care and Public Health Intervention Initiative (CEPHII). Participants were briefed on the objectives and procedures of the study. Informed consent was obtained from all attendees. For those unable to attend, emails detailing the meeting resolutions were sent, and consent to participate in the survey was obtained before their inclusion in the study.

Ethical considerations

The study was approved by the Center for Eye Care and Public Health Intervention Initiative (CEPHII) and ethical approval was obtained from the Humanities and Social Sciences Research Ethics Committee of the University of KwaZulu Natal Durban South Africa (HSSREC/00004715/2022). Participation was voluntary, and confidentiality were maintained throughout the study.

Data collection

Data collection was conducted from April 28 to 31 May 2024, and included only schools of optometry in Sub-Saharan Africa. Short courses and other informal training programs in optometry were excluded from the study because these informal training courses may only be in place on an ad hoc basis to meet specific human resource and project needs. A spreadsheet was prepared to collect comprehensive information on various aspects of optometry education from each participating school. Weekly reminders were sent to the school representatives to ensure high response rates. The spreadsheet included the following four main fields

School information

This included the name of the school, country, year of establishment, number of student enrolments per year, number of graduates since inception, total number of graduates per year (using the previous year as an estimate), and total number of students currently enrolled.

Academic and staff information

These covered degrees offered, duration of study in years for each degree, number of full-time staff (teaching optometry students), number of part-time staff (teaching optometry students), and number of non-optometry staff involved in teaching (e.g., pharmacology, anatomy, physiology).

Technological and administrative information

This included the use of a learning management system (e.g., Blackboard, Canvas, Moodle),[12] name and contact details of the head of school/department/college of Optometry for verification of information if needed, challenges faced by the institution and the level of training according to the Global Competency-Based Model of Scope of Practice in Optometry categories 1–4 of the World Council of Optometry (WCO). These four categories are summarised as follows:

Category 1: Optical Technology Services (OT) = Management and dispensing of ophthalmic lenses, ophthalmic frames and other ophthalmic devices that correct defects of the visual system.
Category 2: Visual Function Services (VF) = Optical Technology Services, plus Investigation, examination, measurement, diagnosis and correction/management of defects of the visual system.
Category 3: Ocular Diagnostic Services (ODx) = Visual Function Services, plus Investigation, examination, and evaluation of the eye and adnexa, and associated systemic factors, to detect, diagnose and manage disease.
Category 4: Ocular Therapeutic Services (OTx) = Ocular Diagnostic Services, plus Use of pharmaceutical agents and other procedures to manage ocular conditions/disease.[12] The WCO has however recently reviewed the

Global Competency for Optometry to reflect World Health Organization (WHO) Eye Care Competency Framework (2022).[13] The 2024 WCO Global Competency for Optometry grouped optometry competencies into five broad categories curriculum domains namely; refractive error, visual function assessment, ocular health and ocular disease, public health and professional practice.[14]

Professional and regulatory information

This included the scope of care provided by the graduates, whether the optometry profession is integrated into the public sector of the country concerning employment opportunities, government recognition of optometry programs, scope of practice (country legislation based on the Global Competency-Based Model categories 1–4 of WHO), and regulation of optometry in the country (existing legislation, name of regulatory body if applicable).

Data analysis

Data was collated and checked by authors OU and OOG to ensure completeness. Where information was incomplete or additional clarification was needed, this was requested from the school representatives. The ratio of current student enrolment to staff (all teaching staff included) was calculated. Descriptive statistics, frequencies, percentages, ratios, and means/averages were used to summarise the data collected and analysed using SPSS statistical software V29 (IBM Corp Armonk, NY, USA) and Microsoft Excel. The results were presented in tables and figures to highlight key findings.

Results

School information

Requests for information were sent to 39 optometry schools across Sub-Saharan Africa, with 32 schools responding, yielding a response rate of 82.1%. The countries with optometric training institutions that participated in this study included Ethiopia, Ghana, Kenya, Nigeria, Zimbabwe, Malawi, South Africa, Uganda, Mozambique, Mali, Somalia, and Côte d'Ivoire (Figure 1). Nigeria had the highest number of optometry schools ($n = 14$), followed by South Africa ($n = 4$). Table 1 shows the distribution of optometry schools according to the official language of the responding countries.

The first optometry school in Sub-Saharan Africa was established in 1930 in South Africa at the Technikon of Witwatersrand (TWR) in Johannesburg, where the optometry program was initially offered as a diploma. In 2005, the TWR optometry program merged with the optometry program at the Rand Afrikaans University (RAU), founded in 1985, to become the University of Johannesburg Department of Optometry. Data on the establishment dates of the optometry schools revealed that 25 (78.1%) of the 32 schools providing this information were established after 2000 (Figure 2).

Student enrolments

In 2024, the total number of enrolled students in each country for which data were provided ranged from 50 in Zimbabwe to 3,945 in Nigeria (Figure 3). One of the 14 schools in Nigeria did not report its student enrolment figures.

