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President's Lecture

International collaboration in training human resources for eye care: Early lessons from CBM programmes in Sub-Saharan Africa

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ABSTRACT

The global burden of vision impairment is rising, affecting at least 2.2 billion people, with over 1 billion cases preventable or untreated. Sub-Saharan Africa (SSA) faces a “double deficit”: high levels of avoidable blindness and a severe shortage of trained eye-health personnel. While global initiatives advocate integrated, people-centred eye care (IPEC), they offer limited practical guidance on developing and maintaining the necessary workforce. This article outlines CBM's approach to strengthening human resources for eye health (HReH) in SSA through international collaboration. It highlights simulation-based surgical education, postgraduate ophthalmology scholarships, and subspecialty training partnerships. Collaborating with ministries of health, universities, and eye-care institutions, CBM aims to increase the number, skills, and distribution of eye-health workers. Key initiatives include a Lavelle-funded, multi-country simulation programme for cataract and glaucoma surgery at the University of Cape Town and partner centres; a proposed national

simulation training initiative in Nigeria with HelpMeSee; postgraduate scholarships for African ophthalmologists; and partnerships with LV Prasad Eye Institute, Children's Vision Fund, and the International Ophthalmological Fellowship Foundation (IOFF). By early 2025, the simulation project had trained 118 ophthalmic surgeons and twenty-four trainers. Follow-up surveys with 200 trainees found that 93% reported increased surgical confidence, 78% experienced fewer complications, and 74% saw improved postoperative visual outcomes. The scholarship programme has supported 140 doctors, with 102 completing residency, 34 in training, and four discontinuing. CBM's experience suggests that coordinated investments in simulation training, regional postgraduate education, and fellowships can expand the eye-health workforce and enhance the quality of care. Integrating these initiatives within national health systems and aligning with IPEC and 2030 In Sight provides a practical pathway to translate eye-health strategies into workforce-focused implementation.

Keywords: *Human resources for eye health, cataract surgery, simulation-based training, ophthalmology education, sub-Saharan Africa, CBM, universal health coverage.*

INTRODUCTION

Globally, avoidable vision loss has become a significant public health issue. According to the World Health Organisation (WHO), more than 2.2 billion people experience near or distance vision problems, with more than 1 billion cases that could have been prevented or remain unaddressed.¹ The main causes of blindness and visual impairment worldwide are uncorrected refractive errors and cataracts.^{1,4} These issues predominantly impact older adults and individuals in low- and middle-income countries, leading to significant consequences for education, economic productivity, safety, and overall quality of life.^{2,5-8}

The demand for eye care services is increasing significantly due to factors such as an ageing population, lifestyle changes, and improved survival rates from chronic illnesses.^{2,9} The World Report on Vision emphasises that maintaining the current approach is inadequate to address these issues and advocates for adopting Integrated People-Centred Eye Care (IPEC) as the ideal model, integrated within robust primary health care and universal health coverage systems.⁹ Likewise, the Lancet Global Health Commission on Global Eye Health underscores that enhancing eye care is vital to achieving the Sustainable Development Goals and urges a redefinition of eye health as both a health issue and a development priority on the international stage.²

In sub-Saharan Africa (SSA), a significant obstacle is the lack of human resources for eye health (HReH).¹⁰ Recent research shows that most SSA countries have only about 2.5–2.7 ophthalmologists per million people, well below the VISION 2020 goal of at least 4 per million and far fewer than the roughly 76 per million in high-income nations.¹¹⁻¹³ These shortages result in longer wait times for eye care services, persistent cataract surgical backlogs, and noticeable access disparities between urban and rural areas.^{14,15}

Despite clear workforce shortages, recent global plans have largely remained vague about how to develop, sustain, and distribute the eye health workforce necessary for large-scale IPEC

delivery.¹⁶ The International Agency for the Prevention of Blindness (IAPB)'s 2030 In Sight strategy and a related *Eye* journal commentary emphasise the importance of viewing vision as a vital socio-economic development issue, integrating eye health into broader health systems, and increasing consumer demand for eye care.¹⁷ They explicitly acknowledge the need to train and build a diverse, resilient workforce to achieve these objectives.¹⁸ Yet these broad frameworks allow considerable flexibility for countries and organisations to develop practical, context-specific solutions tailored to their particular needs and health system contexts.¹⁹

