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## CLINICAL REVIEW

# Optometric Education in Africa: Historical Perspectives and Challenges

Olalekan A. Oduntan\*, Khathutshelo P. Mashige†, Franklin E. Kio‡, and Samuel B. Boadi-Kusi§

### ABSTRACT

The African continent, with a population of more than one billion and 55 recognized developing countries, is still grappling in some countries with socioeconomic and other challenges inherent in developing countries. The continent is working toward a single political entity known as the African Union, and development is taking place faster than ever in most countries. The continent is known to have high levels of health problems, including visual impairment and blindness. Most nations in the continent are making efforts to reduce the scourge of health problems including visual impairment and blindness. Visual impairment in the continent is mostly caused by refractive errors. Consequently, optometry can help reduce the prevalence of visual impairment on the continent. The educational programs currently offered by the different institutions include Diploma in Optometry (DipOptom), Bachelor of Optometry (BOptom), and Doctor of Optometry (OD). There are 17 established institutions offering optometry degree programs on the continent, of which 14 are fully accredited. Considering the optometric manpower needed in the continent, more optometry institutions need to be established. Staffing and infrastructural and training facilities are major challenges facing the majority of the existing institutions. There is also a need to place greater emphasis on postgraduate education to meet the institutional, national, and international professional training standards and to ensure sustainability of optometry education. This article addresses the historical development, educational issues, challenges, and needs, as well as recommendations, for improving the standard and sustainability of optometric education.

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Key Words: optometric education, optometry, quality assurance, harmonization, sustainability

### HISTORICAL BACKGROUND OF UNDERGRADUATE EDUCATION

More than a decade ago, Penisten<sup>1</sup> and Sheni<sup>2</sup> reported on the evolution of undergraduate optometric education in Africa. Others have reported on the establishment of institutions and educational training in Nigeria,<sup>3,4</sup> South Africa,<sup>5–7</sup> Ghana,<sup>8,9</sup> and Ethiopia.<sup>10</sup> However, more recently, optometry education on the continent has been evolving at a faster rate, and there have been changes in the programs offered at various institutions. The history and current status of optometry education in African

countries are presented here and update the past reports.<sup>1,2</sup> Several institutions have been established, several name changes have occurred, programs have been upgraded, and postgraduate programs have since been established. Also, information presented by other authors on individual institutions<sup>3–10</sup> is incorporated. Furthermore, several issues that have not been previously addressed such as challenges facing institutions, issues relating to quality assurance, licensure, postgraduate education, need for more institutions, appropriate geographical and urban-rural distribution, and sustainability of optometry education in the continent are addressed. The intent is to monitor and document developments taking place in optometric education in Africa.

### South Africa

Optometric education in Africa originated in South Africa in 1924 when 24 British-trained optometrists formed the South African Optometric Association. Its aim was to establish educational and training facilities and to implement legislation that excluded unqualified personnel.<sup>5</sup> The first optometry course was started at the Technikon Witwatersrand in 1924 as a 2-year part-time

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diploma course that was later upgraded to a 2-year full-time program and subsequently expanded to a 3-year diploma course and finally to a 4-year diploma in 1969.<sup>5</sup> This evolution was during the apartheid regime, and the program was exclusively for white South Africans.

A 4-year bachelor degree program was established for black South Africans in 1975 at the University of the North (now University of Limpopo, Turfloop campus), a rural location in the Northern Transvaal (now Limpopo Province).<sup>6</sup> In 1979, another 4-year bachelor degree program was established at the University of Durban-Westville (now a campus of the University of KwaZulu-Natal, Durban) to cater for the optometric education of Indian ethnic groups living in the country. The Durban-Westville program was followed in 1985 by another Bachelor (BOptom) program at the then Rand Afrikaans University (now University of Johannesburg), providing optometric education to white South Africans.<sup>11</sup> After the demise of the apartheid regime in 1994, a 4-year multiracial optometry program was established by the democratic government in 2002 at the University of Free State, Bloemfontein.<sup>11</sup>

There are currently four institutions in South Africa that produce an average of 120 optometrists every year. The several sociopolitical changes in the country after the end of apartheid included restructuring of higher education in 2004, leading to the merging of tertiary institutions.<sup>12</sup> The University of the North was merged with the Medical University of South Africa (Medunsa) to form the University of Limpopo, the University of Durban-Westville was merged with the University of Natal to form the University of KwaZulu-Natal, and the Technikon Witwatersrand was merged with the Rand Afrikaans University to form the University of Johannesburg. All institutions now accept students from different race groups, and attempts are being made to redress the racial imbalance in the admission of students into optometry programs as it is for other courses offered in the South African tertiary institutions.

