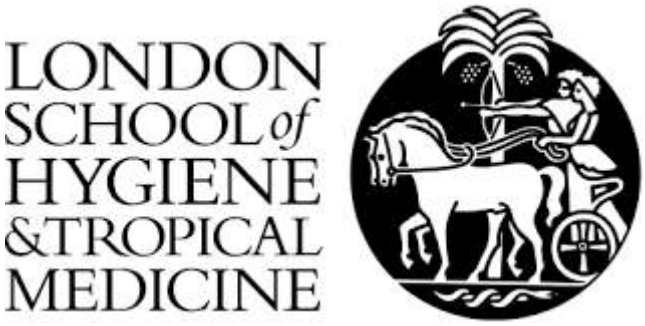

Assessing the technical capacity of primary health care facilities in Anambra state, Nigeria to implement the World Health Organisation African Region's primary eye care package.

ADA AGHAJI

Thesis submitted in accordance with the requirements for the degree of Doctor of Philosophy

University of London

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Funded by: The Commonwealth Eye Health Consortium, through the Queen Elizabeth Diamond Jubilee Trust.

Research Group affiliation(s): International Centre for Eye Health

Declaration

I, Ada Aghaji, confirm that the work presented in this thesis is my own. Where data and information have been derived from other sources, I confirm that these have been indicated in the thesis. I devised a technical feasibility capacity profile for primary eye care to guide countries wishing to implement, based on an internationally accepted feasibility framework. This profile was sent to nine experts in eye care I sub-Saharan Africa for their input and the final document was used as the basis for this study.

All analyses were undertaken by me, with advisory support from my supervisors.

Signature Date 3rd February 2024

Abstract

Introduction

Globally 80% of the 596.3 million people worldwide who are blind or visually impaired have conditions where sight could be restored or where interventions could have prevented visual loss. An even greater number have less severe conditions where treatment is warranted. In low-and-middle income countries (LIMCs) the main reason why people become or remain blind is lack of access to eye care services. Primary health care (PHC) is the cornerstone of health care, and the same applies to eye health. However, primary eye care (PEC) as an integral component of PHC is lacking in most LMICs. In response, the World Health Organization AFRO region recently launched a PEC package for Africa (WHO AFRO PEC package) to be delivered at PHC level. It has facility-based management and health promotion components. A literature review identified many limitations to the delivery of PEC in Africa, and no studies explored the extent to which PHC has the capacities to deliver PEC. This mixed-methods study aimed to address this in six districts in Anambra State, Nigeria.

Methods

The study had the following elements: literature reviews of 1. PEC in LMICs and of theoretical frameworks on the feasibility of delivering health interventions; 2. review of relevant Nigerian policy documents; 3. a Delphi exercise to finalise the technical complexity of the two components of the WHO AFRO PEC package and the capacities needed at PHC level to deliver it; 4. development and pilot testing study tools; 5. a study in 48 PHC facilities (33 health centres and 15 health posts) and 5. In-depth interviews with district level supervisors and purposively selected heads of nine facilities. Data were analysed to identify capacity gaps using WHO's health systems framework.

Results

The following key gaps were identified: underdeveloped policy in relation to PEC in Nigeria; weak supportive supervision and lack of referral systems; eye conditions are not being recorded in registers or reported; marked under-staffing of health centres but not health posts and high staff turnover; most facilities lacked visual acuity charts and almost all had no eye medication in stock. The majority of facilities focussed on maternal and child health which was reflected in the age of patients who attended. Only four facilities provided eye care services. Two unexpected findings were that a quarter of those working in study facilities were ad hoc workers or graduate volunteers, and some facilities were visited by eye care providers who provide services. Health promotion consisted mainly of creating awareness of services available at primary health care facilities and did not promote health

literacy. Furthermore, health promotion activities were largely unsupervised and focussed mainly on maternal and child health activities.

Conclusions

Recommendations arising from the findings in relation to the delivery of the WHO AFRO PEC package as an integral component of PHC include the need to realign and strengthen policies; eye conditions need to be included in health management systems; training should be included in pre-service training of all PHC cadres and supervisors will need orientation on PEC; referral systems need to be put in place; all facilities need visual acuity charts and torches; advocacy will be needed to ensure all medication included in the Essential Drugs List are available, and strategies will need to be adopted to increase demand.

PREFACE (format of the thesis)

This PhD thesis uses the “research/review paper” format that was recently introduced by the London School of Hygiene & Tropical Medicine. It therefore includes a number of papers which have been published, submitted or are formatted for submission to peer-reviewed journals. The chapters listed in the Contents page are formatted this way and where applicable, include publication details in a cover sheet, which includes acknowledgements of the contributions of other people. Other information and data not presented or covered in the papers, but which make the body the thesis more understandable and are included as linking material in other chapters. The linking chapters were written by Ada Aghaji.

Acknowledgements

The following persons contributed to make this work possible.

My heartfelt gratitude to Professor Clare Gilbert. From the beginning, she has been a pillar of support, guiding the research process and making sure it was on track. She taught me so much about robust research, from ethics, data collection tools, data management and academic writing. She also ensured that I had all the support I needed to finish this project. She has been more than a supervisor- a mentor, a mother, a big sister. I look forward to working with her on other projects.

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I appreciate Professor Matthew Burton, Director of the Commonwealth Eye Health Consortium and current Director of the International Centre for Eye health, for his encouragement during the research period and for generously funding this work.

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The Anambra State Primary Health Care Development Agency Executive Secretary Chioma Ezenyimulu for her support and granting me access to my study primary health care facilities. To the district supervisors for health and all the health workers in my study areas who gave me maximum cooperation. To my research team, especially Ekene Uzokwe who went over and beyond the call of duty to simplify the logistics for this study.

To the University of Nigeria that granted me study leave to undertake this research and my colleagues at the Department of Ophthalmology who covered my academic and clinical duties during the study period.

To the staff of the International Centre for Eye Health who have been like family to me and supported me every step of the way.

Finally, to Almighty God Who protected me and the research team during our numerous travels, even to hard-to-reach areas and Our Blessed Mother whose Intercessions made all this possible.

From the bottom of my heart, I say thank you.

Dedication

This thesis is dedicated to all those who will seek eye care services at primary care facilities and the health workers who will treat them. May both the demand and the supply sides of primary eye care be satisfying for all concerned.

Contributors

Person	Position	Contribution
Clare Gilbert	Professor of International Eye Health, LSHTM	Main PhD Supervisor
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ABBREVIATIONS

AFRO	Africa Region
ASPHCDA	Anambra State Primary Health Care Development Agency
CHEW	Community Health Extension Worker
CHO	Community Health Officer
GAP	Global Action Plan
HMIS	Health Management Information Systems
HoF	Head of Facility
HP	Health Post
HRH	Human Resources for Health
IAPB	International Agency for the Prevention of Blindness
IM	Intramuscular
(J)CHEW	Junior Community Health Extension Worker or Community Health Extension Worker
LGA	Local Government Authority
LMIC	Low- or middle-income country
NCD	Non-Communicable Diseases
NGO	Non-Governmental Organisation
NHP	National Health Policy
NMW	Nurse Midwife
NPHCDA	National Primary Health Care Development Agency
NSHDP	National Strategic Health Development Plan
OIC	Officer in charge
PEC	Primary Eye Care
PHC	Primary Health Care
PHCFs	Primary Health Care Facilities
PHCUOR	Primary Health Care Under One Roof
RCT	Randomized Controlled Trial
SOML	Saving One Million Lives

SOP	Standard Operating Procedure
SUP	Supervisor
UNICEF	United Nations Children's Fund
VHW	Village Health Worker
WHO	World Health Organization

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Chapter 1 INTRODUCTION

The longest journey begins with a single step…the road to a PHC facility in Anambra state.

Case study

Sitting in the eye clinic and attending to patients, many of whom come in too late to be helped made me wonder how I could change the paradigm. One day a cataract blind 8-month-old infant with a lovely smile was brought to see me. Her mother recounted all the hurdles she had to jump to come to the eye clinic. "How can a baby at this tender age start going to see the eye doctor?" family and community members asked. But the baby's mother stuck to her guns. After examinations and tests, we made a diagnosis of congenital rubella syndrome, and the baby underwent surgery. Surgery was uneventful but the visual outcome was sub-optimal. She was eventually chased out of her matrimonial home by her husband's family who felt she was bewitched to have given birth to a blind child. The baby's smile haunted me, and I felt that the system had failed both mother and child. Why hadn't we created awareness of childhood eye conditions in rural communities? Why wasn't the cataract detected earlier? How could we have made eye care more accessible to her? That was the push I needed to change the narrative and see how we could develop and implement primary eye care with health promotion to create awareness of eye conditions and make treatment timely and accessible. I felt the best way to do this was a top-down approach, so I took a year out to do a sabbatical at the National Primary Health Care Development Agency- an institution responsible for the development and implementation of primary health care policies in Nigeria. There it dawned on me that policy does not change overnight…and more importantly we needed evidence to support any policy change; hence my sojourn to the London School of Hygiene and Tropical Medicine to undertake a research degree.

1.1 Blindness and vision impairment and impact

Globally, 596 million people were estimated to have distance vision impairment in 2020, 43 million of whom were blind. Another 510 million people had uncorrected near vision impairment. About 90% of those affected live in low-income and middle-income countries.(1) This means that almost one in seven people worldwide have vision impairment.

Despite the large number of people affected, in 2017 blindness accounted for only 29.9 million DALYS globally which is lower than for hearing impairment (34.2 million) and far lower than for neonatal disorders (186 million) and diabetes (67.9 million). (2) (Table 1). The rankings are similar for age-adjusted DALY rates. These findings are likely to reflect why the control of blindness is not always prioritized politically. However, what is not captured in these data are the fact that low cost, highly effective and scalable solutions are available for the major causes of vision impairment and blindness.

Table 1. DALYS due to blindness and other disorders, globally and in sub-Saharan Africa

	Total DALYS (millions)		**Age-adjusted DALY rate/100,000 population**		
	Global(2)	**SSA(3)**	**Global(2)**	**SSA**	**Europe/high income**
Blindness **(**2017)	29.9		377		
Cataract in (2015)	8.0	0.35	101.8	90 (3)	27 (3)
Refractive error	8.0		102.2	62.8*(4)	55.1* (4)
Neonatal disorders	186,000		2,765		
Diabetes	67,900		839.0		
Hearing impairment	34,200		434.6		

*Moderate and severe visual impairment and blindness

The DALY estimates for eye conditions vary from region to region. For example, the total number of DALYs for cataract blindness in Africa is lower than in other regions but age-adjusted DALY rates (90/100,00) are higher than in Europe (27/100,000), the Western Pacific and America.(3) The age standardized DALY rates for blindness from refractive errors is 1.1/100,000 population in high income countries and 6.89/100,000 population in sub-Saharan Africa.(4) Hence the populations of sub-Saharan Africa are more severely impacted by eye conditions than populations in more developed economies. The impact of blindness in terms of DALYS and where it is ranked, is largely determined by age structure of the population and the weighting given to each condition, which for blindness declined from 0.6 in 1994 to 0.173 in 2015.(2)

It is estimated that 58.4 million Africans are blind or visually impaired. In addition, over 51 million have near vision impairment.(5) However, only 30% of Africans have access to eye care(6) which is usually delivered at secondary or tertiary health facilities. A lack of access to

eyecare is why people become or remain blind.(1) Another reason for high levels of vision impairment in Africa is a lack of health promotion such as facial cleanliness to prevent trachoma, and physical activity and low carbohydrate diet to prevent diabetes.

1.2 Primary eye care

The World Health Organisation Global Action Plan 2014-2019 advocates a primary health care approach to eye care (Primary Eye Care) to increase access.(7) Primary eye care (PEC) is an integrated, participatory and inclusive approach to the eye health component of PHC consisting of promotive, preventive, curative and rehabilitative services.(8) The potential for PEC was realized when it was noted that, with minimal equipment, primary health care workers could be taught to identify patients with red eyes, cataracts and with additional skills, measure visual acuity- a crucial indicator of the health of the eye.(9) This could have far reaching implications for the development of eye care services at the primary level, therefore increasing access to basic eye care.(10) In the absence of eye care, including at the primary level, people with eye conditions may self-medicate, use traditional eye remedies, or purchase inappropriate medication from informal sources.(11) In Nigeria a traditional practice for cataract is couching, in which the opaque lens is dislocated into the back of the eye by a sharp instrument, often with disastrous consequences.(12)

Several eye conditions can be managed at the PHC level either by prevention, detection and treatment or detection and referral (Table 2).

Table 2. Eye conditions that can be identified, treated or referred at primary health care level.

Eye Condition	Description	Common symptoms	Prevention/ treatment	Management at Primary Health Care level
Eye conditions which cause blindness or visual impairment				
Conditions principally of adults				
Cataract	• Age related condition • Increasing opacity of the lens of the eye • Usually bilateral • Commonest cause of blindness in Nigeria	Gradual painless loss of vision	Surgery restores vision	Detect, refer, counsel
Refractive error	• Blurred distance vision • Commonest cause of visual impairment in Nigeria	Gradual painless loss of vision	Spectacles restore distance vision	Detect, refer, counsel
Presbyopia	• Blurred near vision • Affects most people over the age of 50 years	Gradual painless loss of near vision	Spectacles restore near vision	Detect, give reading glasses
Glaucoma	• Gradual, progressive, painless loss of peripheral vision • Can lead to bilateral, irreversible blindness. • Second commonest cause of blindness in Nigeria	Gradual painless loss of vision	Early detection and treatment can preserve vision	Detect, refer, counsel
Diabetic retinopathy	• Complication of diabetes	Gradual painless loss of vision	This can be prevented by better control of diabetes, including self-management through diet.	Refer people with diabetes for eye examination
Corneal ulcer	• Infection often secondary to mild trauma. May be fungal	Pain and loss of vision		Health promotion, detect and refer
HIV eye disease	• Manifestation of untreated HIV	Skin lesions on lid, painless loss of vision		Detect and refer
Trachoma	• Commonest cause of infectious blindness in Nigeria. • Transmitted by flies. • Active infection in children; lid scarring, trichiasis and corneal scaring in adults.	Pain/discomfort, loss of vision	Face/environmental hygiene. Mass administration of antibiotic; surgery for trichiasis	Health promotion, detect, treat

Eye Condition	Description	Common symptoms	Prevention/ treatment	Management at Primary Health Care level
Ocular trauma	• Many be blunt or penetrating; foreign body	Pain / loss of vision from trauma		Health promotion, first aid, refer if serious
Loss of vision of unknown cause		Sudden or gradual loss of vision		Detect and refer
Childhood conditions				
Vitamin A deficiency	• Nutritional blindness affecting children < 5 years of age. • Common cause of childhood blindness in low-income countries	Sudden painless loss of vision	Vitamin A supplementation; vitamin A rich food; exclusive breast feeding to 6 months	Health promotion, detect, treat
Measles	• Vaccine preventable blindness in children • Causes corneal opacity	Pain with loss of vision	Measles vaccination	Prevent
Conjunctivitis of the new-born	• Caused by a sexually transmitted disease in the mother as the new- • born passes down the mother's birth canal.	Red eye(s) with thick discharge	Topical antibiotic at birth	Prevent, treat, refer more serious cases
Cataract in children	• Can be genetic or due to congenital rubella	White pupil: child cannot see	Rubella vaccination	Detect white pupil, refer
Squint in children	• Usually secondary to refractive errors	In/out turning eye	Spectacles and/or surgery	Detect, refer
Retinoblastoma	• Can be genetic	White pupil; eye swelling; red painful eye; squint	Depends on stage	Detect white pupil, refer
Milder eye conditions				
Conjunctivitis	• Allergic or infective inflammation of the conjunctiva. Common in children and young adults	Red sticky eye(s)	Anti-allergic or anti-bacterial eye drops will provide relief	Treat, refer
Dry eyes	• Commoner in the elderly and postmenopausal women. • Irritable itchy eyes often with a burning sensation.	Discomfort	Eye lubricants often provide relief.	Detect, treat or refer

1.3 Primary eye care in Africa

Most curricula for PHC workers in Africa either do not include eye care, or the training is extremely limited or outdated.(13) In response, international non-government organizations (INGOs) have developed their own curricula for in-service training and have trained different cadres of PHC workers using their own trainers. Whilst this vertical approach can lead to an increase in knowledge and some change in practices,(14) there can be considerable challenges. The main challenge is that this approach is not scalable or sustainable, as they are time-bound with a limited budget. Other challenges of PEC, include inadequate supervision, attrition of workers, and the delivery of eye care is seen as extra responsibility and not part of their job description.

1.4 WHO AFRO Primary Eye Care Package

Another challenge of implementing PEC in sub-Saharan Africa is the lack of a defined curriculum which has resulted in deficient training and unrealistic expectations. (9) To address this, the WHO's African Region recently launched a packet of interventions for the delivery of primary eye care across sub-Saharan Africa (WHO AFRO PEC Package). The WHO AFRO PEC package was launched in 2019 to improve access to eye care in sub-Saharan Africa where it has been estimated that only 30% of the population has access to eyecare.(6)

The WHO AFRO PEC package arose out of many advocacy and planning meetings in African countries over several years. The package was created using a process of expert consensus and evidence of the effectiveness of interventions was not a key consideration. The package was pilot tested in Kenya and Rwanda (15) but the findings have not been published in a peer reviewed journal.

The package has two components: health promotion and facility based case management.(16)(see Appendix 2 for further details):

1. Facility case management

- 5 evidence-based algorithms, for red eye, swellings, trauma, vision loss for distance and near, and children 0-5 years (Figure 1).
- 12 evidence-based protocols [e.g., how to measure visual acuity.
- 10 standards and indicators for monitoring and evaluation
- Training package (curriculum and materials)
- Core lists of essential consumables, technologies and medicines
- Templates for the management of health data

2. Health promotion

- 4 sets of health messages for different groups

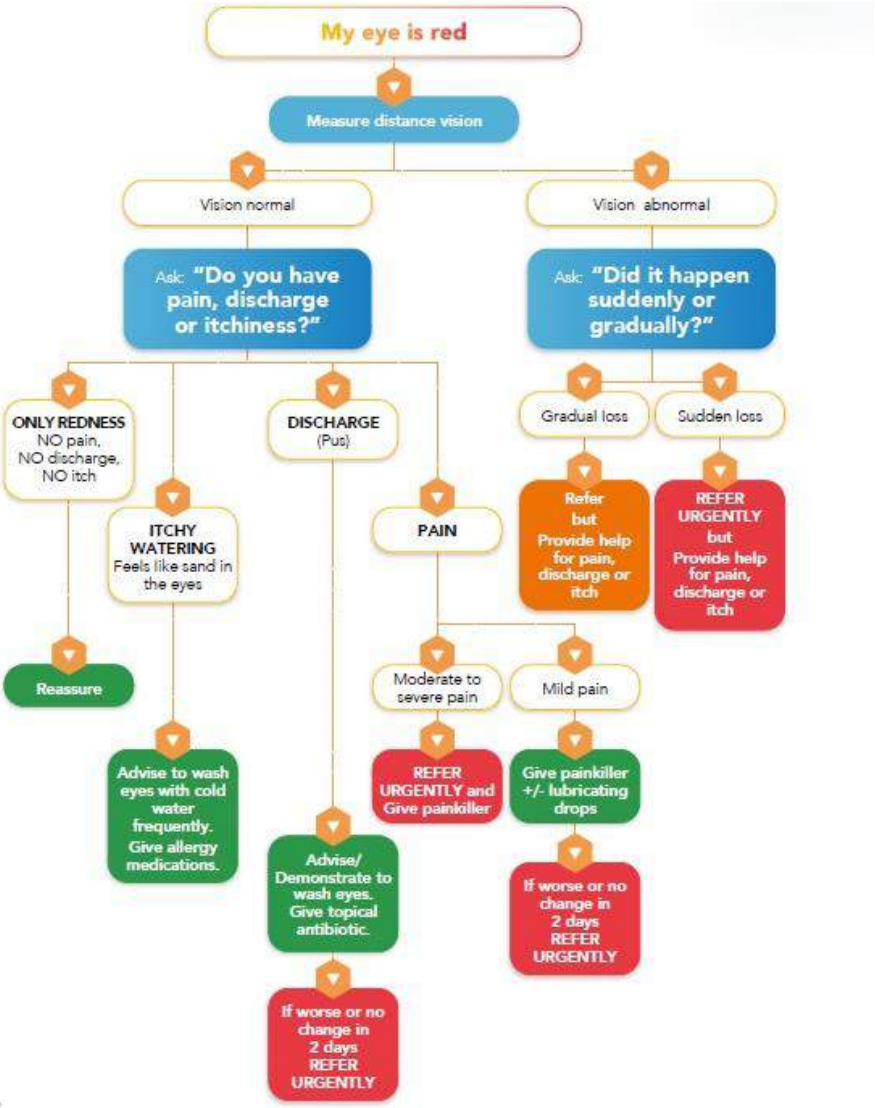

Figure 1. WHO AFRO Primary Eye Care Package algorithm for red eye(16)

The facility case management component is essentially a symptom-led, triaging tool which leads to action without a diagnosis i.e., counsel, treat, refer (routine or urgent) or a combination of these actions. The main equipment required is a visual acuity chart (at the 6/12 level only) and a torch. Treatment is recommended for conditions without loss of vision or pain, for example a red eye or ocular trauma.

The majority of the symptoms which people with eye conditions could present with to a PHC facility (Table 2) are covered by the algorithms with the exception of symptoms of dry eye

(irritation, soreness). In addition, the package does not include eliciting the red reflex to detect retinoblastoma or cataract in young children. Potential challenges of the package are that symptoms cannot easily be defined and are, therefore, open to interpretation, and nuances may be lost in translation. For example, in the Igbo language there is no word which equates to 'moderate', as there are only words which describe the extremes.
There are no published studies on the validity of the algorithms in the WHO package when used by PHC staff compared with examination by an eye health professional. However, a recent study in Kenya which used a simplified algorithm which only included distance and near visual acuity and pain, had a sensitivity 91% and a specificity of 78% with a positive predictive value of 89%.(17)
The eye health promotion component includes messages for PHC workers to include in their health talks. The messages cover a) avoiding risk factors for eye diseases, b) when to access health care when they have symptoms, c) for screening (e.g., for diabetic retinopathy and glaucoma if there is a family history) and d) specific actions they can take (e.g., nutrition education for mothers to prevent vitamin A deficiency).(16) The risk factors to be avoided are all evidence based (e.g., wearing seatbelts and protective eyewear, not smoking, avoiding excessive sunlight), and there is evidence of the benefit of screening and treatment for diabetic retinopathy and glaucoma. However, the health messages and on their own will not support health literacy, nor will they empower communities.

The WHO package does not include screening for any eye conditions. However, WHO has recently added eye screening to their recommendations for newborn care, recommending that red / fundal reflex testing is assessed in all newborns.(18) Researchers at the International Centre for Eye Health have undertaken a body of work in Tanzania which has led to the inclusion of an Eye Module in the Ministry of Health's primary level child health programme, WHO/UNICEF's Integrated Management of Newborn and Childhood Illness (IMNCI).(19) The overall goal of this work is that eye care, including re/fundal reflex testing, is included in global and regional IMNCI strategies.

1.5 Primary health care workers in Nigeria

In Nigeria, PHC is delivered in primary health centres and health posts by a range of cadres of health professionals (Table 3).

Table 3. Roles and responsibilities of primary health care staff in Nigeria

Cadre in order of seniority	Training / qualifications	Roles and responsibilities	Use Standard Operating procedures#
Nurse midwife*	Nursing and midwifery (4 years)	In health centre: antenatal care; deliveries with referral of complex case. Managing less complex conditions with referral. Administration and supervision.	No
Community Health Officer (CHO)*	6 years (schools of health technology; 2 in teaching hospitals)	As above, plus supervision of staff in the community	Yes
Community Health Extension Worker (CHEW)*	4 years in schools of health technology	In health centre: antenatal care; deliveries with referral of complex case. Managing less complex conditions with referral. Health promotion: 20% of their time is spent in the community.	Yes
Junior Community Health Extension Worker (JCHEW)**	2 years in schools of health technology	In Health Facility: Treat minor ailments. Health promotion, supervise village health workers. 40% of their time is spent in the community	Yes
Village Health Worker (VHW)	On the job	Based in the community. Health promotion	-

#Also known as standing orders in Nigeria *Can be heads of PHC facilities ** Can only be head of health posts

As many PHC facilities are understaffed, existing staff often have to expand their responsibilities, taking on more senior or junior roles.(20)

This thesis reports on the capacities that will be needed in sub-Saharan African countries to implement the WHO AFRO PEC package (and how we developed the capacity framework), the gaps that will need to be addressed before PEC can be implemented in Nigeria and finally the policy implications of our study.

The *President International Agency for the Prevention of Blindness 2012 said,*

"PEC is critical in expanding eye care services and creating greater equity and access. Its implementation still remains a challenge and so does integration into Primary Health Care. The evidence to support such integration and advocacy efforts needed still remain elusive."

Our study provides a piece in the jigsaw puzzle of evidence needed to implement PEC.

1.6 Setting of the study.

Nigeria is a country of great cultural and linguistic diversity with over 250 ethnic groups and languages; the three major tribes constitute 60% of the population. 56% of the population is aged 15 years and over and 62% of persons are literate. (21) Subsistence farming is practiced across the country. The north of the country, which has a hot, dry climate, is generally poorer, with lower levels of education than the tropical southern states.