Christian Blind Mission, an international development organisation, has worked for many years with governments, training institutions, and local groups across Africa, Asia, and Latin America to address the HReH gap.^{20,21} Its current Inclusive Health Initiative focuses on prioritising HReH within efforts to deliver integrated, inclusive eye care from the community level to tertiary care, ensuring that persons with disabilities are not left out.²²

This article draws on internal programme data and experiences from CBM-supported initiatives to outline a multifaceted approach to training human resources for eye care in SSA. It focuses particularly on:

1. Simulation-based surgical training at the University of Cape Town (UCT);
2. A proposed national simulation-based training programme in Nigeria;
3. A regional postgraduate ophthalmology scholarship scheme; and
4. Subspecialty and mid-level training partnerships with institutions such as LV Prasad Eye Institute (LVPEI), alongside the Jones Foundation-funded Children's Vision Fund project and a collaboration with the International Ophthalmological Fellowship Foundation (IOFF) to facilitate training.

These experiences are discussed in the context of the emerging evidence base for simulation-based training in ophthalmology and of current global policy frameworks for eye health and Universal Health Coverage (UHC).

CBM'S APPROACH TO HUMAN RESOURCES FOR EYE HEALTH

CBM's work on HReH is grounded in principles that closely align with WHO's integrated people-centred eye care framework and the *Eye care in health systems: Guide for action*^{1,9}:

- (a) **Partner-led and system-oriented** programmes are designed and owned by national ministries of health, universities and hospitals, with CBM providing catalytic technical and financial support rather than creating parallel systems.^{20,23}
- (b) **Integrated and district-focused** training emphasises team-based care across cadres (ophthalmologists, clinical officers, nurses, optometrists, rehabilitation workers) and across levels of care, from community outreach and primary care to tertiary services, in line with CBM's inclusive eye-health model and its broader Inclusive Health Initiative.^{20,22}
- (c) **Quality and patient safety:** CBM-supported programmes prioritise competency-based curricula, simulation-based surgical education and structured supervision, consistent with evidence that intense simulation-based training improves cataract surgical competence and reduces complications, and with WHO competency frameworks.^{11,19}
- (d) **Equity and inclusion** are pursued by coordinating trainee selection and deployment with governments to address geographic maldistribution and to expand access for underserved rural populations and people with disabilities, reflecting both CBM's commitment to disability-inclusive eye health and WHO's emphasis on equitable, people-centred services.⁹

Within this framework, CBM supports a portfolio of mutually reinforcing initiatives including intense simulation-based training, long-term ophthalmology residency scholarships, subspecialty fellowships and targeted capacity building in paediatric eye care and mid-level cadres to expand HReH in Africa and other low- and middle-income settings.^{21,23}

These investments aim to enhance both the quantity and quality of eye health personnel, strengthen regional training institutions, and contribute to more resilient eye health systems in the Global South.^{11,23}

SIMULATION-BASED SURGICAL TRAINING AT THE UNIVERSITY OF CAPE TOWN

Project overview

In 2022, CBM, the University of Cape Town (UCT), and the London School of Hygiene & Tropical Medicine launched a project titled 'High-impact simulated ophthalmic surgical training in sub-Saharan Africa'. The three-year initiative (April 2022–March 2025) was funded by the Lavelle Fund for the Blind and aims to mainstream simulation-based surgical education across a network of regional training centres. (*Programme details in this section are drawn from CBM internal Programme data.*)

Key objectives included:

- Establishing a digital classroom at UCT, equipped with an Eyesi surgical simulator and multiple wet-lab stations using synthetic eyes.
- Training at least 90 ophthalmic surgeons through intense simulation courses in manual small-incision cataract surgery (MSICS), phacoemulsification and glaucoma surgery.
- Training 15 faculty members as simulation trainers to sustain and scale up the model.
- Embedding simulation into national and regional curricula through partnerships with universities and professional colleges.
- Evaluating the impact of simulation training on surgical competence, complication rates and patient visual outcomes.