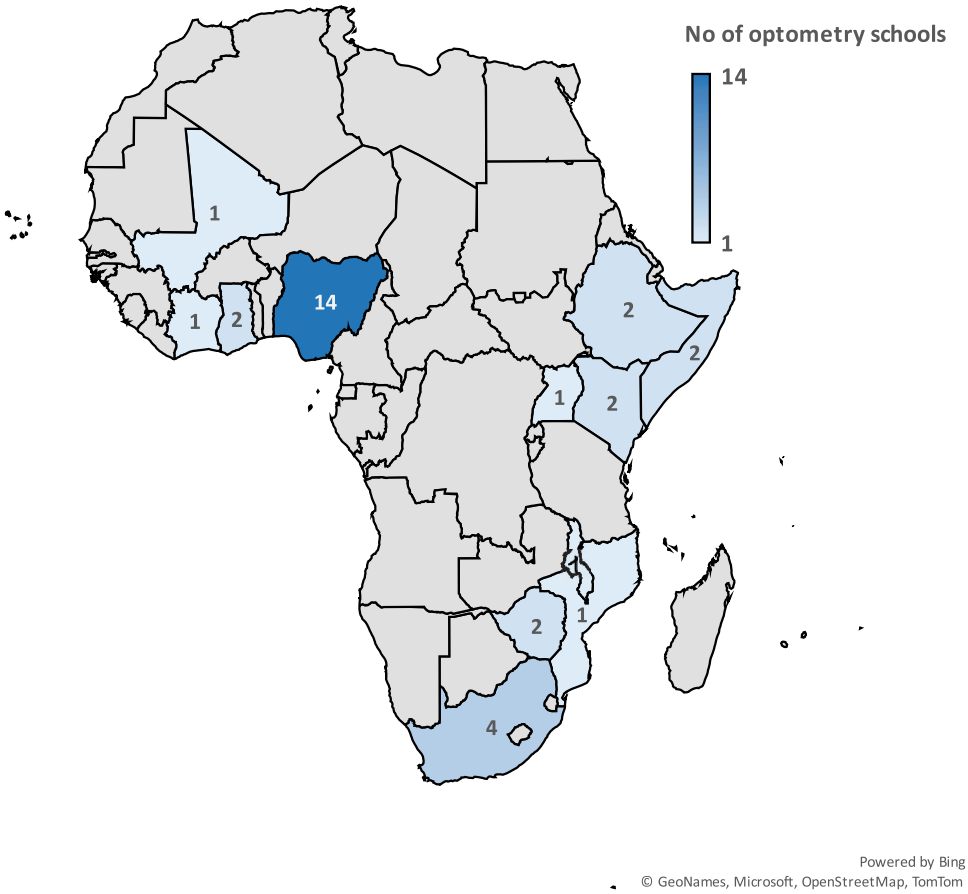

Figure 1. Distribution of optometry schools in Sub-Saharan Africa. The grey area shows countries without responses or optometry training schools.

Table 1. Number of optometry school according to official language of the responding country.

Anglophone	Francophone	Arabic	Lusophone
Ethiopia (2)	Mali (1)	Somalia (1)	Mozambique (1)
Ghana (2)	Côte d'Ivoire (1)	Sudan*	
Kenya (2)			
Nigeria (14)			
Zimbabwe (2)			
Malawi (1)			
South Africa (4)			
Uganda (1)			

No in parenthesis indicates the number of optometry school in each country.
*The authors are aware of optometry school in Sudan, although no response was obtained from the representative of the school.

Graduates

Institutions from 10 countries provided data on the estimated number of graduates since inception, which ranged from 66 in Mali to 8,920 in Nigeria (Figure 4). Only five schools in Nigeria provided data on the estimated number of graduates since the inception of their optometry programs. Six schools in Nigeria, established from 2018 to the time of reporting, have yet to graduate any students because of the 6-year duration of the OD program in Nigeria.

A total of 71 students have graduated from the two schools in Zimbabwe which commenced optometry program in 2018. Of the four optometry schools in South Africa, one did not report the number of graduates. From the figure, the annual estimate for Uganda (100) was obtained using the average of 20 graduates per year for five years (effective four years after the establishment of the program to 2023). For South Africa, the estimate for the University of Johannesburg was calculated from 2006, when TWR and RAU were merged and based on an estimated average of 45 per year and for the University of KwaZulu-Natal, it was estimated based on an average of 40 graduates per year effective from 1983, 4 years after the establishment of the program.

The third school in South Africa reported a total graduation figure of 450 since its inception in 2002. The reported number of graduates from the two optometry schools in Ghana is 941 since their inception.

Academic and staff information

Most of the institutions offer the 4-year BSc or Bachelor of Optometry (BOptom) degrees, except for those in Mali and Eritrea, which offer 3-year BSc degrees, and in Ghana and Nigeria, which offer the 6-year OD degrees. One of the two schools in Kenya offered the 4-year BOptom degree until 2017 when they reviewed their curriculum and began offering the 5-year Bachelor of Optometry (BOptom) degree.

The duration of the BSc Optometry program in Mozambique was 4 years from 2009 to 2019. Following a comprehensive curriculum review, the program duration was extended to 4.5 years starting in 2020. This extension was implemented to provide additional practice time and distribute the course load more evenly across semesters. This change was implemented after consultations with students and external stakeholders, and by reviewing curricula from other countries. Additionally, schools in five countries offer postgraduate qualifications, including Masters (Ethiopia and Kenya) and PhDs (Ghana, Nigeria, and South Africa).

