INTERNATIONAL CENTRE FOR EYE HEALTH

LONDON SCHOOL of HYGIENE &TROPICAL MEDICINE

INTERNATIONAL CENTRE FOR EYE HEALTH

CONTENTS

WHO Collaborating Centre for Eye Care and Vision

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INTRODUCTION

Worldwide there are 1.1 billion people living with vision impairment, of whom 43 million are blind. Yet 90% of this vision impairment is either treatable or preventable. Poor eye health can have profound effects on health and wellbeing. It can also increase poverty, impede learning, shorten life span and reduce quality of life. Vision loss also affects national economies through lost productivity.[1]

The International Centre for Eye Health (ICEH), which is based at the London School of Hygiene & Tropical Medicine (LSHTM) are working towards a world in which everyone, everywhere has good eye health. This is achieved by developing high quality eye care services and improving access to them. ICEH are contributing to this endeavour through research, education, capacity strengthening and technology. We have a proven track record in improving eye health over decades, and the tools to realise this in the future. In 2026 ICEH was designated a World Health Organization Collaborating Centre for Eye Care and Vision.

Image credit: The Royal College of Ophthalmologists.

Professor Matthew Burton

Professor of Global Eye Health and Director of ICEH at LSHTM

"Global Eye Health is a personal issue for many. The majority of us will experience some form of sight loss during our lifetime. Although it may affect us all, the outcomes will not be equal. Millions of affected people will live their entire life with vision impairment and blindness that could have been treated or prevented. Our Centre produces crucial evidence and helps develop the workforce needed to address this. We are an integral part of the Global Eye Health ecosystem, supporting the work of WHO, governments and NGOs involved in eye care."

OUR VISION

Improving eye health worldwide

OUR MISSION

- **We work through partnerships, particularly in low and middle-income countries, to deliver excellence in research, education, capacity strengthening and technology for eye health.**
- **We develop and translate evidence into policy and practice, in order to empower health service providers to deliver quality, sustainable eye care to everyone.**
- **Our work is quality-driven, people-focused and evidence-based.**

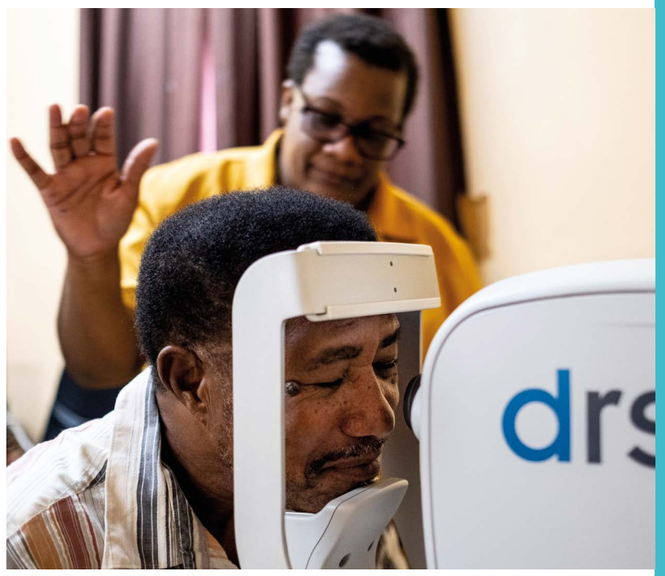


Image credit: Ashley Gilbertson.

WHO Collaborating Centre for Eye Care and Vision

In 2026 ICEH became a WHO Collaborating Centre for Eye Care and Vision. We have worked closely with WHO for many years on shared goals for improving eye health, particularly in the areas of data, research, education and capacity strengthening. This new designation formalises the partnership and provides a framework for ongoing activities including:

- **Collecting, analysing and reporting data including monitoring the WHO 2030 targets for cataract (eCSC) and refractive error (eREC)**
- **Multiple research areas, including epidemiology, intervention strategies, economic evaluations and evidence synthesis**
- **Supporting WHO in strengthening the eye health workforce, with a particular emphasis on public health training and capacity strengthening, for instance training students through MSc courses**

OUR STRATEGIC APPROACH

We seek to be a world-leading centre and network advancing global eye health, with many activities linked to our work as a WHO Collaborating Centre for Eye Care and Vision.

Research

We are an interdisciplinary research team of eye health clinicians, public health specialists, statisticians and many more. Our research is done through partnerships globally, forming a large international network of people and institutions working together on evidence for eye health. We have a broad portfolio of work including cross-cutting themes alongside condition-specific research, and we undertake multiple clinical trials each year.

Education

ICEH is widely viewed as the leading centre for education and training in global eye health and public health for eye care. We run a face-to-face Master's course at LSHTM, which has trained more than 750 people from 100 countries over 40 years, creating an alumni network of leaders in eye health internationally. We also run an annual one-week short course and seven highly popular online courses in topics across eye health.

Technology & Intelligence

Our close partner Peek Vision, a social enterprise born out of ICEH research, develops software, programme design and data intelligence platforms to help community and school eye health programmes become more efficient, more equitable and more effective. ICEH and Peek collaborate on research to develop tools and innovative technology to improve service delivery. We jointly support population-based surveys that gather crucial data on global vision loss, which informs policy and practice worldwide.

Capacity Strengthening

ICEH works to strengthen research capacity through training PhD students and research mentorship with partners. The Centre also coordinates networks that enable shared learning between eye care professionals globally. These facilitate collaboration and learning between countries and regions, improving skills and data-sharing worldwide. Peek's programmes enable health professionals and communities to improve eye services.

Knowledge Sharing

All of our efforts involve communicating the knowledge we generate. We publish the *Community Eye Health Journal,* a free, peer-reviewed resource that provides vital updates for eye care professionals in some of the hardest-to-reach places globally. Through our alumni, networks and education we facilitate the sharing and debating of key ideas, combining evidence and discussion to improve eye health globally.

IMPACT OVERVIEW

ICEH's work has had a huge impact on eye care globally. We have:

DEVELOPED THE EVIDENCE THAT SUPPORTED:

THE FIRST UNITED NATIONS RESOLUTION ON PREVENTABLE SIGHT LOSS, REPOSITIONING EYE HEALTH WITHIN THE UNITED NATIONS' SUSTAINABLE DEVELOPMENT GOALS FRAMEWORK

NEW WORLD HEALTH ASSEMBLY TARGETS ON EFFECTIVE COVERAGE OF CATARACT SURGERY AND EFFECTIVE COVERAGE OF REFRACTIVE ERROR

REPORTED:

>100

PEER-REVIEWED RESEARCH STUDY PUBLICATIONS EACH YEAR

2-3

CLINICAL TRIALS PER YEAR

400

RAPID ASSESSMENT OF AVOIDABLE BLINDNESS SURVEYS FACILITATED

TRAINED:

>75%

OF EYE HEALTH PROFESSIONALS WITH PhDs IN THE AFRICAN REGION

32

STUDENTS AWARDED PhDs SINCE 2010, MAJORITY IN LMICs

EDUCATED:

>750

MSc STUDENTS SINCE 1981 FROM 100 COUNTRIES

>40K

PEOPLE FROM 180 COUNTRIES HAVE TAKEN OUR ONLINE COURSES

SERVED:

>20M

PEOPLE SCREENED DUE TO PEEK-POWERED PROGRAMMES

>2M

PEOPLE TREATED DUE TO PEEK VISION

>2M

PUBMED "HITS" PER YEAR ON *COMMUNITY EYE HEALTH JOURNAL* ARTICLES

CONNECTED:

30

INSTITUTIONS IN HEALTH CAPACITY STRENGTHENING PARTNERSHIPS

121

DISEASE NETWORK PARTNERS

AWARDED:

WHO Collaborating Centre for Eye Care and Vision

ICEH DESIGNATED WORLD HEALTH ORGANIZATION COLLABORATING CENTRE IN 2026

QUEEN'S ANNIVERSARY PRIZE FOR HIGHER AND FURTHER EDUCATION

VISION CARE SECTION OUTSTANDING SCIENTIFIC PAPER AWARD

HISTORY OVERVIEW

1980
ICEH founded

1988
The *Community Eye Health Journal* launches

1993
First Master's Course in Community Eye Health

1997
ICEH Instrumental in developing VISION 2020 – The Right to Sight, a global initiative on eye health

2004
VISION LINKS programme launched

2006
The Cataract Impact Study provides the first evidence that cataract surgery improves quality of life and economic productivity

2012
ICEH starts testing prototype smartphone tools, Peek Vision created

2014
First disease-specific network launches – the Diabetic Retinopathy Network

2014
First free open online course on Global Blindness launched

2016
ICEH collaborates on a series of trials to improve the surgical treatment of trachomatous trichiasis, leading to several global policy changes

2017
ICEH collaborates to define and demonstrate effective cataract surgical coverage, used as a WHO indicator

2021
ICEH coordinates the Lancet Commission on Global Eye Health

2022
ICEH leads the Global Retinoblastoma Outcomes study, including the majority of Rb cases globally

2025
ICEH publishes major results in Trachoma, strengthening the WHO SAFE strategy

2026
ICEH becomes a WHO Collaborating Centre for Eye Care and Vision

INTERNATIONAL CENTRE FOR EYE HEALTH

WHO WE ARE

INTERNATIONAL CENTRE FOR EYE HEALTH

ICEH is an international team of more than 50 academic and support staff, alongside multiple PhD and MSc students. The Centre is based at the London School of Hygiene & Tropical Medicine. The team is an interdisciplinary group of eye health clinicians, public health specialists, epidemiologists, statisticians, health economists, and evidence synthesis specialists. ICEH is led by the Director, Prof. Matthew Burton.

ICEH is guided by an External Advisory Panel which provides independent advice to the leadership team. The panel consists of leaders within eye health from a range of disciplines and regions, with a majority based in low and middle-income countries.

Image credit: Aeesha Malik.

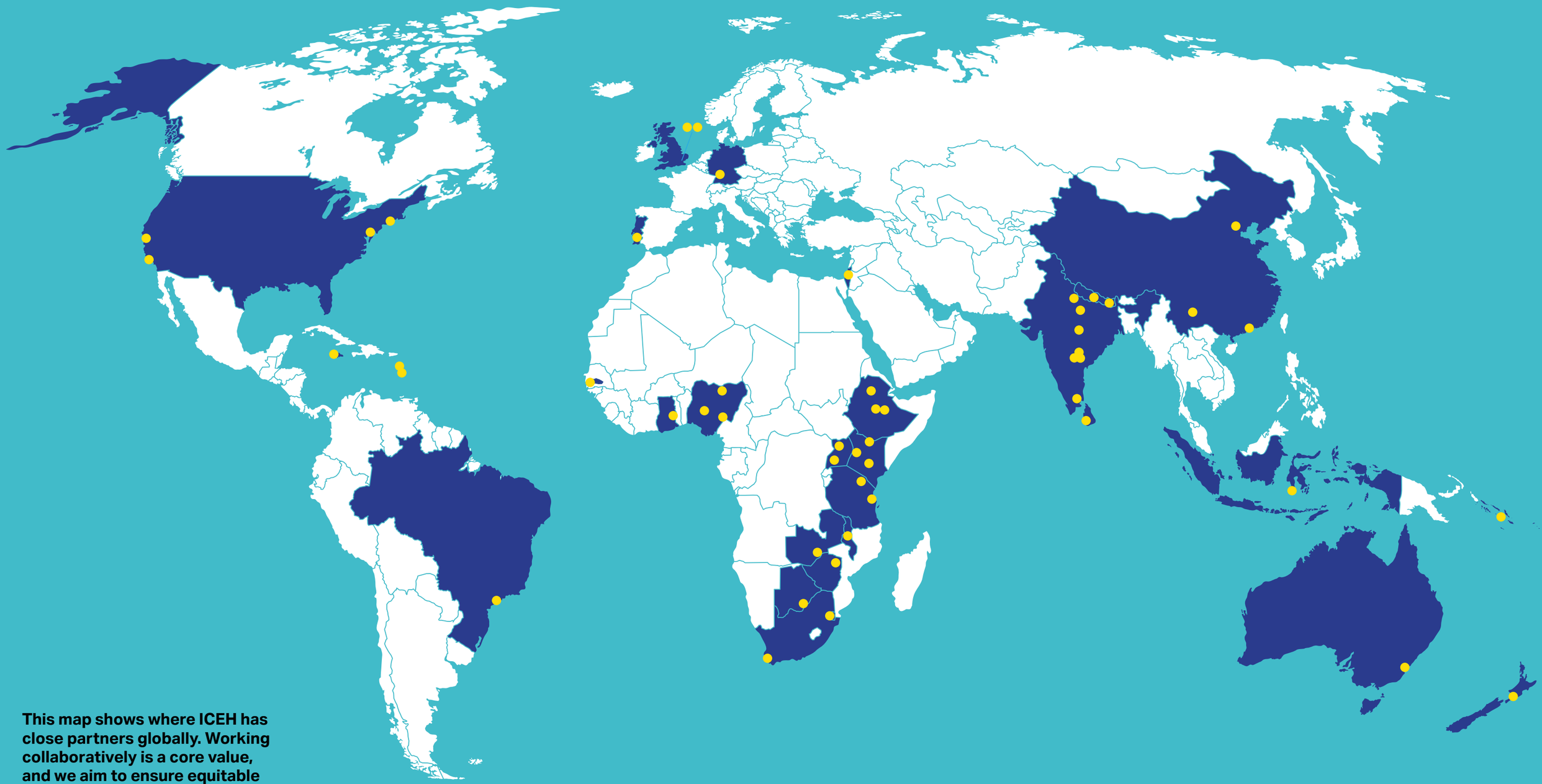
Image credit: Simon Arunga.