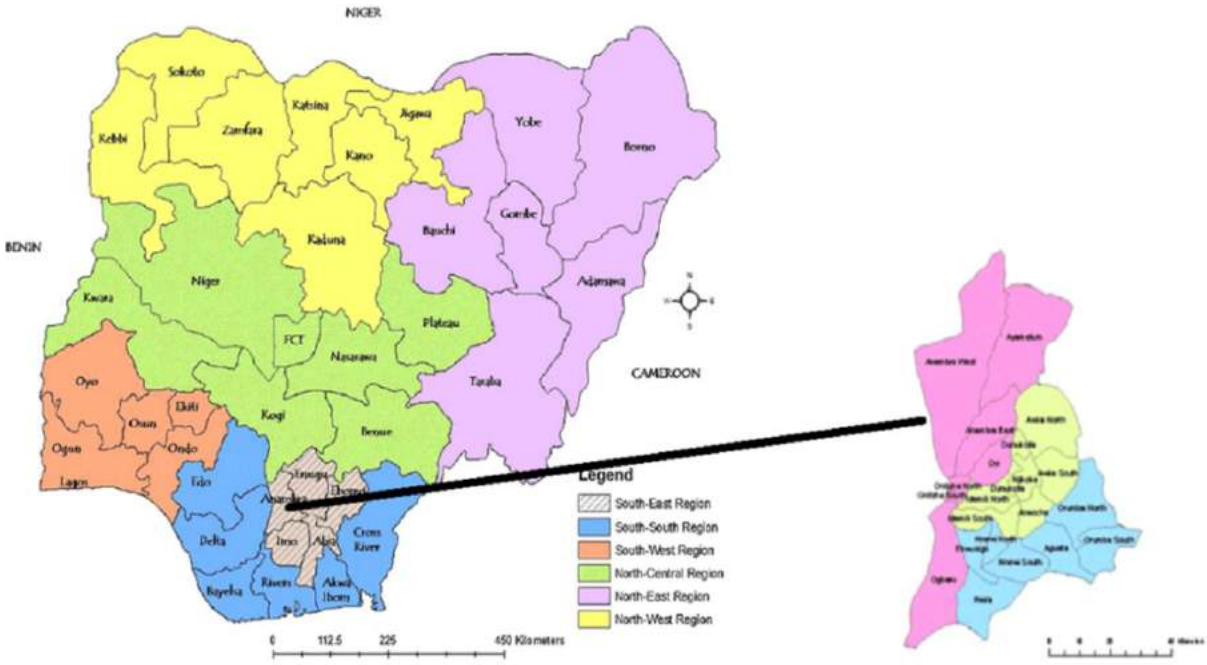

Figure 2. Map of Nigeria showing Anambra state in the southeastern zone.

Anambra State (Figure 2) in the Southeast Zone, was selected for the study for several reasons: no in-service PEC training had taken place; no eye care non-governmental organizations (NGO) are active in the State; all eye care is provided by the government, and for practical reasons, as the State is adjacent to the PhD student's residence. Anambra State has the third highest literacy rate in the country (75% in those aged 6 years and above) and is ranked 30 out of the 36 states in terms of wealth, with only 14.8% of the population living below the poverty line.(22)

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1.7 Paper 1: Strengths, challenges and opportunities of implementing primary eye care in Nigeria. BMJ Global Health BMJ Glob Health 2018;3: e000846

The following published paper (Paper 1 of the thesis) highlights the strengths, challenges and opportunities of integrating PEC into PHC in Nigeria. This paper was written to give an overview of the state of PEC in Nigeria. PEC in Nigeria has been mainly donor driven, with few states taking ownership of the intervention. We accessed data from the implementing states, their donors and documentation from the National Primary Health Care Development Agency (the agency responsible for the development of primary health care in Nigeria) to assess the challenges and opportunities, for PEC in Nigeria.

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Principal Supervisor	Professor Clare Gilbert
Thesis Title	The [illegible] agenda of primary health care facilities in Anambra state, Nigeria in implementing World Health Organization [illegible] package.

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Strengths, challenges and opportunities of implementing primary eye care in Nigeria

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INTRODUCTION

An estimated 253 million people are blind or visually impaired worldwide, 90% of whom live in low-income and middle-income countries (LMICs).[1] In Nigeria, a LMIC, approximately 4.25 million adults are blind or visually impaired with over 80% of the blindness from avoidable causes.[2] Cataract is the most common cause of blindness in Nigeria and is readily treatable by surgery. Refractive errors, which can readily be treated by spectacles, are the most common cause of visual impairment. However, the Nigerian national blindness survey showed that almost half of all eyes that had a procedure for cataract had been couched (a traditional procedure for clearing the visual axis as a treatment for cataract[3]), with poor visual outcomes and <5% of those with refractive errors had spectacles.[4 5] Lack of accessible eye care services and lack of awareness of where to seek services are some of the reasons why patients remain visually impaired or seek unorthodox treatment, even though outcomes are poor.[6]

Other eye conditions which cause ocular morbidity for which access to eye care is needed include presbyopia (age-related decline in near vision), allergic/infective conjunctivitis and other conditions which may cause distress and warrant treatment at the primary level. A recent survey showed that one in four Nigerians (ie, approximately 43 million) have at least one ocular morbidity.[7] Nigeria has 3.3 ophthalmologists/million population, which while higher than the sub-Saharan regional average of 2.2, is less than the four recommended.[8] The majority of ophthalmologists are concentrated in urban areas,[8] therefore, the greater number of Nigerians, who live in rural areas, may have to travel long distances to access care. In the absence of accessible orthodox eye care, patients access other sources, for example, patent medicine vendors, traditional healers and couchers, which may exacerbate the visual loss through harmful practices or delay appropriate treatment. A study in Nigeria reported that over a third of people with eye problems who sought care had consulted these alternative sources.[7] Eye conditions like presbyopia and conjunctivitis which can be treated at the primary level are principally delivered at secondary and tertiary level in Nigeria,[9 10] resulting in inequity in access and higher costs for patients and providers.

There is an epidemic of diabetes globally, including in African countries, and diabetic retinopathy (DR) is increasing as a cause of visual impairment. In Nigeria, the prevalence of diabetes has been reported to be 3.3%, 20.5% of whom had DR.[11] While there are major screening challenges for DR at the primary healthcare (PHC) level, facilities can offer blood sugar testing, health education and referral to services for the detection and management of DR.

There is a need for LMICs to provide universal access to eye care for blinding conditions and for conditions that cause ocular morbidity. As early as 1984, the World

Summary box

- Nigeria has a high magnitude of blindness and visual impairment and in addition, there is inequity in accessing eye care.
- Primary eye care (PEC) activities in Nigeria have largely been donor driven and unsustainable partly due to primary healthcare (PHC) system challenges.
- Nigeria's current administration is implementing Universal Health Coverage through a revitalised PHC system.
- The WHO has recently piloted a PEC package for sub-Saharan Africa (WHO AFRO PEC package).
- Nigeria has the opportunity to leverage on the revitalised PHC and the recently developed WHO AFRO PEC package to implement equitable and accessible PEC and achieve universal eye health.

Health Organisation (WHO) advocated a PHC approach to increase access to eye care.[12] Primary eye care (PEC) is an integrated, participatory and inclusive approach to the eye health component of PHC consisting of promotive, preventive, curative and rehabilitative services.[13] To realistically implement PEC, health workers should receive adequate training to be knowledgeable and skilled in the management (identification, treatment or referral) of eye diseases, be properly equipped, have access to consumables, be adequately supervised and have access to referral centres.

There is a dearth of rigorous research into the effectiveness of PEC in sub-Saharan Africa (SSA) and reports from a few SSA countries have not been encouraging, highlighting challenges such as a lack of skills to manage eye conditions resulting in inappropriate treatment, delayed referrals and failure to refer serious conditions.[14] Other challenges include inadequate supervision, a dearth of equipment and supplies, absenteeism and high staff turnover.[15]

A national survey to assess the population need for PEC in Rwanda showed that nearly a third of the population had the potential to benefit from PEC, particularly older persons and women.[16] To actualise the benefits of PEC, PEC should be part of a continuum of care from community to tertiary level, with each level functioning well and supported by good referral systems between them. This can be actualised in a comprehensive eye care programme. For example, the Rwandan government has streamlined the activities of eye-care collaborators to optimise resources, launching a comprehensive PEC programme in collaboration with Vision for a Nation to develop and implement PEC. Secondary level services have been strengthened with support from the Fred Hollows Foundation and Christoffel-Blinden Mission. Equity in the geographical distribution of PEC services and provision of health insurance have improved access to eye care and demand for services at secondary and tertiary levels has increased to the extent that eye conditions are now the second most common reason for seeking healthcare in Rwanda.[17] In the Gambia, in 1986, PEC was included as part of a National Comprehensive Eyecare strategy. This strategy led to a reduction in blindness from 0.7% to 0.42% over 10 years after adjusting for population growth.[18] In both countries, PEC was included as part of a National Comprehensive Eyecare strategy, so the contribution of PEC is difficult to quantify.

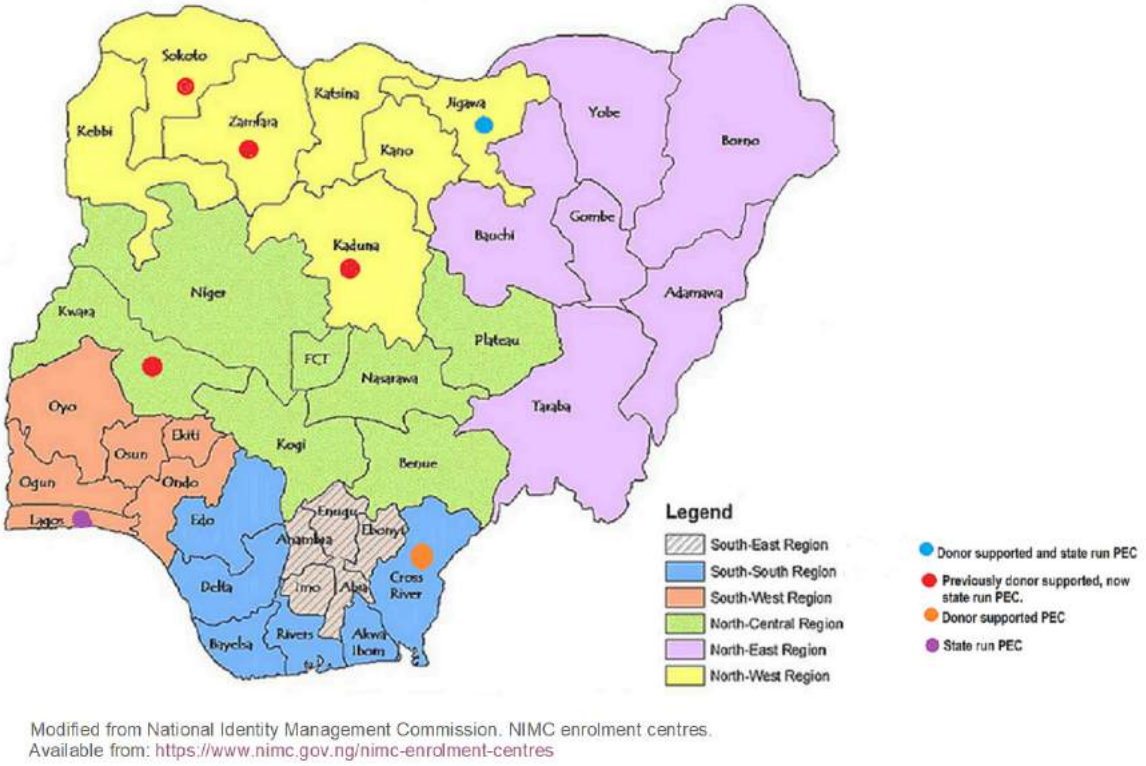
STRENGTHS AND CHALLENGES OF INTEGRATING PEC INTO PHC IN NIGERIA

To effectively integrate PEC into PHC, a functional PHC system is crucial, as PEC can only be as strong as the primary-health structure into which it is integrated.[14] However, the PHC system in Nigeria is beset with challenges which include, but are not limited to, inadequate infrastructure, shortage of health workers, absenteeism[19] and a dearth of basic equipment.[20] Furthermore, poor governance, conflict and inadequate prioritisation of health systems have added to the deterioration of frontline health facilities.[21] Hence, despite the availability of PHC services, rural communities in Nigeria tend to underuse them due to perceptions of poor quality and inadequacy of services.[22]

Despite these PHC challenges, some states in Nigeria have integrated eye-care into PHC, but these have been largely donor driven. In Nigeria as in many LMICs, non-governmental organisations (NGOs) provide a significant proportion of eye-care services.[23] It is thought that NGOs fill the gap because of the 'relative invisibility' of eye-care by governments.[24] The NGOs involved in PEC in Nigeria include Sightsavers, Christoffen-Blindenmission (CBM), the Evangelical Church of West Africa and the Tulsi Chanrai Foundation (TCF). This does not include the private sector or organisations that run eye-care programmes (including PEC) outside the government health system. Figure 1 shows the location of integrated PEC activities in Nigeria.

The NGO-led PEC programmes are not without challenges and have produced mixed results. The broad aim of the Sightsavers-supported programme was to reduce preventable blindness through the provision of sustainable outreach, primary and secondary referral services using a health systems' strengthening approach. The programme covered all the districts in Sokoto, Kwara, Kaduna and Zamfara states, with one eye clinic providing services for a cluster of districts. These were integrated into PHC activities in the states. An evaluation of the Sokoto eye-care programme shows that although the prevalence of unoperated cataract remains high, there has been a sevenfold increase in cataract surgical coverage (the proportion of people who have received cataract surgery as a percentage of all those who could have benefited from cataract surgery) and a doubling of the cataract surgical rate (he number of cataract operations performed per million population/year) since the inception of the programme.[25] Again, this was part of a comprehensive blindness reduction strategy and the contribution of PEC could not be ascertained. A report from a recent audit of the Kwara Eye Health Programme (KEHP) showed that 40% of facilities were unable to sustain services due to insufficient government support (personal communication, Sightsavers KEHP, 2016). In Kaduna state, Sightsavers achieved its target of providing services in at least 70% of districts. However, the failure of the programme to maintain a skilled workforce at the primary level has affected sustainability.[26]

In Jigawa state, PEC activities are supported principally by CBM in conjunction with the Evangelical Church of West Africa (ECWA) eye hospital. There is also a tangible commitment to eye-care by the state government with a budget line of 1.1% of the state health budget pledged for eye-care including PEC. Despite this, Jigawa state experiences challenges from an inadequately skilled PEC workforce.[27] In Cross



Modified from National Identity Management Commission. NIMC enrolment centres. Available from: https://www.nimc.gov.ng/nimc-enrolment-centres

Figure 1 Location of integrated PEC activities in Nigeria. PEC, primary eye care.

Rivers State, the TCF trained 176 PHC workers in PEC, but full implementation of services was stalled by lack of counterpart government funding (personal communication, TCF 2016).

A major limitation of the NGO-led initiatives in Nigeria is that activities largely ceased when funding for in-service training ended. Increasing access to eye-care is not a challenge that can be overcome by the NGO sector alone and a paradigm shift is needed in how eye health services are planned, coordinated and resourced at all levels.[28] Governmental support reinforced by implementable policies is key for eye-care programme implementation. The Lagos state government has trained 167 health workers in 141 primary health centres in eye-care who refer cases to eight general hospitals with eye departments. Although 4902 patients with eye conditions attended the PHCs between January and April 2011, there are limited data on the quality of the service or the number of patients referred.[29]

A major challenge of PEC in SSA is that there has been no consensus on the scope of practice in the PHC system, competencies required or a defined curriculum, which has resulted in deficient training and supportive supervision.[14] As a consequence, in Nigeria, each implementing body has developed their own set of competencies, curricula and have trained different cadres in PEC. The National Primary Health Care Development Agency in Nigeria (NPHCDA) has recently rolled out a revised preservice curriculum for PHC workers, which includes a more comprehensive curriculum on eyecare. There is also a revised Standard Operating Procedure booklet (called National Standing Orders) for PHC workers with guidelines on how to manage a few eye conditions. However, PEC focused on the clinical component alone[15 30] cannot lead to successful PEC outcomes. PEC requires a package of interventions, that is, eye health promotion, basic equipment for eye examination, a supply of medication and consumables, referral mechanisms, supervision, health information and referral/feedback systems, financing mechanisms and strong government commitment. PEC implementation will remain high on rhetoric and low on delivery if the entire package is not addressed.

OPPORTUNITIES AFFORDED BY NEW INITIATIVES

In December 2014, the National Health Bill was signed into law in Nigeria and became the National Health Act. The Act empowers communities to be responsible for their own health and, if properly implemented, should strengthen the PHC system.[31] It includes funding for health insurance at front-line facilities and eligible secondary centres, provision of essential drugs, vaccines and consumables, provision and maintenance of facilities, equipment and transport, human resources for health and counterpart funding for health projects in the district. The equivalent of $150 million has been included in the 2018 budget to implement the Act.[32] This is the first time budgetary provision has been made

to implement the National Health Act and is indicative of government commitment to PHC reforms. In addition, Nigeria's current administration has launched a bold initiative: '*Accelerating progress towards Universal Health Coverage (UHC) through PHC*' to provide equitable access for all Nigerians to quality healthcare using PHC as a vehicle to achieve this. The Federal Ministry of Health through the NPHCDA and the National Health Insurance Scheme (NHIS) are implementing this initiative as part of its mandate to work with states to revitalise PHC service delivery.

Currently, there is increased global and regional support for PEC. The World Health Assembly through the Global Action Plan 2014–2019 stresses the importance of PEC in attaining Universal Eye Health, calling on member states to include PEC in PHC.[33] In addition, WHO AFRO has developed competencies for all eye health personnel, including those providing PEC, for the region which will be launched on World Sight Day, on 11 October 2018.[34] Furthermore, to encourage uniformity and address all components of PEC in SSA, WHO recently developed a package of interventions (WHO AFRO PEC) which was informed by workshops, expert meetings and has been pilot tested in Rwanda and Kenya.

It has been suggested that this package has the potential to strengthen eye health systems and improve coverage.[34] The key components are health promotion and facility-based interventions, with algorithms to guide clinical management of eye conditions and a set of standards and indicators for monitoring and evaluation.[35]

In Nigeria, in order to be scalable, the WHO AFRO PEC package needs to be integrated into the initiatives to revitalise PHC and included in preservice training. To ensure financial sustainability and financial risk protection, the WHO AFRO PEC Package should be included in the essential package for eye-care in UHC plans and the NHIS. Despite the magnitude of blindness and visual impairment in Nigeria, eye-care ranks low in priority for healthcare.[36] The WHO AFRO PEC package, if well implemented, has the capacity to empower communities to take charge of their eye health and benefit from the national momentum towards achieving UHC. This aspiration is based on the premise that the revitalised PHC will overcome the inefficiencies and mistakes of the past and evolve into a more functional and efficient service.

Almost all the ingredients are now in place for the successful integration of eye-care into PHC: a renewed global focus on PHC; national PHC reforms and pro-poor health financing mechanisms; an enabling global policy environment for PEC and a tailor-made PEC package for SSA. However, sustained government support is crucial. In addition, continuous economic evaluation of PEC should inform how scarce resources should be deployed. Furthermore, any strategy to successfully implement PEC in Nigeria needs to be pragmatic, building on the evidence of what works in different settings but adapted to the local context.

CONCLUSION

PEC may not be the silver bullet to solve the eye-care needs of a population. Although there is limited high quality evidence of the effectiveness of PEC, the literature suggests that implementation of PEC as part of a comprehensive eye-care strategy could increase access to eye-care.

With global and regional support for PEC and strong government commitment to PHC reform, Nigeria has the opportunity to implement PEC, potentially making eye-care accessible and equitable for all her citizens.

Contributors AEA, NI and CG drafted the initial manuscript. HF helped with subsequent revisions. AEA, CG and HF read and approved the final manuscript.

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Chapter 2 RATIONALE, AIMS, OBJECTIVES, RESEARCH QUESTIONS

People who live in underserved areas have the right to quality PEC too; a hard-to-reach community in Anambra state.

Rationale for the study

Nigeria has a high prevalence of ocular morbidity, blindness and visual impairment, and most vision loss is from conditions which could have been prevented or treated. A large proportion of Nigerians lack access to proper eye care services; hence they seek treatment for eye conditions from unorthodox sources which may be harmful or lead to delays in seeking appropriate care.

The WHO urges member states to integrate eyecare into PHC to improve access and has developed a primary eye care (PEC) package for sub-Saharan Africa (WHO AFRO PEC package).

Primary eye care is an integrated participatory and inclusive approach to the eye health component of PHC[1] consisting of the following elements: health protection, health promotion, detection and treatment of common eye conditions, detection and referral of more complex conditions such as cataract, and record keeping. This entails staff working in the community, who focus on health promotion and prevention, and staff in PHC facilities who focus on detection, treatment and referral. The latter require basic equipment for eye examination as well as a supply of medication, referral mechanisms, supervision health information systems. In other words, many components of the health system need to be strengthened or adapted to effectively deliver PEC. The WHO has described a health system framework, which describes the buildings blocks necessary to improve health without leading to catastrophic health expenditure (Figure 3)

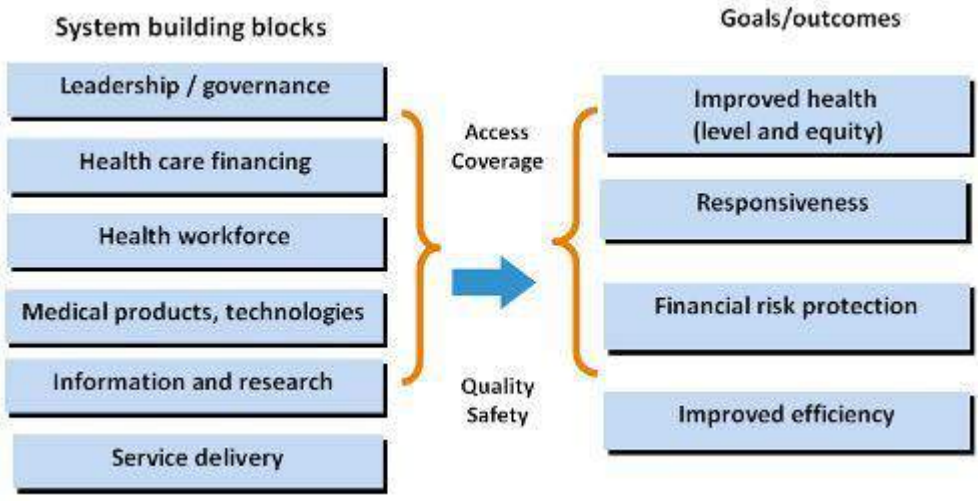

Figure 3. World Health Organization health system framework[2]

The system buildings blocks are inter-related and should have patients and communities at their centre (Figure 4).

Figure 4. **Interconnection between World Health Organization building blocks.[3]**

The integration of eye care into PHC is a complex intervention. The Medical Research Council defines a complex intervention as an intervention with several interacting components.[4] The intervention may be delivered by more than one cadre, have a number of variable outcomes, may be a package of interventions, require behavioural change of those receiving or delivering the intervention or a combination of these.[5]

The UK's Medical Research Council (MRC) has developed a framework for the evaluation of complex interventions, which entails a number of phases (Figure 5).

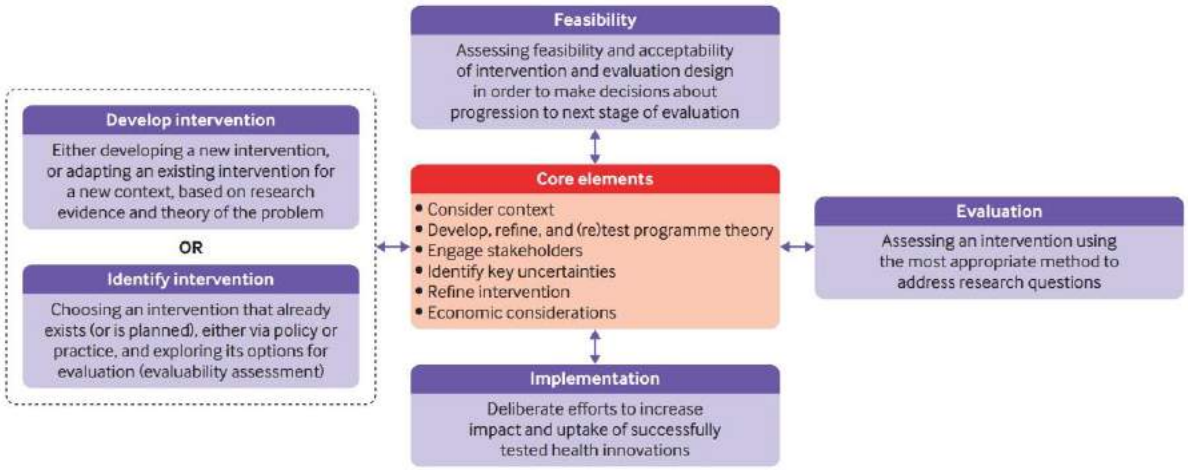

Figure 5. Medical Research Council framework for the evaluation of complex interventions

As can be seen, assessing the feasibility of the intervention is a key step. Feasibility is a broad construct, consisting of political, cultural, technical and financial elements.[6] As it has been suggested that integration of a health intervention must be founded on technical grounds, this thesis focusses on technical feasibly, acknowledging that the other elements are also important. [7] To our knowledge, no technical feasibility study of the integration of eye care into PHC in sub-Saharan Africa has been undertaken. Identifying the challenges, opportunities and gaps in the technical feasibility required for the implementation of the proposed WHO AFRO PEC package will be central to influencing policy makers to make an informed choice about its implementation.

An important recommendation in the World Report on Vision is that eye care should be patient centred and delivered at every level of the health system. The services delivered should be comprehensive in terms of the eye conditions covered and the full spectrum of preventive strategies, encompassing eye health protection and promotion, prevention of specific conditions, detection and treatment and vision rehabilitation.[8] For this reason, the technical feasibility of delivering the health promotion and facility-based case management of the WHO PEC package is included in this thesis.

Research questions

1. What are the technical complexities of both components of the WHO AFRO PEC package?
2. What technical capacities are needed to implement the WHO AFRO PEC package in Nigeria?
3. How can these technical capacities be assessed?
4. What gaps would need to be addressed to implement the WHO AFRO PEC package in PHC facilities in Nigeria?

Aim

To assess the gaps which would need to be addressed to effectively deliver the WHO AFRO PEC package in Nigeria.

Objectives

1. To assess the technical complexity of the two components of the WHO AFRO PEC package.
2. To identify the technical capacities required to deliver the WHO AFRO PEC package.
3. To assess the technical capacities of PHC facilities to deliver PEC in 48 facilities in Anambra State, Nigeria
4. To analyse gaps in technical capacities which would need to be addressed to effectively deliver the WHO AFRO PEC package in Nigeria.

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Chapter 3. METHODOLOGY

Interviewing a health worker in a Primary Health Centre.

This chapter describes the methodology and includes two published papers.

3.1 Overview

First, two literature reviews were undertaken, to determine the scope of PEC in sub-Saharan Africa and to identify a suitable technical feasibility framework; we selected Gericke's technical feasibility framework.[1] Next, a technical complexity profile for PEC was created based on the WHO PEC package, augmented by findings from the literature review of PEC. Next a two-stage Delphi exercise was undertaken to reach a consensus on the technical complexity of each element of the WHO AFRO PEC package, and then the capacities needed for implementation. The resulting framework guided the development of study tools (observation, check lists; questionnaires and topic guides) and participant groups (staff and facility heads working in health centres and health posts and their supervisors, and village health workers). Field work was undertaken in 48 facilities in six districts which were selected to be representative of the state. Data were analysed for the facility-based management of eye conditions, and health promotion component of the WHO AFRO PEC package using WHO's health system framework.