The number of full-time teaching staff reported for each country ranged from two in Uganda to 96 in Nigeria. Two schools in Nigeria and one in South Africa did not provide data on the number of staff in their programs. The distribution of full-time and part-time staff is presented in Figure 5. The part-time staff includes non-optometry lecturers from other departments who teach optometry students, as well as optometry lecturers who do not hold full-time teaching positions. It should be noted that the two institutions in Ethiopia do not have part-time teaching staff.

In Table 2, the ratio of currently enrolled students to teaching staff for each participating optometry school with available data is presented. It showed that, on

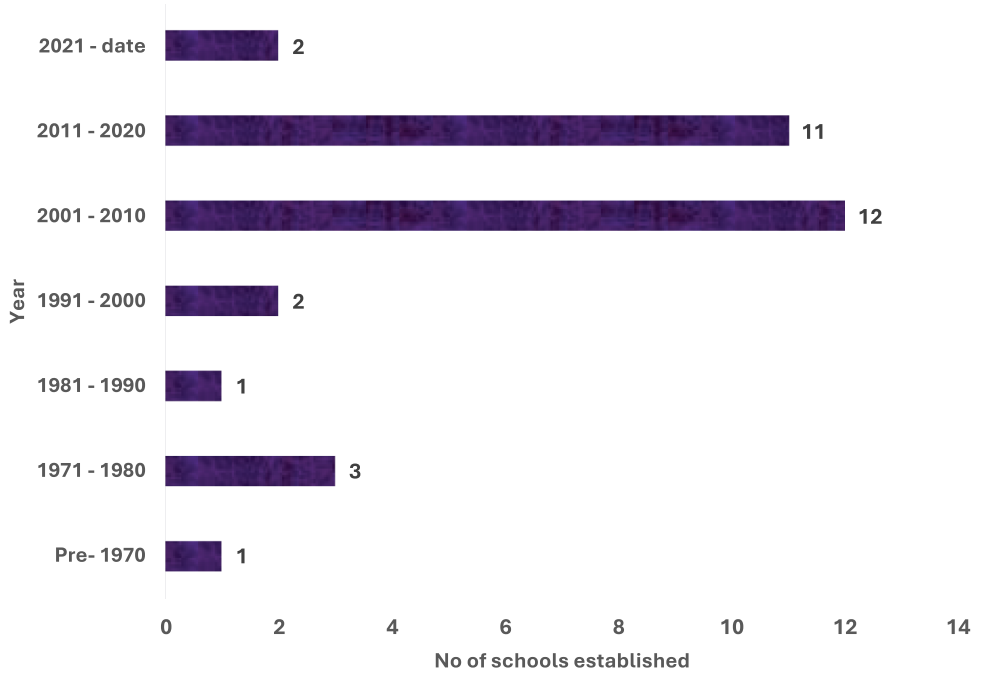

Figure 2. Trends in the number of schools established in Sub-Saharan Africa.

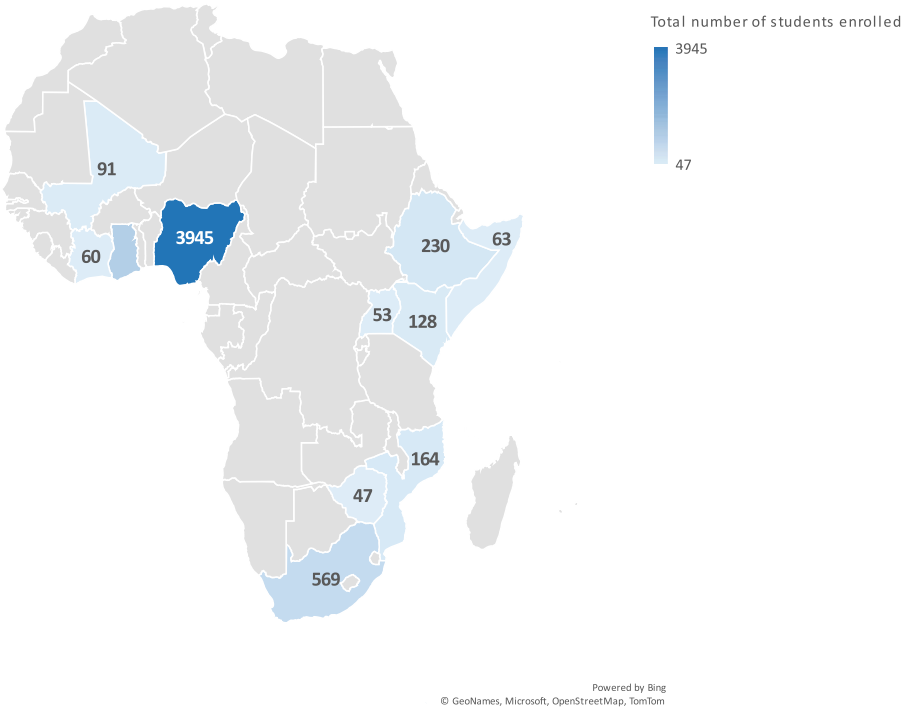

Figure 3. Number of enrolled students in each country. One school in South Africa and Nigeria, respectively did not report the number of enrolled students in their school. The current student enrolment for Ghana is 968.