Image credit: Rolex Joan Bardeletti.

Image credit: Jelena Djordjevic.

Image credit: Nazif Jemal.

COLLABORATOR MAP



This map shows where ICEH has close partners globally. Working collaboratively is a core value, and we aim to ensure equitable partnerships wherever we work. We jointly design and deliver projects with our partners, seeking to learn from each other, building trust and working towards mutually beneficial outcomes.

Countries

Australia	Dominica	Ghana	Jamaica	New Zealand	South Africa	The Gambia	Zambia
Botswana	Eswatini	India	Kenya	Nigeria	Sri Lanka	Uganda	Zimbabwe
Brazil	Ethiopia	Indonesia	Malawi	Portugal	St Lucia	UK	
China	Germany	Israel	Nepal	Solomon Islands	Tanzania	USA	

RESEARCH

ICEH is an interdisciplinary research team of eye health clinicians, public health specialists, epidemiologists, statisticians, health economists and many more. Our research work is done through long-standing research partnerships with colleagues – including many alumni – in institutions in multiple countries. We have a deep portfolio of research work including cross-cutting themes and methodologies alongside condition-specific research areas. Over the last five years we have produced on average more than 100 peer-reviewed research publications each year. For a complete publication list please visit the ICEH Publication Directory.

The *Lancet Global Health* Commission on Global Eye Health

ICEH led the *Lancet Global Health* Commission on Global Eye Health, published in February 2021.[1] Prof Matthew Burton was lead author and co-chair with Prof Hannah Faal from Calabar, Nigeria. The research undertaken and collated by the Commission has provided key analyses and data used across the global eye health field.

The Commission involved undertaking more than 20 new studies and publications, creating and organising evidence for many areas of global eye health. These include key analyses, highlighting that:

- eye health is integral to achieving seven of the United Nation's Sustainable Development Goals[2]
- the risk of death increases substantially with increasing severity of vision impairment, compared to normal vision[3]
- vision impairment leads to an estimated $411 billion in lost productivity globally each year[4]
- 90% of people living with vision loss reside in low and middle-income countries (LMICs)[1]
- over 90% of people with vision impairment require cataract surgery or glasses, both existing, highly cost-effective treatments[1]

The Commission conducted several globally representative Delphi exercises on eye health research prioritisation,[5] eye health indicators[6] and improving access to cataract services. It also explored the environmental sustainability of eye care.[7]

The Commission report has been very influential, including translating into policy through supporting the case for the first United Nations General Assembly Resolution on Vision in July 2021. The findings from the Commission have been used widely for eye health advocacy to make the case for the importance of improving eye health. Another Commission is planned for 2030.

Image credit: *The Lancet Global Health*.

Data for Eye Health

Image credit: Peek Vision.

To tackle the challenge of global eye health most effectively, we must collect high-quality data. The more information we have about who experiences eye health conditions and why, the better equipped we can be to develop strategies to treat them.

Our primary contribution to eye health data is through the Rapid Assessment of Avoidable Blindness **(RAAB)** survey methodology. RAAB surveys people aged 50 years and older to provide population estimates of vision impairment, its causes and information on key eye health service indicators. Since 2000, 400 RAAB surveys have been conducted across 85 countries in multiple world regions, primarily in low- and middle-income settings.

Data from RAABs are primarily used for local and national planning of eye health services. By assessing need within an area, service providers can appropriately distribute care and plan strategic programmes to improve eye health. RAAB estimates can be used to shape and prioritise policy, contributing to reducing avoidable sight loss.

RAAB also provides the majority of data sources for global and regional estimates of the magnitude of vision impairment and its causes used by the World Health Organisation, the International Agency for the Prevention of Blindness, NGOs and the Global Burden of Disease Project. It is currently the main tool used to generate data to track progress towards WHO's effective coverage of eye health targets for 2030:

- a 30-percentage point increase in effective cataract surgical coverage (eCSC)
- a 40-percentage point increase in effective refractive error coverage (eREC)

RAAB data was instrumental in establishing the baseline estimates for these targets in 2022 and in follow-up studies in 2025 and 2026 that showed very few countries are likely to achieve either the eCSC or eREC target by 2030 at current rates of progress.[8,9,10,11]

RAAB7 is the latest generation of the RAAB survey, developed by ICEH and powered by Peek technology. Delivered digitally, it enables faster, more accurate collection and analysis of secure, high-quality eye health data relevant to current eye health priorities.

Recent updates to RAAB7 include the ability to measure near vision impairment, near eREC, and optional modules on diabetic retinopathy and disability.

RAAB data that are made available open access are held in an online repository (www.raab.world) where users can access data and reports and view country profiles. We encourage all RAAB users past and present to make their data available open access on the repository to support ongoing eye health research and advocacy efforts.

RAAB is focussed on older adults, but no comparable tool exists for children.

We don't know how many children worldwide have problems with their eyesight. The best estimates suggest that globally, almost 450 million children need glasses and around two million are blind. Short-sightedness (myopia) in children is also rapidly increasing in many parts of the world.

To learn effectively, children need to be able to see clearly. Children with poor eyesight in low- and middle-income countries are up to five times less likely to be in formal education.

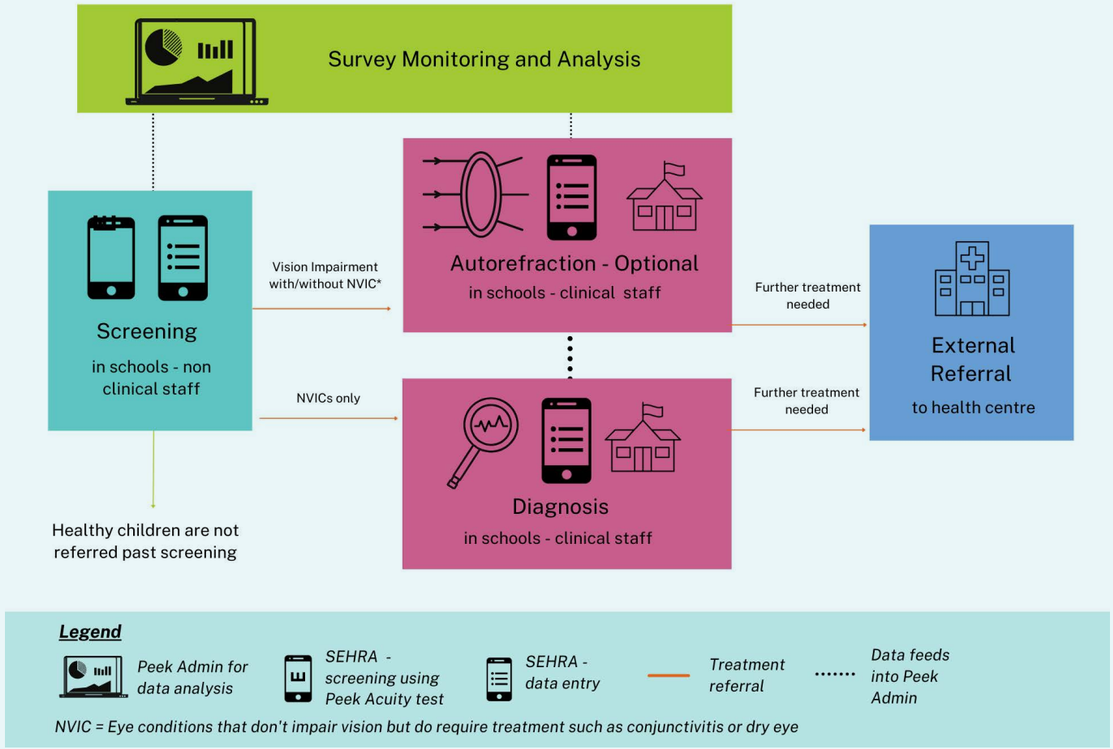
To combat this, eye health providers across the world run school eye health programmes that find and treat children who need access to eye care. But they are hampered by the scarcity of reliable information about children's eye health needs.

The School Eye Health Rapid Assessment (SEHRA) tool has been developed by Peek and ICEH with input from school eye health experts in the sector. SEHRA is the first planning tool dedicated to providing school eye health programmes with comprehensive data needed to allocate scarce resources and guide programme implementation.[12]

Image credit: Peek Vision.

The tool consists of two modules. The Scoping Module which explores five components: Sectoral legislation, policy, and strategy; Institutional and service delivery environment; Human resources and Barriers. The Magnitude Module which is a school-based survey on a random sample of children. Data from these can then be used to understand the environment and then plan, monitor and evaluate school eye health programmes to improve the eye health of children in the area.

The Framework for SEHRA



Cataract

Cataract, the clouding of the lens of the eye, is responsible for around 50% of people living with avoidable blindness globally. However, the majority of those affected only need a 10-minute surgery to regain their sight.

The World Health Organisation has set a target of a 30 percentage point increase in effective cataract surgical coverage (eCSC) by 2030. Our research is integral to the WHO's efforts to monitor this.

In 2022, we reported baseline estimates of CSC and eCSC from RAAB surveys for 55 countries, providing a starting point for future monitoring.[8] The work found a large range in estimates across different countries, and that eCSC was on average higher in men than women across the included surveys.

In 2026, further research by ICEH revealed that global eCSC is predicted to increase by only 8.4 percentage points between 2020 and 2030, well short of the 30 percentage-point target.[11]

A recent study modelled the number of people in Kenya who have cataract and will receive surgery in their lifetime. The analysis showed that 77% of people with cataract in the country in 2025 will die before receiving surgery, highlighting a huge disparity with high income countries.[13]

Previous ICEH work in cataract includes a seminal study that showed people who receive cataract surgery experience increased income and quality of life, one of the first to do so. The Cataract Impact Study (2005-2008) was undertaken in Kenya, Bangladesh and the Philippines.[14] One year later, those who had surgery experienced an increase in monthly expenditure and spent more time on productive activities, while experiencing an increase in health-related quality of life.

Other research has focused on outlining the groups most likely to be underserved by cataract services, alongside the best strategies to improve access to them.[15]

Image credit: Ulrich Eigner.

Image credit: Dr Shroffs Charity Eye Hospital.

Refractive Error

Refractive error is a major cause of vision impairment, and there are an estimated nearly 1 billion people with uncorrected refractive errors worldwide.[1] This includes myopia (nearsightedness), hyperopia (farsightedness), astigmatism, and presbyopia (age-related near vision loss). These conditions occur when the eye's shape prevents light from focusing properly on the retina, causing blurred vision.

Unaddressed refractive error impacts education, productivity, and quality of life, particularly in low- and middle-income countries (LMICs).

Effective strategies to tackle the challenge include screening, improving services, integration, affordability and awareness campaigns.

ICEH are working with the Vision Loss Expert Group to track the WHO eREC target. A recent analysis of RAAB and other survey data predicted that none of the 16 most populous countries globally were on track to reach the 2030 goal of a 40 percentage point increase in 2025.[10]

A major new clinical trial at ICEH will assess the impact of providing eyeglasses for people with near vision impairments in India and Kenya. The randomised controlled trial of the Economic Advantages of Readers for Near vision (EARN), will test the effect on income, household consumption and expenditure, and vision-related quality of life for adults 35-65, before and after being provided with glasses.

It's hoped that the EARN trial results will provide evidence that supplying people with near-vision spectacles is a cost-effective mechanism for development, improving lives and livelihoods for individuals, families and communities. Long term, this could potentially lead to more funding for the provision of reading glasses, using eye health to unlock progress in low and middle-income countries globally.

We have done multiple studies in collaboration with Peek Vision (featured in a later section of this report), which have assessed and validated Peek's tools for use in eye health programmes. Peek-powered programmes have now allowed more than one million people to access eye care, with many receiving treatment for refractive error.

The School Eye Health Rapid Assessment (SEHRA), featured above, also allows many children to receive treatment for refractive error via school eye health programmes.

Glaucoma

The glaucomas are a group of eye diseases affecting the optic nerve that lead to progressive and irreversible vision loss. Globally, the glaucomas are the most frequent cause of irreversible blindness. The highest prevalence and incidence of glaucoma is found in the African region. Also, the prevalence of blindness due to glaucoma is higher in sub-Saharan Africa than in other regions of the world.

To provide more evidence to tackle these challenges, we are focusing on the early detection and treatment of glaucoma, in collaboration with colleagues and institutions in Nigeria, Tanzania, Ghana and others.

Major research by ICEH includes a clinical trial that tested using a laser therapy commonly used in Europe and North America, Selective Laser Trabeculoplasty (SLT), as a treatment in Tanzania against the current standard most available treatment in LMICs: timolol eye drops.[16] We found a significant benefit to using SLT for reducing eye pressure. The study also considered the affordability of SLT, finding that in spite of the initial cost of the laser equipment, for hospitals dealing with high volumes of glaucoma patients, the treatment could be offered at a similar price as the annual supply of eye drops.

Image credit: Heiko Philippin.

Image credit: Hugh Bassett.

Research in Nigeria and Tanzania concerns the detection, diagnosis and treatment of glaucoma, which is currently challenging and requires multiple tests, expensive equipment and highly trained personnel. Low-cost and easily carried out tests would help to detect glaucoma at an earlier stage and reduce the progression to blindness.