Lavelle Fund for the Blind has granted follow-up funding for three years (2026–2028) to expand training at UCT and to pilot follow-up coaching of 15 trainees at their hospitals.

Outputs and early outcomes

By early 2025, internal programme monitoring showed that the project had:

1. Trained more than 118 ophthalmic surgeons, surpassing the original target of 90. Figure 1 presents details of the training

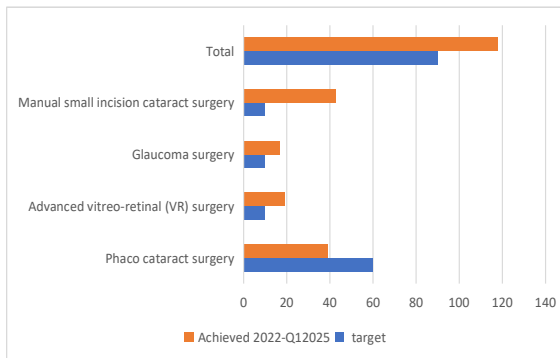


Figure 1: Cumulative number of ophthalmic surgeons trained through the simulation programme compared with original targets, 2022-2025

targets and their achievement by target area.

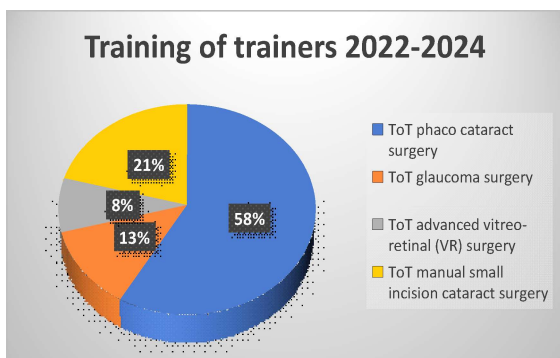


Figure 2: Percentage of faculty trained as simulation trainers by speciality

2. Trained 24 faculty members as simulation trainers, exceeding the target of 15 (Figure 2).
3. Attracted participants from a wide range of roles (approximately two-thirds consultant ophthalmologists, one-sixth residents/registrars, and smaller proportions of medical officers and ophthalmic clinical officers) and from multiple countries across East, Central, Southern and West Africa, as shown on the map of Africa in Figure 3.
4. Established a network of training centres to embed simulation training, with functional digital classrooms and simulation training rooms in each partner centre, as shown in Figure 4. UCT helped establish the other training centres in the network with



Figure 3: Geographic distribution of simulation-course participants across East, Central, Southern and West Africa

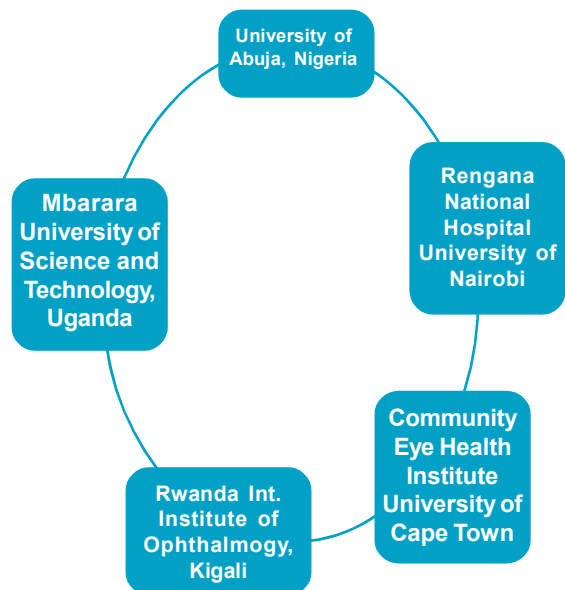


Figure 4: Network of simulation training centres

consumables, materials, and equipment, through mentorship and by facilitating exchange visits.