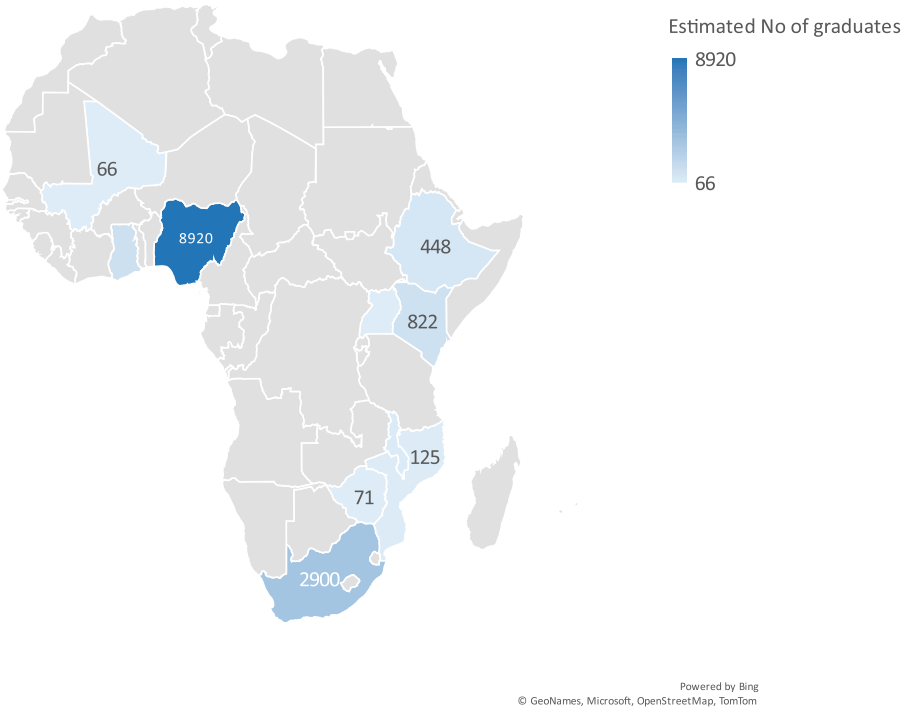

Figure 4. Estimated number of graduates from optometry schools in each country.

average, the Nigerian optometry schools had the highest student-to-staff ratio (31:1) which varies widely across institutions within countries. At the University of Ilorin in Nigeria, the student-to-staff ratio was as high as 37:1 and as low as 1:9 at Novena University. In South Africa, the student-to-staff ratio was as high as 15:1 at the University of Johannesburg and as low as 8:1 at the University of KwaZulu Natal. By contrast, the school in Mozambique had approximately one student per staff.

Technological and administrative information

Some institutions reported using different LMS, including Moodle and Blackboard. Table 3 shows the distribution of LMS platforms used by the number of optometry schools in Sub-Saharan Africa that provided this information. The most used LMS platform was Moodle (nine schools, 28.1%), and a significant number of institutions do not utilise any LMS (14 schools, 43.8%). Since these tools can be used for teaching, learning, and assessment, it was assumed that they were