The theoretical framework for the study is shown in (Figure 6) and an overview of the methodology in shown in Figure 7.

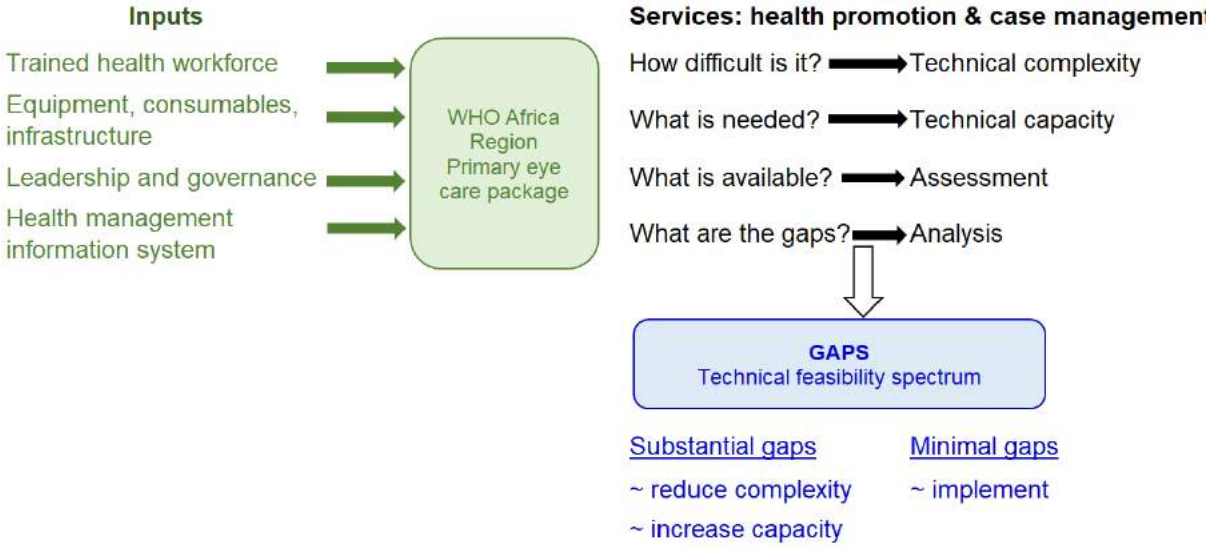

Figure 6. Theoretical framework for the study

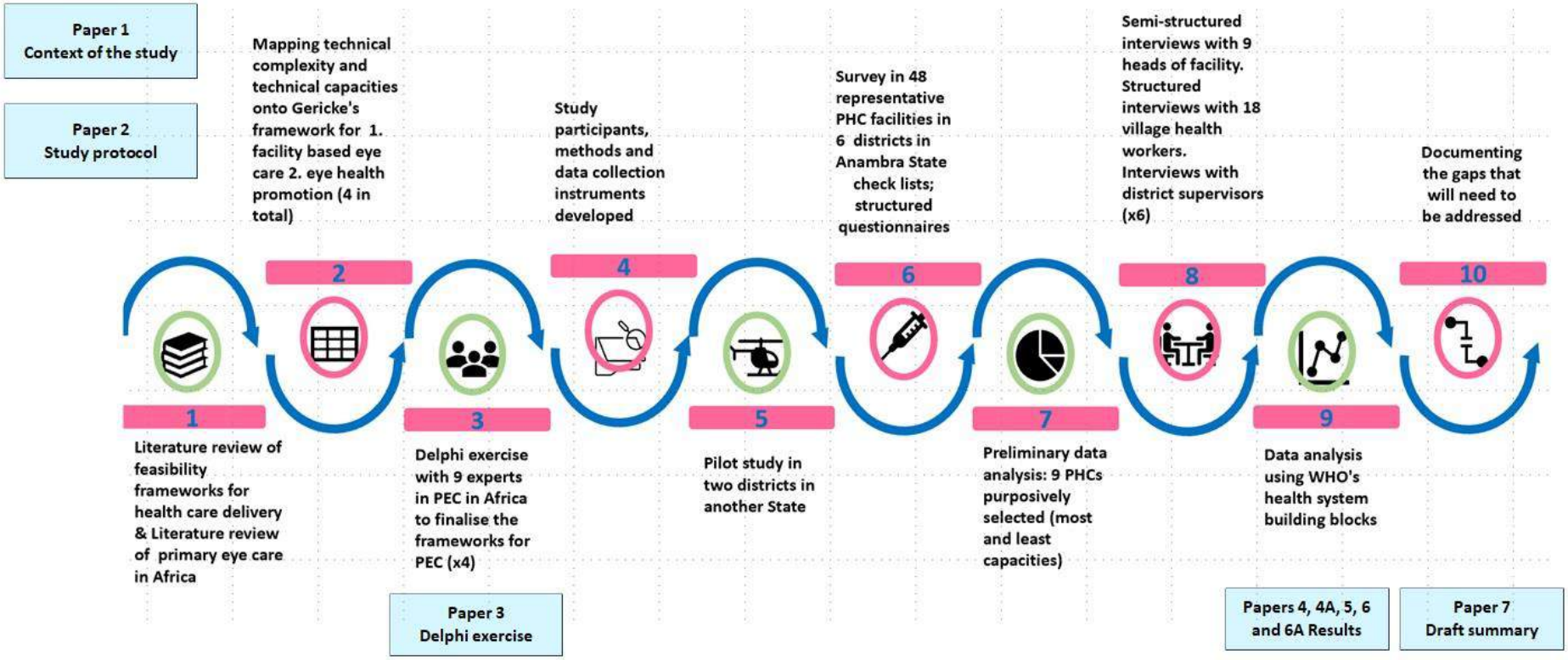

Figure 7. Overview of the methodology used in the study, signposting the publications.

Item 1, Figure 7: literature review in PEC in Africa (see Paper 3).
Item 1, Figure 7: **l**iterature review on feasibility frameworks **(**see Paper 3).

The search identified 25 different frameworks. Gericke's framework was selected for the study as it was the only framework which allowed an evaluation of the technical feasibility of public health interventions. Gericke's framework uses the construct that the technical feasibility of an intervention is determined by the complexity of the intervention and the capacities needed to deliver it (Figure 8). Data arising from the framework were analysed using the WHO health system building blocks.

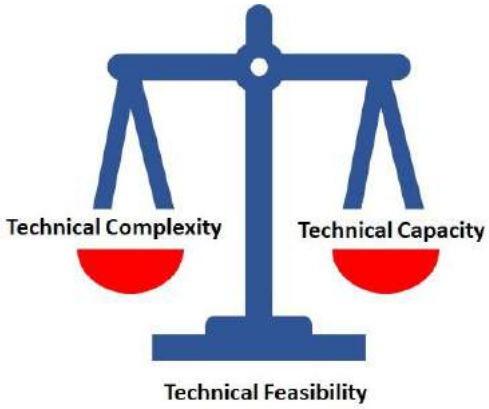

Figure 8. Technical feasibility comprises technical complexity and technical capacity.

Gericke's framework has four main domains (Table 4).

Table 4. Domains in Gericke's feasibility framework.

Domain	**Details**
Intervention characteristics	• Basic product design • Supplies • Equipment
Delivery characteristics	• Type of facility needed. • Human resource requirement • Communication and transport
Government requirements	• Regulation/ legislation • Management systems • Collaborative action
Usage characteristics	• Ease of use • Pre-existing demand • Black market risk

Item 2 and item 3, Figure 7. Mapping complexities and capacities and Delphi exercise. See Paper 3 below.

Item 4, Figure 7 Data collection instruments and study participants
After the Delphi exercise, for each capacity identified, the relevant participant group(s) was selected, and the most appropriate data collection method(s) were decided (see an example in Table 5) (See all data collection data instruments in Appendices 3-9).

Table 5. Mapping data collection tools and data to be collected to participant groups.

	Type of data collection tool					
	Checklist	Checklist	Questionnaire	Questionnaire	Questionnaire	Semi-structured Interviews
Participant group	Head of facility	Community Health Extension Worker	Head of facility	Community Health Extension Worker	Village health workers	District supervisors and selected facility heads
Examples of information sought	• Personnel available • standard operating procedures available • Supervision • patient load	• Evidence of health promotion activities; • practices; • supervision of village health workers	• Service delivery, • training	• Facility and community service delivery practices	• Health promotion practices and needs	• Health system opportunities and challenges for implementing PEC

The Clinical Assessment for Systems Strengthening (ClASS) Model was used to identify the best data collection method to use. [2]

a. Qualitative approach: Assessment is done by an external facilitator by interviews and focus group discussions (FGDs) using prepared topic guides.
b. Semi qualitative approach: Explicit benchmarks for indicators are ranked on a Likert scale.[3] E.g. for referrals- 1. Limited or no referrals. 2. Refer orally. 3. Refer with referral slip. 4. Accompany patient to referral facility
c. Quantitative/Scorecard approach: Generic benchmarks for indicators are ranked on a Likert scale e.g. supervision of health promotion activities: 1. weekly. 2. monthly. 3. quarterly, and 4. rarely/never
d. Checklist approach: Indicates the presence or absence of pre-specified indicators.

Each method has its advantages and disadvantages (Table 6).

Table 6 Comparison of Capacity Assessment Measurement Approaches.[1]

"Measurement" Approach	**Advantages**	**Disadvantages**
1.Qualitative	• Provides detailed analysis of each component to be assessed. • Provides most reliable assessment results	• Requires skilled facilitators. • Results are dependent on facilitators' area of expertise. • It is cost intensive. • Comparison of results may be difficult.
2. Semi qualitative	• Easy to administer and comprehend. • States definite criteria for capacity building efforts • Results are comparable	• List of benchmarks may be excessive. • Overestimation or underestimation of results if benchmarks are misunderstood in a self-assessment.
3. Quantitative scorecard	• Ease of application • Ease of comparison of results across facilities or sectors	• Conflicts in scoring. • Overestimation or underestimation of assessment
4. Checklist	• Ease of application. • Ease of comparison of results across facilities or sectors.	• Confirms the existence of a process or structure but unable to assess its level of development. • Restricted utility as a capacity building tool.

We used a combination of the data collection approaches for the health workers we identified, thus triangulating our data to increase validity.

Junior Community Health Extension Workers (JCHEWs) work in the community and in the facility and are well placed to give information on both community and facility activities. Questionnaires and observational checklists were administered to the JCHEWS in the facilities. Data was sought on their activities in health service delivery at the facility and the community and availability of appropriate health promotion materials.

Questionnaires and checklists were administered to heads of facility. Data was sought on the resources available at the facility and the potential of the facility to deliver PEC.

Item 5, Figure 7 Pilot study of data collection tools (See Paper 2 below).

Item 6, Figure 7 Survey in 48 facilities in Anambra State (See Paper 2 below).

Item 7, Figure 7 Preliminary data analysis.

Facility heads and village health workers (VHWs) were considered crucial for the study but interviewing all 48 facility heads and the large number of VHWs would not have been feasible. A purposely selected sample of facilities was, therefore identified after an initial analysis of key variables from all 48 facilities. The variables analysed included staffing levels, frequency of supervision, use of SOPs, availability of referral slips, glucose testing, functional fridges, functional torches and the number of adults aged 50 and above and of all ages who attend the health facility per 100,000 population. The variables were scored and then summed to give an overall score. Nine facilities were selected: six health centres (three with the highest and the lowest scores) and health posts (two with the highest and one with the lowest score). These facilities were visited again for structured interviews with the facility heads and to deliver structured questionnaires to VHWs.

Item 8, Figure 7 Interviews with facility heads and district supervisors

Information was sought from facility heads on the challenges and opportunities they have experienced while delivering health care in their facility, the extent to which they believe PEC can be implemented in their centre and their experiences of supervising health promotion and health prevention activities in the community.

Questionnaires were administered to VHWs from selected facilities to determine their health promotion practices and their perspective on PEC health promotion and health prevention.

In-depth interviews were conducted with district level health supervisors in all six districts after the facility survey had been completed. Information was sought on the challenges and opportunities they have experienced while supervising PHC in the facilities and to explore their views on whether PEC could be implemented in the PHC centres.

In paper 2, we describe the protocol for the study, while in paper 3, we describe the how we developed a technical capacity profile needed to implement the WHO AFRO PEC.

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2. MacLeod P. Clinical Assessment for Systems Strengthening (ClASS) Model and Methodology Review. University of Washington & University of California, San Francisco; 2013.

3. United States President's Emergency Plan For AIDS Relief (PEPFAR). Capacity Assessment Implementation Framework Best Practices:Technical Consultation Report Expert Technical Consultation Washington, DC; 2014.

Paper 2**: The technical feasibility of integrating eye care into the health system at primary health care level in Nigeria: protocol for a mixed methods cross sectional study in Anambra State.**

In this paper, we outline the research methods used to determine the capacities which needed to be assessed to implement PEC and the methods for assessing the capacity of primary health care facilities in Anambra state to deliver PEC.

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SECTION A – Student Details

Student	AGHAJI Ada Ejealor. ID No lsh 284966
Principal Supervisor	Professor Clare Gilbert
Thesis Title	Assessing the technical capacity of primary health care facilities in Anambra state to implement the World Health Organization's Primary Eyecare Package.

If the Research Paper has previously been published please complete Section B, if not please move to Section C

SECTION B – Paper already published

Where was the work published?	JMIR Research Protocol		
When was the work published?	October 2020		
If the work was published prior to registration for your research degree, give a brief rationale for its inclusion			
Have you retained the copyright for the work?*	Choose an item.No	Was the work subject to academic peer review?	Choose an item. Yes

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SECTION C – Prepared for publication, but not yet published

Where is the work intended to be published?	
Please list the paper's authors in the intended authorship order:	
Stage of publication	Choose an item.

SECTION D – Multi-authored work

For multi-authored work, give full details of your role in the research included in the paper and in the preparation of the paper. (Attach a further sheet if necessary)	AA led the conception and design of the study drafted the manuscript and edited it with consideration of input from her supervisors and co-authors.

Student Signature: [redacted] **Date:** 12th March 2023

Supervisor Signature: [redacted] **Date:** 17 March 2023

Protocol

The Technical Feasibility of Integrating Primary Eye Care Into Primary Health Care Systems in Nigeria: Protocol for a Mixed Methods Cross-Sectional Study

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Abstract

Background: Approximately 90% of the 253 million blind or visually impaired people worldwide live in low- and middle-income countries. Lack of access to eye care is why most people remain or become blind. The World Health Organization Regional Office for Africa (WHO-AFRO) recently launched a primary eye care (PEC) package for sub-Saharan Africa—the WHO-AFRO PEC package—for integration into the health system at the primary health care (PHC) level. This has the potential to increase access to eye care, but feasibility studies are needed to determine the extent to which the health system has the capacity to deliver the package in PHC facilities.

Objective: Our objective is to assess the technical feasibility of integrating the WHO-AFRO PEC package in PHC facilities in Nigeria.

Methods: This study has several components, which include (1) a literature review of PEC in sub-Saharan Africa, (2) a Delphi exercise to reach consensus among experts regarding the technical complexity of the WHO-AFRO PEC package and the capacities needed to deliver it in PHC facilities, (3) development of PEC technical capacity assessment tools, and (4) data collection, including facility surveys and semistructured interviews with PHC staff and their supervisors and village health workers to determine the capacities available to deliver PEC in PHC facilities. Analysis will identify opportunities and the capacity gaps that need to be addressed to deliver PEC.

Results: Consensus was reached among experts regarding the technical complexity of the WHO-AFRO PEC package and the capacities needed to deliver it as part of PHC. Quantitative tools (ie, structured questionnaires, in-depth interviews, and observation checklists) and topic guides based on agreed-upon technical capacities have been developed and relevant stakeholders have been identified. Surveys in 48 PHC facilities and interviews with health professionals and supervisors have been undertaken. Capacity gaps are being analyzed.

Conclusions: This study will determine the capacity of PHC centers to deliver the WHO-AFRO PEC package as an integral part of the health system in Nigeria, with identification of capacity gaps. Although capacity assessments have to be context specific, the tools and findings will assist policy makers and health planners in Nigeria and similar settings, who are considering implementing the package, in making informed choices.

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KEYWORDS

primary eye care; primary health care; implementation; visual impairment; technical feasibility; feasibility study; health policy; Nigeria; World Health Organization Regional Office for Africa; WHO-AFRO

Introduction

Approximately 253 million people are blind or visually impaired worldwide, 90% of whom live in low- and middle-income countries (LMICs) [1]. In Nigeria, about 4.25 million adults are blind or visually impaired and over 80% of the blindness is due to avoidable causes [2,3]. Lack of access to eye care services is one of the reasons why people remain or become blind [4]. Cataracts are the most common cause of blindness in Nigeria [2], and high-quality cataract surgery should be accessible and affordable for all. However, in the Nigeria National Blindness and Visual Impairment Survey, almost half of all eyes that had undergone a procedure for cataract treatment had undergone couching—a traditional procedure to treat cataracts—often with poor visual outcomes. Glaucoma, which causes irreversible visual loss, was the second-most common cause of blindness [2]. Although early treatment can prevent or slow progression of the disease, in Nigeria people with glaucoma present very late to eye care services, often already blind in one or both eyes.

Other blinding-eye conditions in Nigeria include uncorrected refractive error [5], trachoma, and diabetic retinopathy. Presbyopia, the age-related decline in near vision, affects an estimated 20 million adults in Nigeria [6] and can lead to considerable productivity losses if uncorrected. Although blindness in children is rarer than in adults, many of the blinding conditions in LMICs, such as measles infection and vitamin A deficiency, can be prevented at the primary level [7,8].

Other eye conditions that cause ocular morbidity for which access to eye care is needed include dry, irritable eyes and allergic and infective conjunctivitis [9]. There is, therefore, a need for LMICs to provide universal access to eye care, not just for blinding conditions but also for conditions causing troublesome symptoms. Approximately 25% of Nigerians have ocular conditions [9]; with a population of 200 million, this means that approximately 50 million Nigerians are in need of eye care.

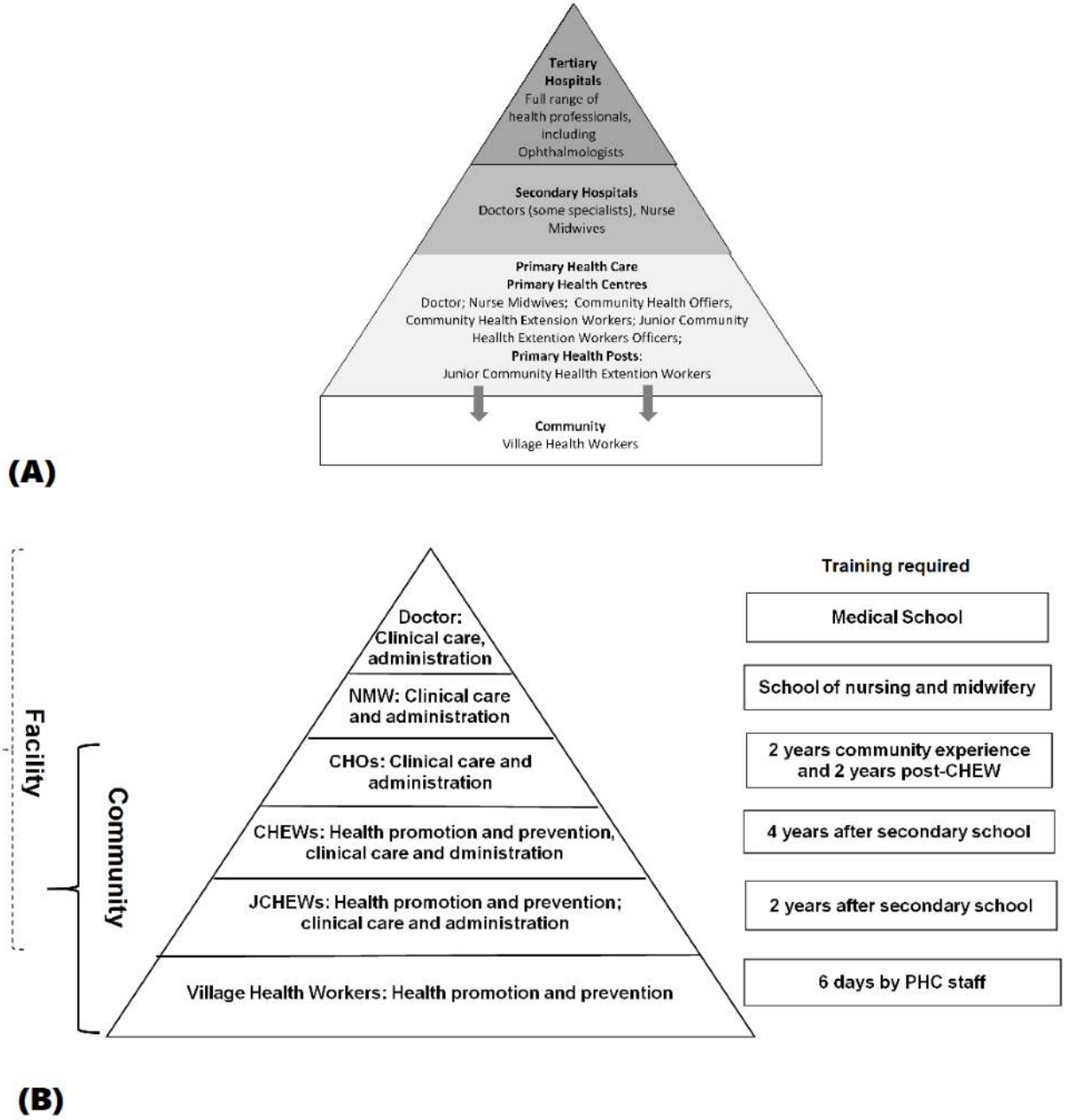
In LMICs, most eye care is delivered in secondary- and tertiary-level facilities, which are mainly located in urban areas. This leads to inequity in access, higher costs for patients and providers [10], and the patronage of other sources of care (eg, informal drugs sellers, traditional and spiritual healers, and couchers), which may exacerbate the visual loss through harmful practices or delayed access to appropriate treatment [9,11]. Over 35% of Nigerians with ocular problems consult an informal drug seller as a first option, primarily due to a lack of access to eye care services [9].

One way to improve access to eye care in LMICs is to integrate eye care into primary health care (PHC) [10], which is advocated by the World Health Organization (WHO) in their report Universal Eye Health: Global Action Plan 2014-2019 [12]. Primary eye care (PEC) entails the following elements: health protection, health promotion, specific preventive measures, detection and treatment of common eye conditions, detection and referral of more complex conditions, and record keeping. The health promotion elements can be delivered in the community as well as in facilities, while the other components principally take place in PHC facilities.

However, delivering PEC can have challenges; these include low PEC skill levels [13], inadequate supervision [14], and inadequate equipment and supplies [15]. A review of the literature on PEC in sub-Saharan Africa showed that there has been no consensus on the scope of PEC nor guidelines on the technical skills PHC workers require to implement eye care; this has resulted in deficient training and inadequate supervision [16]. To encourage uniformity of the scope of PEC in sub-Saharan Africa, the WHO Regional Office for Africa (WHO-AFRO) recently launched a package of evidence-based interventions for PEC: the WHO-AFRO PEC package [17]. The package can be subdivided into two broad elements: health promotion and facility-based eye care. The latter comprises five evidence-based algorithms and protocols on how to measure distance and near visual acuity, administer eye medication, remove foreign bodies, apply an eye patch, document findings, and refer and counsel patients. The purpose of the package is to strengthen the capacity of PHC workers in sub-Saharan Africa to manage patients with eye conditions [17] and widen access to eye care [18]. The package has been pilot-tested in Rwanda and Kenya [18].

In Nigeria, the health system has three tiers of service delivery—primary, secondary, and tertiary (see Figure 1, A)—staffed by appropriate cadres. The PHC system provides basic services and is often the first point of contact with the health system and the only source of health care for the majority of Nigerians in rural and remote communities [19]. PHC is delivered in health centers and smaller units called health posts. PHC staff comprise junior community health extension workers, community health extension workers (CHEWs), community health officers, and nurse midwives (see Figure 1, B).

Figure 1. Human resources for health in Nigeria (A) across the tiers of the health system and (B) at primary health care (PHC) facilities. CHEW: community health extension worker; CHO: community health officer; JCHEW: junior community health extension worker; NMW: nurse midwife.



Challenges of delivering PHC in Nigeria include, but are not limited to, shortage of health workers and absenteeism [20], infrastructural decay and poor funding [21], a dearth of basic equipment [22], and lack of trust in the system by the community [23]. Attempts have been made by nongovernmental organizations to implement PEC in some parts of Nigeria by training a limited number of staff using their own curricula and providing basic equipment. However, these initiatives were only scaled up with financial support in one state, so they were not scalable nor sustainable [24]. Nevertheless, to deliver an effective and sustainable intervention, it is important that feasibility studies are conducted in each implementation setting.

Feasibility research can help identify the opportunities and challenges in implementing a new health initiative, including PEC, which can only be as efficient as the PHC system into which it is built [16].

Feasibility is a complex construct [25], which has been defined in different ways. For example, Snowden et al define feasibility as encompassing the following domains: political, cultural, or community acceptability as well as technical, cost, and legal feasibility [26]. This study focuses on technical feasibility, which comprises the technical complexity of an intervention and the technical capacities needed to deliver it [27]. To our knowledge, no technical feasibility study in relation to PEC in

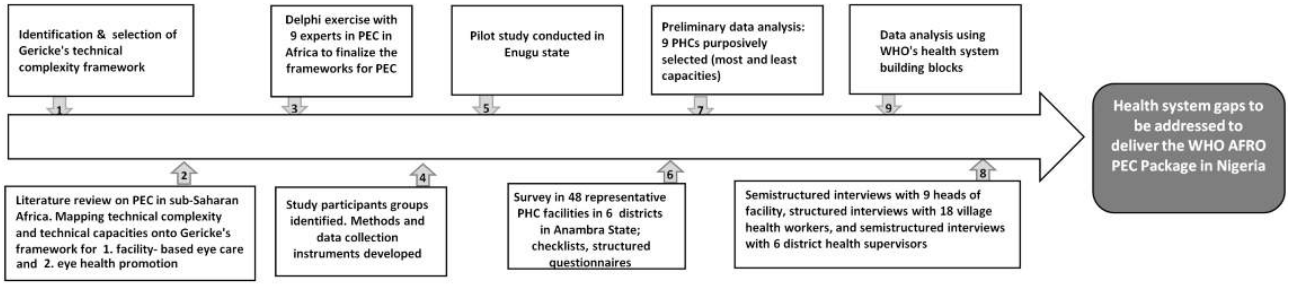
sub-Saharan Africa has been undertaken. Identifying the challenges, opportunities, and gaps in the technical capacities required will provide information for policy makers to make informed decisions about how the health system needs to be strengthened to deliver PEC as an integral component of PHC. The research is timely, as PHC reforms are currently underway in Nigeria, which include national policies to train primary-level staff and to provide essential drugs and consumables under the umbrella of Universal Health Coverage. These initiatives provide real opportunities to integrate PEC into PHC [24]. The overarching aim of this study is to determine the technical feasibility of implementing the WHO-AFRO PEC package into PHC facilities in Nigeria; in this paper, we describe, in detail, the methods to achieve this.