## Nigeria

The first institution to offer a degree-awarding optometry program in Africa was the University of Benin, Benin City, Nigeria.<sup>2,3</sup> The department was established in 1970 to offer a 4-year Bachelor of Science (BSc) Honors degree program. This was followed by two other departments established at the University of Abia State, Uturu, in 1980, and at Imo State University, Owerri, in 1993. The Imo and Abia State Universities started with 6-year Doctor of Optometry (OD) degree programs and were the first institutions to offer the OD degree programs in Africa. Subsequently, the BSc degree at the University of Benin was upgraded to the OD degree in 1994. Another two universities have recently started OD degree programs in Nigeria. These are Madonna University (a private institution), which was established in 2006, and the Federal University of Technology, Owerri. The latter had offered a bachelor degree in the Optical Technology course since 1995 and was upgraded to offer the OD degree in 2010. Although the Madonna University program has received accreditation from the Nigerian University Commission (NUC) to produce optometrists, the Optometrists and Dispensing Opticians Registration Board of Nigeria (ODORBN), which regulates optometric education and practice in the country, has not accredited the program.

The program at the Federal University at Owerri is yet to be accredited by both the NUC and ODORBN. The three fully accredited institutions in Nigeria currently produce an average of 150 optometrists per year for a national population of about 170 million.

## Ghana

The establishment of formal optometry training programs in Ghana is credited to the late Mr. Francis K. Morny, a British-trained Ghanaian optometrist who subsequently obtained an OD degree in 1998, at the age of 75 years, from the Abia State University, Nigeria.<sup>9</sup> In 1988, Mr. Morny started the now defunct Premier College of Optometry in Kumasi as a private institution after several attempts to get the public universities to start an optometry program failed. The college trained and awarded certificates to refracting opticians who had acquired their skills as apprentices without any certification. In 1990, the Premier College of Optometry formally admitted five students who had completed their BSc degree in Ghanaian universities for a 1-year course in optometry.<sup>9</sup> As the college was not an accredited private institution,<sup>9</sup> Mr. Morny intensified his negotiation and consultations with professional optometry associations in Nigeria and other places between 1990 and 1991. This resulted in an Optometry program starting in 1991 at the Department of Physics, University of Science and Technology, Kumasi (now Kwame Nkrumah University of Science and Technology [KNUST]).<sup>8,13</sup> The program started as a 2-year postgraduate Diploma in Optometry (PGDipOptom) for those who had a bachelor's degree in any of the basic sciences. It was designed to prepare graduates to engage in basic optometric practice that would include comprehensive eye examinations, refraction, ocular disease diagnosis, referral, and treating limited ocular diseases in the interest of the public.<sup>8,13</sup> In 2000, the program at KNUST was upgraded to a 4-year BSc optometry program, and the first set of 18 students was admitted in 2001.<sup>9</sup> In 2002, the University of Cape Coast was established and admitted five students into a 6-year OD program. This was also engineered by Dr. Morny, who was also one of the founding faculty members.<sup>9</sup> In 2004, KNUST phased out its BSc program and admitted its first set of OD students at the beginning of the 2006 academic year. The first set of 18 BScOptom graduates was also readmitted to pursue the OD program. The institutions in Ghana currently graduate an average of 50 optometrists per year for a population of approximately 20 million.

## Sudan

Sudan has a population of approximately 35 million and started a refraction course in 1954 at Khartoum Eye Hospital, and this was subsequently upgraded to the Institute of Optometry and Visual Sciences, offering diploma courses. In 1997, the Institute joined the University of Al-Neelain and was upgraded to the Faculty of Optometry and Visual Sciences, offering a 5-year BSc Honors degree. A course was subsequently organized to upgrade the Diploma holders to a BSc degree. The Faculty of Optometry and Visual Sciences in Al-Neelain University is the only institution that offers the optometry program in Sudan.

## Tanzania

The Tanzanian optometry program was established in 1979 at the Kilimanjaro Christian Medical Center in Moshi, Tanzania. Although the program is one of the oldest optometric institutions in Africa, it still runs a 3-year diploma course in Optometry. The program is well established and considered to offer a quality optometric course. The authors hope to see this program upgraded to a 4-year BSc degree program in the near future.