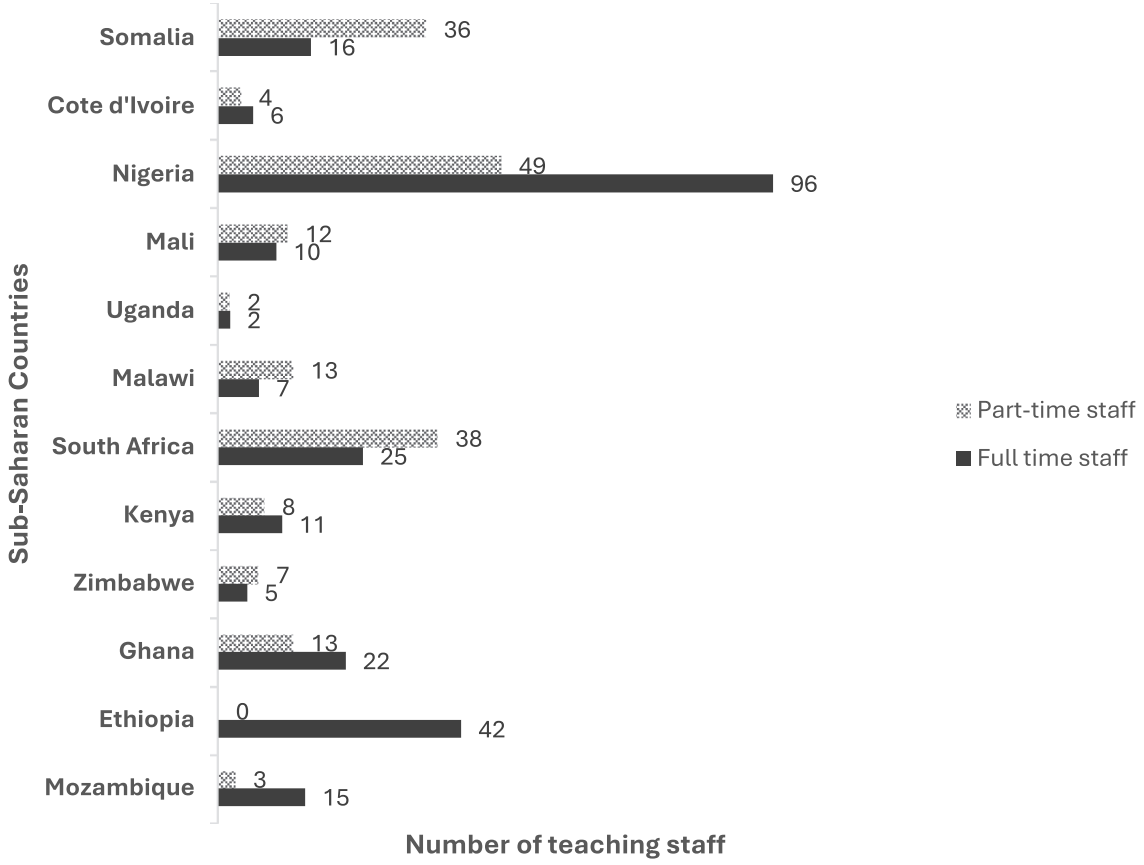

Figure 5. Distribution of full-time and part-time staff reported for ten countries in Sub-Saharan Africa.

Table 2. The ratio of students to staff by optometry schools in Sub-Sharan Africa.

University in Sub-Saharan Africa	Ratio of student to staff
University of Ilorin, Nigeria	37.2
University of Benin, Nigeria	32
Federal University of Technology Owerri, Nigeria	23.3
Kwame Nkrumah University of Science and Technology, Ghana	18.3
University of Johannesburg, South Africa	15.1
Makerere University, Uganda	13.3
University of Cape Coast, Ghana	11.6
Masinde Muliro University of Science and Technology, Kenya	9.1
University of the Free State, South Africa	7.5
Adalmedical Uuniversity, Somalia	7
University of KwaZulu Natal, South Africa	7
University of Gondar, Ethiopia	6.7
Isfop optique Optometrie, Côte d'Ivoire	6
University of Zimbabwe	4.3
Hawa Sub-Saharan Africa university, Ethiopia	4.3
Bindura University of Science Education, Zimbabwe	4
Novena University, Ogume, Nigeria	1.9
Bayero University, Kano, Nigeria	9.5
Universidade Lurio, Faculty of Health Science, Mozambique	1.4

Table 3. Distribution of educational tools used by optometry schools in Sub-Saharan Africa.

Learning Management System Used	Frequency (%)
Moodle	9 (30.0)
Blackboard	2 (6.7)
Canvas	2 (6.7)
Muele	1 (3.3)
Not specified	2 (7.7)
None	14 (67.7)
Total	30 (100.0)

deployed for these purposes; however, this information was not explicitly reported.

Challenges

Optometry programs in Sub-Saharan Africa continue to face several challenges, including attracting experienced academics with PhD, inadequate equipment, and low remuneration rates (Figure 6). Most of the countries reported that they practice at Category 4 of the World Council of Optometry (WCO) scope of practice, which includes optical technology services, visual function services, ocular diagnostic services, and the use of pharmaceutical agents and other procedures to manage ocular conditions/diseases (Ocular Therapeutic Services) except Zimbabwe, Kenya, Uganda, Mali, and Côte d'Ivoire which did not report on their scope.

Professional and regulatory information

Information on the professional and regulatory status of optometry is shown in Table 4. Optometry schools in six countries provided professional and regulatory information. In Mozambique the optometry profession is regulated by an ophthalmology body with report that they are working towards independent recognition and regulation of the profession. In South Africa, optometrists generally practice at WCO Category 3 with a limited number of optometrists who have obtained additional qualifications practicing at Category 4. In Côte d'Ivoire, there was no report of the scope of optometry practice and government regulation of the

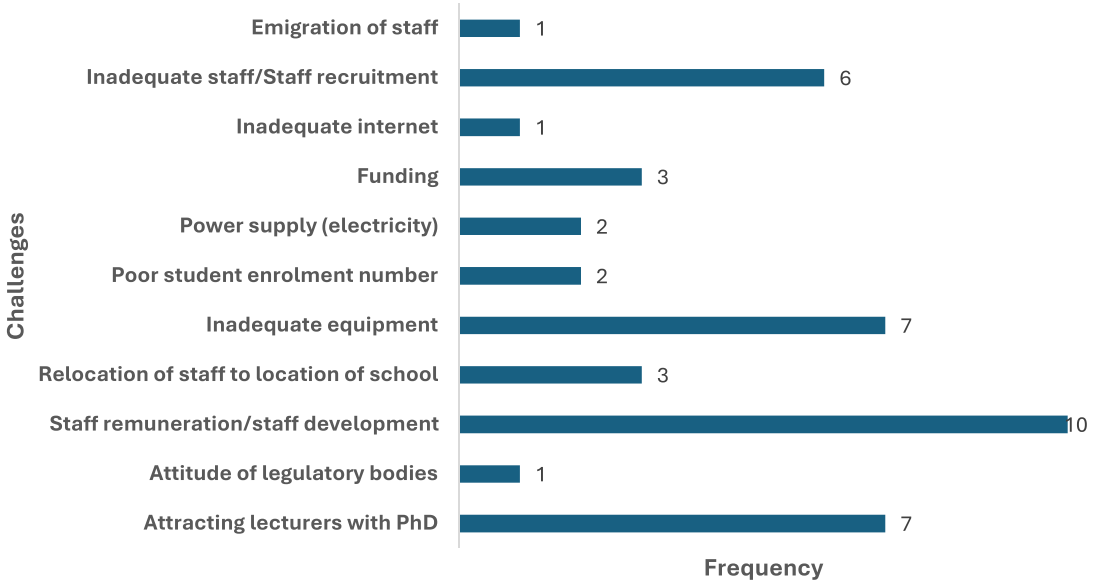

Figure 6. Challenges faced by optometry schools in Sub-Saharan Africa.