In Tanzania we are testing three methods for more affordable and easier detection: eyecatcher visual fields, peek vision contrast sensitivity and an optic nerve photograph. The work assesses the feasibility and repeatability of the tests, and what combinations work best together, the results of which could then potentially be deployed in low-resource settings. As part of a PhD project we are also training staff in earlier detection and treatment of those with glaucoma, and developing ways to increase awareness and knowledge among patients and their relatives.

In Nigeria we have another PhD project which is evaluating the use of similar portable diagnostic devices in detection of glaucoma in community health care settings, after trialling them in a hospital setting. This can help to detect glaucoma at an earlier stage. In a separate study in Northern Nigeria we are conducting a feasibility study to try and determine the effectiveness and acceptability of different types of laser treatment in the treatment of glaucoma, comparing Selective Laser Trabeculoplasty to Micropulse Laser Trabeculoplasty in patients with high intraocular pressure. Patients for whom pressure remains high are offered a third laser: transcleral cyclodiode laser which reduces the production of aqueous humor.

Another new trial in Nigeria will assess the relationship between vitamin B3 (niacin) and glaucoma, the first of its kind in LMICs. The aim is to estimate the association between dietary B3, certain blood markers and glaucoma in people with and without the condition, which could inform future prevention and treatment.

The centre also hosts a capacity strengthening network for glaucoma, the Glaucoma-NET, which is featured later in this report.

Child Eye Health

Globally more than 70 million children aged 0-14 years are vision impaired, 1.4 million of whom are blind.[1] In low-resource settings approximately half of this blindness is avoidable.

Some of the major challenges in child eye health are that: children do not complain; there is a lack of trained staff and screening at community and primary health care level; there is a lack of awareness in the community about child eye health; and late presentation and treatment can have a life-long impact on a child's visual potential.

Our research in child eye health addresses these major challenges, focusing on interventions to support early diagnosis and treatment of child eye problems to ensure that children have the best vision possible and avoid loss of vision and life.

A major programme, the Global Child Eye Health Project, started by training primary health workers in Tanzania on eye health by including it as a module within the Integrated Management of Newborn and Childhood Illness (IMNCI), a WHO strategy used in at least 100 countries for primary health services for young children. The study was a success, leading the government to include the eye health module within their national guidelines and training 3000 workers, enabling thousands of children in Tanzania to receive treatment for eye conditions.[17]

Workers were also trained in the use of a low-cost device, the Arclight, which allows people in remote or low-resource areas to assess eye conditions. Forty thousand children were screened over 6 months.

A large new grant will now build on this work to carry out five studies in Tanzania and Nepal, including a randomised controlled trial. The studies will test a set of health system interventions such as training within IMNCI, strengthening data collection and screening using the Arclight. This will lead to an approach that can be taken up by governments around the world, integrating eye care into child health in their countries and ensuring every health care worker providing primary care for children can detect eye problems. If successful, this would benefit hundreds of millions of children globally.

We also carry out research into Retinopathy of Prematurity (ROP), a disease which can make infants born preterm

Image credit: Aeesha Malik.

Image credit: Aeesha Malik.

irreversibly blind. In ROP, the retinal blood vessels grow abnormally, and in advanced stages the retina can detach. With 15 million babies born preterm every year, it is an important problem in child eye health which is rising as the number of children born prematurely increases with improved access to neonatal care and therefore increasing survival.

To treat ROP and prevent sight loss in children, it must be accurately diagnosed early with timely screening after birth. Current screening methods are costly and rely on specialized equipment that is often unavailable in low-resource settings.

We are currently running a study in Nepal testing a telemedicine screening model which will allow non-specialists to do the ROP screening allowing for greater scale up of services. We will then compare human assessment of the images from both devices against an AI algorithm. The second phase of the study will compare the current (expensive) standard equipment against a newly developed cheaper smartphone-based camera.

We have also carried out research into the epidemiology of ROP and modelled programmes for it, along with facilitating almost 40 national and regional workshops. These workshops have led to regional guidelines, an expansion of services, and in some countries, major support from Ministries of Health and other donors. ICEH also leads an ROP network which is featured later in this report.

Furthermore, we are also at the forefront of global retinoblastoma research, facilitating a research group that

Image credit: The Queen Elizabeth Diamond Jubilee Trust / Poulomi Basu.

brings together experts from over 150 countries and more than 450 centres worldwide. This has led to significant new research, including a study published in 2022 showing that children in low-income countries are at 16 times greater risk of dying within three years from Rb compared to their peers in high income countries, highlighting deep inequities in the diagnosis and treatment of this condition.[18] Further detail on this group is included later in this report.

Diabetic Retinopathy

Diabetic retinopathy (DR) is a complication of diabetes, caused by high blood sugar levels damaging the back of the eye (retina), leading to sight loss and eventually blindness. DR has increased rapidly in recent years alongside global increases in diabetes. In 2020 there were one million people blind and three million people living with moderate or severe sight loss globally due to DR. All 463 million people worldwide who live with diabetes should be screened regularly for the condition.[1]

To successfully tackle DR, health systems need to have strong links between general medical services, where people with diabetes are identified and referred, and eye care services that deliver DR diagnoses and management.

We conduct clinical trials to test interventions which can improve the journey of a person with diabetes towards visual loss prevention. One current trial is testing artificial intelligence solutions for DR screening within a programme in Tanzania, to compare the technology to standard services. The results will show if this technology can connect more people with diabetes to eye care services, where they can receive sight-saving treatment.

Image credit: Hugh Bassett.

A new study will mathematically model how to integrate DR screening and treatment into the health system in Malawi, where 500,000 people with diabetes require services. The model will be able to inform the DR interventions that deliver the highest health gains to the population and showcase how and where DR services should be implemented within existing diabetes services.

Previous work looked at how peer support from people living with diabetes can increase uptake of DR screening, finding that five times as many people who received the peer support interventions attended DR screenings compared to those who did not.[19]

We also have a highly successful and popular global capacity strengthening network for DR, the DR-NET, more details of which are later in this report.

Image credit: Ashley Gilbertson.

Equity

The Sustainable Development Goals and Universal Health Coverage initiatives both emphasize the importance of addressing inequity so that no one is left behind. Lack of effective approaches to address inequity has resulted in increased levels of avoidable blindness worldwide.

Equity cuts across all our research themes, but we also have specific equity research foci to understand who is affected, quantify the challenge, and seek solutions for reducing inequity in eye health. In addition to ICEH-led projects, our staff contribute to a range of global and regional projects with an equity focus.

Equity is embedded across our work, with an emphasis on including equity markers in trial design, disaggregating data by gender, and ensuring equitable partnerships within our collaborations.

Examples of recent work include:

- Developing a new indicator to assess geographical access to cataract services (and demonstrating it in Kenya, Malawi and Rwanda)[20]
- Showing that in diverse settings, rural women without a spouse experience a disproportionate level of blindness from cataract due to lower access to good quality services[21]
- Identifying context-specific strategies to improve access to cataract services for underserved groups through global consultation across all regions[22]
- Assessing gender parity and ethnic diversity among leadership bodies in global eye health[23]
- Exploring how further equity indicators can be included in Rapid Assessment of Avoidable Blindness population surveys[24]

Image credit: Ashley Gilbertson.

Image credit: Ashley Gilbertson.

Trachoma

Trachoma is the leading infectious cause of blindness. It has major consequences for affected individuals and communities, frequently compounding health problems and poverty. Prevention of blindness from trachoma remains a major public health priority internationally.

The disease is caused by repeated infections with the bacterium *Chlamydia trachomatis,* leading to progressive scarring and the eyelashes turning inwards (trichiasis), so that they scratch the surface of the cornea. The cornea becomes irreversibly scarred, leading to vision impairment and blindness.

We have conducted five clinical trials to try to improve the outcomes from trichiasis surgery, for example comparing alternative operations, post-operative antibiotics, alternative suture types and epilation.[25,26,27] These have impacted on policy, including changes in WHO's surgery guidelines for the condition.

We have recently completed a large cluster randomised controlled trial, Stronger SAFE, with the Ethiopian Federal Ministry of Health, testing out new and enhanced approaches for trachoma elimination, developed through an improved understanding of transmission and extensive co-creation work with the communities involved. We found that the strengthened interventions and the standard WHO 'SAFE' strategy performed equally well, indicating that if the latter is implemented well it has the potential to clear trachoma from previously highly endemic populations.[28]

Some of our work has focused on the rational use of antibiotics.[29] This research has contributed to an understanding of the major reservoirs of infection within endemic communities and to the current approaches for the use of antibiotic drugs.

We have also studied the way that the human immune system reacts to chlamydial infection, conducting large scale cohort studies in Tanzania and Ethiopia that have regularly assessed people for disease and infection.

Image credit: Oumer Shafi.

Corneal Infection

Infections of the cornea are a major cause of sight loss, and this condition is associated with considerable morbidity and reductions in quality of life. Our research encompasses epidemiology, prevention, diagnostic tests and treatment to ensure that people do not unnecessarily lose their sight from this condition.

A new project will develop and test a smartphone-based artificial intelligence (AI) tool for diagnosing corneal infections in Nepal. The study will identify AI models that are capable of accurately distinguishing the type of infection based on an image of the affected eye, to improve accurate diagnostic accuracy and therefore treatment.

We recently performed a clinical trial testing chlorhexidine, an existing, cheap and easily formulated general antiseptic against the more expensive and less available standard treatment of natamycin, finding that the latter is better for treating fungus.[30]

Clinically diagnosing fungal keratitis (FK) is challenging. We ran a study to estimate the sensitivity comparing in vivo confocal microscopy (IVCM – imaging the front of the eye in detail without needing to take a sample), smear microscopy (taking a sample to put under a microscope) and culture (taking a sample to grow in the lab), finding that smear microscopy had the highest sensitivity, followed by IVCM and culture.[31]

We have also published the first global estimate of the annual incidence of fungal corneal infections, based on a systematic review and meta-analysis of the literature, showing that more than one million people worldwide develop the infections each year.[32] The large majority of people affected live in low and middle-income countries and there is some evidence that numbers are increasing.

Further work has explored the epidemiology and risk factors for developing microbial keratitis in Uganda, as well as its impact on quality of life, finding a persistent long-term reduction in quality of life associated with the condition.[33]

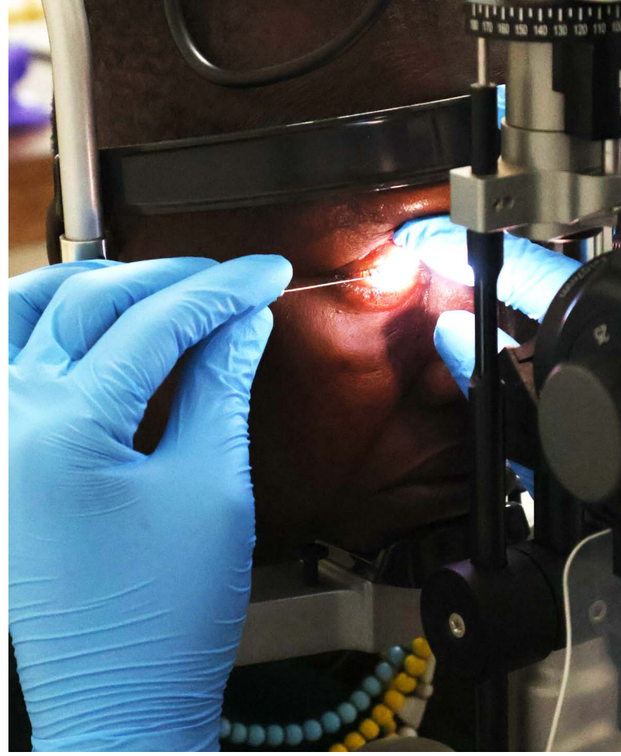


Image credit: Hugh Bassett.

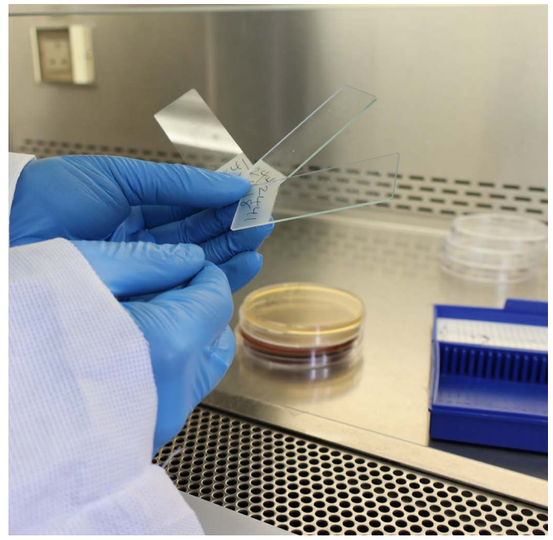


Image credit: Hugh Bassett.

We have also carried out several research projects looking at the impact of traditional healers in eye medicine, which suggest that traditional practices increase the likelihood of developing the condition, and that healers are open to being trained in modern eye health care, potentially improving care for patients by becoming referrers to the main health system.[34,35]

Surgical Training

We support work on strengthening ophthalmology clinical training and human resources for eye health through research. This includes projects analysing the current workforce and training institution capacity in the Africa region.