## Ethiopia

Ethiopia has only one institution offering the Bachelor of Optometry (BOptom) degree. The program is located at the University of Gondar, Gondar, approximately 650 km north of the capital city, Addis Ababa. The optometry program, which forms part of the Faculty of Health Science, was started in 2005, and the first set of students graduated in 2008. The program produces an average of 16 optometrists per year for a national population of about 87 million.<sup>10</sup> The Department was set up by Mrs. Gemma Peters, an optometrist from England, in collaboration with an American nonprofit organization, ORBIS. The initial optometry teaching faculty consisted of two lecturers, Mrs. Peters and Ruhan du Plooy. Most of the lectures are offered to the students by guest lecturers. The department can significantly benefit from teaching and training resources from other African countries.

## Mozambique

Mozambique, with an estimated national population of 25 million, has one institution offering a 4-year BOptom degree. The department is located at the University of Lúrio (Universidade Lúrio) in Nampula City, northern Mozambique. The Optometry school was established in 2008 through the Mozambique eye care project, an Irish-Aid-funded initiative, involving partners from the Lúrio University in Mozambique and the International Centre for Eye Care Education (ICEE) (now the Brien Holden Vision Institute [BHVI]), in collaboration with the Dublin Institute of Technology and the University of Ulster. The aim of the project was to address the problems of avoidable blindness in Mozambique and across developing nations. The first set of nine students graduated in 2012.

## Malawi

The University of Mzuzu in Malawi started training professional optometric personnel in 2009, offering a 4-year bachelor's degree in Optometry (BOptom). The first set of six optometrists graduated in 2012, 13 students are expected to graduate in 2013, and 15 others are expected to graduate in 2014. These graduates will be great assets to the optometric eye care need in Malawi, a country with a population of approximately 16 million.

## Kenya

In an effort to fight against uncorrected visual impairment and avoidable blindness, the BHVI and the government of Kenya

collaborated in 2009 to establish a 4-year BSc degree at the Department of Optometry and Vision Sciences, Masinde Muliro University of Science and Technology at Kakamega county, 366 km from the capital city Nairobi. The current population of Kenya is estimated to be 44 million, and the seven pioneer students are due to graduate in 2014.

## Zimbabwe

Zimbabwe will join African institutions offering optometry within the next few months. Equipment has been purchased, and efforts are being made to recruit qualified academic staff. The 4-year BOptom program is to be established in the Department of Ophthalmology, University of Zimbabwe, Harare. This program will be a test of cooperation between ophthalmology and optometry in Africa.

The institutions providing optometric education in Africa are summarized in Table 1.

## EYE CARE EDUCATIONAL INSTITUTIONS

There are several nonoptometric eye care departments in Africa. However, they are noteworthy as they train personnel that offer some forms of eye care services and are potential future optometry schools. These include the departments in Mali, Zambia, Ivory Coast, and Eritrea. A 3-year course producing optometric technicians was established in Mali in 2009. The Optometry Technician course at Chianama College in Zambia was established with a deed gift from Vision Aid Overseas to Sightsavers Zambia. The course was intended to meet the current gap in optometric services in the country. Ivory Coast has a 2-year diploma course training opticians to perform refraction. It was started in 1998 and modeled after the French programs. A 2-year program was established in Eritrea in 2009 to produce optometric technicians. The BHVI is collaborating in the development of eye care programs in Cameroon and Uganda.

## UNDERGRADUATE CURRICULA AND LICENSURE

The current curricula for Optometry in Africa vary among institutions; some institutions offer a DipOptom, and others offer the BOptom or OD degree. The bachelor's degrees are generally in line with the British curricula, whereas the OD degrees were adapted from the American and/or Canadian curricula. Therefore, all essential optometry subjects are contained in the degree-awarding programs, although the proportion of subjects and course content vary in the different curricula. Further refinement of the curricula is necessary. This is because most countries in Africa have large rural areas, so there is a need to emphasize primary health care and eye health promotion in the curricula irrespective of the professional degree offered. In addition, there is a need to establish a national optometry curriculum and uniform credentialing mechanisms to ensure high standard optometric education.