Table 4. Professional and regulatory status of optometry in seven countries.

Country	Scope of Care	Optometrists embedded in public service	Government recognised	Government-regulated	Regulatory body
Ghana	Category 4	Yes	Yes	Yes	Allied Health Professions Council
Malawi	Category 4	Yes	Yes	Yes	Medical Council
Nigeria	Category 4	Yes	Yes	Yes	Optometrists and Dispensing Opticians Registrations Board of Nigeria
South Africa	Category 3	Yes	Yes	Yes	Health Professionals Council
Mozambique	Category 4	Yes	Yes	Yes	National Ophthalmology Program department, Ministry of Health of Mozambique
Somalia	Category 4	Yes	Yes	Yes	National Eye Health Unit, Ministry of health and Human Services Somalia
Côte d'Ivoire	NR	Yes	NR	No	

NR = not reported.

profession, although optometrists are embedded in the public service sector.

Discussion

This study provides a general overview of the current state of optometric education in Sub-Saharan Africa, highlighting significant growth in the number of training institutions since 2000. Several factors may explain the increase in the number of optometry schools. These include a growing awareness of the role of optometry in eye care, the expansion of optometry's scope from a focus on optics to a broader healthcare profession, increased government recognition and regulation, and challenges in securing admission to medical schools. Research has shown that many optometry students initially preferred a career in medicine.[15,16]

One study reported that up to 87% of fifth- and sixth-year (clinical) optometry students who did not initially choose optometry had applied to study medicine.[15] With 32 out of the 39 contacted schools participating, the data reflects an 82.1% response rate. The findings indicate a notable increase in student enrolments and a corresponding rise in the number of qualified optometrists, which is crucial for addressing significant burden of visual impairment in the region. Despite these advancements, challenges such as the need for more training institutions, the significantly high student-to-staff ratio especially in Nigeria and South Africa, and the variability in duration of the optometry programs and staffing remain.

The high ratio of student to staff in these optometry schools has implications for the mental well-being of the staff (increased risk of burnout).[17,18] These findings underscore the critical need for educational frameworks which emphasises standardised program outcomes and competencies, enhanced regulatory support, and the integration of technological resources to further enhance the quality and accessibility of optometric education across Sub-Saharan Africa. The effective use of LMS can improve accessibility to optometric education by providing opportunities for remote delivery of lectures and enhance continuing professional development.[19]

Increase in the eye health workforce in Sub-Saharan Africa

Although formal training of optometrists in Africa began in South Africa in 1930, followed by Nigeria in 1972, there were only a few training programs for optometry until after 2000 when significant growth of optometry schools occurred. This expansion of the number of optometry schools across Sub-Saharan Africa, notably Nigeria, reflects the increasing

awareness of the role of optometry in addressing the burden of vision impairment.[20]

Despite this increase, there are still a few African countries that do not have formal training of optometrists. Africa is still lagging in the number of optometrists required to meet the WHO target of 1 optometrist to a population of 250,000.[21] Given the increasing number of optometry schools in Sub-Saharan Africa with increasing number of graduates, it is expected that this may lead to closing this optometric workforce gap in the region.

The increasing number of optometry schools has resulted in increasing student enrolment and the number of qualified optometrists who provide eye care services, thus addressing the eye health workforce needs of Sub-Saharan Africa. Notwithstanding this increase and the positive impact the proliferation of optometry schools is having in the delivery of eye care services, there continues to be the challenge of a shortage of optometrists in Sub-Saharan Africa, especially in the rural areas, which carries a disproportionate burden of visual impairment.[4,22]

Several factors may have contributed to this continuing dearth of optometrists in the region including the lack of government recognition and regulation of optometry,[4,18,23] the absence of a formal scheme of service for optometrists in the public service,[23,24] and the emphasis on the commercial model of optometry rather than the health care model.[25,26] This commercial emphasis often lead to the migration of optometrists to urban centres for profit, resulting in an unequal distribution of the available workforce.[27] It also means that many experienced optometrists may not opt to become faculty members in the optometry schools which as reported as a challenge in some of the countries.

In the present study, only six countries reported that the optometry profession is regulated, recognised, and integrated into the public service in their countries (Table 4).

Regulatory and professional challenges

The study identified significant challenges in some countries such as Mozambique, where optometry is regulated by the ophthalmology department of the Ministry of Health.[28] This is a barrier with the potential to limit the autonomy of optometry practice. An interdisciplinary model of regulation such as exists in Nigeria and Ghana where the regulatory authority comprise of optometrists, ophthalmologists and other health care professions is advocated. In Kenya, there is no formal recognition of optometry profession. In these settings, optometrists frequently lack involvement in national eye health policy discussions, thereby limiting their influence on the scope and practice standards of the profession.