Key trials include assessing the impact of intense simulation-based surgical training courses for ophthalmologists performing trabeculectomies for glaucoma across several African countries, with surgical competence increasing 30.4% compared to 9.8% for a control group 3 months after training, with a difference maintained over a year.[36]

A further study looked at cataract surgery training, with trainees receiving the intense simulation training intervention increasing competency scores by 212% at 3 months after training, compared to 40% among controls. This trial also illustrated a dramatic improvement in patient safety with a 72% reduction in complication rates of cataract surgeries among those who had the simulation surgical training.[37]

We have recently developed further simulation training centres and facilitated more trainings, for instance in Nigeria where we trained 12 consultants using glaucoma simulation, with surgical scores improving from 45 to 70%.

Current/future research include increasing access to simulation training throughout the sub-Saharan Africa Region, and assessing the impact of phacoemulsification cataract surgery simulation training.

Image credit: Vanessa Kerton / The Queen Elizabeth Diamond Jubilee Trust.

Image credit: Vision for a Nation Foundation.

Health Economics

Health economics applies economic theories of human behaviour, decision-making and outcomes for health. For instance, health economics projects can assess the cost-effectiveness or cost-benefit of certain treatments or interventions, investigate the impact of behavioural changes, or evaluate the wider impact of programmes, among other targets.

Our health economics projects focus on assessing the impact of improving eye health services, collecting accurate vision-based health economic data and estimating the global cost of vision loss.

A major piece of research in 2021 estimated the annual potential productivity losses associated with reduced employment due to blindness and moderate and severe vision impairment (MSVI) at the regional and global level.[4]

We found that globally, there is a potential annual productivity loss of $411bn (purchasing power parity), among 161m people with MSVI or blindness of working age. The overall relative reduction in employment by people with vision loss was 30.2%.

We have also developed a health economics module for use within the latest version of the Rapid Assessment of Avoidable Blindness surveys. The aim is that this module will allow for comparative analysis of the employment status and health-related quality of life in people with and without vision impairment, and by severity of vision impairment.

ICEH is also, in collaboration with partners, developing a 'reference case' for eye health, which aims to give an overview of the costs and considerations for implementing a health intervention, as a guideline for reimbursing treatments or systems. Initial work found substantial variation across studies in average treatment costs per patient for most conditions, for example estimates for cataract surgery ranged from $54-$3654 (purchasing power parity).[38]

Further work is aiming to summarise the methods that have been used to estimate disability and quality of life weights, which are used to quantify perceived quality-of-life for different conditions. We will analyse other available evidence to evaluate the weights of blindness and vision impairment and provide recommendations to help design and develop weights measurement studies in the future, leading to improved decision making in the field.

Artificial Intelligence

Artificial intelligence (AI) holds transformative potential for health, particularly in eye care where it has demonstrated significant promise.

With many places around the world lacking trained specialists, AI could offer faster, cheaper and more efficient diagnostics than current systems, freeing up healthcare workers to perform duties and allowing more people to receive treatment. We are at the forefront of researching AI for eye care in low-income settings, and several current projects are focused on assessing its use for improving sight and people's lives worldwide.

There are no African institutions or African researchers leading ophthalmic AI development and research programmes. Our aim is to change this by establishing Africa's first Centre of Excellence for Ophthalmic AI research. Based in Tanzania, this project will bring together two leading institutions to facilitate collaborative research and create local capacity for AI in eye care.

In Tanzania we are also currently testing AI within real-world programmes, to see if it can improve screening outcomes for patients and prevent people losing vision from DR. By providing a point-of-screening diagnosis, the technology could streamline referrals and help connect more people with sight-threatening DR to eye care.

In Nepal we are running a study which will develop and test a smartphone-based AI tool for diagnosing corneal infections. The study will identify AI models that are capable of accurately distinguishing the type of infection based on an image of the affected eye, to improve accurate diagnosis and therefore treatment.

A further Nepal-based trial will then compare human assessment of images for retinopathy of prematurity from two different devices against an AI algorithm. The second phase of the study will compare the current (expensive) standard equipment against a newly developed cheaper smartphone-based camera.

Image credit: Hugh Bassett.

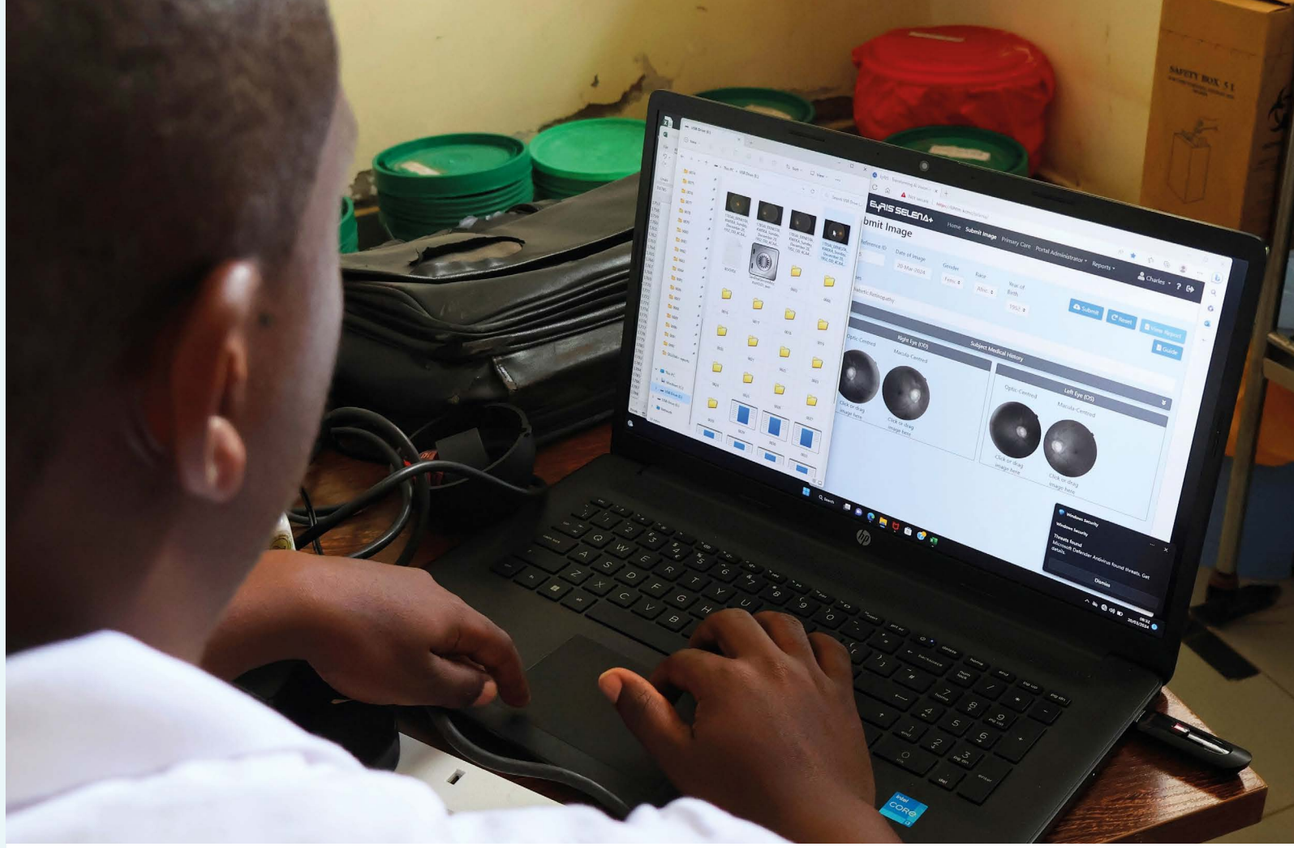


Image credit: Hugh Bassett.

Oculomics

A major new field of research in ophthalmology involving AI analysis of ocular images is Oculomics. This involves the study of relationships between the eyes and overall bodily health and disease. Changes in the eyes, particularly in the retina, can be associated with other diseases in the rest of the body, potentially predicting and diagnosing them, leading to earlier treatment or prevention.

ICEH is leading the establishment of the Africa Oculomics Research Programme, the largest and most detailed prospective oculomics study globally. This is a partnership with the MRC Uganda Unit, UCL Institute of Ophthalmology and Makerere University. The study is based in a long-established general population cohort in Uganda. Over 8 years, we will assess the changes in ocular markers and retinal images in the cohort using AI and then match these to changes in their general health (for instance cardiovascular disease, liver disease and stroke). The resulting AI models will be trained on an African population and openly available for public use.

A future is possible where patients can get a predictive result from an AI-analysed scan at the point of screening with a doctor, receiving treatment and prevention years before serious health problems emerge.

Using AI-assisted, low-cost ocular imaging at scale has the potential to provide major benefits in low-resource settings, improving patient outcomes, lowering long-term healthcare costs. Although rooted in eye health, this project has major applications across general health and technology, and ICEH are at the forefront of its use.

Peek Vision Research

Image credit: Priya Morjaria / Peek Vision.

Peek began life in 2010 and became a research project in Kenya led by ICEH in 2012. Peek's technology was originally developed and tested with a small team of visionary local clinicians and technical experts. They worked on the first prototypes of a smartphone vision-testing app that could be used by anyone with a smartphone, even in the hardest-to-reach locations.

That app developed into Peek Acuity, which launched in 2016 as the world's first clinically-validated visual acuity test smartphone app. In 2017 it was nominated the "Best Social Impact Application" by Google. It is still available for free and has been downloaded and used by over 50,000 people in 160 countries.

In 2015, Peek spun out from LSHTM to become an independent non-profit organisation. Since then, teams working in Botswana, India and Kenya have tested and refined the tools, which now incorporate Peek Acuity as part of a powerful system for eye health data capture and analysis. With Peek, eye health programme providers can follow the patient journey from screening to treatment and identify where patients are being left behind.

Peek tools are backed by numerous peer-reviewed research studies. With a strong, ongoing research collaboration with ICEH, Peek continues to develop, refine and validate its tools. Peek's software, programme design tools and data insights are now used in schools and communities across Africa and Asia.

Developing and validating Peek Acuity

Peek Acuity, Peek's vision check app, is embedded into Peek's software for eye health surveys and school and community eye health programmes. Research published in *JAMA Ophthalmology* in 2015 shows that Peek Acuity is at least as accurate as conventional distance vision checks when used by non-specialist community health workers in Kenya, and is also slightly quicker than a conventional test.[39]

In an external systematic review of 14 mobile visual acuity tests in 2020, the Peek Acuity app was determined to have the best reproducibility and correlation with standard testing methods.

School and Community eye health programme approach validation

A school eye health programme powered by Peek in Kenya was evaluated in a randomised controlled trial comparing it to a conventional school eye health programme and published in *The Lancet Global Health* in 2018. 21,000 children were screened by 25 teachers over nine days. The results show that with Peek, **more than double the proportion of children attended follow-up appointments**.[40] The programme was later scaled up to reach all 200,000 school-going children in the county.

Image credit: Peek Vision.

Another randomised controlled trial in Kenya compared a community eye health programme powered by Peek to a conventional programme. Published in *The Lancet Digital Health* in 2021, the study showed that with Peek, **almost three times the number of people with eye problems were connected to care** compared to conventional programmes.[41] The study also showed how programmes powered by Peek can improve their use of specialist resources. With Peek, the proportion of people attending hospitals for eye problems that could have been treated at the primary care level reduced from 61% to 17%, while the proportion being treated at hospitals for more complex conditions rose from 8% to 63%.

Further research

Peek is working concurrently on multiple projects to provide new services, for instance with partners in Nepal, where Peek has developed and validated a new smartphone-based near visual acuity test,[42] as well as an algorithm for prescribing reading glasses at the doorstep.

Unaddressed near vision impairment affects more than 500 million people, and WHO plan to use both the near and distance vision app for data collection in surveys and surveillance.

A recent study used innovative trial methods that listen to left behind groups. The study used a rapid randomised controlled trial (RCT) methodology, designed to produce robust results far faster than conventional trials. The results showed a significant increase in attendance from 32 percent to 39 percent among young adults in Kenya by using SMS reminders that were co-created with the most left-behind group. The trial reached its stopping point in just 30 days from introducing the intervention. Further research using these trial methods is underway in Kenya and more countries.[43]

Peek is exploring the use of AI to enhance the capability of screeners to identify referrable eye health issues with greater precision and developing new platform capabilities to support eye care providers to measure and improve the outcomes of services with data from the community, e.g. for cataract and refractive errors.

Image credit: Rolex Joan Bardeletti.

CAPACITY STRENGTHENING

Our group works to improve eye health professional capacity globally. We strengthen research capacity through training PhD students and research mentorship with partners, while co-ordinating networks that enable shared learning between eye care professionals globally. Peek's programmes support health professionals to better identify people in need and connect them to services.

Image credit: Ashley Gilbertson.

Research Capacity Strengthening

To improve eye health services and outcomes for people worldwide, it is essential to have research which provides evidence for improvement. This evidence should also be locally-led and relevant.

This capacity strengthening has a focus on clinical researchers. Since 2010 we have had 32 research degree students (registered at LSHTM) who have been awarded their PhDs; 17 of these are nationals of LMICs. Of people holding PhDs in the field of ophthalmology / eye health from the Africa region, ICEH has trained the large majority of them (>75%).

The Commonwealth Eye Health Consortium (featured on next page) funding led to approximately a doubling of the number of research active clinicians trained to PhD level from the African region. These researchers are conducting contextually relevant, public health-orientated eye health research.