Methods

Overview

This study has several components, including a literature review on PEC in sub-Saharan Africa; a Delphi exercise to reach consensus among experts regarding the technical complexity of the WHO-AFRO PEC package and the capacities needed to deliver it in PHC facilities; development of PEC technical capacity assessment tools; and data collection, including facility surveys and semistructured interviews with PHC staff and their supervisors and village health workers (VHWs) to determine the capacities available to deliver PEC in PHC facilities (see Figure 2). Analysis will identify opportunities and the capacity gaps that need to be addressed to deliver PEC.

Figure 2. Flowchart of the study. PEC: primary eye care; PHC: primary health care; WHO-AFRO: World Health Organization Regional Office for Africa.



Components of the Study

Identification and Selection of Theoretical Framework

There are only a few analytical tools to assess the technical complexity of an intervention, one of which was proposed by Gericke et al [27]. This framework comprises four domains: (1) intervention characteristics, (2) delivery characteristics, (3) government capacity requirements, and (4) usage characteristics with criteria for each (see Table 1 [27]). A theoretical framework for assessing the technical feasibility of implementing the WHO-AFRO PEC package in PHC facilities in Nigeria has been designed by the investigators (see Figure 3 [27]), which builds on Gericke's framework of technical complexity [27]. This involves assessing the complexity of each component of the intervention and, from this, extrapolating to the technical capacities required to implement it. Analysis of the data collected will reveal the gaps that need to be addressed, which may be minimal or substantial. The size and nature of the gaps will determine the feasibility of implementing the intervention.

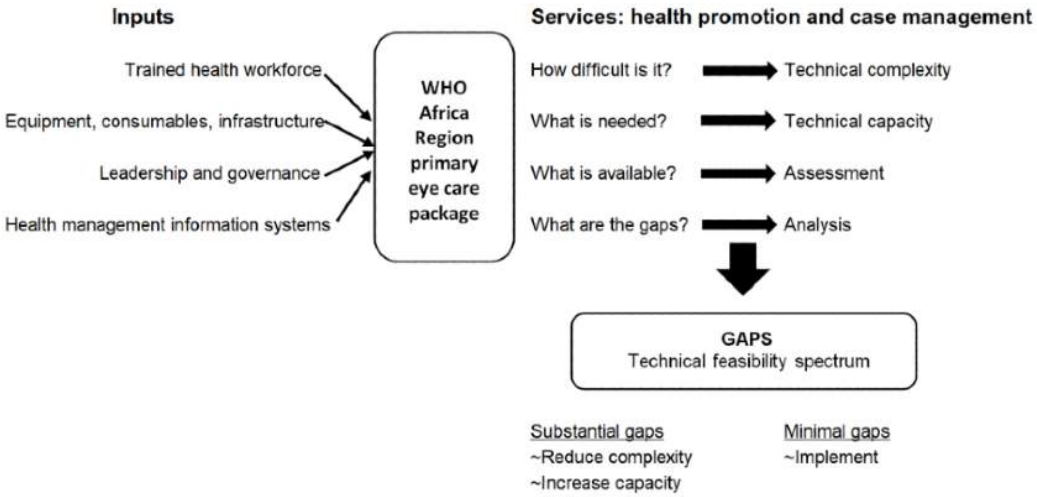
The Delphi method is a scientific, multistage approach to achieve consensus from combined expert opinion through a series of structured questionnaires completed anonymously. Advantages of the Delphi approach include anonymity and the achievement of consensus where definitive evidence is lacking [28,29].

A two-round Delphi exercise was used to build consensus on, first, the technical complexity of the WHO-AFRO PEC package and, second, the technical capacities required to implement it. The study was conducted over 5 months in 2018.

Table 1. Gericke et al's framework to assess the technical complexity of health interventions [27].

Category	Criteria
Intervention characteristics	
Basic product design	Stability
	Standardizability
	Safety profile
	Ease of storage
	Ease of transport
Supplies	Need for regular supplies
Equipment	High-technology equipment and infrastructure needed
	A number of different types of equipment needed
	Maintenance needed
Delivery characteristics	
Facilities	Retail sector
	Outreach services
	First-level care
	Hospital care
Human resources	Skill level required for service provision
	Skill level required for staff supervision
	Intensity of professional services in terms of frequency or duration
	Management and planning requirements
Communication and transport	Dependence of delivery on communication and transport infrastructure
Government capacity requirements	
Regulation and legislation	Need for regulation
	Need for monitoring regulatory measures and enforcement of regulation
Management systems	Need for sophisticated management systems
Collaborative action	Need for intersectoral action within government
	Need for partnership between government and external funding agencies
Usage characteristics	
Ease of use	Need for information and education
	Need for supervision
Pre-existing demand	Need for promotion
Black market risk	Need to prevent resale and counterfeiting

Figure 3. Theoretical framework for technical feasibility assessment derived from Gericke et al [27]. WHO: World Health Organization.



Literature Review of PEC in Sub-Saharan Africa and Mapping Onto the Appropriate Segment of Gericke's Framework to Form the Delphi Questionnaire

The WHO-AFRO PEC package was divided into two components: eye health prevention and promotion and facility-based case management. Gericke's framework was used to develop two questionnaires, one for health promotion and the other for facility-based care, which were entered into a Microsoft Excel 2016 spreadsheet.

In order to populate the two questionnaires, a literature search on PEC in sub-Saharan Africa was undertaken based on literature published in PubMed up to April 2018. Search terms included "primary eye care" and "sub-Saharan Africa." The bibliographies of the two most recent published reviews on PEC in sub-Saharan Africa were also reviewed [16,30]. A total of 173 articles were retrieved. Articles that were not related to PEC in sub-Saharan Africa were excluded, leaving 51 articles for inclusion, including 2 randomized trials.

Further implementation characteristics were identified by two of the authors (CG and AA) who have more than 40 years' combined experience in eye care in sub-Saharan Africa. These two sources yielded a list of key criteria for the technical complexity of PEC, which were used to populate the Delphi questionnaires. A 4-point Likert scale, ranging from 1 (strongly agree) to 4 (strongly disagree), was applied to each statement. The Delphi questionnaires were reviewed by an expert in international eye health (CG), a health interventions expert (HB), and a statistician (David MacCleod, London School of Hygiene & Tropical Medicine).

The Delphi Exercise

Selection of Experts for the Delphi Exercise

The main eligibility criteria for the Delphi panel included being an eye care professional with long-standing experience in community eye care in sub-Saharan Africa, preferably for a minimum of 10 years and who is still professionally active, and having experience in eye health policy. Panel members were selected by a modified, exponential, snowball-sampling method where an initial participant provides multiple referrals [31]. Each new referral was vetted and included in the study if the eligibility criteria were met.

Delphi Rounds

A total of 12 panel members were contacted by email and telephone, 9 of whom confirmed their willingness to take part. All 9 completed both rounds of the Delphi exercise.

For the first round, panel members were sent the following documents: the methods to be used during the Delphi exercise, an explanation of Gericke's framework of technical complexity, and the first pair of questionnaires on the technical complexities of PEC. Participants were invited to state their level of agreement with each statement by ticking the appropriate level in the Likert scale. A comments box was included beside each statement for comments or suggestions.

Once all the questionnaires had been received, they were analyzed for consensus, defined as at least 70% agreement on each statement in the upper-50th percentile (Likert scale scores of 1 and 2). Where consensus was reached, the statements were adopted. Statements where consensus was not reached were modified based on the suggestions and comments and were incorporated into the second round, as were newly identified statements.

For the second round, each of the agreed-upon statements on technical complexity were modified to reflect the technical capacities required for delivery, and Likert scales were added. Panel members were sent the questionnaires on technical capacities, which included the comments and suggestions of participants from the first round. Only statements that achieved consensus, as defined as above, were included in the final document. Any minority views (<70% consensus) were not adopted but were documented.

Development of PEC Technical Capacity Assessment Tools and Selection of Participant Groups

Overview

The technical capacities derived from the Delphi exercise were mapped onto the WHO's health systems framework, which comprises the health workforce, leadership and governance, financing, health management information systems, equipment, technology and infrastructure, and service delivery [32]. After reviewing the capacities needed, the optimal method of assessment was determined (ie, document review; structured questionnaires; observational checklists; in-depth interviews, using a structured topic guide; and the relevant participant groups: VHWs; PHC staff, including facility heads; CHEWs; and district supervisors) (see Table 2). Mixed methods were used to ensure a comprehensive understanding and to triangulate the data [33]. The instruments were developed in English and interviews were conducted in English, except for the VHW questionnaire, which was translated into Igbo and back-translated into English to ensure it retained its meaning.

Table 2. Methods of assessment for technical capacities and participants.

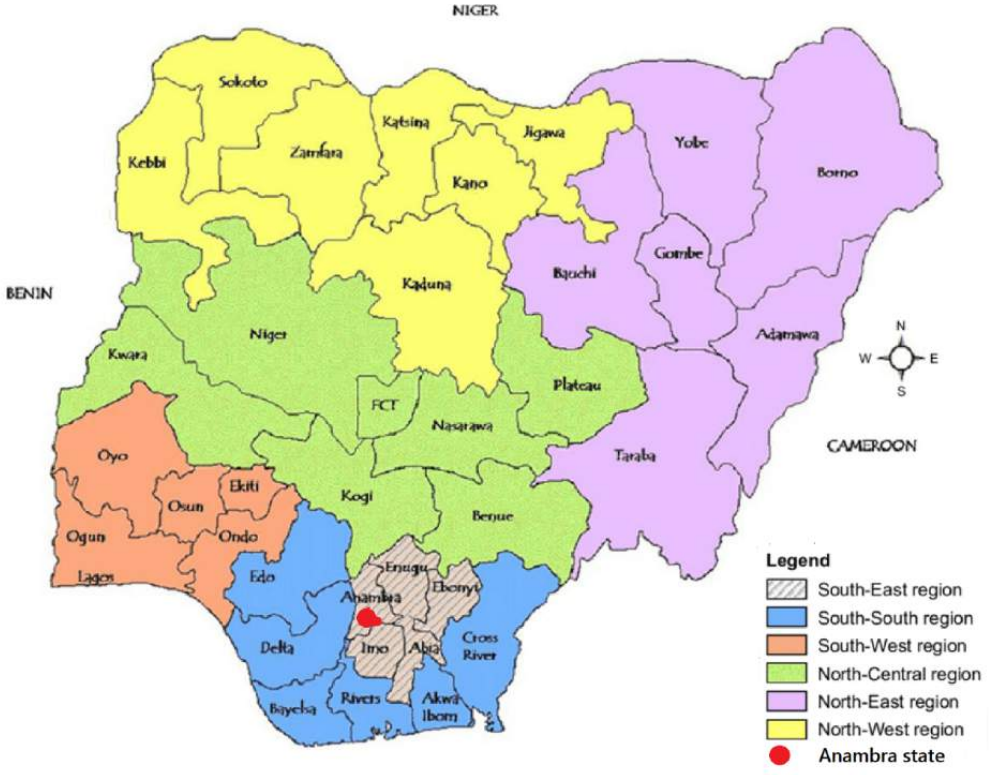
Assessment method	Participants	Data to be collected
Document review	N/A[a]	Policies that could support implementation of primary eye care (PEC)
In primary health care (PHC) facilities		
Structured questionnaire A	Heads of facilities, which can be any cadre	Facility practices that could support PEC implementation
Structured questionnaire B	Community health extension workers	Health promotion practices that could support PEC implementation
Observational checklist A	Heads of facilities	Equipment, consumables, infrastructure, and register data that could support PEC implementation in facilities
Observational checklist B	Community health extension workers	Equipment, consumables, infrastructure, and register data that could support health promotion of PEC
In purposively selected facilities		
In-depth interviews A	Heads of facilities	PHC experiences; extent to which PEC can be implemented in their facilities
Structured questionnaire C	Village health workers	Perspectives on PEC promotion and prevention
In each district		
In-depth interviews B	District PHC supervisors	PHC management experiences; extent to which PEC could be implemented in their districts

[a]N/A: not applicable; participants were not involved in the review of the document.

Study Area

Nigeria has 36 states in six geopolitical zones. Enugu State was selected for the pilot study and Anambra State for the main study, both of which are in the southeast zone (see Figure 4 [34]).

Figure 4. Map of Nigeria showing the six geopolitical zones and the 36 states [34].



Pilot Study in Enugu State

A pilot study was undertaken in three PHC facilities in one district in Enugu State to assess all the data collection instruments. Appropriate amendments were made to the study tools based on the responses of participants.

Main Study in Anambra State

Overview

Anambra state has 21 local government areas, or districts, which can be stratified into urban, semiurban, and rural. The main occupations are agriculture, manufacturing, and commerce. The literacy rate of individuals aged 6 years and older is 75.1% [35], and 11.3% are considered to be poor [36].

Participants

Participants included heads of facilities, CHEWs, district supervisors, and VHWs. If a facility had two or more CHEWs, one was randomly selected. Data to be collected from each participant group are summarized in Table 2. Facility surveys were undertaken in primary health centers and health posts.

Selection of Districts, Facilities, and Participants

As this was a descriptive study, a sample of 48 facilities was estimated for a baseline study to be sufficient to determine a prevalence of 50% of PHCs with the technical capacity to implement PEC, with a margin of error of 20% with a 95% confidence level, a cluster design effect of 1.8, and accounting for a 10% nonresponse rate [37].

Facilities for inclusion in the main study in Anambra State, which has 21 districts with 235 PHC centers and 112 health posts (ie, a ratio of 2:1), were selected using a two-stage process. First, a list of districts was drawn up, stratified by rural, semiurban, and urban location, to create a sampling frame. Six districts were selected by selecting the appropriate number within each stratum to represent their distribution (ie, three semiurban to two rural to one urban) using simple random sampling. Second, within each district a list of PHC facilities was obtained from the National Primary Health Care Development Agency. The number of facilities—PHC centers and health posts—within each stratum was selected by probability proportionate to size in each district and to represent the 2:1 distribution of health centers and health posts.

The principal researcher administered the head-of-facility questionnaires and facility observational checklists; trained research assistants administered the CHEW and VHW questionnaires and the health promotion observational checklists. Paper forms were used to collect the data.

Preliminary Data Analysis and Purposive Selection of Participants for Qualitative Interviews

Interim data analysis was undertaken using predetermined criteria (eg, the availability of regular supervision, availability and use of standard operating procedures [SOPs], health workforce strength, and number of patients attending the facilities). The highest- and lowest-scoring facilities were stratified by location (ie, urban, rural, or semiurban) and type of facility (ie, health center or health post).

Structured Interviews With VHWs and Semistructured Interviews With Facility Heads and District Supervisors

Based on the preliminary analysis, nine facilities (ie, six health centers and three health posts) were purposively selected. The principal researcher conducted in-depth interviews with the heads of these facilities using semistructured topic guides. A total of 2 VHWs from each of the nine facilities were also randomly selected, and the trained research assistants administered structured questionnaires. Finally, the principal investigator conducted in-depth interviews with the district supervisors of each of the six districts using semistructured topic guides. All the interviews were conducted in English apart from the questionnaires for VHWs, which were administered in the local language by bilingual research assistants.

Data Management

Overview

All the data from the two checklists and three questionnaires have been entered into specially prepared databases in Microsoft Access 2016 and transferred to Stata, version 15.1 (StataCorp LLC), using Stat/Transfer for analysis. Interviews with heads of facilities and district supervisors have been conducted and were recorded on an MP3 player. Verbatim transcription and reflection were ongoing during the interviews and evolving concepts were explored in subsequent interviews.

Quality assurance of data collection for the questionnaires was undertaken by training the research team with a daily debriefing. Each structured questionnaire was initialed by the research team member only when the form was correctly and completely filled out. For data entry, data validation rules were applied to the appropriate fields, which included range checks for numerical values. In addition, 10% of the questionnaires were randomly selected and data entry was cross-checked. During the semistructured interviews, the principal investigator was aware of her role as a benign interviewer and not a judgmental ophthalmologist. At the end of each interview, a summary of the participant's views was read to them for confirmation. The interview recordings were transcribed by the principal investigator and checked for errors or omissions by replaying the tapes.

All data have been stored in a backed-up hard drive in a password-encrypted laptop and in the institution's data repository (Filr) with controlled access limited to authorized users. Any data transferred through the internet have been encrypted. Data will be stored for 10 years to enable publications to be made from the data; they will then be deleted.

Data Analysis

Questionnaires and Checklists

Frequency tables will be generated from the data. Simple descriptive analyses will be performed (eg, the proportion of the facilities visited with tools for referrals). Existing capacities will be benchmarked against norms [38], when available (eg, staffing levels by cadre; SOPs; frequency of supervision; and some components of equipment, consumables, and medication, including systems to maintain the cold chain for vaccines). For indicators without norms, a descriptive analysis will be undertaken, benchmarking against the capacities required. The data will be analyzed based on the WHO health systems framework to highlight the elements that require strengthening.

In-Depth Interviews

Thematic analysis will be used to explore the data using OpenCode software, version 4.02. The data will be coded, categorized using the WHO health systems framework, and developed into themes. Data interpretation will be reviewed and discussed with the research team and qualitative experts. Final themes will be developed. The analysis will be supported by anonymized quotes from the data. Identification codes will be generated according to interview number, participant cadre, and type of facility. Reporting of the analysis of the interviews will follow COREQ (Consolidated Criteria for Reporting Qualitative Studies) guidelines [39].

Ethical Approval

Ethical approval was granted by the ethics review committees of the Federal Ministry of Health, Nigeria; the University of Nigeria Teaching Hospital; and the London School of Hygiene & Tropical Medicine. Written informed consent was obtained from each participant at the beginning of each interaction. For the interviews with heads of facilities and district supervisors, consent included permission to audio record the interviews and use anonymous quotes.

Results

Consensus was reached among experts during the Delphi exercise regarding the technical complexity of the WHO-AFRO PEC package and the capacities needed to deliver it in PHC facilities. Based on the agreed-upon technical capacities, quantitative tools have been developed and relevant stakeholders have been identified to assess the technical capacity of PHC facilities to deliver the WHO-AFRO PEC package (ie, structured questionnaires, observation checklists, and topic guides of in-depth interviews).

Results from the pilot study highlighted large gaps in human resources for health and supervision at the community level, and the study tools were amended to accommodate this. The pilot study involved staff in three health centers in one district in Enugu State. All the data collection tools were pilot-tested apart from the topic guide for supervisors and the structured questionnaire for VHWs, as they were not available. Only one change was made to data collection, which was that the main survey questionnaire be administered to the appropriate cadre, as health promotion was mainly undertaken by a different cadre than anticipated.

Key findings were that none of the facilities had the full complement of staff, and none had a doctor or nurse midwife. The only in-service training that staff had received in the previous 12 months was in child health, maternal health, and HIV. Regarding health promotion, in each facility senior members of staff were providing health promotion in the community, which focused almost exclusively on maternal and child health. The only health promotion topic of relevance to eye care was not to self-medicate. The only form of transport provided to visit communities was a motorbike in one facility. No facility used forms for referral, which was done verbally. For facility-based management, all three were observed to have standing orders, and all reported supervision to be irregular. The main focus of the services delivered was maternal and child health, and none provided any eye care. Two facilities were able to test blood sugar, and none provided services for the elderly. In relation to equipment for eye care, one facility had a visual acuity chart, none had flashlights, and only one had antibiotic eye ointment. The facility survey in 48 PHC facilities has been completed as planned, and interviews with district supervisors and facility heads of the nine purposively selected facilities have been undertaken.

Capacities to deliver PEC are being analyzed, and gaps are being identified. Findings from all sources will be reviewed, including from the desk review of guidelines and policy documents. The convergence of findings will highlight whether gaps in the capacity to deliver PEC are due to limitations in the national guidelines or policies and/or whether they are due to limitations in the current delivery of PHC at district and/or facility levels.

Discussion

This is the first study, to our knowledge, to assess the technical feasibility of integrating eye care into PHC in sub-Saharan Africa and the extent to which the health system needs to be strengthened to deliver it. An alternative approach to facilitate implementation in low-capacity settings would be to adapt the PEC package. There has been renewed interest in assessing the integration of services into health systems in LMICs [40], and the results from this study will be central to enabling policy makers to make an informed choice about what needs to be done to implement PEC in Nigeria.

The development of a conceptual framework for assessing health system interventions is important [41]. This study builds upon the technical complexity framework of Gericke to incorporate technical capacity assessments and will report a gap analysis in the system based on the WHO health systems framework. It is critical that countries implementing or scaling up new interventions have access to reliable, accurate, and comprehensive data on capacities and gaps in the system to deliver an equitable [42] and sustainable intervention. This study provides tools that could be adapted or modified for use in other countries in the region that plan to deliver the WHO-AFRO PEC package.

A limitation of the study is that it only addresses technical feasibility; other aspects of feasibility as delineated by Snowden, such as cultural, legal, financial, and political feasibility, may also need to be addressed. In addition, the assessment tools are cadre specific and designed for the Nigerian PHC context and may not be applicable to other settings. In this study, the sample size was 48 facilities. The study may not have been powered sufficiently to assess any capacity differences between health centers and health posts.

Results of the study will be disseminated to stakeholders in PHC and eye care in Nigeria by communique at stakeholders' meetings and at local, national, and international ophthalmology and public health conferences, as well as in peer-reviewed journals.

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Authors' Contributions

AA and CG conceived the study. AA, CG, HB, and JW made substantial contributions to the study design. AA, CG, HB, and SH designed the study tools. AA was responsible for data collection as part of the fulfilment for a research degree. CG and HB supervised the work. All authors made contributions and agreed to the final draft.

Conflicts of Interest

None declared.

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Abbreviations

CHEW: community health extension worker
COREQ: Consolidated Criteria for Reporting Qualitative Studies
LMICs: low- and middle-income countries
PEC: primary eye care
PHC: primary health care
SOP: standard operating procedure
VHW: village health worker
WHO: World Health Organization
WHO-AFRO: World Health Organization Regional Office for Africa

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Paper 3: Results of a Delphi exercise to identify health system capacities required to deliver the World Health Organization's primary eye care package for Africa.

In this paper, we explain how we arrived at the technical capacities needed in health systems to implement the World Health Organisations primary eye care package for sub-Saharan Africa. It includes a review of primary eye care in sub-Saharan Africa.

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SECTION A – Student Details

Student	AGHAJI Ada Ejealor. ID No lsh 284966
Principal Supervisor	Professor Clare Gilbert
Thesis Title	Assessing the technical capacity of primary health care facilities in Anambra state to implement the World Health Organization's Primary Eyecare Package.

If the Research Paper has previously been published please complete Section B, if not please move to Section C

SECTION B – Paper already published

Where was the work published?	BMJ Open		
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SECTION D – Multi-authored work

For multi-authored work, give full details of your role in the research included in the paper and in the preparation of the paper. (Attach a further sheet if necessary)	AA led the design and conceptualization of the study, collected and analyzed the data, drafted and edited the manuscript with consideration of input from her supervisors and coauthors.

Student Signature: [redacted] **Date:** 12th March 2023

Supervisor Signature: [redacted] **Date:** 17 March 2023

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Technical capacities needed to implement the WHO's primary eye care package for Africa: results of a Delphi process

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ABSTRACT

Objective The aim of the study was to establish the technical capacities needed to deliver the WHO African Region's primary eye care package in primary healthcare facilities.

Design A two-round Delphi exercise was used to obtain expert consensus on the technical complexity of each component of the package and the technical capacities needed to deliver them using Gericke's framework of technical feasibility. The panel comprised nine eyecare experts in primary eyecare in sub-Saharan Africa. In each round panel members used a 4-point Likert scale to indicate their level of agreement. Consensus was predefined as ≥70% agreement on each statement. For round 1, statements on technical complexity were identified through a literature search of primary eyecare in sub-Saharan Africa from January 1980 to April 2018. Statements for which consensus was achieved were included in round 2, and the technical capacities were agreed.

Results Technical complexity statements were classified into four broad categories: intervention characteristics, delivery characteristics, government capacity requirements and usage characteristics. 34 of the 38 (89%) statements on health promotion and 40 of the 43 (93%) statements on facility case management were considered necessary technical capacities for implementation.

Conclusion This study establishes the technical capacities needed to implement the WHO Africa Office primary eye care package, which may be generalisable to countries in sub-Saharan Africa.

Strengths and limitations of this study

- This is the first study to establish the technical capacities needed to implement primary eye care in sub-Saharan Africa.
- A recognised technical feasibility framework was used, and statements were derived from a literature review of primary eye care in sub-Saharan Africa.
- A Delphi exercise was used to garner expert opinion and to reach consensus.
- Our expert panel was a non-random sample, and this may have led to hidden biases as the participants may not be representative of all the experts with the predetermined inclusion criteria.