To understand the medium-term impact on practice, a survey of 200 trainees was conducted three to forty-eight months after course completion, with data collection completed in late 2024. Preliminary analyses indicate that:

- **93%** of respondents felt their surgical confidence had increased.
- **78%** reported a decrease in complication rates in their cataract surgery.
- **74%** observed improved postoperative visual outcomes among their patients.

Trainees also reported substantial positive effects on career progression, including increased readiness to take on complex cases, assume leadership roles in theatre, and serve as trainers for junior colleagues.

However, the survey also highlighted several persistent barriers to fully realising the benefits of simulation:

- Limited access to simulation facilities in home institutions;
- Inconsistent supervision and mentorship in live surgery;
- Competing clinical service pressures that restrict time for practice and reflection.

These findings align with broader research emphasising the need for systemic changes—such as protected training time, dedicated simulation facilities, and faculty development to integrate simulation effectively into standard ophthalmology education.^{11,24}

PROPOSED NATIONAL SIMULATION-BASED TRAINING PROGRAMME IN NIGERIA

Building on lessons from the UCT initiative, CBM and the non-profit organisation HelpMeSee have developed a national simulation-based training programme for Nigeria, where cataract remains a leading cause of avoidable blindness and surgical coverage is uneven across regions. The project is scheduled to begin in 2026.

The proposed model includes:

- Establishment of three simulation training centres in Nigerian universities and teaching hospitals, each equipped with high-fidelity cataract surgery simulators provided by HelpMeSee and fully equipped dry labs.
- A training-of-trainers (ToT) component for at least eight Nigerian faculty members, delivered by master trainers from HelpMeSee and CBM partners.

- A target to train around 220 ophthalmology trainees and early-career surgeons over three years, covering MSICS tunnel construction and complete cataract procedures.
- Integration with existing residency curricula, with simulation serving as a prerequisite before independent live surgery.

The programme will combine e-learning, virtual-reality simulation, synthetic-eye exercises, and closely supervised live surgery. Evidence from India indicates that Virtual reality (VR) simulation curricula for Manual Small Incision Cataract Surgery (MSICS) reduce initial errors in scleral tunnel creation and may enhance patient safety during the initial surgical procedures performed by trainees.

By locating simulation centres in Nigeria and training local faculty, the project aims to create sustainable national capacity and reduce reliance on ad hoc, donor-funded overseas courses.

CBM POSTGRADUATE OPHTHALMOLOGY SCHOLARSHIP PROGRAMME

Rationale

Since 2000, CBM has been implementing a Postgraduate Ophthalmology Training Scholarship Programme for African doctors. The rationale is straightforward: without adequately trained ophthalmologists in national health systems, achieving the required cataract surgical volumes and ensuring clinical governance – essential for Universal Health Coverage (UHC) in eye care becomes unfeasible.

Evidence from SSA indicates that ophthalmology training places are limited, concentrated at a few urban universities, and often under-resourced. Governments frequently struggle to fund postgraduate training, leading to reliance on external sponsorship. CBM's scholarship scheme aims to close this gap by co-financing training places aligned with national workforce plans and with clear expectations that graduates serve in institutions serving rural and underserved communities. Scholarships are offered to doctors who have secured training places to

increase the number of ophthalmologists in underserved communities.

Programme design and scale

According to CBM internal data (2025), the scholarship programme:

- Has supported 140 doctors from multiple African countries (Benin, Cameroon, DR Congo, Ethiopia, Kenya, Malawi, Rwanda, Sierra Leone, South Sudan, Tanzania, Uganda and Zambia) to train as ophthalmologists since 2000.
- Of these, 102 have completed training, 34 are currently in residency, and only four have discontinued.
- Works with a network of training institutions in at least ten countries, including universities and teaching hospitals in Ethiopia (Addis Ababa, Jimma, St Paul's),

Kenya (University of Nairobi, Moi Teaching and Referral Hospital), Malawi, Tanzania (Kilimanjaro Christian Medical University College; Muhimbili University of Health and Allied Sciences), Uganda (Mbarara University of Science and Technology), Zambia, Ghana and Benin, among others (Figure 5).