It has led to regional networks of researchers collaborating to further build this capacity, with ongoing collaboration and support with the ICEH team.

In future we aim to keep ensuring the development of research capacity in the global south, and encourage LMIC hubs that can facilitate research capacity strengthening directly.

Case Study: Post-doctoral Research Fellowship

"Research capacity development is an often-unspoken need for improving eye health in East Africa. Perhaps this is because basic needs like deficiencies in infrastructure, consumables and health personnel are so overwhelming that it seems superfluous to think of research. Yet countries in this position need to be sure that interventions are proven to work locally before committing the few resources available. Developing research capacity is really useful towards this end. Until recently, in Kenya we had only a few ophthalmologists with masters' degree training in research and none at PhD level – now we have 4 with PhDs."

Dr Stephen Gichuhi, Chair of the Department of Ophthalmology, **University of Nairobi, Kenya**

Dr Gichuhi completed his PhD at ICEH in 2016

Commonwealth Eye Health Consortium

ICEH led the establishment of the Commonwealth Eye Health Consortium (CEHC) in 2014 with the support of a generous grant from The Queen Elizabeth Diamond Jubilee Trust. The CEHC was an international collaborative network of leading training and research institutions, regional Colleges of Ophthalmology, Ministries of Health, NGOs and service providers.

The Consortium made a substantial contribution to the strengthening of the eye health workforce in Commonwealth countries and beyond, strengthening eye health systems, research capacity and improving integration with the wider health sector. People from at least 39 countries benefited from new or improved services, brought about through training, increasing and sharing knowledge, and developing new tools and technology.

The Consortium supported the development and delivery of several online courses for eye health, now taken by >40,000 people in 188 countries. It supported the training of 180 eye health personnel in public health leadership or specialist clinical disciplines – resulting in the development and delivery of new services and increased regional training capacity in many countries. It facilitated the establishment of new services for diabetic retinopathy in 17 countries, retinoblastoma in 14 countries and retinopathy of prematurity in 6 countries.

Image credit: (Above) Rolex Joan Bardelettin. (Right) Andrew Bastawrous / Peek Vision.

Clinical Capacity Strengthening

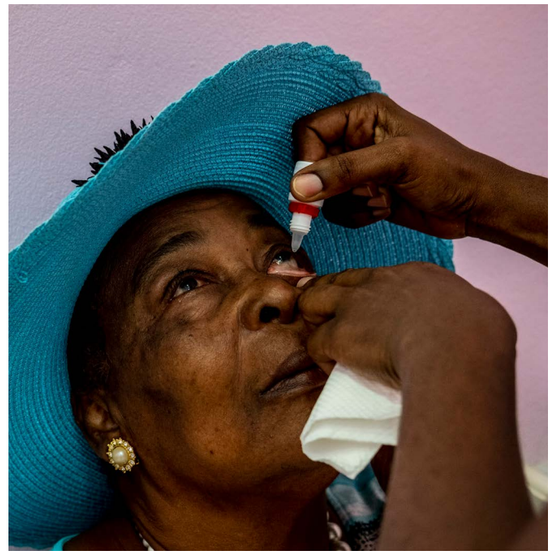


Image credit: Ashley Gilbertson.

The VISION 2020 LINKS & Networks Eye Health Partnerships Programme ('LINKS Programme') was started by ICEH in 2004. It connects hospitals and eye health training centres/institutions in LMICs, with an emphasis on Africa, with hospital eye departments, mostly in the UK. The purpose is to support the strengthening of clinical training and service provision. More than 30 long-term partnerships have been established across 18 countries.

Over time, disease-specific networks have developed. These consist of LINKS partners with the same priority need. The first network was for Diabetic Retinopathy (DR-NET) and more recently Retinoblastoma (Rb-NET), Retinopathy of Prematurity (ROP) and Glaucoma. Networks enable 'south-south' knowledge sharing, with countries and regions that face similar problems learning from each other.

As well as strengthening clinical skills and capacity, the LINKS and Networks team at ICEH also facilitates national policy and guideline development, at the request of Ministries of Health. The networks have proven to be powerful catalysts for change and, besides measurable capacity-strengthening, have also led to widespread data-sharing and impactful research. All the LINKS and Networks staff team and the work they do is entirely funded by grants and donations from individual donors and philanthropists, trusts and foundations.

Image credit: Ashley Gilbertson.

VISION 2020 LINKS Programme

The VISION 2020 LINKS Programme was established to address one of the key needs for eye care in Africa – strengthening the capacity of eye health workers to help them deliver better quality care for their patients.

Each LINK partnership is established in response to the priority training and capacity-strengthening needs identified by the overseas partner institution. The LINKS Programme 'matches' potential partners, organises and facilitates visits, supports and monitors ongoing LINKS and seeks funding for the partners to carry out their joint programme of training activities.

The LINKS Programme facilitates the sharing of the best UK eye care expertise (NHS Trust hospital eye departments – ophthalmologists, optometrists, nurses, managers, IT specialists etc) with African eye departments, to help the African partner team to meet the priority needs of the population they serve. The benefits are mutual; the UK team members return from training visits with much greater awareness of their role in global eye health, stronger teaching skills and enhanced knowledge and morale.

The LINKS approach establishes equitable, sustainable institution-institution partnerships. It is recognised that through long-term partnership, trust and friendships develop, which in turn enhance the value of the training and increase the likelihood of the LINK partner achieving their specific goals. LINKS bring about lasting change in every aspect of an eye department.

The VISION 2020 LINKS Programme relies entirely on charitable donations and grants from trusts, NGOs and individuals.

Image credit: Ashley Gilbertson.

Image credit: Ashley Gilbertson.

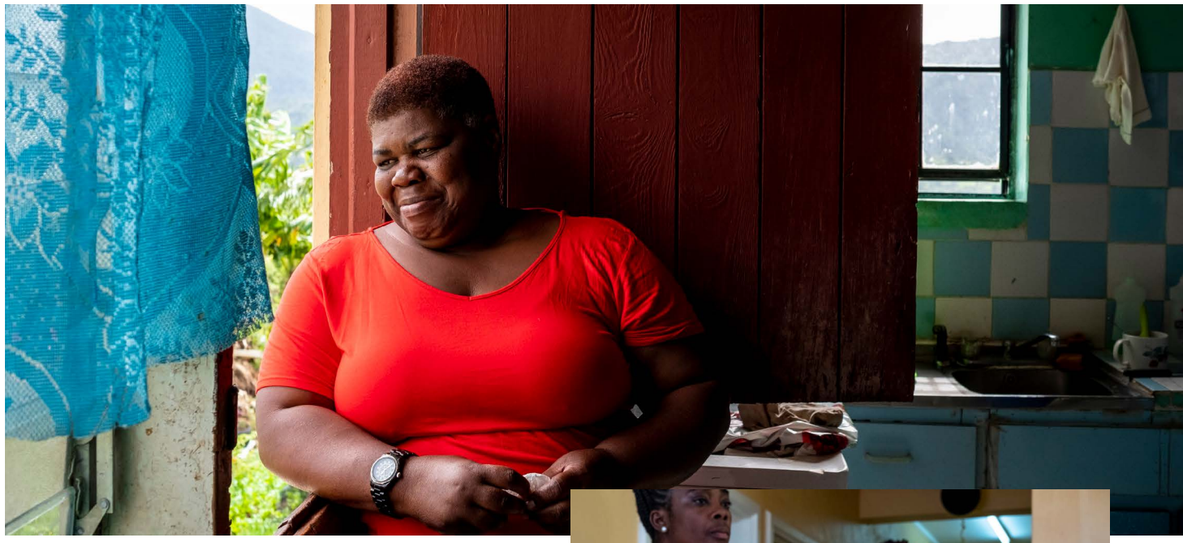


Image credit: Ashley Gilbertson.

Image credit: Ashley Gilbertson.

The DR-NET

Diabetes is a major public health problem and is rapidly increasing globally. More than half a billion people are living with diabetes. Diabetic retinopathy (DR) is the leading cause of blindness among adults of working age. Thousands of people go blind every year in LMICs simply because their DR is diagnosed too late.

The DR-NET was formed in 2013 with the aim of building capacity in LMICs to establish and run integrated DR screening programmes to identify and treat people with diabetes whose sight is threatened. There are now 30 DR screening partnerships in the network, involving 17 countries in Africa, Asia, the Caribbean and the Pacific. The network brings together key Ministry of Health and clinical leads from the diabetes and eye health teams to facilitate the development of national and regional DR policy and service frameworks, with associated implementation plans. National DR guidelines have been developed in Tanzania, Zambia, Botswana, Ghana, Nigeria through close collaboration with the Ministries of Health of each country.

Partners in the DR-NET have achieved major health system improvements leading to many people with diabetes having access to screening and treatment for the first time. All countries have established new DR services, and some are now scaling up towards consolidation as national DR screening and treatment programmes. In the first five years of the network more than 190,000 people were screened and 37,000 treated, an 88% increase in number of patients screened and a 40% increase in number treated. This was estimated to prevent 750,000 years of blindness.

DR-NET also runs a programme of online and in-person international educational activities to directly strengthen capacity for service delivery. These include Workshops where Network partners share their experiences and learn from each other, and specialist training for health care professionals in, for example, laser treatment to prevent blindness.

As the prevalence of diabetes continues to grow in Africa, it is essential that health service providers work together to ensure that diabetes services include offering people with diabetes regular eye screening, education and counselling, with timely treatment when needed, to save sight and prevent blindness.

Image credit: Swathi Kaliki.

The Rb-NET

The Rb-NET was established in 2017 with the aim of improving retinoblastoma (Rb) outcomes in LMICs, enabling more children to survive and see. Retinoblastoma (Rb) is the most common and most devastating eye cancer that affects children worldwide.

There are 8,000 new cases of Rb every year and if diagnosis is delayed or treatment is not available the child will die. In high-income countries, with specialised Rb centres, almost all children will survive, and most eyes do not have to be removed. Sadly, that high success rate is not yet possible in LMICs, where only about 60% of children affected by Rb will survive three years from diagnosis.

Rb-NET was initially made up of 10 Rb treatment centres in six sub-Saharan African countries (Tanzania, Uganda, Malawi, Kenya, Nigeria and Zimbabwe), linked with experts from specialist Rb centres in the UK, India, Israel and the USA. The network trains multi-disciplinary teams who work together to develop and deliver comprehensive Rb care. The network has grown since its establishment and the expert panel now holds regular national Multidisciplinary Team meetings (MDTs) online for Rb treatment centres from over 30 countries in sub-Saharan Africa and Asia. Cases are discussed and treatment plans developed. The sessions are recorded and made available as a resource on the website, so that learning can be further shared globally.

This network has enabled the development of an Rb research network, the Global Retinoblastoma Study Group (GRSG), that brings together experts from over 150 countries and more than 450 centres worldwide. This has led to significant new research, including a study published in 2022 showing that children in low-income countries are at 16 times greater risk of dying within three years from Rb compared to their peers in high income countries, highlighting deep inequities in the diagnosis and treatment of this condition.[15] In addition to public health initiatives for earlier diagnosis, we are starting a new drug trial in Africa to improve survival in late-presenting Rb, the first of its kind. The GRSG centres are currently submitting their 2024 data, which will assess patients presenting in 2024 and their outcomes in 2027.

Bringing global specialists together through Rb-NET raises the profile of Rb and draws international attention to the inequity, together with the need for better access to early diagnosis and curative treatment for children with Rb in LMICs. All the work of the Rb-NET is dependent on grants and donations to help improve the diagnosis and treatment of children with Rb in LMICs.

The ROP-NET

The ROP network was established in 2017 and included six "mentee" countries: Ghana, Nigeria, Kenya, Tanzania, Pakistan and Sri Lanka. A network model with South-South partnerships, principally with experienced mentors in India, was established.

Important principles included; joint local neonatology-ophthalmology teams leading the programmes, training and team building and needs-based, country-specific plans.

The partners worked together to develop and establish their ROP programme goals including multi-disciplinary training in the Indian institutions, team visits between institutions, increasing awareness of ROP within country and working with national Ministries of Health. This has led to National ROP guidelines and delivering ROP screening in several countries for the first time.

The network is currently focusing on establishing ROP telemedicine screening, strengthening data collection, and collaborating with Ministries of Health, WHO and UNICEF for sustainable integration into national policies. The network holds regular webinars and meetings to discuss clinical cases and service challenges for continuing education and ongoing support.

The Glaucoma-NET

The Glaucoma-NET was established in 2021 to improve diagnosis and treatment of glaucoma, with the aim of preserving and maximising sight through a range of activities including knowledge-sharing and development of clinical services.