INTRODUCTION

Scope of the problem

Estimates from sub-Saharan Africa (SSA) indicate that about 22 million people are blind or visually impaired, mainly from avoidable causes such as cataract and uncorrected refractive errors. In addition, over 100 million older adults in SSA are estimated to have near visual impairment.[1] The age standardised prevalence of blindness (≥50 years) is highest of all world regions, being in 5.1% in western and 4.3% eastern SSA,[2] with 80% of causes being preventable or treatable. Much of the regional variation in prevalence is explained by variability in access to eye care.[3]

Although there are limited data on regional estimates for non-visually impairing conditions (NVICs) in SSA, such as allergic/infective conjunctivitis and dry eye syndrome, the prevalence of NVICs in Kenya and Nigeria are estimated to be 15% and 25%, respectively.[4 5] These figures suggest a high need for eye care services in SSA, yet only 30% of Africans have access to eye care.[6]

Primary eye care in SSA

The inclusion of PEC in primary healthcare (PHC) has been recommended as a strategy to increase sustainability and access to eye care services,[7 8] and there is global and regional support for PEC.[9] Indeed, the WHO, in their Global Action Plan 2014–2019, reiterates the importance of accessible eye care services for the effective control of blindness and visual impairment and calls on member states to secure the inclusion of PEC within PHC.[10] However, a literature review of PEC in SSA reported many challenges to the effective implementation of PEC. These include a lack of agreement on the scope of PEC and a lack of clear guidelines on the technical

eye-related skills required by PHC workers; these affect the extent of training, supervision and the type of equipment and consumables required.[11] In response to this, the WHO Africa Office (WHO AFRO) recently developed and pilot tested a package of interventions for PEC in SSA. The WHO AFRO PEC package consists of eight elements that cover two broad areas, that is, health promotion and facility-based case management.[12 13] For health promotion, the package has (two elements): (1) four sets of health messages for healthy people, people at risk of and with eye diseases, for children and carers, those aged 40 years and above, people of all ages and those with diabetes and (2) instructions on how to give a health talk. For facility-based case management the package has six elements: (1) five evidence-based algorithms for red eye, eye swelling, trauma, vision loss for distance and near and children 0–5 years, (2) a set of 12 evidence-based protocols covering five topics: how to measure visual acuity, how to cover an eye, medication, referrals and removal of foreign bodies, (3) a training package (curriculum and materials), (4) core lists of essential consumables, technologies and medicines, (5) a set of 10 standards and indicators for monitoring and evaluation and (6) templates to collect health information, monitoring and evaluation. Although this health initiative has the potential to increase coverage of eye health services in SSA,[8] not all health initiatives proposed may be feasible to implement. Feasibility research can help identify the challenges as well as opportunities in implementing a new health initiative. This is particularly true for the WHO AFRO subregion where there is a marked variability in the ability of the 47 member states to implement additional interventions within PHC.[14]

Feasibility in relation to health initiatives is a multifaceted construct that Snowdon described as having the following components: technical, political, cultural, financial and legal feasibility[15]; the technical feasibility component was selected for this study. Technical feasibility is a balance between how complex the intervention is and the technical capacities required to implement it.[16] The WHO AFRO PEC package has many different technical components, and the overall purpose of this study was to assess the feasibility of integrating the package into PHC in SSA. In this paper, we report the processes involved in developing the content of the feasibility framework for PEC for use in PHC settings in SSA countries.

METHODS

Our approach was framed by awareness of the limited published literature on the effectiveness of PEC in SSA[11] and the need to adopt a systematic method to provide expert consensus on the feasibility of implementing PEC to guide policy makers. Against this backdrop, we used a combination of methods: literature reviews (of feasibility frameworks for public health interventions and of PEC in SSA) and a Delphi process. The Delphi method is an iterative method of collecting opinions from a group of experts where evidence from other more robust sources is not available. It uses a series of questionnaires, and responses are modified based on feedback.[17] The Delphi process has been used in a wide variety of research areas, including health research.[18] The classic Delphi process is characterised by: (A) anonymity of the participants to each other, which encourages free expression of opinion, (B) iteration, (C) controlled feedback from the group and (D) statistical aggregation of the group response.[18]

Step 1: Delphi questionnaire development

The WHO AFRO PEC package was divided into two components: eye health prevention/promotion and case management. An appropriate technical feasibility framework was identified by searching PubMed from January 2000 to April 2018 using the search terms ‘technical feasibility’ and ‘frameworks’. The titles and abstracts of articles identified by the search strategy were screened, and potential full-text articles were reviewed by a single author (AA) (figure 1A) (see online supplemental material: appendix 1).

The conceptual framework to evaluate the technical complexity of public health interventions selected for this study, which was developed by Gericke *et al*[16] has four dimensions: basic characteristics of the intervention, delivery characteristics, government capacity/need for regulation or legislation, and usage characteristics[16] (table 1). Gericke’s framework has been used to determine the technical complexity of condom social marketing for the prevention of HIV/AIDS and other sexually transmitted diseases[16] and to assess aflatoxin risk reduction strategies in Africa, for example.[19] For an intervention to be deemed feasible, the technical capacity must match the technical complexity of the intervention, thus intervention complexity complements the concept of institutional capacity.[16]

The WHO AFRO PEC package was divided into two components: eye health prevention/promotion and case management. The four dimensions of Gericke’s framework were applied to each component, that is, intervention characteristics, delivery characteristics, government capacity requirements and usage characteristics.

To populate the framework, a literature search on PEC in SSA was conducted, and all articles of PEC in SSA up to April 2018 were searched for using MEDLINE. Search terms included ‘primary eye care’, with ‘sub Saharan Africa’ and ‘eye disease’ or ‘eye’ with ‘primary healthcare’ and ‘Africa’.[11] In addition, we used all the relevant articles from the two most recent published reviews on PEC in SSA[11 20] to identify evidence-based criteria for the technical complexities required to implement each component of the WHO AFRO PEC package (figure 1B).

Further implementation characteristics were identified by two of the authors (CEG and AA) who have more than 40 years combined experience of eye care in SSA. This yielded a list of key criteria for the technical complexity of PEC. A 4-point Likert scale (where 1=strongly agree and 4=strongly disagree) was applied to each of the

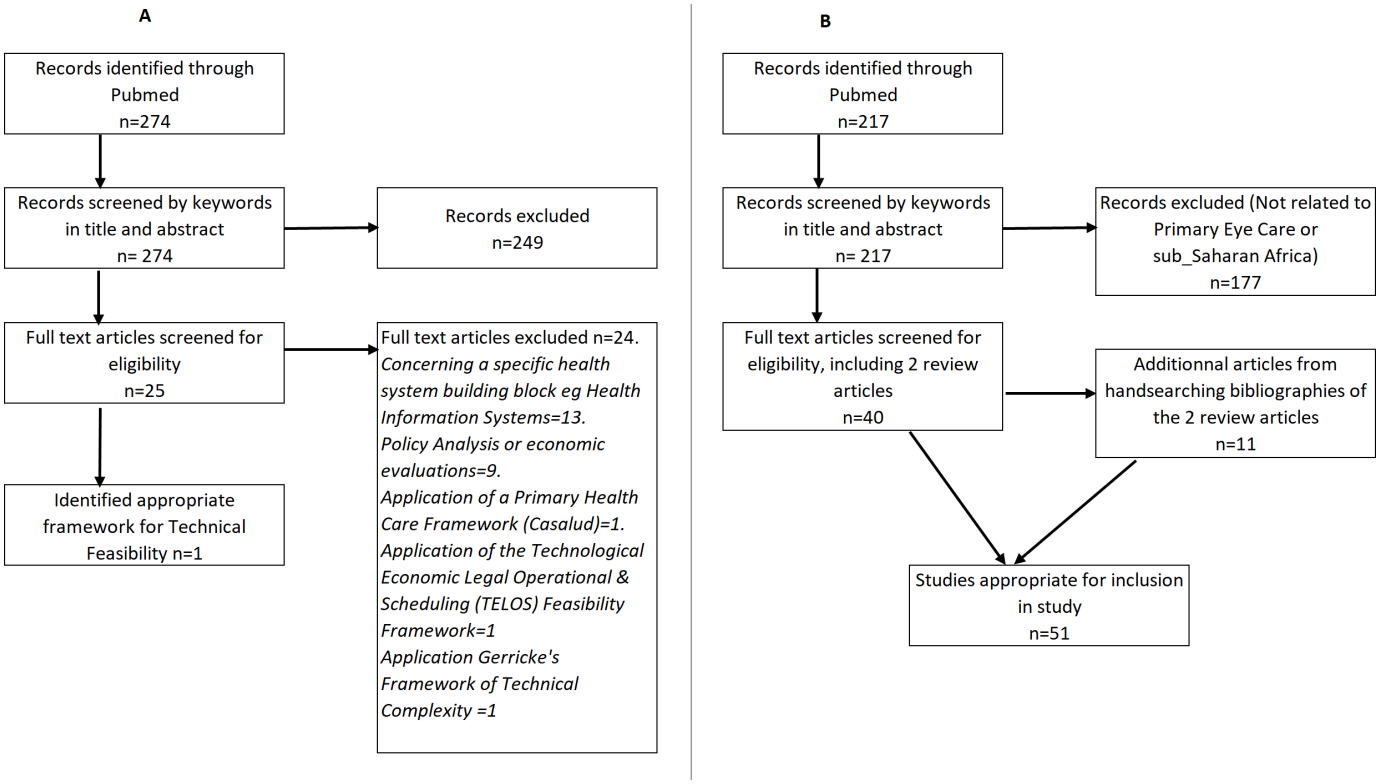

Figure 1 Literature searches for (A) technical feasibility framework and (B) primary eye care in sub-Saharan Africa.

statements, and this formed the Delphi questionnaires. The Delphi questionnaires were reviewed by an expert in international eye health (CEG), a health interventions expert (HEDB) and a statistician (DM). They were then sent to a panel of experts in PEC in SSA.

Step 2: selection of experts for the Delphi exercise

The aim was to recruit a panel of eye care professionals who were experts in eye care in SSA, with expertise to validate the relevance of the selected technical complexities and capacities required to implement the WHO AFRO PEC Package. Eligibility criteria included an eye care professional with a minimum of 10 years' experience of community eye care in SSA, still professionally active and with experience of eye health policy. They were selected by a modified exponential snowball sampling method where an initial participant provides multiple referrals.[21] Each new referral was vetted and included in the study if the eligibility criteria were met. Two of the authors AA and CEG selected the initial participants, and these participants nominated others based on the stated eligibility criteria.

Step 3: Delphi round 1

Members of the team were contacted by email and telephone, and their availability was confirmed. Written informed consent was obtained. Members were sent the following documents: the methods to be used during the Delphi exercise, an explanation of Gericke's framework of technical complexity and a draft of the technical complexities required to deliver both components of the WHO AFRO PEC package in the form of the first Delphi questionnaires. Participants were invited to state their level of agreement to each statement in the questionnaire by ticking the appropriate level in the Likert scale in a Microsoft Excel spreadsheet. A comments box was included beside each statement for comments or suggestions.

Step 4: analysis of Delphi round 1

Once all the questionnaires had been received, they were analysed for consensus. Analyses were performed using STATA V.15.1 (Statcorp, Texas, USA) to generate descriptive statistics. No universally accepted criteria for consensus have been defined for Delphi studies.[22] However, it has been shown that consensus can be said to have been achieved if a certain proportion of the votes fall within a predefined range.[23] Consensus for this study was defined as at least 70% agreement on each statement in the upper 50th percentile (Likert scores 1 and 2). Where consensus was reached, the statements were adopted. Statements where consensus was not reached were modified based on the suggestions/comments and incorporated into the second round, as were newly identified statements.

Step 5: modification for technical capacity

Statements included from the first round were modified so that panel members could indicate their agreement on the technical capacities, which need to be available to deliver the WHO PEC package.

Table 1 Technical feasibility framework of Gericke

Gericke's framework	
Category	**Criteria**
Intervention characteristics	
Basic product design	Stability.
	Standardisability.
	Safety profile.
	Ease of storage.
	Ease of transport.
Supplies	Need for regular supplies.
Equipment	High-technology equipment and infrastructure needed.
	Ease of acquisition.
	Number of different types of equipment needed.
	Maintenance needed.
Delivery characteristics	
Facilities	Outreach services.
Facilities	First-level care.
Facilities	Hospital care.
Human resources	Skill level required for service provision.
	Skill level required for staff supervision.
	Intensity of professional services in terms of frequency or duration.
	Management and planning requirements.
Communication and transport	Dependence of delivery on communication and transport infrastructure.
Government capacity requirements	
Regulation/legislation	Need for regulation.
Management systems	Need for sophisticated management systems.
Collaborative action	Need for intersectoral action within government.
	Need for partnership between government and external funding agencies.
Usage characteristics	
Ease of use	Need for information and education.
Pre-existing demand	Need for promotion.
Black market risk	Need to prevent resale/ counterfeiting.

Table 2 Characteristics of the Delphi panel (n=9)

Characteristics		N (%)*
Gender	Female	5 (55.6)
Age (years)	<50	2 (22.2)
	>50	7 (77.8)
Professional group	Ophthalmologist	7 (77.8)
	Administrator	2 (22.2)
Primary function	Clinician	3 (33.3)
	Researcher	3 (33.3)
	NGO administrator	3 (33.3)
Type of institution	Academic hospital	2 (22.2)
	Non-academic hospital	1 (11,1)
	Research institute	3 (33.3)
	Eyecare NGO	3 (33.3)
Region of practice	West Africa	5 (56)
	East Africa	2 (22)
	South Africa	2 (22)
	Central Africa	1 (11)
	Europe	1 (11)
Involved in national policy making	Yes	9 (100)

The mean number of years of experience in eye health of the participants was 31.1±8.9 (range 18–43) years.
*Some participants had multiple roles/had worked in multiple regions.
NGO, non-governmental organisation.

Step 6: Delphi round 2

For this round, the participants received the questionnaires with the comments/suggestions of other panel members from the first round. However, this was modified for technical capacity, as stated above, and sent to the same expert panel using the same Likert scale and level of consensus.

Step 7: analysis of Delphi round 2

Only statements that achieved at least 70% consensus in the upper 50th percentile (Likert scores 1 and 2) in the second round were included in the final document. Where consensus was reached, the statements were adopted and formed the basis of the final document. Any minority views (<70% consensus) did not form part of the adopted technical capacities but were documented. The technical capacities needed were mapped unto the WHO health system's building blocks.[24]

Patients were not involved in this study.

RESULTS

Composition of Delphi panel of experts

A total of 12 experts were contacted, nine of whom agreed to participate (table 2). No response was received from the other three invitees despite at least three contacts by email. All nine completed the two rounds of the Delphi survey.

Delphi questionnaire development

A total of 81 statements on the technical complexity of the WHO AFRO PEC package were developed from

Aghaji A, et al. BMJ Open 2021;11:e042979. doi:10.1136/bmjopen-2020-042979

Table 3 Statements for each component of the WHO AFRO primary eye care package

		Component of WHO AFRO PEC package	
		Health promotion and prevention	Facility case management
Gericke's framework domains		Number of statements	
Intervention characteristics	Basic product design	7	10
	Supplies	2	1
	Equipment	3	5
Delivery characteristics	Type of facility needed	3	4
	Human resource requirement	8	9
	Communication and transport	3	2
Government capacity requirements	Regulation/ legislation	2	4
	Management systems	2	1
	Collaborative action	4	3
Usage characteristics	Ease of use	2	2
	Pre-existing demand	1	1
	Black market risk	1	1
Total		38	43

PEC, primary eye care; WHO AFRO, WHO Africa Office.

Gericke's framework, 38 for health promotion and 43 for facility-based case management (table 3).

In the first round, there was consensus in 84% of the statements with over 40% of the statements achieving 100% consensus (see online supplemental material: appendix 2). Based on comments from Delphi round 1, six modifications were made in the health promotion component and seven in the facility case management component (see online supplemental material: appendix 3). The modified questionnaire formed the basis of technical capacity questionnaire for round two.

In the second round, four statements were deemed not to be applicable by 89% of participants and were removed. Consensus was achieved in 94% of the statements, with 62% achieving 100% consensus (online supplemental appendix 4). Results of the 34 statements on technical capacity for health promotion for which consensus was reached are shown in table 4A with their respective Likert ratings, quartile and 50th percentile values. Results of the 40 statements on technical capacity for facility case management for which consensus was reached are shown in table 4B with their respective Likert ratings, quartile and 50th percentile values. The top quartile shows the number and proportion of participants who strongly agreed with each of the statements, while the 50th percentile shows the number and proportion of participants that strongly agreed or agreed. The technical capacities needed were mapped unto the WHO health system's building blocks (table 5A and B).

DISCUSSION

Despite global and regional interest in PEC,[8 10 25 26] insights into the technical complexity of PEC and the technical capacities required to deliver it within PHC in SSA are lacking. The technical complexity was assessed using the well-known framework devised by Gericke, which complements the notion of institutional capacity in determining the feasibility of implementing or scaling up an intervention.[16]

In this study, we did not address other aspects of feasibility, such as legal and financial feasibility, and it may be argued that health financing is an important element to consider in low-resource countries, particularly in SSA, where less than half the countries have the minimum level of health financing of US$44 per capita.[27] However, non-financial resources are considered to be the critical factor limiting the implementation of health interventions.[16]

To the best of our knowledge, this is the first Delphi exercise to explore the technical capacities needed to implement the WHO AFRO PEC package in SSA.

Our study complements a recent systematic review on health systems preparedness for integration of services at the PHC level,[28] and tools developed from our study will enable identification of elements of the health system at primary level that need to be strengthened to deliver PEC. This is important as the delivery of PEC can only be as effective as the PHC into which it is integrated.[11] Having said this, it is important to recognise that eye health needs to be integrated into all levels of the health system to achieve universal coverage for eye health.[10 29]

Data to populate Gericke's framework were largely derived from a detailed review of the literature of PEC in SSA. Consensus on the capacities required to deliver PEC were reached after a two-round Delphi exercise by experts in public health for eye care in SSA: researchers, clinicians, policy makers and administrators. The primary function of panel members was evenly distributed between these three categories, and as all had been involved in policy development and service delivery for eye care in the region, they were experienced in what was feasible and what was not.

The literature review and the high consensus from the panel of experts increase the validity of the findings. In the first round, over four-fifths of the statements reached the predefined consensus, which implies that the majority of the technical complexities aligned with the views of the expert panel and their familiarity with the literature. In the second round, there was consensus on almost all the statements, with 100% consensus for almost two-thirds. This is to be expected, as the technical capacities were

Table 4A Consensus statements on technical capacity for health promotion, with analysis of Likert scales

Category/criteria	Technical capacity needed (elements that need to be available)	Top quartile Likert 1 N	Top quartile Likert 1 %	50th percentile Likert 2 N	50th percentile Likert 2 %	Median (IQR)
1. Intervention characteristics						
Basic product design						
Stability: usable lifetime and risk of destruction	Posters that promote eye health.	7	77.8	9	100	1 (1–1)
	Durable posters are available.	4	44.4	9	100	1 (1–2)
Standardisability: the degree to which an intervention can be standardised	Standardised posters available to deliver the same message per target group.	5	55.6	9	100	1 (1–2)
	Posters available in the language of the community.	6	66.7	7	77.8	1 (1–2)
	Posters with self-explanatory graphics available for the non-literate.	8	88.9	9	100	1 (1–1)
	Different types of posters available for different target groups that are appropriately displayed.	5	55.6	8	88.9	1 (1–2)
Number of different types of equipment needed. Maintenance needed	Health promotion materials available that are easy to maintain.	5	55.6	9	100	1 (1–2)
	A system for the easy procurement of health promotion materials.	6	66.7	9	100	1 (1–2)
2. Delivery characteristics						
Facilities						
Retail sector, outreach services, first-level care and hospital care	Health promotion in the community that includes young children and their carers, persons with diabetes and the elderly as their target audience.	4	44.4	9	100	1 (1–2)
	Time, space and willingness to deliver opportunistic eye health promotion to groups in the facility.	7	77.8	8	88.9	1 (1–1)
	Time and the willingness to deliver opportunistic eye health promotion to targeted individuals in the facility, for example, persons with diabetes.	5	55.6	7	77.8	1 (1–2)
Human resources						
Skill level required for service provision	Staff skilled in communicating with community members.	7	77.8	9	100	1 (1–1)
	Staff who are knowledgeable about community, eye diseases and where to access care.	7	77.8	9	100	1 (1–1)
	Village health workers resident in the community who are able to deliver health promotion.	6	66.7	9	100	1 (1–2)
	Facility-based staff who are able to deliver health promotion.	5	55.6	9	100	1 (1–2)
	Professionals to train staff on eye health promotion and develop health promotion materials.	9	100	9	100	1 (1–1)
Skill level required for staff supervision. Degree of supervision required	Supervisors who are able to supervise health promotion activities including eye health.	7	77.8	9	100	1 (1–1)
Intensity of professional services in terms of frequency or duration, for example, on schedule/periodic or continuous to accommodate emergencies	Staff who regularly deliver health promotion on schedule.	7	77.8	9	100	1 (1–1)
Need for managerial staff: management and planning requirements	Existing managerial staff who plan and organise target audience to be sensitised in appropriate locations, for example, carers of young children.	5	55.6	9	100	1 (1–2)

Continued

Table 4A Continued

Category/criteria	Technical capacity needed (elements that need to be available)	Top quartile Likert 1 N	%	50th percentile Likert 2 N	%	Median (IQR)
Communication and transport						
Dependence of delivery on communication and transport infrastructure: telephones and roads	Local transport infrastructure to visit communities.	6	66.7	7	77.8	1 (1–2)
Need for substantial exchange of information between different sectors or levels of care	Appropriate communication channels between the community and frontline health facilities.	8	88.9	9	100	1 (1–1)
	Staff who are able to communicate in the local language.	9	100	9	100	1 (1–1)
3. Government capacity requirements						
Regulation/legislation						
Need for legislation/regulation, monitoring regulatory measures and enforcement of regulation	Health promotion materials that have been approved and endorsed by local regulatory authorities.	5	55.6	8	88.9	1 (1–2)
	Eye health promotion activities that are recorded and monitored.	4	44.4	7	77.8	1 (1–1)
	National blindness prevention strategy that incorporates eye health promotion.	9	88.9	8	88.9	1 (1–1)
Need for sophisticated management systems and managerial staff. Level of management and planning requirements	Existing managerial structures for health promotion that can be used to manage eye health promotion.	4	44.4	7	77.8	2 (1–2)
Collaborative action						
Need for intersectoral action within government. Need for partnership between government and civil society	Intersectoral activities within government or partnerships between government and civil society.	6	66.7	9	100	1 (1–2)
	Existing school health programmes.	3	33.3	7	77.8	2 (1–2)
Need for partnership between government and external funding agencies	Collaborations with NGOs to provide health promotion.	1	11.1	7	77.8	2 (1–2)
	Collaboration between communities and frontline health communities.	7	77.8	9	100	1 (1–1)
4. Usage characteristics						
Ease of use						
Need for information and education	Communication channels with community to inform target population.	9	88.9	9	100	1 (1–1)
Need for supervision	Staff to supervise health promotion activities.	9	88.9	9	100	1 (1–1)
Pre-existing demand						
Need for promotion	Staff who engage in health promotion that includes the uptake of eye care when required.	9	88.9	9	100	1 (1–1)
Black market risk						
Need to prevent resale/ counterfeiting	Staff who engage and train traditional healers to identify and refer eye conditions, with a system to support training.	7	77.8	9	100	1 (1–1)

Table 4B Consensus statements on technical capacity for facility case management, with analysis of Likert scales

Category/criteria	Technical capacity needed (elements that need to be available)	Top quartile Likert 1 N	%	50th percentile Likert 2 N	%	Median (IQR)
1. Intervention characteristics						
Basic product design						
Stability/ease of storage/ease of transport	Torches can be solar powered and are stable.	6	66.7	9	100	1 (1–2)

Continued

Table 4B Continued

Category/criteria	Technical capacity needed (elements that need to be available)	Top quartile Likert 1 N	%	50th percentile Likert 2 N	%	Median (IQR)
	Appropriate and secure storage for drugs and consumables.	8	88.9	9	100	1 (1–1)
	Eye-drops that do not require cool storage should be stocked.	5	55.6	8	88.9	1 (1–2)
	Tetanus toxoid, which requires cool storage.	6	66.7	8	88.9	1 (1–2)
	Topical antibiotic ointment does not require cold storage.	6	66.7	8	88.9	1 (1–2)
	Sterile saline solution for eye irrigation is stable.	4	44.4	7	77.8	1 (1–2)
	High dose vitamin A is stable.	5	55.6	9	100	2 (1–2)
	Injectable antibiotics, for ophthalmia neonatorum and other conditions, may require cool storage	4	44.4	7	77.8	1 (1–2)
	Pre-existing PHC transport channels should be available to transport PEC consumables.	7	77.8	9	100	1 (1–1)
Standardisability	The WHO AFRO PEC package is standardised.	6	66.7	9	100	1 (1–2)
Safety profile	Staff who are trained/can be trained to deliver the intervention correctly and not cause harm.	8	88.9	9	100	1 (1–1)
Supplies						
Need for regular supplies	Medication supply system to support regular supply of eye medications and consumables.	8	88.9	9	100	1 (1–1)
Equipment						
High-technology equipment and infrastructure needed	Diagnostic equipment: Snellen distance visual acuity chart; near visual acuity chart, torches and batteries.	7	77.8	9	100	1 (1–1)
	Adequate space to use appropriate, standardised visual acuity charts.	6	66.7	8	88.9	1 (1–2)
	Adequate space for counselling patients.	8	88.9	9	100	1 (1–1)
Number of different types of equipment needed	One set of diagnostic equipment.	6	66.7	8	88.9	1 (1–2)
Maintenance needed	System to maintain equipment in the facility.	5	55.6	9	100	1 (1–2)
2. Delivery characteristics						
Facilities						
First-level care	Eye care services to manage uncomplicated eye conditions.	6	66.7	9	100	1 (1–2)
Hospital care	Referral hospital to manage complicated eye conditions.	8	88.9	9	100	1 (1–1)
Human resources						
Skill level required for service provision	Staff able to make a diagnosis (take a history; measuring visual acuity; basic eye examination).	8	88.9	9	100	1 (1–1)
	Staff able to manage some conditions, for example, eye irrigation; remove foreign bodies; give IM injections.	8	88.9	9	100	1 (1–1)
	Staff able to identify which cases to refer and the level of urgency.	8	88.9	9	100	1 (1–1)
Skill level required for staff supervision. Degree of supervision required.	Primary healthcare supervisors knowledgeable about eye conditions and their management.	6	66.7	9	100	1 (1–2)
	Regular supervision of PHC activities and PEC activities.	6	66.7	9	100	1 (1–2)
Frequency or duration of services: for example, on schedule/periodic or continuous to accommodate emergencies	Staff trained in PEC always available to manage eye conditions and emergencies.	8	88.9	9	100	1 (1–1)

Continued

Table 4B Continued

Category/criteria	Technical capacity needed (elements that need to be available)	Top quartile Likert 1 N	%	50th percentile Likert 2 N	%	Median (IQR)
Management and planning requirements. Need for managerial staff	Facility managers who supply consumables and plan purchasing.	6	66.7	9	100	1 (1–2)
	Facility managers establish and maintain referral and feedback between the PH centre and eye care facilities.	5	55.6	7	77.8	1 (1–2)
	Managerial systems to coordinate staff rotations to ensure daily facility coverage by trained PEC staff.	7	77.8	9	100	1 (1–1)
Communication and transport						
Depends on delivery of communication and transport infrastructure	Communication channels to maintain referral and feedback mechanisms between the PH centre and referral centre.	6	66.7	9	100	1 (1–2)
	Transportation between the PH facility and referral centre.	3	33.3	7	77.8	1 (1–2)
3. Government capacity requirements						
Regulation/legislation						
Need for regulation	National Essential Drug List includes appropriate medication and equipment for eye care in PH facilities.	6	66.7	8	88.9	1 (1–1)
Regulatory measures need to be enforced and regulated	System that regulates drug prescribing and dispensing by appropriate staff.	7	77.8	9	100	1 (1–1)
	Reporting systems for measles outbreaks.	9	100	9	100	1 (1–1)
	Reporting system for ophthalmia neonatorum.	7	77.8	9	100	1 (1–1)
Management systems						
Sophisticated management systems required	Managerial structures for PH care include eye care.	7	77.8	9	100	1 (1–1)
Collaborative action						
Intersectoral action needed within government, and partnership between government and civil society	Intersectoral action within government or partnerships between government and civil society.	6	66.7	9	100	1 (1–2)
4. Usage characteristics						
Need for supervision	Staff who make supervisory home visits.	5	55.6	7	77.8	1 (1–2)
	Staff who supervise referrals to ensure compliance.	4	44.4	8	88.9	1 (1–2)
Pre-existing demand						
Need for promotion	Staff who engage in eye health promotion to target audiences.	4	44.4	8	88.9	1 (1–2)
Black market risk						
Need to prevent resale/ counterfeiting	Staff who engage and train traditional healers to identify and refer eye conditions, with a system to support training.	6	66.7	8	88.9	1 (1–2)

IM, intramuscular; PEC, primary eye care; PH, primary health; PHC, primary healthcare; WHO AFRO, WHO Africa Office.

derived from the technical complexities. For example, one of the technical complexities was 'hospital services are needed for referrals, severe cases, treatment failures, further investigations and management, as required', and the technical capacity derived was 'the availability of a referral hospital to manage complicated eye conditions'.