The Optometric Examination Board established by the Ghana Optometric Association in 2009, with an initial membership of five,<sup>9</sup> is now made up of seven members consisting of two faculty members from each of the two training institutions, one person each from the public and private practice, and an executive

**TABLE 1.**

Various optometry institutions in Africa, year of establishment, country, and programs offered

Institution	Year established	Programs	Location/country	Region
University of Benin	1970	OD, MSc	Benin City, Nigeria	West Africa
Abia State University	1980	OD	Uturu, Nigeria	West Africa
Imo State University	1993	OD	Owerri, Nigeria	West Africa
Madona University	2004	OD	Elele, Nigeria	West Africa
Federal University of Technology	2010	OD	Owerri, Nigeria	West Africa
University of Limpopo	1975	BOptom, MOptom	Turloop, South Africa	Southern Africa
University of KwaZulu-Natal	1980	BOptom, MOptom, PhD	Durban, South Africa	Southern Africa
University of Johannesburg	1984	BOptom, MPhil, DPhil	Johannesburg, South Africa	Southern Africa
University of Free State	2002	BOptom, MOptom	Bloemfontein, South Africa	Southern Africa
Kilimanjaro Christian Medical Center	1979	DipOptom	Moshi, Tanzania	East Africa
Al Neelain University	1997	BSc (Honors), MSc, PhD	Khartoum, Sudan	Central Africa
Kwame Nkrumah University of Science and Technology	2000	OD	Kumasi, Ghana	West Africa
University of Cape Coast	2002	OD	Cape Coast, Ghana	West Africa
University of Gondar	2005	BOptom, MSc	Gondar, Ethiopia	East Africa
Universidade Lúrio	2008	BOptom	Nampula, Mozambique	Southern Africa
University of Mzuzu	2009	BOptom	Mzuzu, Malawi	Southern Africa
Masinde Muliro University of Science and Technology	2009	BSc (Optom)	Kakamega, Kenya	East Africa

member of the association.<sup>9</sup> In Ghana, optometrists are required to pass a licensing examination after successfully completing a 1-year postgraduation internship at any eye care facility outside the university.<sup>9</sup> All optometrists in Sudan are required to be registered with the Sudanese National Council for Medical and Health professions on successful completion of the prescribed examinations after the 2-year preregistration period.

## QUALITY ASSURANCE

Quality assurance processes in academic institutions are designed to critically assess and improve the quality of core academic activities, namely teaching, research, and community engagement.<sup>14</sup> Quality assurance is important in every educational setting to ensure the quality of the academic process (teaching, learning, examinations, etc.) as well as facilities and infrastructure.

In South Africa, the quality and standard of optometry education is regulated by the Professional Board for Optometry and Dispensing Opticians of the Health Professions Council of South Africa. In Nigeria, quality assurance rests with the NUC and the ODORBN. Whereas the NUC accredits each institution based on academic contents, physical facilities, staffing, staff and student welfare, library facilities, funding, as well as employers' reports on graduates, the ODORBN accredits based on professional and academic standards, staffing, clinical facilities, and students' clinical and practice exposure. Qualifying board examinations, just before or after graduation, have been recently suggested but are yet to be implemented. However, the ODORBN representatives are now represented at final clinical examinations of the institutions to observe their procedures and students' performance and competence.

In Ghana, regulating optometry practices has been a challenge. Until recently, when the Allied Health Task Force, chaired by an optometrist, was inaugurated by the government, the regulation

of optometry practice had been the quasi-duty of the Ghana Optometric Association. The Task Force has now registered almost all practicing optometrists in the country. It also assesses the infrastructure and curricula of the training institutions to ensure that they are up to national and international standards. Until the Health Profession Regulatory Bill, which was read in Parliament in December 2012, is passed, the regulation of optometry in Ghana will remain a challenge. The Bill seeks to establish an Allied Health Profession Council that will regulate optometry and other allied health workers registered with other Councils in the health sector. However, the National Accreditation Board, which accredits institutions and programs, periodically assesses and renews the accreditation of optometry programs as it does for other programs.

The Sudanese National Council of Medical and Health Professions approves and regulates optometry education and practices in Sudan. The Medical Councils of Ethiopia, Mozambique, and Malawi have approved the programs and curricula in each country. They are also responsible for quality assurance and management. In Kenya, the program has not yet been approved by the Kenyan Medical Council.

## POSTGRADUATE PROGRAMS

Only few institutions offer postgraduate optometry education in Africa, and this obviously would impact the standard of education and staff development. All institutions in South Africa offer postgraduate education in one form or another. The University of Johannesburg is the first institution to offer postgraduate optometry education in Africa. The Department of Optometry offers both the MPhil and DPhil degrees by research. The University of KwaZulu-Natal offers master's and PhD degrees by research. The University of Limpopo offers a master's (MOptom) degree by research, whereas the University of the Free State offers a master's

(MOptom) degree by coursework. Al Neelain University started the master's degrees by research and coursework in the year 2000, and 130 graduates have already graduated to date. The PhD degree was started in 2003, and six candidates have obtained doctorate degrees from the University. In Nigeria, the University of Benin has programs approved for the MSc and PhD degrees; however, only the master's program is currently operational. Ethiopia started a master's program by coursework in 2011, with collaboration of lecturers from South Africa, Nigeria, Australia, and local ophthalmologists.