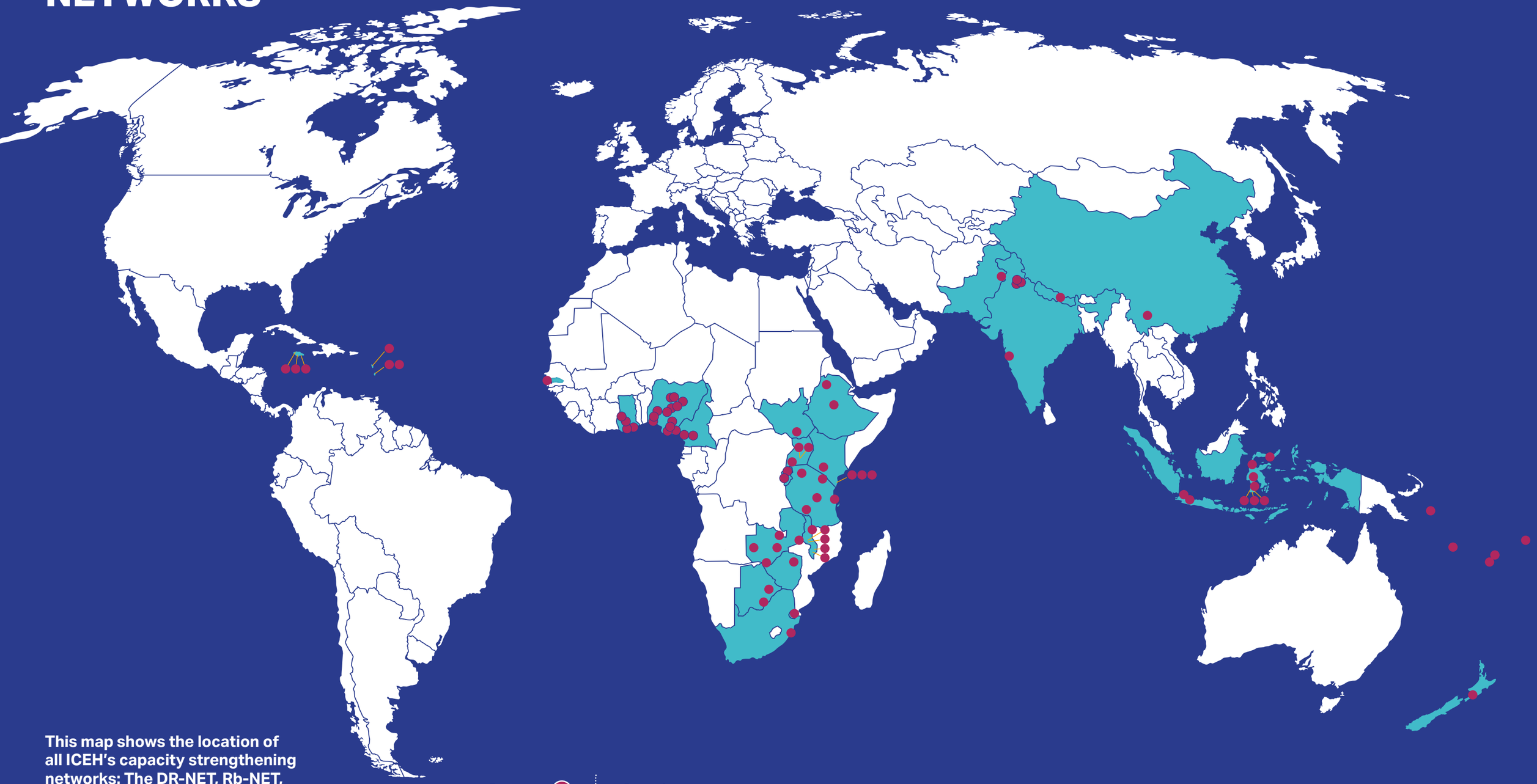
Glaucoma-NET leads and coordinates glaucoma clinicians, Ministries of Health, patient groups and other key stakeholders to establish national frameworks, guidelines and action plans for development of services to improve the outcomes for glaucoma patients in LMICs.

A key achievement is the development and implementation of the Toolkit for Glaucoma Management in sub-Saharan Africa. This provides a framework for best practice, which countries can adapt to their specific national context. Surgical skills training for glaucoma specialists in LMICs makes use of GLAucoma Simulation-based Surgical (GLASS) training and offers intensive hands-on courses. Glaucoma-NET also offers a framework for collaborative multi-country research to address key issues in glaucoma management in LMICs. Advocacy for improved resources for glaucoma care in LMICs, including patient groups, are a vital feature of the Network's activities.

Image credit: Heiko Philippin.

Glaucoma-NET hosts monthly online training and case discussion sessions with participants from LMICs including Burkina Faso, Cameroon, Ethiopia, The Gambia, Ghana, Kenya, Mozambique, Nigeria, South Sudan, Tanzania and Uganda, to share learning and strengthen capacity to prevent vision loss in people with glaucoma.

CAPACITY STRENGTHENING NETWORKS



This map shows the location of all ICEH's capacity strengthening networks: The DR-NET, Rb-NET, ROP-NET and Glaucoma-NET.

Some institutions are members of all four networks. Each network continues to expand.

Partners

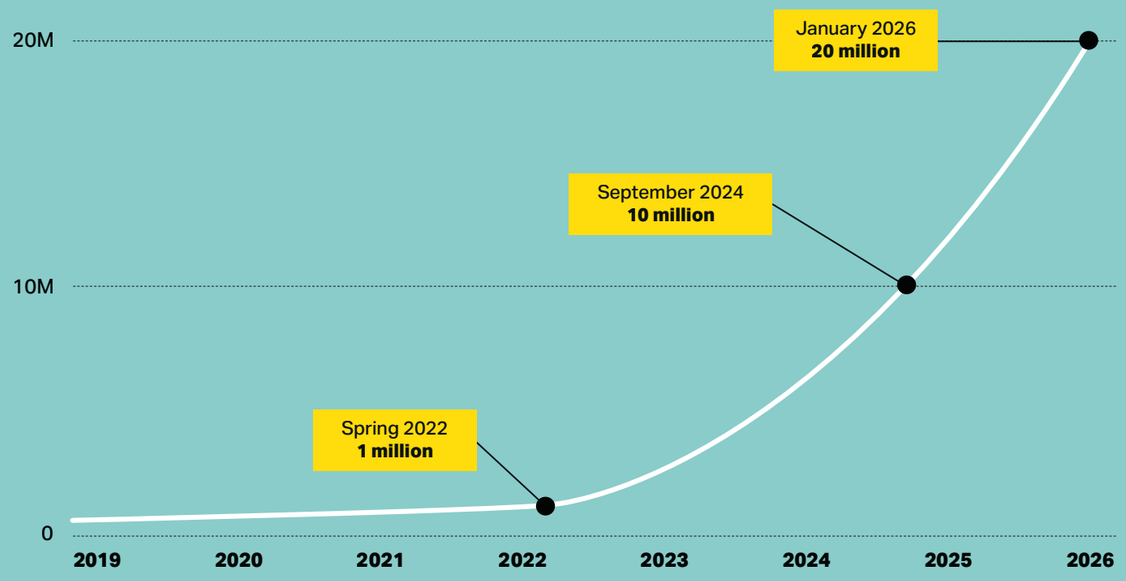
Countries

Botswana	Dominica	Ghana	Kenya	Pakistan	Solomon Islands	The Gambia	Zimbabwe
Burundi	Eswatini	India	Malawi	Rwanda	South Africa	Uganda	
Cameroon	Ethiopia	Indonesia	Nepal	South Sudan	St Lucia	Vanuatu	
China	Fiji	Jamaica	Nigeria	Samoa	Tanzania	Zambia	

Peek Vision

Through Peek's own research and partner organisations' programmes, Peek has powered the screening of over twenty million people and connected more than two million to care. Momentum is growing. It took a decade to reach the first million people (Spring 2022) and just six months to reach the next million (Autumn 2022). There are currently 136 Peek-powered programmes established in 13 countries with 16 programme partners.

People Reached in programmes powered by Peek



A Peek-powered programme enables non-specialists to conduct large-scale eye health screening in schools and communities. Patients requiring specialist review are identified and referred for appropriate treatment. Patients and / or carers receive automated text or voice messages in local languages notifying them of results and actions. Results are sent to local programme managers, head teachers and / or appropriate professionals to facilitate coordination of necessary actions (e.g. appointment booking; organising group local transport). Crucially, "loop-closure" is tracked in real-time with live data to close the huge gap in the proportion of people identified with an eye health need who never make it to treatment, which can be as high as 80-90%.

Eye health providers use Peek's software and data intelligence platform and comprehensive approach to identify hidden barriers to eye health across their programmes. By uncovering these hidden barriers, Peek is enabling system-level changes resulting in eye health systems that are more impactful, cost-effective, efficient and equitable.

Peek and CBM Christian Blind Mission, Peek's anchor INGO partner, commissioned a return on investment study facilitated by an independent health economist.[44] The study compared eye health programmes in four comparable districts in Pakistan, two that were using Peek and two that were not. All projects were implemented over the same one year time period.

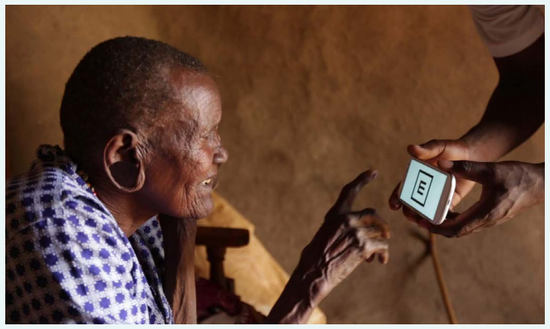


Image credit: Peek Vision.

The key findings were impressive:

2.5x

Increased screening coverage

More than **2 times** the total population screened

16x

More people treated

With Peek, there were **16 times more** people connected to care and receiving treatment

6x

Lower cost per referral

More than **6 times cheaper** per referral attendance.

Peek works within existing systems, complementing programme delivery processes that are already in place. Working in tandem with eye health providers, Peek assists in optimising and accelerating eye health screening and referral pathways through an entire system to increase efficiency and equity of care. Peek is an attractive solution for national governments to adopt and strengthen sustainable, government-led eye health delivery.

Current examples include:

India

Peek is partnering with Dr Shroff's Charity Eye Hospital in India on an innovative partnership to improve vision and eye health. The work in India is led by another ICEH alumnus, Dr Shalinder Sabherwal. In addition to Peek-powered community and school eye health programmes taking place in Uttar Pradesh, a number of research projects are underway, including innovative new tools for presbyopia treatment.

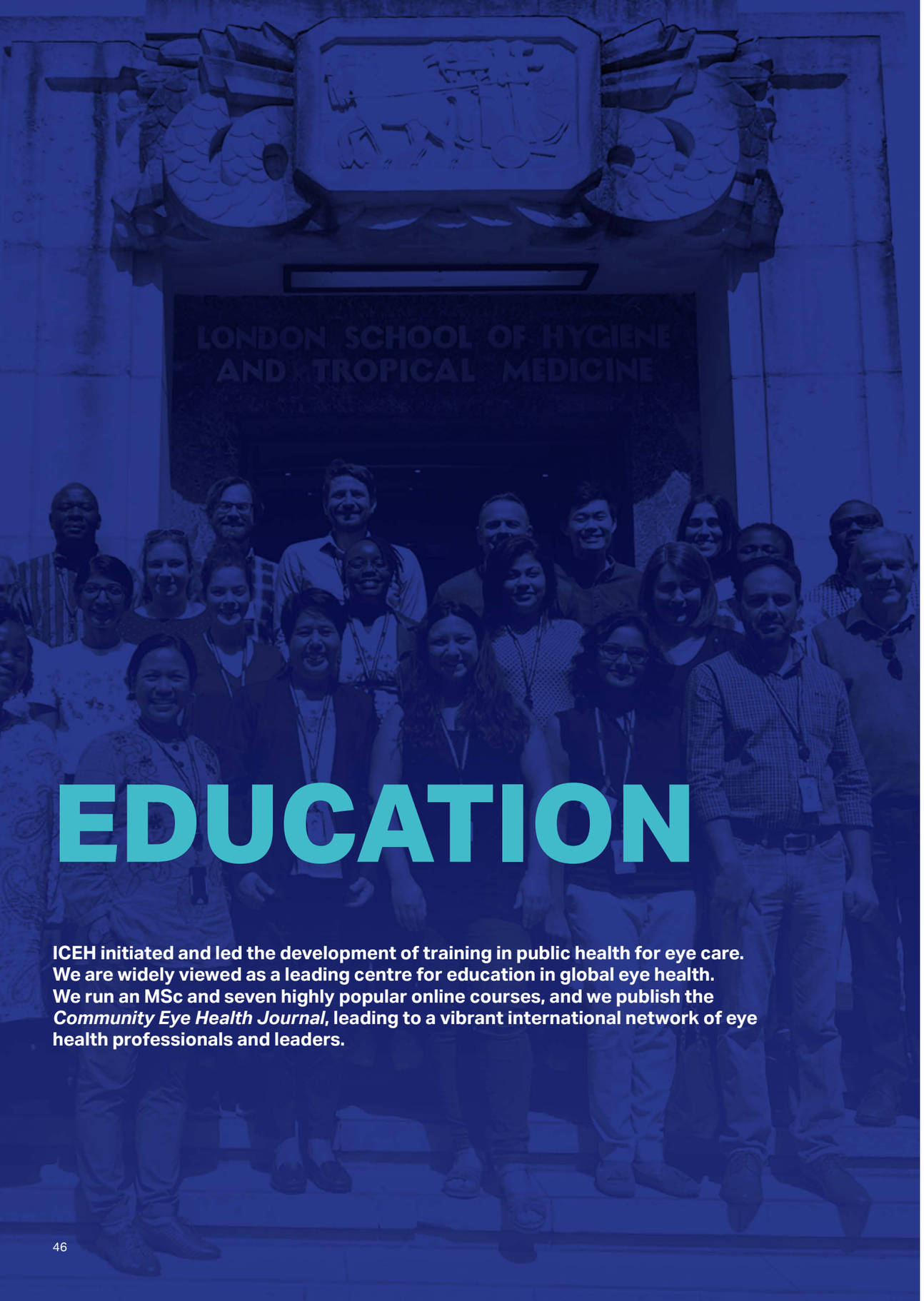
School children being screened in Molefe school demonstrating how Peek technology works. Credit: Peek Vision.