The human resource elements of the delivery characteristics domain for health promotion and facility-based management had perfect consensus. Human resources for health has been identified as a key component for the successful implementation of health interventions,[30] which was emphasised in two review articles on PEC in SSA.[11 20] Government support and strong partnerships are crucial for the success of PEC in terms of sustainability and scaling up, as advocated in the WHO Global Action Plan (2014–2019) and for regulatory activities.[10] Hence, the majority of elements in this domain had near perfect consensus. All the elements in the usage characteristics domain for health promotion had perfect consensus in the final round, emphasising the importance of creating

Table 5 Gericke's framework: technical capacities needed to deliver (A) health promotion and (B) facility-based case management

Category	Criteria	Technical capacity: elements that need to be available	Health system building block
(A) Health promotion			
Intervention characteristics			
Basic product design	Stability	Posters that promote eye health should be available. Posters should be durable.	Infrastructure, technology and so on
	Standardisability	Standardised posters, delivering the same message per target group.	
		Posters that are in the language of the community.	
		Posters with self-explanatory graphics should be available for the illiterate.	
Supplies and equipment	Ease of acquisition	Easy system to procure health promotion materials.	Infrastructure, technology and so on
	Number of different types of equipment needed	Different types of posters available for different target groups that are appropriately displayed.	
	Maintenance needed	Health promotion materials available that are easy to maintain.	
Delivery characteristics			
Facilities	Outreach services	Health promotion that includes young children and their carers, persons with diabetes and the elderly as the target audience in the community.	Service delivery
	First-level care	Time and space available, and staff willing to deliver opportunistic eye health promotion to specific groups in the facility.	
	First-level care	Time and space available, and staff willing to deliver opportunistic eye health promotion to specific individuals in the facility, for example, persons with diabetes.	
Human resources	Skill level required for service provision	Staff skilled in communicating with community members.	Health workforce
		Staff who are knowledgeable about community, eye diseases and where to access care.	
	Intensity of professional services in terms of frequency or duration	Village health workers resident in the community who are able to regularly deliver health promotion.	
		Facility-based staff who are able to regularly deliver health promotion.	
		Professionals to train staff on eye health promotion and develop health promotion materials.	
	Skill level required for staff supervision	Supervisors who are able to supervise health promotion activities including eye health.	
		Staff who regularly deliver health promotion on schedule.	
	Management and planning requirements	Existing managerial staff who plan and organise target audience to be sensitised in appropriate locations, for example, carers of young children.	
Communication and transport	Dependence of delivery on communication and transport infrastructure	Local transport infrastructure to visit communities.	Infrastructure, technology and so on
		Appropriate communication channels between the community and PHC facilities.	Service delivery/HMIS
		Staff who are able to communicate in the local language.	Health workforce
Government capacity requirements			

Continued

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Table 5 Continued

Category	Criteria	Technical capacity: elements that need to be available	Health system building block
Regulation/legislation	Need for regulation/legislation	Health promotion materials that have been approved and endorsed by local regulatory authorities.	Governance and leadership
		A national blindness prevention strategy that incorporates eye health promotion.	
Management systems	Need for management systems	Existing managerial structures for health promotion can be used. Eye health promotion activities that are recorded and monitored.	HMIS
Collaborative action	Need for intersectoral action within government	Intersectoral activities within government or partnerships between government and civil society.	Governance and leadership
		Existing school health programmes.	Service delivery
	Need for partnership between government and external funding agencies	Collaborations with NGOs to provide health promotion.	Governance and leadership
		Collaboration between communities and PHC facilities is required.	
Usage characteristics			
Ease of use	Need for information and education/need for supervision	Communication channels with community that are available to inform target population.	Service delivery
		Staff who are available to supervise health promotion activities.	Governance and leadership
Pre-existing demand	Need for promotion	Staff who are able to engage in eye health promotion to target audience to significantly increase demand.	Service delivery
Black market risk	Need to prevent resale/ counterfeiting	Staff who are able and willing to engage with traditional healers and train them to identify and refer eye conditions. A system that supports this training.	
(B) Facility-based case management			
Intervention characteristics			
Basic product design	Stability and ease of storage	Torches should be available. They can be solar powered and are stable.	Infrastructure, technology and so on
		Appropriate and secure storage for drugs and consumables should be available.	
		Eye-drops that do not require cool storage should be stocked.	
		Tetanus toxoid will require cool storage and should be available from facility childhood immunisation activities.	
		Topical antibiotic ointment does not require cold storage and should be available.	
		Injectable antibiotics for ophthalmia neonatorum may require cool storage but should be available to treat other conditions.	
		Sterile saline solution for eye irrigation is stable and should be available.	
		High dose vitamin A is stable and should be available from maternal and child health activities.	
	Ease of transport	Pre-existing PHC transport channels should be available to transport PEC consumables.	

Continued

Table 5 Continued

Category	Criteria	Technical capacity: elements that need to be available	Health system building block
	Standardisability	The WHO AFRO PEC package is standardised and can be available in all primary care facilities.	
	Safety profile	Available staff who are trained/can be trained to deliver the intervention correctly so as not to cause harm.	Health workforce
Supplies and equipment	Need for regular supplies	A medication supply system that can support the regular supply of eye medications and consumables.	Infrastructure, technology and so on
	High-technology equipment and infrastructure needed	Diagnostic equipment is available: Snellen distance visual acuity chart; near visual acuity chart, torches and batteries.	
		Adequate space to support the use of appropriate and standardised visual acuity charts.	
		Adequate space for counselling patients should be available.	
	Number of different types of equipment needed	The availability of one set of diagnostic equipment.	
	Maintenance needed	An available system for the maintenance of facility equipment.	
Delivery characteristics			
Facilities	First-level care	The availability of eye care services to manage uncomplicated eye conditions.	Service delivery
Facilities	Hospital care	The availability of a referral hospital to manage complicated eye conditions.	
Human resources	Skill level required for service provision	Staff who are able to make a diagnosis (eliciting a history; measuring visual acuity; basic eye examination).	
		Staff who are able to manage some conditions, for example, eye irrigation; removal of foreign bodies; give IM injections (tetanus toxoid; antibiotics)	
		Staff who are able to identify which cases to refer and the level of urgency.	
	Skill level required for staff supervision	PHC supervisors who are knowledgeable about eye conditions and their management.	Governance and leadership
		Supervisors who regularly supervise PHC activities and can supervise PEC activities.	
	Intensity of professional services in terms of frequency or duration	Staff trained in PEC who are available continuously to manage eye conditions, especially emergencies.	Service delivery
	Management and planning requirements	Existing managerial facility staff who are able to manage the supply of consumables and plan purchasing.	Governance and leadership
		Existing managerial facility staff who are able to establish and maintain referral and feedback mechanisms between the PHC facility and eye department/clinic.	
		Existing managerial systems to coordinate staff rotations to ensure daily facility coverage by trained PEC staff.	

Continued

Table 5 Continued

Category	Criteria	Technical capacity: elements that need to be available	Health system building block
Communication and transport	Dependence of delivery on communication and transport infrastructure	Communication channels to maintain referral and feedback mechanisms between the PHC facility and the referral centre.	Infrastructure, technology and so on
		Transport between the PHC facility and the referral centre.	
Government capacity requirements			
Regulation/legislation	Need for regulation.	Appropriate medication and equipment need to be on the national essential drug list to facilitate availability.	Governance and leadership
Management systems	Need for sophisticated management systems	A system that regulates drug prescription and dispensing by appropriate staff.	
		Communication channels to report measles outbreaks to relevant authorities.	
		Communication channels to report cases of ophthalmia neonatorum to relevant authorities.	
		Existing managerial structures for PHC that can be used to manage PEC.	HMIS
Collaborative action	Need for intersectoral action within government or partnership between government and external funding agencies.	Availability of intersectoral action within government or partnerships between government and civil society.	Governance and leadership
Usage characteristics			
Ease of use	Need for information and education/need for supervision	Staff who are available to make supervisory home visits.	Governance and leadership
		Staff who are able to supervise referrals to secondary centres to ensure compliance.	
Pre-existing demand	Need for promotion	Staff who are able to engage in eye health promotion to target audience.	Service delivery
Black market risk	Need to prevent resale/ counterfeiting	Staff who are able and willing to engage with traditional healers and train them to identify and refer eye conditions. A system that supports this training.	

HMIS, Health Management Information Systems; IM, intramuscular; NGOs, non-governmental organisations; PEC, primary eye care; PHC, primary healthcare; WHO AFRO, WHO Africa Office.

demand[31] and reducing the impact of harmful traditional eye practices.[32]

The WHO health systems building blocks were mapped unto appropriate elements of the final technical capacity profile for PEC. Adopting a health systems strengthening approach in which eye health is included in all the building blocks will amplify the benefits of the intervention[33] and promote sustainability.

The technical capacity frameworks for delivering the WHO AFRO PEC package were developed using data and experts from a range of SSA countries. However, caution is needed in extrapolating the findings from the Delphi exercise in this study to all WHO AFRO countries, as local adaptation of the WHO AFRO package may be required and hence the capacities needed to address varying eye health needs in different settings and PHC contexts. For example, the cadres providing PHC are likely to vary, as is the availability of informal health providers.

There are several strengths and limitations of this study. The selection of the expert panel is a crucial part of the Delphi process as the output is based on their expert opinion.[34] Our expert panel was a non-random sample, and this may have led to hidden biases as the participants may not be representative of all the experts with the predetermined inclusion criteria. Indeed, almost half of the participants were from West Africa, but the majority had worked in agencies that had oversight of sub-Saharan African eye healthcare. Another limitation is that although all panel members had relevant expertise and experience, PHC practitioners were not included, as the focus was on eye care, which the majority of PHC practitioners in Africa would have little experience of.

One of the disadvantages of the Delphi consensus is that it is provides low-level evidence (expert opinion)[35] as randomised controlled trials provide the highest level evidence; only a few trials have been undertaken on PEC in low-income and middle-income countries.[36] However, the Delphi method is useful when there are limited data to guide clinical practice. In this study, the framework for the questionnaires was a validated framework that has been used to assess the non-financial inputs needed to implement new interventions with a view to scaling up.[16] Our study used anonymity, which is an inherent strength of the Delphi process, which helped avoid undue influence by any members and the efficient harnessing of expert opinion from diversely geographically dispersed experts[37,38] from East, West, Southern Africa and the UK. Another strength of our study is the low non-response bias. Although 12 experts were invited to participate, nine agreed and all completed both Delphi rounds.

This study has generated the first technical feasibility capacity profile for PEC to guide countries wishing to implement PEC, based on an internationally accepted feasibility framework, a review of the PEC literature and expert opinion. However, there was limited published evidence on PEC in SSA from which the technical capacities were derived. As more high-level evidence studies on PEC in SSA are conducted, the document will need to be revised.

Future research

Mixed-methods data collection tools for different participant groups (village health workers, PHC workers, heads of facilities and district supervisors) in Nigeria have been developed based on our capacity frameworks, that is, structured questionnaires, observational check lists and topic guides for in-depth interviews. A number of PHC facilities in Southeast Nigeria have been assessed using these tools, and a gap analysis will be conducted. The capacity of PHC to deliver eye care has sparked passionate debates,[29] and robust studies on the effectiveness of PEC will be needed in the future.

CONCLUSIONS

Consensus was reached on the technical capacities that need to be in place to deliver the WHO AFRO PEC package using a Delphi exercise. Based on this document, study tools have been developed to assess health system gaps in PHC in Nigeria. Countries or health units wishing to implement PEC using the WHO AFRO PEC package should address any capacity gaps before implementing or scaling up this intervention.

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Chapter 4 RESULTS

A primary healthcare centre in the study area.

Summary: This chapter includes five published papers on the results of the PHC facility survey and one paper being prepared for submission.

Paper 4: Human resources and governance challenges in the delivery of Primary Eye Care: a mixed methods feasibility study in Nigeria.

In this paper, we present our findings with respect to governance and the health workforce situation in primary health facilities in Anambra state and discuss what this means for the delivery of primary eye care.

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Student	AGHAJI Ada Ejealor. ID No lsh 284966
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Thesis Title	Assessing the technical capacity of primary health care facilities in Anambra state to implement the World Health Organization's Primary Eyecare Package.

If the Research Paper has previously been published please complete Section B, if not please move to Section C

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RESEARCH

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Human resource and governance challenges in the delivery of primary eye care: a mixed methods feasibility study in Nigeria

Ada Aghaji[1,2*], Helen E. D. Burchett[3], Ngozi Oguego[4], Shaffa Hameed[5] and Clare Gilbert[2]

Abstract

Background: To increase access to eye care, the World Health Organization's Africa Region recently launched a primary eye care (PEC) package for sub-Saharan Africa. To determine the technical feasibility of implementing this package, the capacity of health systems at primary level needs to be assessed, to identify capacity gaps that would need to be addressed to deliver effective and sustainable PEC. This study reports on the human resource and governance challenges for delivering PEC in Anambra State, Nigeria.

Methods: Design: This was a mixed methods feasibility study. A desk review of relevant Nigerian national health policy documents on both eye health and primary health care was conducted, and 48 primary health care facilities in Anambra state were surveyed. Data on human resource and governance in primary health facilities were collected using structured questionnaires and through observation with checklists. In-depth interviews were conducted with district supervisors and selected heads of facilities to explore the opportunities and challenges for the delivery of PEC in their facilities/districts. Data were analysed using the World Health Organization's health system framework.

Results: A clear policy for PEC is lacking. Supervision was conducted at least quarterly in 54% of facilities and 56% of facilities did not use the standard clinical management guidelines. There were critical shortages of health workers with 82% of facilities working with less than 20% of the number recommended. Many facilities used volunteers and/or ad hoc workers to mitigate staff shortages.

Conclusion: Our study highlights the policy, governance and health workforce gaps that will need to be addressed to deliver PEC in Nigeria. Developing and implementing a specific policy for PEC is recommended. Implementation of existing national health policies may help address health workforce shortages at the primary health care level.

Keywords: Primary eye care, Health workforce, Governance, Feasibility, Nigeria, Word count 5383.

Introduction

Globally, it is estimated that 338 million people are blind or severely to moderately visually impaired [1]. Over 90% of the causes of vision loss are potentially avoidable e.g., cataract and refractive error, and over 90% of those affected live in low- and middle-income countries (LMICs) [2]. The prevalence of blindness increases with advancing age and is highest in those aged 50 years and above [3]. The estimated global prevalence of blindness is 0.49% among all ages, while the estimate for older adults (> 50 years) is at least 1.82%. Sub-Saharan Africa has the highest prevalence of blindness in older adults, which is estimated to be 4.19% in males and 4.36% in females [4]. In addition to conditions associated with vision loss, other less serious eye conditions like allergic and infective

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conjunctivitis are very common, and require appropriate management [5–7].

Much of the regional and gender variation in the prevalence of visual impairment and blindness is explained by inequity in access to eye care, particularly by the poor and women. Access to eye care services in sub-Saharan Africa is limited [8]. In addition, eye care in most LMICs is principally delivered at secondary and tertiary levels, in urban areas [9] leaving rural populations under-served. The World Health Organization's (WHO) Global Action Plan 2014–2019 [10] and the World Report on Vision [9] advocate integrating eye care into primary health care (PHC) as a component of Universal Health Coverage, which could contribute to reducing this inequity in access.

The International Agency for the Prevention of Blindness (IAPB) defines PEC as "an integrated, participatory and inclusive approach to the eye health component of PHC consisting of promotive, preventive, curative and rehabilitative services." [11] One of the challenges of delivering PEC in SSA has been lack of clarity on the scope of practice [12]. To address this, the WHO Africa Regional office recently developed and launched a package of PEC interventions for sub-Saharan Africa (WHO AFRO PEC) [13] to equip PHC workers, individuals and communities in sub-Saharan Africa to effectively manage common eye diseases [14]. This package, hereafter referred to as the WHO AFRO PEC package, [13, 14] has two broad components - eye health promotion and facility-based eye care. The eye health promotion component has two elements: 1) sets of health messages for children, mothers and care givers, and people of all ages and 2) information on how to give a health talk. For facility-based care there are six elements: 1) five evidence based algorithms (for red eye, eye swelling, trauma, vision loss for distance and near, and for children 0–5 years), 2) a set of 18 evidence based protocols covering several areas (measuring visual acuity (VA); applying an eye pad; prescribing medication; making referrals; removing foreign bodies, counselling, giving health talks), 3) a training package (curriculum and materials), 4) core lists of essential consumables, technologies and medicines, and 5) charts and recording forms. The purpose of the package is to strengthen the capacity of PHC workers in sub-Saharan Africa to manage patients with eye conditions [13] and widen access to eye care [15]. The package has been pilot tested in Rwanda and Kenya and has the potential to transform eye care in terms of treatment coverage for the majority of people with eye conditions in Africa [15].

However, PEC can only be as effective as the PHC elements of the health system into which it is integrated. In Nigeria, PHC is delivered in health centres and health posts, the former being larger and better equipped than the latter. Health centres provide 24-h services, including antenatal care and deliveries, while care health posts is more limited in scope.

The staff who work in PHC facilities and in the community include Community Health Officers (CHOs), Community Health Extension Workers (CHEWs), Junior Community Health Extension Workers (JCHEWs) and nurse-midwives (NMWs). Some primary health centres employ doctors (Additional File 1.) Support staff include health attendants and security staff [16]. The National Primary Health Care Development Agency (NPHCDA) is the national body which manages PHC and it has developed norms for staffing levels, supervision activities and minimum standards for the delivery of PHC [16]. Staff in PHC facilities are supervised by the local government authority (i.e., districts supervisors for health).

The purpose of this study was to assess the feasibility of integrating the WHO AFRO PEC package into the health system at PHC level in Nigeria, to allow policy makers and planners to make informed decisions about how the health system needs to be strengthened to deliver PEC [17]. Governance, financing and human resources for health (HRH) have been identified as key components for the successful implementation of health interventions [18]. This paper reports the findings of a mixed methods study of PHC facilities in Nigeria, highlighting the workforce and governance capacities to deliver PEC. Findings on equipment, service delivery and management information systems are reported in a companion paper.

Methods

Snowdon describes many components of feasibility which include cultural, financial, technical and legal feasibility [19]. In this paper, we report some of the findings of a study to assess the technical feasibility of integrating eye care into PHC. The full protocol has been described elsewhere [20]. Based on Gericke's technical feasibility framework, [21] the initial step was to develop a technical feasibility framework and then a technical capacity framework for PEC in sub-Saharan Africa, [22] from which tools were developed to assess the capacity of PHCs in Anambra state to deliver the intervention. Methods included a desk review, a facility survey, and semi structured interviews with relevant health workers.

Desk review

A desk review of relevant Nigerian national PHC policy and national health policy documents was undertaken to assess the extent to which policies are in place to support the technical capacities required to implement the WHO AFRO PEC package (Additional File 2). These documents were obtained from the Federal Ministry of Health, the

Fig. 1 Map of Nigeria showing Anambra state

Primary Health Care Systems Development Department of the NPHCDA and the National Eye Health Strategic Team. Data of relevance to governance and the health workforce for the facility-based management component of the PEC package were mapped onto the WHO's health systems framework [23].

Facility survey

Study area

The study area chosen was Anambra state in southeast Nigeria, (Fig. 1) which has a population of 5.53 million [24]. There are 21 districts, which are classified by the government as rural, semi urban and urban, although there is some overlap. There are two tertiary hospitals, 35 secondary hospitals, and 347 PHC facilities comprising 235 health centres and 112 health posts (a ratio of 2:1). Anambra state was selected because it is one of the states in Nigeria that is yet to implement PEC [25].

Sampling PHC facilities

PHC facilities were selected using a two-stage stratified random sampling method to ensure representation by location and type of facility. In step one, six districts were selected randomly from a sampling frame of districts stratified by location so that two rural, three semi-urban and one urban district were selected. In step two, a list of all the PHC facilities in each selected district, stratified by type, was obtained from the National Primary Health Care Development Agency (NPHCDA). Forty-eight health facilities were proportionately selected i.e., more PHC facilities were randomly selected in districts with a larger number of facilities, maintaining the 2:1 ratio of health centres to health posts. Hence 33 health centres and 15 health posts were selected.

Data collection tools were designed based on two frameworks (one for health promotion, the other for facility-based care) developed using a Delphi exercise to assess the technical complexity of the different elements

of PEC and the capacities needed for implementation [26]. Study tools included: 1. two observational checklists to assess the resources available, one for heads of facilities (CHOs, NMWs, or (J)CHEWs) and one for (J)CHEWs; 2. two structured questionnaires; one for each head of facility and one for a (J)CHEW/facility, and 3. topic guides for semi-structured interviews with selected heads of facilities and supervisors in each district. Based on a preliminary analysis of facility survey data, nine facilities were purposively selected (six health centres, three health posts) to represent high and low performing facilities in terms of workforce, supervision, available infrastructure, and patient visits /1000 population/year. In these facilities, facility heads were interviewed. The purpose of the interviews was to explore participants' perspectives on the opportunities and challenges for delivering PEC in their facilities/districts.

The study team comprised the principal investigator (AA) and two research assistants from the Department of Ophthalmology, University of Nigeria: a recently qualified fellow in ophthalmology and an administrative officer. The principal investigator trained the team for two days on the study protocol, facility survey methodology, participant recruitment, data collection and ethical procedures. The principal investigator administered the checklists and structured questionnaires to facility heads and interviewed the supervisors and facility heads.

Data management

Quantitative data were entered by the principal investigator into databases created in Microsoft Access® for each questionnaire and checklist. Data were transferred to STATA V.15.1 (Statcorp, Texas) for analysis using STATransfer. Data were benchmarked against published norms, when available, such as the minimum number of each cadre of staff in health centres and health posts [16]. Simple descriptive analyses were performed e.g., the proportion of facilities visited with tools for referrals.

All interviews were conducted in English in the interviewee's office in the presence of a trained note-taker. The interviews were recorded with an MP3 player after permission was granted. Interview methods and measures to ensure confidentiality are described in detail in a protocol paper [20].

The recordings were transcribed verbatim by AA and checked for accuracy by simultaneously reading the transcripts and playing back the audio recordings. The transcripts were read several times for familiarization with the content, and then coded using the WHO's health system building blocks as the framework for analysis [26]. (Additional File 3). Framework analysis was used to obtain a descriptive overview of the data [27]. Initial coding of the transcripts was undertaken by AA using (Open Code Software V. 4.02) which was discussed with CG and HB. A matrix was developed to chart the data using the WHO Health systems building blocks in columns and the individual participant's responses in rows [27]. To interpret the data, associations and comparisons were made within and between participants to generate themes.

Ethics Ethical approval was obtained from the ethics review boards of the Federal Ministry of Health, Nigeria, the University of Nigeria Teaching Hospital, and the London School of Hygiene & Tropical Medicine. Permission was obtained to collect data from the State Ministry of Health and district departments of health. All participants gave written informed consent including to take photographs, [28] record interviews and use anonymous quotes where appropriate. Each participant was given a unique code to maintain confidentiality.

Results

Study sites

The health centres and health posts were selected from rural, semi- urban and rural districts in Anambra state (Table 1).

Table 1 Number of primary health facilities per districts selected for the study by probability proportionate to size

District location	Total health centres	Number selected	Total health posts	Number selected	Total selected
Rural	6	4	11	5	9
Rural	10	7	4	1	8
Semi-urban	11	6	2	1	7
Semi-urban	4	2	5	2	4
Semi-urban	5	3	7	3	6
Urban	20	11	5	3	14
Total	**56**	**33**	**34**	**15**	**48**

Facility survey and interviews

Thirty three of the 48 PHC facilities visited were health centres and 15 were health posts. All facility heads were female, and their ages ranged from 37 to 63 years (mean 48.8 years). The average number of years spent as head of facility was 7 (range 1–22) years and 69% lived in the local community. Interviews were held with a range of staff, from community health extension workers to medical doctors (Table 2).

Human resources for health

Number of staff in the facilities

Health centres None of the health centres met the approved norms for clinical staffing. The mean number of nurse/midwives per health centre was 1.1 (range 1–3), whereas the normative standard is 4 (Table 3). Over three quarters (27/33, 82%) of health centres had less than 20% of the total number of community health workers recommended, five had 30–60% of the total number of staff recommended and one had 90%.

Health posts Some health posts were inappropriately staffed with nurse midwives or had up to four times the required number of community health workers (Table 3). 47% of health posts had the full complement of the clinical staff required, and 53% had more staff than recommended.