No other institution in Africa currently offers postgraduate programs in Optometry; hence, academic staff from such institutions often go overseas (United Kingdom or America) to obtain PhD degrees or register for postgraduate Optometry degrees (master's or PhD) in South Africa. Others register for postgraduate degrees in basic sciences such as Biochemistry, Microbiology, or Physiology in their institutions.

### NEED FOR EXPANSION OF OPTOMETRIC EDUCATION IN THE CONTINENT

Ten percent of the world's population resides in Africa, yet the continent carries 19% of the world's blindness.<sup>15</sup> Refractive errors are major contributors to preventable visual impairment and blindness. Unfortunately, the optometrist-to-population ratio is low in virtually all African countries; estimated to be as low as 1:100,000 in some countries where there are no optometry schools. Even in countries with optometry schools, the ratios are below expectation (Ghana, 1:80,000; Nigeria, 1:71,000; South Africa, 1:17,000; and Sudan, 1:68,000). It is estimated that a ratio of 1:10,000 might be needed to reach a reasonable optometrist-to-population ratio, considering the great eye care need and the poor transportation system in most parts of the continent. These indicate a great and urgent need for more optometrists on the continent. This can only be achieved if more optometry departments are established, particularly in countries where they currently do not exist. Because of the poor optometrist-to-population ratios and the estimated optometric manpower that will be needed as the continent's population grows, we recommend that every country with 20 million or more people should have an optometry department in a tertiary institution, where such exists.

The inadequate number of optometry institutions in Africa is compounded by a geographical maldistribution of the institutions with regard to their rural-urban locations. For example, all the five institutions in Nigeria are located in the southeastern part of the country. In South Africa, the Universities of Johannesburg and Limpopo are located in the northwest, and the other two (KwaZulu-Natal and Free State) are located in the southeast, with no institutions in the northeast and the southwest. In addition to these national geographical maldistributions, there is also an imbalance in the rural-urban distributions of the optometry schools, with few institutions in the rural areas. In Ghana, the two departments are located one in the north and the other in the south. However, they are both located in the urban areas in the regional capitals of Kumasi and Cape Coast. The institutions in Sudan and Ethiopia offering optometry are located in cities. Similarly, those in Kenya, Mozambique, and Malawi are located

in cities. Because Africa is predominantly rural and optometrists are mainly located in cities, it is recommended that preference be given to the rural location of optometry schools. Also, it has been reported that graduates from rural origins are likely to go back to practice in the rural areas<sup>16–19</sup>; therefore, if all areas of Africa are to be adequately served by optometrists, optometry institutions should be distributed in both rural and urban areas.

### NEED FOR HARMONIZATION (PROGRAM AND CURRICULA)

While efforts are now being made at several strata to unite Africa politically, economically, and in security, education (including optometry) is one area where this commitment seems to be lacking. Although it would be preferable to harmonize optometric education on the continent, a major barrier to this is the variation in programs (Diploma, Bachelor's, and OD) in the different countries. Program harmonization would facilitate standardization of curricula across all the institutions and enhance monitoring of their educational course contents and quality. In 2005, the World Council of Optometry adopted the Global Competency-Based Model of Scope of Practice in Optometry, which provides a rational framework for addressing the challenges of harmonization [Editor's note: a recent update was made available in 2013 after acceptance of this article]. This document may ensure that optometrists become an accepted part of a truly comprehensive health care team by stimulating greater uniformity when applied to teaching syllabi and statutory definitions of the scope of practice. It may also help regulatory bodies ensure practitioner competency when faced with the migration of optometrists across national borders. The model includes four categories of clinical care<sup>20</sup>:

1. Optical technology services: Management and dispensing of ophthalmic lenses, ophthalmic frames, and other ophthalmic devices that correct defects of the visual system.
2. Visual function services: Investigation, examination, measurement, diagnosis, and correction/management of defects of the visual system.
3. Ocular diagnostic services: Investigation, examination, and evaluation of the eye and adnexa and associated systemic factors to detect, diagnose, and manage disease.
4. Ocular therapeutic services: Use of pharmaceutical agents and other procedures to manage ocular conditions/disease.