Having a formal regulation of the optometry training ensure that the training offered are in line with the approved scope of practice and that the training programs equis the trainees with the competencies to provide optometry care. This will help to safeguard the visual health of the community and prevent visual impairment.

Additionally, the emigration of highly qualified optometrists exacerbates the workforce shortage, as these professionals seek opportunities abroad (the *japa* syndrome in Nigeria).[29] To address this, the relevant authorities should develop a definite policy that seeks to attract and retain highly qualified optometrists to academia. This can be achieved through various models such as what is in place for medical consultants and senior legal professionals in Nigerian medical and law schools. Medical consultants in teaching hospitals in Nigeria are allowed to retain the professional role in the teaching hospital while holding a teaching role in the medical school with additional remuneration.

Despite the expansion of optometry institutions over recent decades, there has been an unequal distribution of optometry institutions across linguistic lines, with a predominance in Anglophone countries, which further exacerbates access disparities. This limited expansion affects the availability of optometric education and, consequently, eye care services in Francophone and Lusophone regions.

There is also the challenge of not providing sufficient evidence to underscore the integration of optometry into health systems in Sub-Saharan Africa as has been done elsewhere. For example, the evidence that there was good agreement between optometrists and ophthalmologists in glaucoma decision-making led to the increasing role of hospital optometrists in glaucoma co-management in the UK.[30,31] There is also the problem of inadequate research infrastructure for optometry to generate the evidence for this initiative.

Variable curriculum and staffing challenge

Similar to previous reports,[5,6] the study highlights significant variability in optometry curricula across Sub-Saharan Africa, with programs ranging from 3-year BSc to 6-year OD degrees. The variation in the duration of the programs also relates to the program outcomes. For example, in Ghana and Nigeria where the optometry program is run as a 6-year OD degree, optometrists qualify with therapeutic rights whereas those in countries running the 4-year BSc degrees need to undertake additional certificate training to be able to use ocular therapeutic agents. This disparity complicates the standardisation of qualifications and hinders workforce mobility across borders. It also impacts the exchange of academic staff and the quality of optometric training. This is because a qualified optometrist in one jurisdiction (say with 3 years optometry training) may not be considered adequately trained or sufficiently qualified in a country with 5- or 6-year OD program. Staffing challenges are significant, with a marked shortage of core optometry lecturers, particularly those with higher academic qualifications.

A key challenge highlighted in this study was the distribution of optometry schools according to the language spoken in the different countries in Sub-Saharan Africa as depicted in Table 1. The proliferation of optometry schools in the region may have been influenced by the official language of each country. Francophone Africa has been influenced by the French educational system. In that context, ophthalmology is seen as the provider of refractive services and optometry is often not included in the national human resources plan for eye care. In Anglophone Africa, optometry is often recognised irrespective of the scope of practice across their borders.[32]

The limited staff number indicated by the high student-to-staff ratio has implications for the mental health of the faculty. In a systematic review of burnout among university academic staff, authors revealed that staff exposure to high numbers of students is a strong predictor of burnout.[33] Academic staff who feel high exhaustion from academic work are 64 times more likely to suffer depersonalisation than those who did not feel exhaustion from academic work[17] which may impact

their quality of teaching and the capacity to sustain robust training programs. Institutions face difficulties in attracting and retaining experienced academics with PhD, a challenge compounded by inadequate remuneration and insufficient resources.[34]

Technological and administrative resources

The utilisation of LMS demonstrates considerable variability across educational institutions, with Moodle being the predominant platform. However, a significant number of schools do not use any LMS, which limits their ability to deliver education effectively[35] particularly during disruptions like the COVID-19 pandemic. The pandemic highlighted the importance of online platforms in maintaining educational continuity despite restrictions on physical gatherings.[36] More so, this variability can further limit the exchange of resources across borders. Adapting curricula to incorporate online and virtual learning tools has significant long-term implications for optometry education. This adaptation demonstrates the potential of blended learning models, which integrate online and face-to-face instruction. Such flexibility can enhance the resilience and accessibility of educational strategies, thereby making optometry training more adaptable to future challenges.

Notwithstanding the limited use of LMS as reported in this study, there is increasing anecdotal evidence to show that more optometry school in Sub-Saharan Africa are adopting digital technologies to enhance delivery of optometric training. For example, during the COVID-19 pandemic, lecture materials were sent out to students on social media platforms. There appears to be a growing trend towards the use of e-books, potentially driven by the assumption that youths today are more inclined towards digital technology than traditional printed materials. Beyond ensuring inclusive and equitable education for all, digital technology is also reported to be environmentally-friendly.[19]

Data gaps and challenges in optometry education in Sub-Saharan Africa

The survey revealed significant data availability gaps among Sub-Saharan Africa optometry schools. Despite an 82.1% response rate from 32 out of 39 schools, critical data on student enrolments and graduate numbers were inconsistently reported. For instance, one of the 14 schools in Nigeria did not report its student enrolment figures, and only five schools in Nigeria provided data on the estimated number of graduates since inception highlighting the inconsistency in data reporting. Additionally, the number of full-time teaching staff varied widely, with some schools not providing this information. Similarly, some of the countries did not provide information on their scope of practice. Technological resources and the use of LMS also varied, with many institutions not utilising any LMS.