Shortage of staff in health centres was acknowledged by two supervisors, who said the following:

> *You see, ... in all of the 34 health facilities [in the district] we have six nurses..... Six nurses! SUP/3.*

> *None here has the full complement. In short, some of my so-called primary health centres have only one*

Table 2 Code numbers and characteristics of health workers interviewed

Identification code	Age group (years)	Sex	Qualification	Facility type	Location
Heads of facility (HoF)					
HoF/HP/U/1	51–60	Female	Com. Health Extension Worker	Health Post	Urban
HoF/PHC/U/2	31–40	Female	Nurse midwife	Health Centre	Urban
HoF/PHC/U/3	31–40	Female	Community Health Officer	Health Centre	Urban
HoF/PHC/SU/4	51–60	Female	Nurse midwife	Health Centre	Semi urban
HoF/PHC/R/8	31–40	Female	Community Health Officers	Health Centre	Rural
HoF/HP/R/7	31–40	Female	Com. Health Extension Worker	Health Post	Rural
HoF/HP/SU/6	41–50	Female	Community Health Officers	Health Post	Semi urban
HoF/PHC/SU/5	41–50	Female	Nurse midwife	Health Centre	Semi urban
HoF/PHC/R/9	51–60	Female	Nurse midwife	Health Centre	Rural
Supervisors for health (SUP)					
SUP/1	51–60	Male	Medical Doctor	*see below	
SUP/2	51–60	Female	Community Health Officers		
SUP/3	51–60	Male	Medical Doctor		
SUP/4	51–60	Male	Medical Doctor		
SUP/5	51–60	Female	Community Health Officers		
SUP/6	51–60	Male	Medical Doctor		

*The location of supervisors for health have been anonymised to protect their identity

Table 3 Staffing norms and number and cadre of clinical staff employed in health centres and health posts

	Health centres ($n = 33$)			Health posts ($n = 15$)			Total ($N = 48$)
	*Norm	Mean (range) of available staff	% meeting norms	*Norm	Mean (range) of available staff	% meeting norms	% meeting norms
Doctors	1	0.24 (0–1)	24%	0	**NA	*NA	24%
Nurse midwives	4	1.1 (0–3)	0%	0	0.07 (0–1)	*NA	*NA
(J)CHEW / CHO	10	1.9 (0–9)	0%	1	1.6 (0–4)	93.7%	29%

*Norm = This represents the normative standards for both health centres and health posts in Nigeria [16]

**NA = not applicable as health posts are not required to be staffed by doctors or nurse midwives

member of staff. SUP/6.

The maldistribution of human resources affected the workload, as staff in health posts appeared to be underutilised, as expressed by the head of a health post:

Well, I would say that the work here is, let me tell the truth…it [the work] is not much, you understand. HoF/HP/U/1.

However, health centre staff felt overworked, as a comment by a head of a health centre shows:

We are already overloaded with work. HoF/PHC/U/2.

The staff shortages leading to staff being overworked was also noted by the supervisors:

Sometimes, things don't go the way we like, but we cannot blame the health workers because they are handicapped in terms of manpower….to cope with the workload, most of them [heads of facility] employ volunteers. SUP/2.

It [the workload] is heavy ….the staff work long hours…..we hope that the government will one day recruit more staff. SUP/3.

You have some facilities that have too much work and some that are not doing anything. It depends on many things. Some facilities are sited where the community cannot reach it. SUP/5.

An unexpected finding was that there was an almost equal number of volunteers and ad hoc staff working in the study facilities as formally employed PHC staff. Volunteers are either trained community health workers or informally trained health attendants who are not officially employed. Ad hoc workers, who are graduates in a medically related topic, are employed by the federal government on a temporary basis (1–2 years) and are paid the national minimum wage. Volunteers and ad hoc workers comprised 48.4% of those working in the facilities (Table 4).

Heads of facility generally used volunteers to compensate for the lack of formally employed staff:

Hmm….my workload is very hectic. But I have voluntary [a volunteer]. HoF/PHC/U/3.

You have seen it, I am the only person here, so I looked for someone to help me…. I have a volunteer. HoF/PHC/SU/4.

Concerning the scope of work performed by the ad hoc workers, a head of facility said:

It depends on their field and their training. We have a nurse who helps us to work and a microbiologist who does some statistics for us. HoF/PHC/U/2.

The use of volunteers to overcome the critical shortage of staff appears to have been approved in principle by the local administrative authorities, but facility heads need to find money to pay them, as explained by a head of facility:

Because the WDC [ward development chairperson] was told that, because there is a lack of manpower, each facility should employ one or two volunteers, but not more than two, from which we will source out funds to pay them. So, from there we manage to give them some stipend. HoF/PHC/SU/5.

Staff turnover in the previous year Two facilities had each employed a doctor in the previous year, and one had left. Five NMWs had been employed but ten had left, and 12 CHEWs had been employed while 16 had left. Hence in the previous year, there had been a net gain of one doctor and a net loss of five NMWs and four CHEWs from the facilities in the study. It appears when new facilities open, existing staff from other facilities are redeployed. This may account for staff turnover, as recounted by a facility head:

Table 4 Health workforce in primary health centres facilities

Staff status	Staff in Health Centres		Staff in Health Posts		Total in PHC facilities	
	N	%	n	%	N	%
Employed	87	51.2	25	53.2	112	51.6
Volunteers						
(J)CHEWs	14	8.2	3	6.4	17	7.8
Health attendants	25	14.7	8	17.0	33	15.2
Ad hoc workers	44	25.9	11	23.4	55	25.4
Total	170	100.0	47	100.0	217	100.0

You know how people are employed - today they open a health post, tomorrow again they open another facility. So, if you are three, they take one and post out [to another facility], take another and post out. That is the problem I have. HoF/PHC/SU/4.

It also appears that there is also regular turnover of ad hoc staff, as suggested by another facility head:

There is a saying that goes "soldier go, soldier come". So, this one now.... she will finish by June (next month). When another batch [of adhoc staff] comes, there may be a nurse. If we request, the HOD [supervisor] will give us one. HoF/PHC/U2.

Health worker training In over 95% of facilities, there was at least one health worker who had received in-service training within the previous two years. The focus of the training was data collection and data management (78.8% of health centres and 66.7% of health posts), child health (76% of health centres and 87% of health posts), and maternal health (61% of health centres and 60% of health posts). Almost one in five (18.8%) facilities had workers who had undergone training in other areas of health, such as HIV. None had received in-service training in eye health, but 13.6% of (J)CHEWs reported having undergone pre-service training in eye care. The majority of the (J)CHEWs (93%) were willing to be trained in eye care. Staff had received no in-service training in care of the elderly and diabetes care. 60.9% of all the in-service training was supported by non-governmental organizations.

Comments by the head of a health centre suggested that staff attend several training sessions.

Everyone gets trained. We go for a lot of trainings. Even recently there were some people that went for training on HIV. Some people have gone for training in reproductive health. So, we go for many trainings. HoF/PHC/R8.

Concerning training in eye health, the head of a health post responded:

Eye? We have not gone for training in eye. HoF/HP/R7.

A comment by a head of facility suggested that volunteers also attend government funded in-service training.

You know.... training always comes in batches....so they may call for one training, we may send our volunteer to go. So that is how we are doing it, it's not always the officer in charge [that goes].... HoF/PHC/SU/5.

Informal, on the job training of volunteers by facility heads was also reported, so that these staff could become useful. One head of facility said:

So, I've been training my volunteer.....and she's picking up very fast. So, it's helpful to me, she's learning how to do it little by little. HoF/PHC/R8.

Supervision Regular supervision was conducted at least quarterly in over half of the facilities, and this was more common in health centres. However, visits by supervisors were not regular in a third of health centres and almost half of health posts. The majority (85%) of staff reported that data monitoring was the most common activity performed by supervisors during their visits (Table 5). Other supervisory activities such as teaching, observation of case management and feedback were performed less often.

The supervisors were aware of the shortcomings of their supervision when so much training was required, as one commented:

So (quarterly integrated) supportive supervision ... essentially is training people on the job. Supervision wise, I say that we are not there. SUP/4.

Another mentioned that there was an inadequate number of supervisors, and important challenges were lack of transport and the poor road infrastructure.

The most pressing challenge is that of transport.... transport. And then the personnel.... they are not enough ....it is also a problem. For instance, you'll be the only person supervising over 30 health facilities. It's not easy, so that's the big challenge..... and the terrain. You have areas that have very bad terrain.... That place when it rains, it's very slippery..... SUP/3.

Two supervisors acknowledged the major role that non-governmental organisations (NGOs) play in supervising specific activities:

For immunisation campaigns, if UNICEF sponsors, they will come and supervise it....they go to the field to see what's happening... SUP/3.

What makes it [the immunisation programme] successful is that they (supervisors) do supervision from time to time. Constant monitoring. They are always in the field, monitoring. If there is any gap in the supervision, the staff backslide. Constant monitoring

Table 5 Regulation of primary health care activities

		Health Centre		Health post		Total	
		N	%	N	%	N	%
Frequency of supervision in the previous 12 months							
Norms met	Monthly	13	41.9	5	29.4	18	54.2
	Quarterly	6	19.4	2	11.8	8	
Norms not met	Bi-annually	1	3.2	2	11.8	3	6.2
	Irregularly	11	35.5	8	47.0	19	39.6
Supervisors Activities							
Data monitoring		28	84.8	13	86.7	41	85.4
Check supply of medications		14	42.4	8	53.3	22	45.8
Check supplies of other consumables		7	21.2	3	20	10	20.3
Teaching		11	33.3	5	33.3	16	33.3
Observe case management		14	42.4	5	33.3	19	39.9
Gives feedback		16	48.5	8	53.5	24	50
***Standard Operating Procedures (SOPs)**							
Available and observed		12	36.4	7	46.7	19	39.6
Reported use of SOPs							
Norms met	Always	0	0	2	11.8	2	43.8
	Often	3	9.7	3	17.6	6	
	Sometimes	10	32.3	3	17.6	13	
Norms not met	Rarely	16	51.6	8	47.1	24	50.0
	Never	2	6.4	1	5.9	3	6.2

* SOPs are called National Standing Orders and are clinical guidelines for primary health care workers to manage patients with basic health conditions [29].

of staff - looking into what they do, then it will run well. HoF/HP/SU/6.

Commenting on the possibility of supervising PEC when it is implemented, two supervisors noted the importance of training:

The person supervising eyecare will need some training so that he or she will know what to do. SUP/1.

[For PEC] you need to train some people as supervisors…. So the supervisor will be supervising the health care people to be sure they are doing the right things. SUP/4.

Governance

Facility oversight

In the past, PHC facilities were administered at local government area (LGA) level - the third tier of governance. In 2018 administration was handed over to a state level agency, the Anambra State Primary Health Care Development Agency (ASPHCDA), the second tier of governance. Some facility heads felt that this had brought some positive changes:

Yes, there is a lot of difference…a lot of difference. Because before they [the supervisors] never entered this community. If someone was sent on supervision the person will stay at his/her post and do what they like….But now they are trying, they come here and see what the community is like. HoF/PHC/R/8.

These people are more involved in our work than before and the supervisors come more frequently, steady, steady, steady. So that is the difference, and it has made everyone to buckle up. HoF/HP/R/7.

The only thing I've seen since we changed to the agency, is work. We have more work to do, more tasks……..We don't rest since we moved to the Agency, all the time we are working…..Supervision is every week. So, what is happening is that if in the past you were coming to work twice a week, now you have to come every day. HoF/HP/SU/6.

However, supervisors have borne the brunt of the transitional period of change in governance, including a change in the financial management, as two of them explained:

Then this thing we are having….because of this movement from the LGA service commission to the ASPHCDA. So, you go there - you don't know who is in charge. That is the problem, even the staff,

the OICs [officers in charge] are having problems. Where do they pay the funds generated? Where are they going to pay this money they are supposed to be paying? SUP/1.

It's a hard thing. In fact, we are feeling it. Because the local government - if you run to them for anything, they will say, "You people are not with us anymore. You run to the Agency, they will say "We don't have money for anything now". There is nothing for us now. In fact, we are just looking. SUP/5.

Oversight for eye care Most supervisors did not know whether eye care had been included as part of PHC, as one supervisor for health commented:

Hmm.... It's not one of the components of primary health care, unless it has been recently added. SUP /2.

Clinical management guidelines Less than 40% of facilities had clinical management guidelines, also called standard operating procedures (SOPs) or standing orders, and their reported use was low (Table 5). The regular use of SOPs was significantly more common in facilities headed by CHO/(J)CHEWs (62.5%) than by NMWs (25%) It appears NMWs are not required to use SOPs to manage patients, as mentioned by a head of facility and a supervisor:

I am a trained nurse; I am not supposed to use standing orders. I don't have any need for it. I am a trained nurse who was well taught. It is the CHEWs that use the standing orders. How can a trained nurse use standing orders? HoF/PHC/SU/4.

Remember that it is CHEWs that use standing orders, not nurses. SUP/6.

However, a head of facility who is a community health worker attested to the importance she placed on the SOPs when she said:

The standing order is our Bible. It's our legal leg. So, if you do anything outside the standing order and there is problem, you'll go in for it. But if you do it according to the standing order, it is your legal backing..... I encourage my staff to always use it. HoF/PHC/U/3.

Policy findings (Additional File 2) The National Health Policy 2016 emphasises that PHC is the focus of national health development. Recently, NPHCDA developed a PHC policy which devolves the administration of PHC to the states, who have administrative and financial autonomy [30].

In 2016, the NPHCDA developed a minimum health care package for PHC and included eye health under the non-communicable diseases (NCD) umbrella, [31] while eye health was only included in any Nigeria National Strategic Health Development Plans in 2018. However, one of the objectives of the recent Plan II (2018–2022) is to eliminate avoidable blindness and reduce the prevalence of visually impairing conditions [32]. Key strategies and activities to implement this include integrating eye care services into existing national health programmes, and building capacity for eye care delivery at all levels, including the primary level. Similarly, the National Health Policy 2016 recently included eye care in its priority public health interventions, with an initiative to integrate eye care services into the existing national health programs [33]. To improve coordination of eye care services in the country, the establishment of a functional unit for eye health at the Federal and State Ministries of Health is planned [32]. However, eye health is not included in the policy document, National Guidelines for the Development of Primary Health Care System in Nigeria, developed by the NPHCDA, (the central decision making body for PHC), which lists ten components of PHC such as maternal and child, oral and mental health [34].

Policy for human resources for health The Federal Ministry of Health and its parastatals have developed several policies on human resources for health of relevance to PHC. (Additional File 2). For example, one of the goals of the National Health Policy (2016) is to provide appropriate and adequate human resources for healthcare at all levels of the health system, [33] including PHC. Another government policy stipulates that there should be a minimum number, mix and skill sets in each facility type, and that cadres of workers should be matched to services based on their competencies [16]. A further policy document indicates that the PHC management team should develop a sustainable system for human resources for health advancement and capacity building [31].

The National Health Act (2014) provides a sustainable funding policy for human resources at PHC level. It mandates the development and implementation of a Basic Health Care Provision Fund with 10% of the fund dedicated to the development of human resources for

PHC [35]. The in-service training of PHC workers is the responsibility of State Ministries of Health [31].

For PEC, the National Eye Health Strategic Plan (2014–2019) recommends in-service training in eye care for PHC staff through workshops and seminars on the identification and management of some basic eye care conditions [36].

Policy for governance Standing orders (PHC management guidelines for clinical care) are compulsory for (J) CHEW/CHOs and it is advisable that nurses/midwives, doctors, dentists and dental assistants working in PHC use them [34].

Discussion

The main objective of this study was to assess the technical capacities of PHC facilities to deliver the WHO AFRO PEC package, in order to identify capacity gaps that would need to be addressed. This paper reports the findings in relation to human resources and governance and is the first study to assess the capacity of PHC facilities against a PEC benchmark and highlights the gaps that would need to be addressed to effectively deliver PEC.

The main findings were a critical shortages of trained health workers, which has in part been met by volunteers and ad hoc staff, inadequate supervision in terms of the frequency and activities, the low use of SOPs in the majority of facilities, and a lack of a clear policy for PEC.

In our study, there was a maldistribution of staff which affected the workload. More than half of the health posts were overstaffed, while none of the health centres met NPHCDA normative standards for staffing. To compensate for workforce shortages, PHC facility heads engage paid volunteers. The volunteers include trained (J) CHEWs who had not been formally employed and informally trained health attendants. There is no government policy to support this, hence they are not on the government's payroll, but are paid a stipend from facility earnings. A considerable number of ad hoc workers were also working in facilities. They are university graduates, with or without relevant healthcare qualifications, who are paid to do community service for two years to reduce graduate unemployment and address deficiencies in public services (the N-power scheme) [37]. Our findings on the use of volunteers are similar to those in PHCs in Akwa Ibom state in South-south zone of Nigeria where 17.4% of the clinical staff were trained CHEWs who were informally employed as volunteers [38]. A challenge of relying on volunteers with basic training is that it is associated with dysfunctional health systems [39]. However, the use of volunteers may be a cause or a consequence of dysfunctionality. The untrained PHC worker situation is similar to that in Malawi where a significant proportion of the PHC workforce were unofficial health attendants [40]. This will pose a challenge for the delivery of PEC as the WHO AFRO PEC curriculum is specifically intended for trained medical personnel. Hence, delivering PEC in inappropriately staffed health facilities is likely to have grave implications for the quality of the services provided.

Low staffing levels are likely in part to be due to attrition of staff, as more had recently left facilities than had been recruited. An explanation given for this was that the Federal Government of Nigeria is revitalising PHC, and rather than employing new staff, existing staff are being redeployed to newly commissioned facilities, further worsening the health workforce situation. The absence of a national policy on staff transfers and postings in the PHC system in Nigeria [41] may have led to the unregulated transfer of PHC staff. A shortage of staff has also been reported in other countries, and it has been estimated that PHCs in sub-Saharan Africa only have 10% of the recommended number of PHC workers [42]. The Nigerian government urgently needs to implement policies for sustainable solutions to address the health workforce shortage [39]. It is anticipated that the new governance structure of PHC systems will lead to state governments taking responsibility for the recruitment of an appropriate number of trained staff.

The in-service training of PHC staff in study facilities focused on maternal and child health, with no training on eye care, diabetes and the elderly. These are gaps that needs to be addressed as the prevalence of eye disease increases with age, and up to 10% of people with diabetes have sight threatening retinopathy [43]. In addition, the low number of trained staff means that in-service training in the WHO AFRO PEC package would not give good coverage and would put additional strain on existing staff. Another factor to consider is that in-service training usually depends on additional funding, often from non-government sources, as identified in this study, which can result in episodic training when funding is available. In addition, our study found that volunteers as well as formally employed staff were trained, which suggests that PEC services may not be sustainable.

In Nigeria, PHC facilities should be supervised at least quarterly [34] but this requirement was met by only half of the facilities in this study during the previous year. This finding needs to be seen in the context of a recent change in the agencies responsible for PHC, and our study suggests that supervision has improved since the change was made. Reviews have been mixed on the benefits of supervision in PHC facilities in terms of the quality care [44] [45]. A cluster RCT on enhanced supervision of PEC in

three East African countries revealed that facilities with enhanced supervision were more likely to have functioning torches and visual acuity charts, and staff were able to measure visual acuity better than their routinely supervised counterparts. However, there was no difference between the two groups in the ability of staff to identify and manage common eye conditions [46]. This suggests that supervision of PEC may not significantly impact the management outcomes of PEC unless case management is also supervised. In this study there is anecdotal evidence that regular and more frequent supervision of PHC facilities is one of the benefits of the new governance structure (i.e., transition from district level to ASPHCDA). However, the transition has presented some challenges and supervisors appear to be caught in the middle. Implementers of policies should adopt appropriate strategies to ensure a more collaborative change management process to successfully implement any reforms [47]. In addition, we suggest that more research on the impact of supervision of PEC will be needed.

We found that supervision in Anambra state focused on data monitoring, and there is need to include problem solving, feedback and mentoring. Indeed, recent studies have suggested broad strategies to improve supervision outcomes which include changing supervisory practices to create a more supportive environment for primary care providers [48]. Our study suggests that supervisors will also need to be trained in PEC to provide effective supportive supervision, which is one of the technical capacity requirements for the delivery of PEC [22].

National Standing Orders / SOPs are clinical guidelines for primary health care workers to manage patients with basic health conditions [29]. PHC guidelines also advise that NMWs and doctors use SOPs to maintain uniformity of practices at PHC level [34]. However, our study suggests that NMWs may be unlikely to use SOPs for eye care as less than half of the facilities used SOPs, a finding which was more common in facilities headed by a NMW. A plausible explanation for this is that the use of SOPs are not part of their training, unlike the training of (J)CHEWs and CHOs [49]. This has implications for the delivery of the WHO AFRO PEC package, which is driven by clinical algorithms and depends on SOPs. Staff who are trained to use algorithms in clinical practice will be best suited to deliver the package i.e., (J)CHEWs and CHOs. However, the availability of SOPs is not synonymous with their use, as demonstrated in our study and in others in the region [50]. For example, the WHO's Integrated Management of Childhood Illness (IMCI) is another algorithm driven intervention. However, health workers in PHC facilities in Tanzania rarely adhered to IMCI guidelines when managing critically ill children [51]. Nevertheless, our study shows that PHC facilities headed by (J)CHEWs and CHOs are more likely to have and use SOPs. Interventions to increase adherence to SOPs will be needed when the PEC package is introduced.

Implications for policy

Clear policies exist for sustainable human resource development and adequate staffing for PHC in Nigeria, but these policies are not being fully implemented. If implemented, these policies will deepen the capacity of PHC facilities to deliver crucial health interventions, including PEC. However, there is no PHC policy on staff deployment to regulate the indiscriminate transfer of staff.

Overall, there appear to be enabling policies for PEC in Nigeria, but these are scattered across general policies for eye health and other PHC policies. There is need for a unified PEC policy, like mental health and oral health in Nigeria which have specific policies at PHC level [34]. The lack of a defined policy for PEC may affect the development and sustained implementation of PEC in Nigeria, as government support is essential [8, 25]. For example, a report from South Africa suggests that the absence of an integrated policy for eye health promotion may be responsible for limited promotion activities [52]. In contrast, the integration of mental health into PHC in Ethiopia had policy backing, with very high-level government support [53]. Securing government support and appropriate resources for eye health in LMICs will require strong stakeholder engagement at political and economic levels in ministries of health.

The national eye plan recommends in-service training in PEC for PHC workers.

However, a more sustainable solution which would give greater coverage and quality of PEC services would be to include the WHO AFRO PEC package in the pre-service training of all relevant PHC workers, possibly as a component of non-communicable diseases training or care of the elderly. This has been successfully implemented in Rwanda, leading to a regular supply of PEC trained nurses [54].

Nigeria needs a coherent government policy for PEC which will frame eye health in the context of PHC systems, while aligning with other PHC and eye health policies. Such a policy should address pre-service training, the use of clinical guidelines and adequate supervision. High level advocacy will be needed to implement existing PHC human resource policies and address retention using context specific strategies [55].

A strength of this study is that the technical feasibility assessment was based on tools derived from a technical feasibility framework validated by PEC experts in sub-Saharan Africa [22]. We expect that the tools will be applicable to other African countries with similar settings as Nigeria. This was a mixed methods study which

provided broad insights into the problems encountered in the health sector, including gaps and inconsistencies in relevant policies [56]. The triangulation of data from multiple sources i.e., policy documents, observational checklists, in-depth interviews and structured questionnaires provided a deeper understanding, from multiple perspectives, of the challenges and opportunities of delivering PEC in PHCs. This study is timely as the World Report on Vision has recently recommended delivering eye care services at PHC as a component of integrated people-centred eye care, [9] which is endorsed by the Lancet Commission on Global Eye Health [2].

A limitation of the study is that it was not adequately powered to detect statistically significant differences between health centres and health posts. Another limitation of the study is that financial, legal and political feasibility, as described by Snowden [19], were not included in this study which focussed on technical feasibility [21].

Conclusions

Our study highlights health workforce, governance and policy gaps that will need to be addressed to deliver PEC in Nigeria. Developing and implementing a specific policy for PEC is recommended and the implementation of existing human resource policies may help address health workforce shortages.

Addressing the gaps highlighted in our study may result in the more effective delivery of PEC, but further research will be needed to assess the impact of an appropriately trained and supported eye health workforce on PEC and ultimately whether PEC delivery can reduce the prevalence of blindness in sub-Saharan Africa.

Abbreviations

AFRO: African Region; ASPHCDA: Anambra State Primary Health Care Development Agency; CHEW: Community Health Extension Worker; CHO: Community Health Officer; IAPB: International Agency for the Prevention of Blindness; IMCI: Integrated Management of Childhood Illnesses; JCHEW: Junior Community Health Worker; LMICs: Lower Middle-Income Countries; NCD: Non-Communicable Diseases; NMW: Nurse Midwife; NPHCDA: National Primary Health Care Development Agency; PEC: Primary Eye Care; PHC: Primary Health Care; SOP: Standard Operating Procedure also called National Standing Orders; WHO: World Health Organization.

Supplementary Information

The online version contains supplementary material available at https://doi.org/10.1186/s12913-021-07362-8.

Additional file 1.

Additional file 2.

Additional file 3.

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Authors' contributions statement.

AA and CG conceived the study. AA, CG, HB, and SH made substantial contributions to the study design. AA, CG, HB, and SH designed the study tools. AA and NO were responsible for data curation as part of the fulfilment for a research degree for AA. CG and HB supervised the work. All authors made contributions and agreed to the final draft.

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Availability of data and materials.

The dataset generated and analysed for this study are available from the corresponding author on reasonable request.

Declarations

Ethics approval and consent to participate

This study was performed in accordance with the Declaration of Helsinki and was approved by the Ethics Committees of the Federal Ministry of Health, Nigeria (NHREC Approval Number NHREC/01/01/2007–12/03/2018) and the London School of Hygiene & Tropical Medicine (LSHTM Ethics Ref: 14624). All participants gave informed written consent.

Consent for publication

Not Applicable.

Competing interests

There are no competing interests.

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Publisher's Note

Paper 4A: Policies for Primary Eyecare in Nigeria: A case study.

In this paper, we summarize the policy situation in Nigeria with respect to primary health care and eye health and highlight policy gaps that will need to be strengthened to deliver primary eyecare in Nigeria.

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Student	AGHAJI Ada Ejealor. ID No lsh 284966
Principal Supervisor	Professor Clare Gilbert
Thesis Title	Assessing the technical capacity of primary health care facilities in Anambra state to implement the World Health Organization's Primary Eyecare Package.

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Where was the work published?	Community Eye Health Journal		
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For multi-authored work, give full details of your role in the research included in the paper and in the preparation of the paper. (Attach a further sheet if necessary)	AA led the conceptualization and design of the study, collected and analyzed the data, drafted the manuscript and edited it with consideration of input from her supervisors and co-authors.

Student Signature: [redacted] **Date:** 12th March 2023

Supervisor Signature: [redacted] **Date:** 17 March 2023

Policies for primary eye health care in Nigeria: a case study

Ada Aghaji
Professor of Public Health Ophthalmology: College of Medicine, University of Nigeria, Enugu Campus, Nigeria.

Clare Gilbert
Professor of International Eye Health: International Centre for Eye Health, London School of Hygiene & Tropical Medicine, London, UK.

New primary eye health care policies have the potential to profoundly change how eye health is delivered in Nigeria, provided the gaps are addressed.