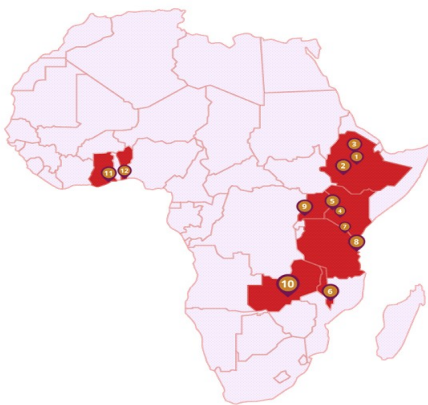
Scholarships typically cover tuition fees, stipends, learning resources, and, where necessary, supplementary clinical placements for hands-on training (provided by universities). Selection is undertaken jointly by CBM, training centres, and, where possible, ministries of health, with attention to:

- Geographic distribution and rural origin;
- Commitment to public service and to working with underserved communities.

BEYOND NUMBERS: ALUMNI NETWORK AND LEADERSHIP

Recognising that quality and leadership are as important as headcount, CBM has invested in an alumni network that includes:

- A mentor–mentee programme linking newer graduates with more experienced ophthalmologists;
- Regular continuing medical education (CME) opportunities;
- Annual alumni meetings aligned with the College of Ophthalmology of Eastern, Central and Southern Africa (COECSA) Congress;
- Alumni representation on scholarship award committees to strengthen peer accountability and local ownership.



KEY:

1. Ethiopia, Addis Ababa University
2. Ethiopia, Jimma University
3. Ethiopia, St Paul Hospital Millennium Medical College
4. Kenya, University of Nairobi, UoN
5. Kenya, Moi Teaching and Referral Hospital,
6. Malawi, Kamuzu University of Health Sciences
7. Tanzania, Kilimanjaro Christian Medical University College
8. Tanzania, Muhimbili University of Health and Allied Sciences, KCMC
9. Uganda, Mbarara University of Science and Technology
10. Zambia, University of Zambia
11. Ghana, Korle Bu Teaching Hospital
12. Benin, University of Abomey-Calavi

Figure 5: Map of Africa showing geographic distribution of the partner training institutions for the CBM Postgraduate Ophthalmology Scholarship Programme

Many alumni now hold key positions as training faculty, national eye-care coordinators or leaders of district-level eye programmes, multiplying the impact of the original investment.

PARTNERSHIPS FOR SUBSPECIALIST AND MID-LEVEL TRAINING

LV Prasad Eye Institute (LVPEI) collaboration

CBM collaborates with LV Prasad Eye Institute (LVPEI) in India to provide context-sensitive training for different cadres of African eye-care workers. This partnership is premised on “one

partner building the capacity of another” and includes:

- Tailored training packages for CBM partners’ ophthalmologists, optometrists, nurses and low-vision specialists, with emphasis on paediatric eye care, complex cataract and community-oriented service models.
- Customisation of curricula to reflect the epidemiology, resources and referral pathways of trainees’ home countries.
- Ongoing mentorship, both on-site and virtual, after trainees return, to support the adaptation of new skills to local settings.
- Facilitation of additional scholarship slots at LVPEI for CBM partner staff.

By leveraging LVPEI’s experience as a high-volume, high-quality eye-care institution in a middle-income country, this collaboration exemplifies effective South–South learning and complements the Africa-based residency programmes.

Children’s Vision Fund

Through the Children’s Vision Fund, which started in 2023 and was funded by The Jones Foundation, USA, CBM, and partners, have strengthened paediatric eye-care services by training:

- Ophthalmologists in paediatric cataract and paediatric comprehensive eye care (for example, trainees from Ethiopia and Malawi);
- Mid-level cadres such as orthoptists, paediatric ophthalmic nurses and optical dispensers (for example, teams from Cameroon and other countries);
- Additional paediatric eye-care trainees are currently enrolled at institutions in East Africa and India.