These data gaps are some of the challenges facing optometry programs in Sub-Saharan Africa, in addition to attracting experienced academics with PhD, inadequate equipment, and low remuneration rates. The lack of comprehensive data hampers efforts to assess and address educational and professional needs in the region. Reliable data collection and analysis are crucial for developing effective health education programs and ensuring the equitable distribution of resources.[37] Furthermore, comprehensive data is essential for improving educational outcomes and institutional performance.[12]

Limitations of the study

One of the key limitations of this study is the reliance on information provided by key informants from the institutions, which may introduce bias as they are more likely to present their institutions in a favourable light. This might result in over-reporting or selective reporting of positive information. However, when in doubt, we confirmed by reaching out to other members of the country associations independently. Additionally, some institutions did not provide complete responses to all questions, resulting in data gaps, and this study did not include optometry schools from other subregions in Africa, potentially limiting its representativeness.

Non-response bias is also a concern, as institutions that did not respond to the survey might differ in significant ways from those that did, potentially skewing the results and limiting the generalisability of the findings. Additionally, the study does not provide longitudinal data that could offer insights into trends over time, which would be valuable for understanding the progress and evolution of optometry education in the region.

The study did not disaggregate the graduate figure in terms of graduate and postgraduate figures. As a result, the study could not provide evidence related to understanding faculty development. In addition, the impact of curriculum changes in terms of duration of the program such as in Kenya and Mozambique could not be determined in the present study.

A further limitation in this study is the use of number of academic staff in optometry rather the full time equivalent (FTE) to compute the staff-student ratio. This metric has the potential to overestimate this ratio. Also, data for countries with educational programs that train optometric technicians or assistants who may provide limited scope of optical services were not included.

Despite these limitations, the study has several strengths. It presents a valuable and contemporary overview of the structure of optometry education in Sub-Saharan Africa, utilising information from key informants across a diverse range of institutions. This comprehensive perspective provides insight into the challenges and opportunities within the field.

The study also highlights the significant growth and expansion of optometry schools in the region, which has a positive impact on the eye health workforce. By identifying key areas for improvement and potential solutions, the study provides a foundation for future research and policy development aimed at enhancing optometry education and eye care services in Sub-Saharan Africa.

Opportunities for future developments

The expansion in the number of optometry training institutions and the corresponding rise in graduates offer several prospects for the future advancement of the profession in Africa. There is a need for intensified advocacy for the recognition, regulation and licencing of the optometry profession across the continent. Retaining graduates within Africa and harmonising the expected graduate outcomes and

competencies will foster collaboration and mobility among professionals, thereby improving the overall quality of optometric education and practice.

Potential solutions to identified challenges

Addressing the challenges identified in this study requires a multifaceted approach. Government recognition and regulation of the optometric profession are pivotal. The establishment of national regulatory bodies and standardised accreditation processes is essential for ensuring uniform educational standards. Increasing investment in underserved areas is crucial for expanding the number of institutions and improving access to education, thereby enhancing eye care services and reducing the burden of visual impairment.

Collaboration between countries with established programs and those with emerging or no programs can facilitate knowledge transfer, resource sharing, and capacity building. These strategies can foster a more robust framework for optometric education across the continent, ensuring that all regions benefit from advancements in the field.

Areas for future studies

This exploratory study has highlighted several areas that require further research to better understand the current state of optometry education in Sub-Saharan Africa and across the continent. These areas include a thorough examination of the demographic makeup of optometry faculty, such as their qualifications and expertise; a comparative analysis of optometry curricula across the region; the influence of technology, including LMS, on the delivery of education; the role of regulation and quality control in optometry programs; and factors affecting the recruitment and retention of experienced optometry educators with PhDs.

Additionally, tracking the career paths of optometry graduates in Sub-Saharan Africa will be important for developing policies to strengthen the eye health workforce and meet eye care needs.

Conclusion

The expansion of the number of optometry schools in the Sub-Saharan Africa region represents a significant and positive development, contributing substantially to the eye health workforce. However, to fully capitalise on these advancements, there is a need for standardised educational frameworks, enhanced regulatory support, and substantial investment in technological resources.

Governments and stakeholders must prioritise the recognition and integration of optometry into national healthcare systems, ensuring equitable distribution of services and addressing inherent challenges facing the profession, including lack of government recognition and regulation of the profession. By implementing these measures, Sub-Saharan Africa can more effectively meet its eye care needs, reduce the burden of visual impairment, and improve the quality of life for its populations.

Abbreviations

BSc	Bachelor of Science
CEPHII	Center for Eye Health and Public Health Intervention Initiative
COVID-19	Corona Virus Disease 2019
LMS	Learning Management Systems
OD	Doctor of Optometry
RAU	Rand Afrikaans University
TWR	Technikon of Witwatersrand
WCO	World Council of Optometry

Acknowledgements

The authors would like to thank all the heads of schools who provided information for this paper.

Disclosure statement

No potential conflict of interest was reported by the author(s).

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