Kenya

Peek is providing the technology for the CBM and Ministry of Health-led *Vision Impact Project,* covering 10 counties in Kenya. More than one million people were screened in the first 11 months of the programme, which is strengthening health systems and providing inclusive access to quality eye care. Peek is referenced in Kenya's National Eye Health Strategic Plan 2020-2025 as a technology to pursue.

Pakistan

The flagship CBM-Peek programme in Pakistan first launched in October 2018 with three health facilities. To increase coverage, 1,200 government-employed Lady Health Workers in Pakistan were successfully introduced to the programme to carry out door-to-door screening in communities. The Peek-powered programme in Pakistan has grown to over 190 connected health facilities and 8,300+ connected schools, with more than 600,000 people screened every quarter.



EDUCATION

ICEH initiated and led the development of training in public health for eye care. We are widely viewed as a leading centre for education in global eye health. We run an MSc and seven highly popular online courses, and we publish the *Community Eye Health Journal*, leading to a vibrant international network of eye health professionals and leaders.

Online Education

Since 2014, ICEH has extended access to public health for eye care training through the development and delivery an extensive portfolio of free online courses: Open Education in Eye Health. The rationale for these courses was to bridge the curriculum gap between disease-focused clinical training and a public health approach. It has extended access to a wide group of health professionals, improving availability and increasing access by removing costs.

The courses have been built with contributions from more than 30 members of our team and 80 external contributors from 25 countries. Five courses now also carry professional accreditation. The course portfolio contains >600 creative commons individual open learning resources, which are being used and adapted by multiple training programmes globally.

IMPACT

Overall, >40,000 people from over 180 countries have engaged with these courses. Each course is annually updated to maintain its relevance and quality for the global participants.

The "on demand" format provides users with complete flexibility to access the course at a time that suits them and complete the course at their own pace. The courses are designed to support self-directed learning.

The impact of these courses has been very widespread, and we have received consistently very high ratings and positive feedback. These have become recognised training resources for many organisations.

Course	What will you gain
Global Blindness: Planning and Managing Eye Care Services	Understand magnitude of global blindness and how to plan effective cataract and refractive error services eye care.
Eliminating Trachoma	Discover how the SAFE strategy is used by communities and experts to end trachoma disease across 44 endemic countries.
Diabetic Eye Disease: Building Capacity to Prevent Blindness	Recognise the magnitude of the diabetes challenge and its impact on vision. Understand the principles of screening and application to prevent blindness.
Retinopathy of Prematurity: Practical Approaches to Prevent Blindness	Explore the neonatal and ophthalmic strategies to prevent and treat retinopathy of prematurity (ROP) across health systems.
Glaucoma: a Public Health Approach to Preventing Blindness	Develop a public health understanding of glaucoma, its lifelong management, and raising awareness for better quality eye care.
Ophthalmic Epidemiology Part 1 – Basic Principles	Discover the key concepts of epidemiology for eye care, explore the causes and distribution of visual impairment in populations, learn about key epidemiological study designs and assess their strengths and limitations for studying eye disease.
Ophthalmic Epidemiology Part 2 – Application to Eye Diseases	Learn to critically analyse the different features of the main epidemiological study designs and how they are used to address different research questions in eye health.

MSc Public Health for Eye Care

Our Master's course in Public Health for Eye Care has been training eye health professionals from around the world for over 40 years. This one-year programme is taught by a global faculty of subject experts.

This training equips eye care professionals to effectively develop, manage, monitor and evaluate programmes, become advocates and trainers in eye health, develop relevant research, and directly influence national eye health policy.

Along with the public eye health education on the MSc, the curriculum includes training in epidemiology, epidemiological research methods, statistics and health economics, culminating in a research project and dissertation, with the fieldwork usually conducted in the candidate's own country.

IMPACT

The impact of this course has been substantial, global in reach, and long-term in duration. This course is unique in the ophthalmic world and provides capacity-strengthening for research and population health approaches to eye care service provision at a local level.

Since the course began, this face-to-face one-year MSc has trained >750 people from 101 countries. Our alumni have gone on to many different roles within the eye health field, holding leadership positions within WHO, many national MOH eye health leads, senior positions in international and national NGOs, academic roles and clinical training and service delivery positions.

In the last ten years 50% of students have been female, and 79% come from low- or middle-income countries. Over these last ten years 75% of our MSc students have been supported through fully funded scholarships. Each year we work hard to raise this scholarship support with several donor organisations.

Caption: MSc students graduating.

Outline of course content:

The MSc programme can be taken full time (12 months) or split (24 months) and starts each September. It predominantly takes place as face-to-face teaching in London. The course has the following desired outcomes:

- describe the basic epidemiology of the major blinding eye diseases
- design and interpret studies to assess public health eye care needs using appropriate research methods
- critically appraise evidence and select appropriate public health interventions for the major blinding eye diseases
- design a comprehensive eye care programme for appropriate preventive and therapeutic measures for a community
- develop the skills necessary for resource mobilisation, management and evaluation of local comprehensive eye care programmes and integration into health systems

Compulsory modules on the course include Basic Epidemiology, Basic Statistics for Public Health & Policy, Foundations of Global Eye Health and Eye Care Programmes, Introduction to Health Economics, Epidemiological Methods Applied to Eye Diseases, Skills for Field Research in Eye Care, Childhood Eye Disease and Ocular Infections, and Non-Communicable Eye Diseases.

ALUMNI PERSPECTIVE: DR SUCHETA KULKARNI

I opted to do the master's in public health for eyecare after almost 17 years of clinical practice, joining the course in London in 2015 with the specific purpose of learning research and programme management skills.

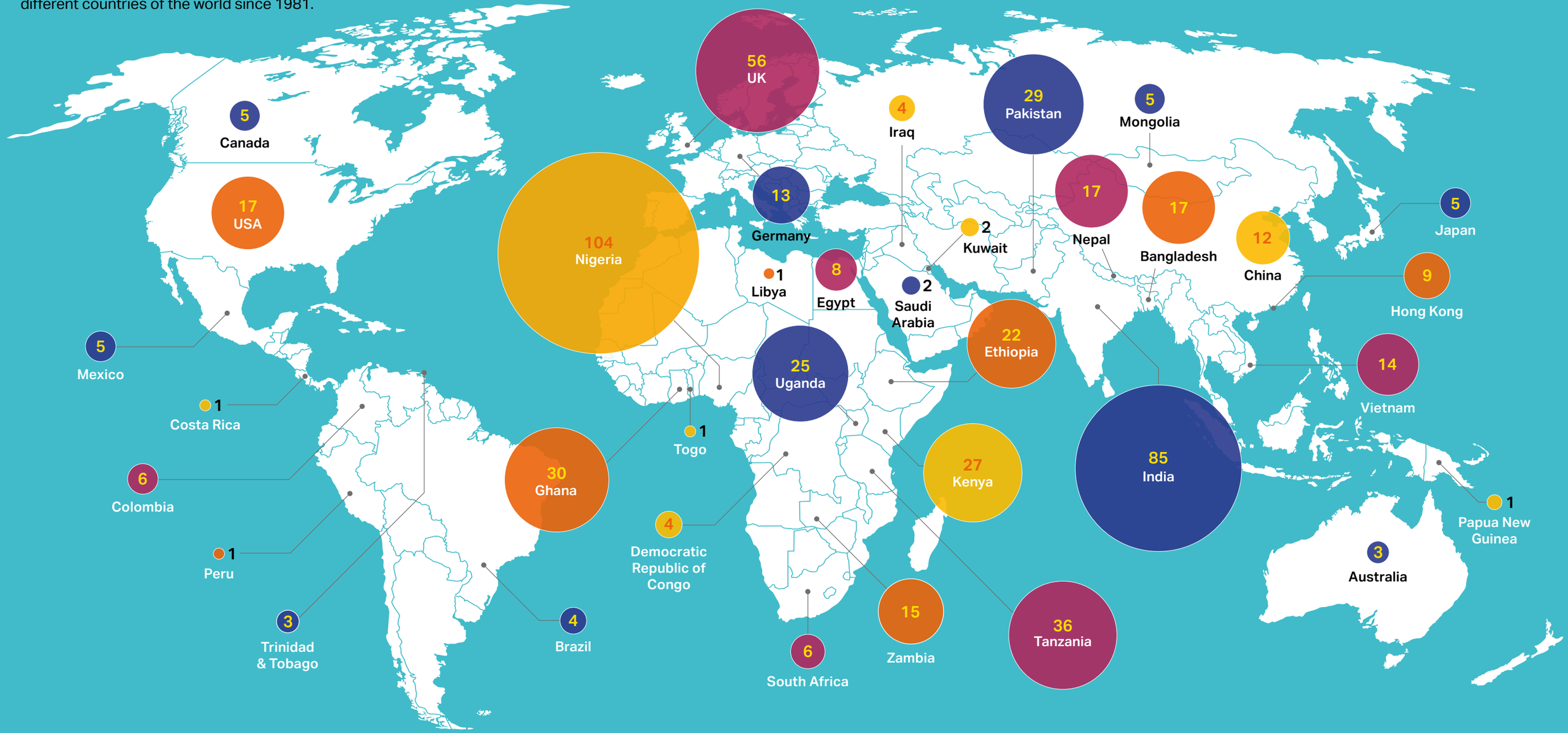
Focused modules on research skills and lots of practice helped me plan and successfully implement several research projects after my master's. The second objective of learning programme management skills was achieved during the second term of the MSc. Understanding the programme cycle and applying this knowledge in several interactive practice sessions (as well as in written assignments), helped me develop a broader perspective of looking at any programme with respect to manpower, material, and money. Similarly I developed a very clear understanding of how 'service provider' and 'health seeker' factors affect the outcome of any project or programme.

After completing my master's, I implemented several research projects in my local area and published them. I also guide young health care professionals to design and implement research projects. Similarly, I have managed several eye care projects including those on diabetic retinopathy and retinopathy of prematurity successfully in the last 7-8 years. I have also been working to raise awareness about disability among eye care professionals, following the modules I took during the MSc.

ICEH MSc Alumni Community

This map shows the number of ICEH alumni from different countries of the world since 1981.

Did you know?
ICEH has over 750 ICEH alumni from 101 countries.



Countries

Afghanistan	4	Cambodia	3	Eritrea	1	India	85	Kenya	27	Mozambique	3	Palestine	2	Senegal	2	Switzerland	5	Tunisia	1
Albania	1	Cameroon	7	Eswatini	2	Indonesia	4	Korea	1	Myanmar	7	Papua New Guinea	1	Seychelles	2	Syria	2	Turkey	3
Armenia	1	Canada	5	Ethiopia	22	Iran	2	Kuwait	2	Namibia	1	Paraguay	1	Sierra Leone	4	Taiwan	1	Uganda	25
Australia	3	China	12	France	1	Iraq	4	Laos	1	Nepal	17	Peru	1	Solomon Islands	1	Tanzania	36	United Arab Emirates	2
Bangladesh	17	Colombia	6	Germany	13	Ireland	4	Liberia	2	New Zealand	3	Philippines	5	Somalia	4	Thailand	10	United Kingdom	56
Belgium	1	Congo, Democratic Republic	4	Ghana	30	Israel	1	Libya	1	Niger	1	Portugal	1	South Africa	6	The Gambia	9	USA	17
Belize	3	Costa Rica	1	Guinea-Bissau	2	Italy	3	Malawi	7	Nigeria	104	Qatar	1	Spain	3	The Netherlands	11	Vietnam	14
Botswana	3	Czech Republic	1	Guyana	1	Jamaica	2	Malaysia	3	Norway	3	Rwanda	3	Sri Lanka	7	The Sudan	8	West Indies	1
Brazil	4	Dominican Republic	3	Haiti	1	Japan	5	Mexico	5	Oman	1	Saint Lucia	1	Swaziland	3	Togo	1	Yemen	1
Brunei	1	Egypt	8	Hong Kong	9	Kazakhstan	1	Mongolia	5	Pakistan	29	Saudi Arabia	2	Sweden	1	Trinidad & Tobago	3	Zambia	15
																		Zanzibar	2

ICEH MSc Alumni Community

This map shows the careers of a selection of alumni following completion of the MSc.

Dr Andy Cassells Brown • UK

Consultant Ophthalmologist for UK NHS and former Fred Hollows Foundation Medical Director, Global Programmes.

Dr Jacquelyn O'Banion • USA

Director of Global Ophthalmology and Associate Professor at Emory Eye Centre, Emory University School of Medicine.

Dr Babar Qureshi • Pakistan

Director of CBM and Vice President of the International Agency for the Prevention of Blindness (IAPB).

Professor GV Murthy • India

Professor of Public Health for Eye Care and Disability and President, PRASHO Foundation.

Amanda Huang • China

Cluster Director-China, Cambodia & Laos, The Fred Hollows Foundation.

Professor Hannah Faal • Nigeria and The Gambia

Former President of the IAPB (1999-2004), Advisor to the Prevention of Blindness programme of the WHO (Sensory Functions, disability and rehabilitation unit).