Although precise numbers vary by year, early programme reports indicate a growing cadre of paediatric-focused teams who can deliver child-friendly services, school-screening programmes and integrated low-vision care.

IOFF Subspecialty Fellowship Programme
CBM also collaborates with the International Ophthalmological Fellowship Foundation (IOFF)

to sponsor three-month subspecialty fellowships for African ophthalmologists in recognised centres, primarily in Europe and other high-resource settings.

Key features include:

- Training opportunities in up to 16 ophthalmic subspecialties, including cornea, glaucoma, retina, paediatric ophthalmology and oculoplastic surgery.
- Support for two ophthalmologists per year from CBM-supported programmes to pursue IOFF fellowships.
- Post-fellowship follow-up, which encourages graduates to develop new services, mentor residents, and implement updated diagnostic and treatment methods at their home institutions.

Survey data from IOFF fellows (not limited to CBM scholars) indicate that 98% considered the fellowship helpful to their daily practice, 92% reported learning new diagnostic and treatment methods, and around 85% introduced regular teaching activities in their departments on return. These findings provide reassurance that short, well-structured international fellowships can be highly cost-effective when linked to clear expectations for local capacity building.

Table 1 provides a summary of the CBM-Supported Human Resource Initiatives for Eye Care in SSA up till the 1st quarter of 2025.

DISCUSSION

Aligning practice with global eye-health strategies

Scaling skills where they are needed most:

By training ophthalmologists and trainers within African institutions, the programmes tackle the gap between the global burden and workforce capacity, as documented by Palmer et al.¹⁰ and Resnikoff et al.¹² This approach also helps reduce the urban–rural imbalance by prioritising trainees from rural institutions and implementing a bonding agreement to ensure they return and continue providing service after their training.

Emphasising quality and patient safety:

Intensive simulation-based surgical education is now supported by robust RCT evidence,

Table 1: Summary of CBM-Supported Human Resource Initiatives for Eye Care in SSA (to Q1 2025)

Component	Geographic focus	Main partners	Cadres targeted	Selected achievements*
UCT simulation-based surgical training	South Africa	UCT, LSHTM, Lavelle Fund, CBM	Ophthalmology residents, early-career consultants, trainers	>118 surgeons trained (target 90); 24 trainers trained (target 15); network of 5 simulation centres; the majority of surveyed trainees report greater confidence, lower complication rates and better outcomes.
Proposed Nigeria simulation-based training project	Nigeria (national)	Nigerian universities/teaching hospitals, HelpMeSee, CBM	Residents and ophthalmologists	3 simulation centres planned, 3 MSICS simulators, ToT for 8 trainers; planned 220 trainees over 3 years.
Postgraduate ophthalmology scholarships	>10 African countries	African universities & teaching hospitals, ministries of health, CBM	Doctors training as ophthalmologists	140 scholarships awarded since 2000; 102 graduates, 34 in training, 4 discontinued; strong alumni network and leadership roles.
LVPEI collaboration	Africa-India partnership	LV Prasad Eye Institute, CBM	Ophthalmologists, optometrists, nurses, and low-vision workers	Sub-specialties, Tailored short courses and observerships in comprehensive eye care; ongoing mentorship and south-south knowledge exchange.
Children's Vision Fund	Selected African countries	CBM, LVPEI and regional centres	Paediatric ophthalmologists, orthoptists, paediatric nurses, optical dispensers	Early cohorts trained in paediatric ophthalmology (e.g. Ethiopia, Malawi) and mid-level paediatric cadres (e.g. Cameroon); trainees on course in East Africa and India.
IOFF subspecialty fellowships	African ophthalmologists placed internationally	IOFF, host centres, CBM	Ophthalmologists seeking subspecialisation	2 CBM-linked fellows per year; high reported impact on clinical practice, new services and teaching activities.