The model reconciles variations in the scope of practice and has become the entry-level threshold for the practice of optometry worldwide.<sup>20</sup> In addition, it complements the unifying principle that optometrists strive to provide comprehensive eye care for their patients. Three educational institutions accredited in Nigeria and two in Ghana offer the OD degree. Optometrists are permitted to perform comprehensive eye examinations, correct refractive errors, orthoptics, low vision, ocular first aid, and aspects of therapeutics. This places Nigerian and Ghanaian optometrists at the threshold of performing the four categories of eye care services. We hope to see other institutions in Africa offering the four categories of optometric services listed above. Also, global standard and progress will be ensured if optometric education authorities in

Africa would monitor whatever future modifications are made to the Global Competency-Based Model and apply them in their curricula.

In both South Africa and Sudan, certified optometrists currently practice ocular diagnostic services (category 3). In South Africa, the expansion of optometry's scope of practice to include ocular therapeutic services (category 4) has been approved by the regulatory body, the Health Professions Council of South Africa, with plans underway for the development of curriculum and assessment processes for the therapeutic course.

## CHALLENGES

### Staffing

Staffing is one of the many problems facing optometric education in Africa. It is expected that all University staff should hold master's and PhD degrees. A few staff members in most optometry departments do not have master's degrees. Currently, many university authorities on the continent expect lecturers to have PhD degrees; however, many staff do not have this credential, although many have registered for the degree. The situation is relatively better in South Africa, where the University of Johannesburg has the highest number ( $n = 4$ ) of PhD degree holders, followed by the University of KwaZulu-Natal ( $n = 3$ ), University of Limpopo ( $n = 1$ ), and the University of Free State ( $n = 1$ ). There are varying numbers of staff pursuing the PhD degree in each of these institutions. In Nigeria, only the University of Benin (Uniben) and Abia State University (ABSU) have PhDs on their teaching staff, three in Uniben and one in ABSU, whereas many more are in their final phase of PhD training in their institutions. In Ghana, there is only one PhD holder at the KNUST currently, whereas other staff have enrolled as PhD candidates at other universities such as in South Africa.

### Facilities

Limited equipment and infrastructure are problems facing some of the departments and affect the intake number into optometry programs, contributing to the low optometrist-to-population ratio. For example, at the University of Cape Coast in Ghana, the average annual first-year optometry intake has been approximately 16 students for almost a decade until the last 2 years when the number has doubled but with the same facilities, thereby increasing the workload of staff.<sup>9</sup> This enrollment figure is against the background that more than 1000 qualified students apply for the program yearly. Inadequate clinical and laboratory facilities have continued to pose great challenges to some of the institutions.

## SUSTAINABILITY OF OPTOMETRIC EDUCATION

To ensure the sustainability of optometric education in the continent, certain timely steps need to be taken. Staffing is a major problem that threatens optometry education because master's and PhD degree holders are needed in many of the existing departments. Furthermore, the continent needs many more optometry departments; therefore, more qualified optometric educators are needed not only in existing institutions but in those that will be established in the future.

For optometry education to be sustained in Africa, drastic steps must be taken to boost postgraduate education, and existing institutions that offer this qualification must seriously consider ways of expanding their student intake and output. Because South Africa currently has the manpower and facilities to train postgraduate students, staff from departments in other countries should consider registering for postgraduate education there. An alternate option is for the established institutions to attract manpower that are able to run postgraduate education programs up to the PhD level from other countries. As soon as each institution has enough manpower to train postgraduate students using these two options, they should also establish postgraduate programs for their own future needs and for those of anticipated additional optometry departments elsewhere in their countries. This is the only way that optometric education in Africa can expand and be maintained at a high academic standard. Governments and academic institutions need to focus on postgraduate education in Africa to meet the future optometry educational manpower and eye care needs of the continent.

## CONCLUSIONS

Although optometric education in Africa started in the second decade of the 20th century, degree education did not start until the seventh decade. Optometry institutions in Africa run varied academic programs, namely DipOptom, BOptom, and OD degrees. It will be of interest to see the continent offer a single program. The lack of sufficient optometry academic institutions to meet the current needs and those anticipated in the future is seriously affecting the provision of services for the many people who need them across the continent, particularly those in rural areas. The challenges facing the profession need to be addressed with urgency if this situation is to be changed not only in the short-term but also for a growing continental population and their future needs. The shortage of postgraduate education opportunities not only affects the credentialing of academic staff members but also threatens the sustainability of optometric education in the continent.

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