Dr Desirée Murray • Trinidad & Tobago

Ophthalmologist. Senior Lecturer in Ophthalmology, the University of the West Indies.

Dr Miriam Cano • Paraguay

Head of Ophthalmology at Catholic University of Asunción Paraguay, former Eye Health Director at the Ministry of Health of Paraguay.

Dr Oteri Eme Okolo • Nigeria

Director, National Eye Care Coordinator, National Eye Health Programme, Institution Federal Ministry of Health and Social Welfare, Nigeria.

Professor Oathokwa Nkomazana • Botswana

Permanent Secretary, Ministry of Health in the Government of Botswana.

Dr Bernadetha R. Shilio • Tanzania

Ophthalmologist and Program Manager, National Eye Care Program, Ministry of Health – Tanzania.

Dr Michael Gichangi • Kenya

Senior Deputy Director of Medical Services and Head of Ophthalmic Services Unit at the Ministry of Health Kenya.

The *Community Eye Health Journal*

The *Community Eye Health Journal* (CEHJ) provides free, practical, peer-reviewed guidance to eye care providers (including ophthalmic nurses, allied health personnel, ophthalmologists and optometrists), managers and policy makers in low-resource settings.

Our goal is to reach as wide a readership as possible of eye care workers in LMICs, providing relevant and useful content to improve patient care. It is a unique resource and for many eye care workers the journal is their only source of up-to-date information on how to deliver high quality services.

ICEH has produced the CEHJ since 1988. There are currently four editions: International (English), South Asian (English/Hindi/Tamil), Francophone Africa (French) and Chinese (Mandarin).

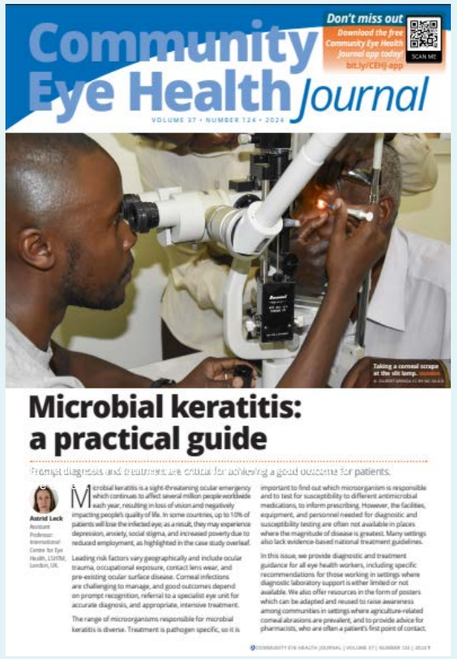
The journal has an international editorial board, the majority of whom are experts from LMICs. The journal relies on donations to fund its production and distribution.

IMPACT

Copies are sent quarterly to readers in 128 countries and content is freely available online via our website and smartphone app. We estimate that the 18,000 print copies are shared by around 100,000 people, and the journals are collectively considered a 'living library' by many. Our articles receive millions of views and downloads on our website and through PubMed.

Our reader surveys show that 87% respondents reported making positive changes to their practice due to things they had read in the journal:

> **"My patient customer care has improved. I handle my instruments with extra care and I take good care of them. I do eye exam systematically. My confidence and competence has increased through the knowledge I get from reading the journals."**



Alumni Network

Many alumni of our MSc return to or take up posts in which they are responsible for the leadership and delivery of eye health programmes for regions of countries, whole countries and internationally.

The training they have received informs the shaping and leadership of these programmes, benefitting millions of people. Therefore, the course has had very considerable strategic impact. The work of previous alumni ranges from: leading eye care at Ministries of Health; positions at WHO; regional leadership roles with the International Agency for the Prevention of Blindness; directing community eye health training in educational institutions and universities; leadership roles with international NGOs, and leading eye research in their own countries.

Our alumni are a great resource within eye health, but also a group of friends and colleagues that we hold dear. We aim to work collaboratively with this group as much as possible and provide opportunities for networking throughout their careers.

Image credit: The International Centre for Eye Health.

DR OTERI OKOLO

Dr Oteri is an ophthalmologist and the National Eye Health Coordinator for Nigeria. She also serves on the board of the National Eye Hospital (NEC), Kaduna.

Since her MSc at ICEH she has been instrumental in strengthening National and State level leadership structures and effective coordination between government and development partners. She has also been involved in improving service delivery, human resource training and research capacity at NEC, finalization of country-level indicators and data tools, advocacy, and development of national guidelines for diabetic retinopathy and glaucoma. She has facilitated in-service training of Community Health Extension Workers (CHEWs) in Primary Eye Care (PEC) in 3 states of the country with plans for a national scale up.

Her research work on the acceptability of the WHO Primary Eye Care manual has led to the upgrade of the curricula for the preservice training of CHEWs. 70% of Nigeria's population reside in rural areas and lack access to basic eye care services. This landmark achievement will potentially increase access to quality eye care services.

REFERENCES

Selected peer-reviewed publications from ICEH and Peek:

1. **The Lancet Global Health Commission on Global Eye Health: Vision Beyond 2020.**
   Lancet Global Health, 2021, 9(4): e489-e551

2. **Advancing the Sustainable Development Goals through improving eye health: a scoping review.**
   Lancet Planetary Health, 2022, 6(3): e270-e280

3. **The Association Between Vision Impairment and Mortality: A Systematic Review and Meta-Analysis.**
   Lancet Global Health, 2021, 9(4): e418-e430

4. **Global economic productivity losses from vision impairment and blindness.**
   eClinical Medicine, 2021,35:100852

5. **Grand Challenges in Global Eye Health: a global prioritisation process.**
   Lancet Healthy Longevity, 2022, 3(1): e31-e41

6. **Eye health indicators for universal health coverage: results of a global expert prioritisation process.**
   British Journal of Ophthalmology, 2022, 106(7):893-901

7. **Addressing the environmental sustainability of eye health care delivery: a scoping review.**
   Lancet Planetary Health, 2022, 6(6): e524-e534

8. **Effective cataract surgical coverage in adults aged 50 years and older: estimates from population-based surveys in 55 countries.**
   Lancet Global Health, 2022, 10(12):e1744-e1753

9. **Effective refractive error coverage in adults aged 50 years and older: estimates from population-based surveys in 61 countries.**
   Lancet Global Health, 2022, 10(12):e1754-e1763

10. **Effective refractive error coverage in adults: a systematic review and meta-analysis of updated estimates from population-based surveys in 76 countries modelling the path towards the 2030 global target.**
    Lancet Global Health, 2025, 13(8): e1396-e1405

11. **Effective cataract surgical coverage in adults aged 50 years and older: empirical estimates from population-based surveys in 68 countries and modelled estimates for 2000–30.**
    Lancet Global Health, 2026, 14(3):e367-e377

12. **A School Eye Health Rapid Assessment (SEHRA) planning tool: Module to survey the magnitude and nature of local needs.**
    BMC Public Heath, 2022, 22(1):1665

13. **Prevalence of death in people with vision impairment from cataracts before treatment: a case study from Kenya.**
    Lancet Healthy Longevity, 2026 7(2):100800

14. **The impact of cataract surgery on health-related quality of life in Kenya, the Philippines, and Bangladesh.**
    Ophthalmic Epidemiol 2010; 17(6): 387-99

15. **Cataract services for all: Strategies for equitable access from a global modified Delphi process.**
    PLOS Global Public Health, 2023, 3(2): e0000631

16. **Selective laser trabeculoplasty versus 0·5% timolol eye drops for the treatment of glaucoma in Tanzania: a randomised controlled trial.**
    Lancet Global Health, 2021, 9(11): e1589 – e1599

17. **Integrating eye health training into the primary child healthcare programme in Tanzania: a pre-training and post-training study.**
    BMJ Paediatrics Open, 2020, 4:e000629

18. **The Global Retinoblastoma Outcome Study: a prospective, cluster-based analysis of 4064 patients from 149 countries.**
    Lancet Global Health, 2022, 10(8): e1128-e1140

19. **Diabetic Retinopathy in Kenya: assessment of services and interventions to improve access.**
    PhD Thesis. London School of Hygiene & Tropical Medicine

20. **Travel time to cataract surgical services in Kenya, Malawi and Rwanda: demonstrating a standardised indicator of physical access to cataract surgery.**
    Eye. 2023

21. **Cataract Services are Leaving Widows Behind: Examples from National Cross-Sectional Surveys in Nigeria and Sri Lanka.**
    Int J Environ Res Public Health. 2019

22. **Cataract services for all: Strategies for equitable access from a global modified Delphi process.**
    PLOS Global Public Health, 2023, 3(2): e0000631

23. **Gender and ethnic diversity in global ophthalmology and optometry association leadership: a time for change.**
    Ophthalmic and Physiological Optics. 2021. 41(3):623-629

24. **Underserved groups could be better considered within population-based eye health surveys: a methodological study.**
    Journal of Clinical Epidemiology. 173:111444

25. **Posterior versus bilamellar tarsal rotation surgery for trachomatous trichiasis in Ethiopia: a randomised controlled trial.**
    Lancet Global Health, 2016, 4(3): e175-184

26. **Absorbable versus silk sutures for surgical treatment of trachomatous trichiasis in Ethiopia: A randomised controlled trial.**
    PLoS Medicine, 2011; 8(12): e1001137

27. **Surgery versus epilation for the treatment of minor trichiasis in Ethiopia: a randomised controlled non-inferiority trial.**
    PLoS Medicine, 2011; 8(12): e1001136

28. **Double-dose azithromycin mass drug administration, facial cleanliness, and fly control measures for trachoma control in Oromia, Ethiopia (Stronger SAFE): a cluster-randomised controlled trial.**
    Lancet Infectious Diseases, 2026

29. **Re-emergence of Chlamydia trachomatis infection after mass antibiotic treatment of a trachoma-endemic Gambian community: a longitudinal study.**
    Lancet, 2005, 365:1321-1328

30. **Topical Chlorhexidine 0.2% versus Topical Natamycin 5% for the Treatment of Fungal Keratitis in Nepal: A Randomized Controlled Noninferiority Trial.**
    Ophthalmology. 2022. 530-541

31. **Diagnosis of Fungal Keratitis in Low-Income Countries: Evaluation of Smear Microscopy, Culture, and In Vivo Confocal Microscopy in Nepal.**
    J Fungi (Basel). 2022. 13;8(9):955

32. **The Global Incidence and Diagnosis of Fungal Keratitis.**
Lancet Infectious Diseases, 2021, 21(3): e49-e57

33. **The impact of microbial keratitis on quality of life in Uganda.**
BMJ Open Ophthalmology, 2019, 4(1): e000351

34. **Traditional eye medicine use in microbial keratitis in Uganda: a mixed methods study.**
Wellcome Open Res. 2019. 4;4:89

35. **Role of traditional healers in the management of microbial keratitis in eastern Nepal.**
Wellcome Open Res. 2024. 9:295

36. **Simulation-based surgical education for glaucoma versus conventional training alone: the GLAucoma Simulated Surgery (GLASS) trial. A multicentre, multicountry, randomised controlled, investigator-masked educational intervention efficacy trial in Kenya, South Africa, Tanzania, Uganda and Zimbabwe.**
British Journal of Ophthalmology. 2021.106(6):863-869

37. **The simulated ocular surgery (SOS) trials: randomised-controlled trials comparing intense simulation-based surgical education for cataract and glaucoma surgery to conventional training alone in East and Southern Africa.**
2021. PhD thesis, London School of Hygiene & Tropical Medicine

38. **The economics of vision impairment and its leading causes: A systematic review.**
eClinicalMedicine. 2022. 46:101354

39. **Development and Validation of a Smartphone-Based Visual Acuity Test (Peek Acuity) for Clinical Practice and Community-Based Fieldwork.**
JAMA Ophthalmology, 2015, 133(8):930-937

40. **Smartphone-based screening for visual impairment in Kenyan school children: a cluster randomised controlled trial.**
The Lancet Global Health. 2018, 1;6(8):e924–32

41. **Effectiveness of an mHealth system on access to eye health services in Kenya: a cluster-randomised controlled trial.**
The Lancet Digital Health, 2021, 1;3(7):e414–24

42. **Development and Validation of a Digital (Peek) Near Visual Acuity Test for Clinical Practice, Community-Based Survey, and Research.**
Translational Vision Science and Technology, 2022, Dec 1;11(12):18–18

43. **Enhanced patient counselling and SMS reminder messages to improve access to community-based eye care services in Meru, Kenya: an embedded, pragmatic, individual-level, randomised, controlled, adaptive platform trial.**
Lancet Global Health, 2026, 14(1): e112-e120

44. **Data on file**

ICEH will continue to strive for excellence in eye health worldwide through collaborative and equitable partnerships. In future we seek to:

- Further develop global networks of academics, clinicians and policymakers to tackle the greatest challenges in eye health
- Create innovative and integrated service programmes through research, collaboration and tools
- Expand our capacity strengthening networks, providing eye health workers globally with the skills and support they need to carry out successful diagnosis, treatment and prevention programmes
- Continue to train and support eye health researchers throughout their careers
- Share knowledge and skills through education and *The Community Eye Health Journal,* reaching the entire eye care workforce with up-to-date information
- Translate all our work into policy and practice through dissemination, engagement and advocacy

Our work would not be possible without funding from international institutions, donors and partners. We are extremely grateful to all our funders for their continued support and help to improve eye health worldwide.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