**Programme achievements are based on CBM internal monitoring data and IOFF survey data as of early 2025.*

including the OLIMPICS trial and VR-based MSICS curricula, which demonstrate improvements in surgical competence and reductions in early complications.¹¹ CBM's internal data, indicating improvements in complication rates and visual outcomes, align with these findings.

Building multi-cadre teams for IPEC: By supporting paediatric ophthalmologists, orthoptists, low-vision and rehabilitation workers, the programmes extend beyond a narrow focus on surgeons, reflecting IPEC's emphasis on a continuum of promotive, preventive, treatment, and rehabilitative services.

Strengthening institutions rather than isolated individuals: Investments in simulation labs, digital classrooms, faculty development, and alumni networks contribute to sustainable capacity building within African universities and teaching hospitals.

Challenges and risks

Despite encouraging progress, several challenges remain:

1. **Financing and sustainability:** Simulation equipment, wet-lab consumables, faculty time, and scholarship stipends require sustained investment. Without long-term financing plans, ideally co-funded by governments, training institutions, and domestic philanthropy, there is a risk that gains will plateau once external grants end.
2. **Retention and distribution:** Training more ophthalmologists does not automatically guarantee equitable access. Many graduates are drawn to urban or private-sector posts. Scholarship bonding agreements, supportive working conditions in public and faith-based hospitals, and clear career pathways in rural and peri-urban areas are critical to avoid internal brain drain.
3. **Embedding simulation in curricula:** As qualitative studies from SSA highlight, simulation centres can become underused trophy projects if not fully integrated into assessment systems, examination requirements and competency frameworks.²⁴ Close collaboration with

regional colleges (such as COECSA) and national specialty boards is therefore essential.

4. **Measuring long-term impact:** Initial self-reported improvements in confidence and perceived outcomes are encouraging, but they need to be supplemented by prospective data on surgical volumes, complication rates, and patient-level visual outcomes, ideally compared with national indicators of effective cataract surgery coverage.

Lessons and recommendations

Several practical lessons emerge from CBM's experience:

- Consider conceptualising initiatives as integrated 'packages' instead of isolated projects. The aggregation of residency scholarships, simulation training, subspecialty fellowships, and team-oriented paediatric training constructs a continuum from fundamental proficiency to advanced mastery and regional leadership.
- Co-design with ministries of health. Aligning trainee selection, deployment, and facility upgrades with national HRH plans increases the likelihood that newly trained specialists will be absorbed into public services and that equipment will be maintained.
- Prioritise trainers, not just trainees. By training and supporting local faculty through ToT, peer networks, and recognition, we amplify the impact of each investment and reduce reliance on visiting international experts.
- Use international fellowships thoughtfully. Short overseas fellowships are most effective when they target clearly identified service gaps, are linked to specific post-fellowship responsibilities (e.g., establishing a glaucoma service), and are part of broader institutional capacity-building.

CONCLUSION

Sub-Saharan Africa's eye-health workforce gap is a major obstacle to achieving universal access to quality eye care. CBM's multi-country experience demonstrates that strategic, collaborative investments in simulation-based surgical training, postgraduate education, and

subspecialty fellowships can expand the number of trained ophthalmologists, improve the quality and safety of surgery, and strengthen regional training institutions.

While these efforts are not a replacement for comprehensive health system reforms, they are essential for establishing scalable, people-focused eye care services. As nations implement the World Report on Vision, the IPEC resolution, and the 2030 In Sight strategy, governments and development partners should regard HReH investment as a sound, high-value health investment that generates jobs, boosts productivity, and helps millions more see, learn, and work.

The next phase of work should focus on:

- Embedding simulation and competency-based training into regional examination systems;
- Securing sustainable domestic financing for training and equipment;
- Strengthening data systems to track workforce distribution and surgical outcomes; and
- Ensuring that the voices of trainees, patients and persons with disabilities shape future workforce planning.

If these steps are taken, the kinds of programmes described here can help move eye health from a series of pilot projects to a core, sustainable component of African health systems.

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