A busy antenatal clinic in a health centre provides an opportunity for eye health promotion amongst pregnant women. NIGERIA

Nigeria (population 200 million) has a high prevalence of blindness (0.78%), most of which is avoidable.[1] The government is increasing political priority for eye health through recent eye health policy statements. The first National Eye Health Policy was launched in February 2022.

We undertook a review of relevant national health policies to identify components which would support the delivery of primary eye health care (PEHC) in Nigeria. Documents were obtained from the Federal Ministry of Health, the Primary Health Care Systems Development Department of the National Primary Health Care Development Agency, and the National Eye Health Strategy team. The policies have several elements of relevance to PEHC (see panel).

Integrating eye care into primary health care

The National Health Policy (2016) advocates integrating eye care services into existing national health programmes, including PHC, while the National Eye Health Strategic Plan recommends developing a policy to support integrating eye care into PHC.

In addition, a priority area of the National Eye Health Policy is to provide access to equitable eye care, including at the primary level. These supportive policies suggest political priority for integrating eye care into PHC in Nigeria.

Health work force funding and training at PHC

The Federal Ministry of Health and its parastatals which deliver PHC have policies on human resources for health at PHC level. For example, the National Health Act (2014) states that 10% of national health funding for basic health care should be for training PHC staff.

PHC policies on staffing indicate that the PHC management team should develop a sustainable system for ongoing capacity building of PHC staff. In addition, it is recommended that there should be

National policies in Nigeria that support the delivery of eye care in primary health care (highlights)

National Eye Health Strategic Plan (2014–2019)
- A policy should be developed that includes eye care as an integral part of Primary Health Care (PHC).
- Workers in primary health facilities should undergo training in eye care to identify and manage basic eye conditions.

NPHCDA Minimum standards for PHC in Nigeria (2015)
- Chloramphenicol eye drops and ointment, and chlortetracycline ointment, should be available at health centres
- Snellen charts and pen torches should be provided at primary health care centres.

National Primary Health Care Development Agency: Integrating PHC Governance in Nigeria: PHC under one roof (2016)
- Primary eye care should be provided to reduce preventable blindness in Nigeria

National Health Policy (2016)
- Eye care should be integrated into existing national health programmes

National Strategic Health Development Plan (2018–2022)
- Eye care should be included as part of the key non-communicable diseases at primary level
- The package for newborn health should include erythromycin ointment for ocular prophylaxis at all levels

National Eye Health Policy (2019)
- Primary health care workers should be trained to provide appropriate eye health services
- Referral forms and registers for eye health should be available across primary and secondary health facilities

a minimum number, mix and skill set in each type of PHC facility, and that cadres of workers should deliver services according to their competencies. If the government fully implements these policies, sustainable funding will be available to build capacity of PHC workers who are skilled to deliver a mix of health services, for maternal and child health, mental health, oral health, and eye health, for example.

In-service versus pre-service training for eye care

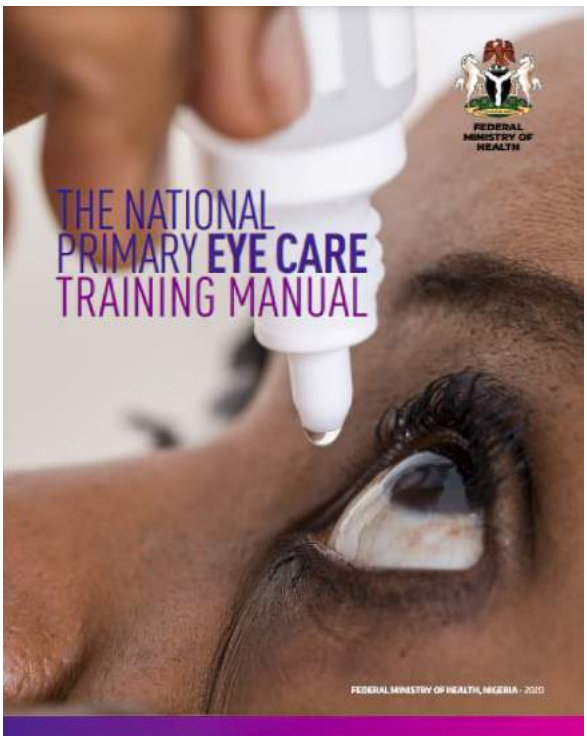
The policies for human resources at PHC level focus on in-service training. Even the Nigeria National Eye Health Strategic Plan recommends in-service training in eye care for PHC workers. It has been suggested that a more effective approach would be to include eye care in the pre-service training of all relevant PHC workers (doctors, nurses, midwives and community health extension workers), possibly as a component of non-communicable diseases training or care of the elderly.[2] Pre-service training is likely to be less costly than in-service training, and would highlight that eye care is a key component of PHC workers' role, and not an added responsibility. Refresher in-service training can then be conducted as required. The pre-service training option, which has been successfully implemented for all ages in Rwanda and for children in Bangladesh, would ensure a regular supply of trained staff members, and provide greater coverage and higher quality of care.

Eye care in health information systems

Currently, the PHC information system does not collect data on eye conditions, as they are not listed as one of the indicators at primary level.[3] It is expected that the new national eye health policy will address this. Eye health data would be a valuable way of recording and reporting eye health needs in the community, for context-specific planning to appropriately address local eye health needs.

Policy gaps

Despite the numerous supporting policies for primary eye health care , some policy statements are not consistent across documents. For example, the National Eye Health Policy states that the government will promote quality eye health services at primary, secondary and tertiary levels. However, the National Guidelines for the Development of PHC Systems in Nigeria does not include eye health as a component of PHC, but oral health and mental health are included. Nevertheless, the policy for minimum standards in PHC recommends the provision of basic eye equipment and medication at PHC level. In another example, the national newborn policy recommends the use of topical erythromycin antibiotics to prevent neonatal conjunctivitis, but it is not listed in the essential drugs list for PHC facilities.[2] This lack of consistency between policies will need to be addressed by policy makers in the ministry of health and relevant health agencies.



The WHO AFRO primary eye care manual has been adapted for Nigeria by the Ministry of Health. NIGERIA

Although primary eye health care in Nigeria has several supportive policies, they are scattered across different policies for PHC, general health and eye health. A clear government policy for primary eye health care as an integral component of PHC which is aligned with other PHC and eye health policies has been recommended.[2]

Primary eye health care is in its infancy in Nigeria and there is insufficient evidence to indicate what works well and what does not. Nevertheless, if a specific primary eye health care policy were to be developed and implemented, it has the potential to revolutionise how eye care is delivered. Ideally, the policy would cover the following:

- Eye health promotion
- Human resource development, deployment, and retention
- The scope of eye care delivered at primary level
- The provision of appropriate drugs and consumables
- The inclusion of eye conditions in national health information systems and referral mechanisms.

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2 Aghaji A, Burchett HED, Oguego N, Hameed S, Gilbert C. Human resource and governance challenges in the delivery of primary eye care: a mixed methods feasibility study in Nigeria. BMC Health Serv Res. 2021;21(1):1321.

3 Aghaji A, Burchett HED, Oguego N, Hameed S, Gilbert C. Primary health care facility readiness to implement primary eye care in Nigeria: equipment, infrastructure, service delivery and health management information systems. BMC Health Serv Res. 2021;21(1):1360.

Paper 5: Primary health care facility readiness to implement primary eye care in Nigeria: equipment, infrastructure, service delivery and health management information systems.

In this paper, we present our findings with respect to equipment, infrastructure, service delivery and health management information systems in primary health facilities in Anambra state and discuss what this means for the delivery of primary eye care.

A private optician filling in the gap at a health post in Anambra state

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SECTION A – Student Details

Student	AGHAJI Ada Ejealor. ID No lsh 284966
Principal Supervisor	Professor Clare Gilbert
Thesis Title	Assessing the technical capacity of primary health care facilities in Anambra state to implement the World Health Organization's Primary Eyecare Package

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SECTION D – Multi-authored work

For multi-authored work, give full details of your role in the research included in the paper and in the preparation of the paper. (Attach a further sheet if necessary)	AA led the conception and design of the study, collected and analyzed the data, drafted and edited the manuscript with consideration of input from her supervisors and co authors.

Student Signature: [redacted] **Date:** 12th March 2023

Supervisor Signature: [redacted] **Date:** 17 March 2023

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RESEARCH

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Primary health care facility readiness to implement primary eye care in Nigeria: equipment, infrastructure, service delivery and health management information systems

Ada Aghaji[1,2*], Helen E. D. Burchett[3], Ngozi Oguego[4], Shaffa Hameed[2] and Clare Gilbert[2]

Abstract

Background: Over two-thirds of Africans have no access to eye care services. To increase access, the World Health Organization (WHO) recommends integrating eye care into primary health care, and the WHO Africa region recently developed a package for primary eye care. However, there are limited data on the capacities needed for delivery, to guide policymakers and implementers on the feasibility of integration. The overall purpose of this study was to assess the technical capacity of the health system at primary level to deliver the WHO primary eye care package. Findings with respect to service delivery, equipment and health management information systems (HMIS) are presented in this paper.

Methods: This was a mixed-methods, cross sectional feasibility study in Anambra State, Nigeria. Methods included a desk review of relevant Nigerian policies; a survey of 48 primary health facilities in six districts randomly selected using two stage sampling, and semi-structured interviews with six supervisors and nine purposively selected facility heads. Quantitative study tools included observational checklists and questionnaires. Survey data were analysed descriptively using STATA V.15.1 (Statcorp, Texas). Differences between health centres and health posts were analysed using the z-test statistic. Interview data were analysed using thematic analysis assisted by Open Code Software V.4.02.

Results: There are enabling national health policies for eye care, but no policy specifically for primary eye care. 85% of facilities had no medication for eye conditions and one in eight had no vitamin A in stock. Eyecare was available in < 10% of the facilities. The services delivered focussed on maternal and child health, with low attendance by adults aged over 50 years with over 50% of facilities reporting ≤10 attendances per year per 1000 catchment population. No facility reported data on patients with eye conditions in their patient registers.

Conclusion: A policy for primary eye care is needed which aligns with existing eye health policies. There are currently substantial capacity gaps in service delivery, equipment and data management which will need to be addressed if eye care is to be successfully integrated into primary care in Nigeria.

Keywords: Primary eye care, Nigeria, Service delivery, Equipment, HMIS

Background

In sub-Saharan Africa (SSA) an estimated 21.5 million adults are blind or visually impaired, 80% from avoidable causes. Uncorrected refractive error accounts for almost half of this visual loss and cataract for another third. In

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addition, over 100 million Africans have uncorrected presbyopia (the age related decline in near vision) which can easily be treated with spectacles [1]. In Africa, at least 40% of blindness in children is avoidable being due to corneal blindness from preventable conditions such as vitamin A deficiency, measles infection and neonatal conjunctivitis, or treatable conditions such as cataract [2].

Access to appropriate health care in SSA is challenging, and the Healthcare Access and Quality Index (HAQ), a measure of personal healthcare access and quality (range 0–100), is estimated to be only 19.6 in Africa compared with 54.4 globally [3]. Furthermore, the majority (approximately 70%) of people in Africa do not have access to eye care [4] as most eye care services are in secondary and tertiary facilities in urban areas [5], reducing access by rural populations. This is significant because inequitable access to eye health services is responsible for the majority of blindness and visual impairment [6]. Primary health care (PHC) services, on the other hand, are widely accessible to the majority of the population in urban and rural areas, and the World Health Organization's (WHO) Global Action Plan (WHO GAP) 2014–2019 recommends that eye care becomes an integral component of PHC and health systems development [7]. The recent WHO World Report on Vision also recommends primary health care systems as the vehicle to deliver "integrated people-centred eye care." [8].

In Nigeria, about 4.25 million people are blind or visually impaired and over 84% of the causes of vision loss could have been prevented or treated [9, 10]. Access to eye care is a major reason why people remain blind in Nigeria [11]. We anticipate that integrating eye care into PHC in Nigeria would increase access to eye care services. Primary level facilities in Nigeria consist of health centres and health posts. Health centres are larger, better equipped 24-h facilities that manage deliveries, while health posts are less well equipped and staffed and are only open for fixed hours during the day. Health centres are staffed by nurse/midwives (NMWs), community health workers (community health officers (CHO), community health extension workers (CHEW), junior community health extension workers ((J)CHEW) and sometimes doctors. Each health post is manned by a (J) CHEW [12]. PHC in Nigeria is governed centrally by the National Primary Health Care Development Agency (NPHCDA) and more recently at state level by Primary Health Care Development Agencies [13].

The WHO Africa region recently launched a package of interventions to integrate eye care into PHC in SSA (the WHO AFRO PEC package) which has been pilot tested in Kenya and Rwanda [14]. However, despite growing support for integration of eye care at PHC level, there are limited data on the capacities needed for delivery, to guide policy makers and implementers on the feasibility of integration [15]. In addition, indicators for monitoring the WHO AFRO PEC package have not yet been published. However, the key eye health indicators for the Africa region (2017) include whether primary eye care (PEC) is part of PHC, the number of patient consultations for eye diseases and the number of relevant eye medications on the essential drug list [16].

Human resources for health (HRH), governance and health financing are crucial for health care delivery [17]. Health systems are composed of interconnected elements which must work together to be effective, as adjustments in one area may affect others [18]. The other elements of the health system i.e., service delivery, health management information systems, and equipment, technology, and consumables, also have a key role to play to achieve improved health outcomes. This article reports a component of a mixed methods study to determine the technical feasibility and the health system capacities required to deliver the WHO AFRO PEC package in PHC facilities in Anambra State, Nigeria.

Methods

Methods leading up to the facility survey included a literature review to identify a relevant theoretical feasibility framework, a literature review of PEC in sub-Saharan Africa, a Delphi exercise to finalize statements on the technical feasibility and capacities needed to deliver the PEC package, and the development of a number of study instruments based on the agreed statements [19, 20]. In this paper we report the findings of a policy document review and facility survey in relation to service delivery, health management information systems (HMIS) and equipment, technology and consumables.

Desk review of policy documents

The desk review included a range of policy documents of relevance to the delivery of PHC and eye care in Nigeria (Additional file 1). Statements on service delivery, equipment, consumables, infrastructure and the data collected for HMIS which would support the WHO AFRO PEC package were extracted and mapped onto the WHO health systems framework [21].

Study location

The PHC facility survey was conducted in Anambra state in south-eastern Nigeria which has a population of 5.53 million [22]. 75.1% of the population aged ≥6 years are literate [23] and 11.3% are poor [24]. There are two tertiary hospitals, 35 secondary hospitals, and 347 PHC facilities comprising 235 health centres and 112 health posts.

Facility survey and interviews with supervisors and facility heads

Details of how facilities were selected for the study are described in detail in a protocol paper [19]. In brief, 48 PHC facilities in six districts were selected using two stage, stratified random sampling, ensuring a proportionate mix of health centres and health posts, in rural, urban or semi urban locations.

Observational checklists were used to assess infrastructure, equipment, drugs and consumables and data recording systems, including the number of patients who attend the facility overall and by age group. Structured questionnaires were administered to facility heads (who comprised a range of different cadres) about the services provided, and referral activities and mechanisms. Nine facility heads were purposively selected for in-depth interviews based on an interim analysis to identify the highest and lowest scoring facilities in terms of patient attendances /1000 population, the health workforce and regularity of supervision. These were stratified by location (urban, rural or semi urban) and type of facility (PHC or health post). Six health centres and three health posts were selected.

Semi-structured interviews were conducted with district supervisors for health in the six selected districts. Topic guides were used to explore the challenges they encounter in delivering PHC and their views on the feasibility of delivering PEC. All interviews were conducted in English by the principal investigator (AA) and were recorded after informed consent had been obtained.

Data management

Data were recorded on paper forms and entered into separate Microsoft Access® databases for the questionnaire and checklists and were transferred into STATA V,15.1 (Statcorp, Texas) using STATransfer for analysis. Frequency tables were generated from the data. Simple descriptive analyses were performed e.g., the proportion of facilities visited with space for visual acuity assessment. Differences in quantitative variables between health posts and health centres were explored using the z-test statistic. Tests of significance were set at the 95% level. The interview recordings were transcribed verbatim, checked for accuracy and coded by AA. The WHO health systems building blocks were used as the framework for analysis after familiarisation of the data by re-reading, indexing, charting, mapping and interpretation. Open Code Software V. 4.02 was used to assist analysis.

Ethics

Ethical approval was obtained from the ethics review boards of the Federal Ministry of Health, Nigeria, the University of Nigeria Teaching Hospital and the London School of Hygiene & Tropical Medicine. Permission to collect data from the state Ministry of Health and district departments of health was obtained. All participants gave written informed consent including to audio record interviews and use of anonymous quotes where appropriate. The following steps were taken to ensure confidentiality; no names were collected for any component of the study and each facility and participant was allocated a unique code. Supervisor codes did not include the district.

Results

Policy document review

Nigeria has no specific policy for PEC. However, recent national health policies support eye care delivery at the PHC level. For example, the National Health Policy 2016 recommends building capacity for eye care services delivery at all levels, including PHC level [25].

In addition, as part of the minimum package for prevention and control of non-communicable diseases, the NPHCDA recommends the provision of primary eye care to reduce preventable blindness which contributes to increased morbidity and mortality [13].

The recent National Strategic Health Development Plan (NSHDP II) 2018–2022 includes eye care as part of the non-communicable disease package at PHC level and recommends scaling up eye care services at all levels, particularly at PHC level. The NSHDP II also recommends the assessment of the prevalence and causes of vision loss to generate more current data and track trends over time. In terms of medication, the NSHDP II recommends that Erythromycin ointment for ocular prophylaxis of the new-born be included in the package for new-born health at all level, including PHCs [26].

Chloramphenicol eye drops and ointment, and Chlortetracycline ointment are the only eye medicines on the Essential Drugs list to be available at primary health centres [27]. The NPHCDA Minimum standards for PHC in Nigeria 2015 recommends that Snellen's charts and pen torches should be available in health centres but not in health posts [12].

The National Health Act (2014), mandates the establishment of the Basic Health Care Provision Fund: of which 20% should be used for essential drugs, vaccines and consumables15% of the fund be used to provide and maintain facilities, equipment and transport for eligible PHC facilities [28]. An additional file shows the relevant sections of the policy documents in more detail. (See Additional file 1).

Sample characteristics of survey

Surveys including observational checklists were conducted in 48 facilities: 33 primary health care centres

and 15 health posts. Data were obtained from all heads of facilities. Four of the 48 (J)CHEWs were unavailable (on study or maternity leave). Interviews were conducted with nine facility heads and six district supervisors for health (Table 1).

Findings from the facility survey and interviews

Infrastructure, equipment and consumables

Over 90% of facilities had space to measure visual acuity (6 m) but less than 5% had a visual acuity chart (Table 2). Less than a third of the facilities had a functioning torch and less than half had secure (i.e., lockable) storage for medication or a functioning refrigerator. It seems that staff in facilities are responsible for repairing and, in some cases, procuring equipment, or staff charge a small fee to cover the cost of replacement, as mentioned by two facility heads:

> *But in case we don't have a sphyg [sphygmomanometer] or it gets spoilt, you have to go and buy (it) because you cannot be waiting for them until they provide a syphg which you use on a daily basis. You have to go and buy to make sure that the work continues. HoF/PHC/SU/5*

> *Here's what we do….. this sphyg that is functioning, we collect 50 Naira [£0.12] when someone comes for the services, so if it gets spoilt, we will use the N50 collected and replace it, so that when people come this service will still be available. HoF/PHC/U/2*

The majority (81.5%) of facilities were observed to have vitamin A 200,000 IU in stock but almost 30% did not have the lower dose (100,000 IU) for younger children (Table 2). Six facilities (12.5%) had no vitamin A. Over 90% of facilities had access to measles vaccine (i.e., either in stock or provided on measles immunization days) but over 85% of health centre, and 100% of health posts, lacked medication for eye conditions.

Facility heads reported that drugs are obtained from multiple sources and that staff also purchase drugs:

> *SOML (Saving One Million Lives, a federal government initiative to increase access to maternal and childcare services at PHC level) brings [the drugs], then the state, then the local government commission. When they bring [the drugs] we go and pay for them…..then we buy ours and add to them because they do not give us all the drugs we need. HoF/PHC/SU/4*

> *We used to buy our medications but recently SOML started bringing medications. There are some that the (district) supervisor brings (HoF/HP/R/7*

There may also be challenges with the quality of the drugs supplied, as explained by a facility head:

> *What upsets us is that the drugs they give us….. are inferior drugs, they bring us inferior products. They are difficult for us to dispose of. When you give it to a patient, they'll say "what kind of drug is this that*

Table 1 Sociodemographic characteristics of the interviewees

Identification code	Age group (years)	Sex	Qualification	Facility type	Location
Supervisors for health					
SUP/1	51–60	Male	Medical Doctor	[a]see below	
SUP/2	51–60	Female	Community Health Officers		
SUP/3	51–60	Male	Medical Doctor		
SUP/4	51–60	Male	Medical Doctor		
SUP/5	51–60	Female	Community Health Officers		
SUP/6	51–60	Male	Medical Doctor		
Heads of facility					
HoF/HP/U/1	51–60	Female	Com. Health Extension Worker	Health Post	Urban
HoF/PHC/U/2	31–40	Female	Nurse midwife	Health Centre	Urban
HoF/PHC/U/3	31–40	Female	Community Health Officer	Health Centre	Urban
HoF/PHC/SU/4	51–60	Female	Nurse midwife	Health Centre	Semi urban
HoF/PHC/SU/5	41–50	Female	Nurse midwife	Health Centre	Semi urban
HoF/HP/SU/6	41–50	Female	Community Health Officers	Health Post	Semi urban
HoF/HP/R/7	31–40	Female	Com. Health Extension Worker	Health Post	Rural
HoF/PHC/R/8	31–40	Female	Community Health Officers	Health Centre	Rural
HoF/PHC/R/9	51–60	Female	Nurse midwife	Health Centre	Rural

[a] Location not documented to maintain confidentiality. Facility type is not applicable here.

Table 2 Infrastructure, equipment and consumables in 48 primary health care facilities

	Health centre		Health post		Total		Difference	
	N	%	N	%	N	%	%	*p* value
Infrastructure and equipment								
Space to measure visual acuity	32	97.0	13	86.7	45	93.8	10.3	0.2
Visual acuity chart	1	3.0	1	6.7	2	4.2	NA	
Torch available	17	51.5	5	33.3	22	45.8	18.2	0.5
Torch available and functioning	11	33.3	3	20	14	29.2	13.3	0.7
Space for counselling	27	81.2	7	46.7	34	70.8	35.1	0.6
Secure drug storage	13	39.4	9	60	22	45.9	20.6	0.3
Functioning refrigerator	18	54.6	4	26.7	22	45.8	27.9	0.3
Medication of relevance to eye care								
Vitamin A 200,000 IU in stock	29	87.9	10	66.7	39	81.5	21.2	0.1
Vitamin A 100,000 IU in stock	25	75.8	10	66.7	35	72.9	0.9	0.6
No vitamin A in stock	4	12.1	2	13.3	6	12.5	1.2	1.0
Access to measles vaccine	30	90.9	14	93.3	44	91.7	0.3	0.8
Tetanus toxoid	22	66.7	4	26.7	26	54.2	40	0.1
Injectable antibiotics	28	84.9	6	40	34	70.8	44.9	0.02
Medication for eye conditions								
Antibiotic eye drops	4	12.1	0	0	4	8.3	12.1	–
Antibiotic eye ointment	5	15.2	0	0	5	10.4	15.2	–
Anti-allergy eye drops	0	0	0	0	0	0	0	–
Consumables for eye care								
Saline	21	63.6	5	33.3	26	54.2	30.3	0.2
Cotton wool	29	87.9	12	80	41	85.4	7.9	0.5
Gauze	24	73.7	6	42.8	30	63.8	29.9	0.2
Plasters	23	69.7	3	20	26	54.2	49.7	0.09
Bandages	8	24.2	2	13.3	10	20.8	10.9	0.7

looks like imitation?" But if we are going to buy the drugs ourselves, we know the best companies to go to for [drugs] that work. But here they supply us with drugs that we know nothing about and then they tell you how much you'll pay for them. HoF/HP/SU/6

A district health supervisor had a different view and explained some of the challenges they face in how drugs are managed in facilities:

There was a drug revolving fund, but we found out that some of the health workers will keep the drugs and will be selling their own drugs….. A lot of our drugs, … are good drugs, but were on the expensive side. Even among the supervisors we have discussed about that. We say, "these things are expensive." If you give them to these officers in charge [heads of facility] they will just pack them there and use their own money to buy their own. At the end of the day, they will tell you, "this thing has expired". So, you find out that when you are talking about this drug revolving fund, you really need to find out which ones the people can afford. SUP/1

Service delivery

Scope of services delivered and patient load

Overall, the mean number of patient visits per 1000 catchment population per year was similar for health centres (mean 316 ± 257) and health posts (301 ± 350) ($p = 0.9$). Antenatal care was available in over 90% of the facilities, and 97% of health centres and 26.7% of health posts provided services for deliveries (Table 3). Measles immunization was provided by all facilities and 93.8% provided vitamin A supplementation. Crede's ocular prophylaxis to prevent neonatal conjunctivitis was not delivered in any facility, and eye care services were available in less than 10% of facilities. Less than half of the facilities provided services for the elderly, and over half (52.1%) of the facilities saw $\leq$10 elderly persons/1000 catchment population in the year 2017. Blood sugar testing was available in a little over half of the facilities.

A head of facility and a supervisor realised the limitations of the scope of services they provide, which do not address the health needs of a large proportion of the population, including for eye care.

Table 3 Service delivery in primary health care facilities

	Health centre		Health post		Total		Difference	
Services provided	**N**	**%**	**N**	**%**	**N**	**%**	**%**	***P* value**
Maternal health services								
Antenatal care	33	100.0	11	73.3	44	91.7	26.7	0.002
Deliveries	32	97.0	4	26.7	36	75.0	70.3	0
Child health services								
Measles vaccination	33	100.0	15	100.0	48	100.0	0.0	
Vitamin A supplements	33	100.0	12	80.0	45	93.8	20.0	0.008
Credes prophylaxis	0	0.0	0	0.0	0	0.0	0.0	
General healthcare services								
Diabetic care	21	63.6	6	40.0	27	56.3	23.6	0.3
Elderly care	16	48.5	5	33.3	21	43.8	15.2	0.6
Eye care	3	9.1	1	6.7	4	8.3	2.4	0.9
Blood pressure measurement	33	100.0	15	100.0	48	100.0	0.0	
Providing 24-h services	29	87.9	3	20.0	32	66.7	67.9	0.004
Total patient visits per year (2017)								
≤ 1000	7	21.2	7	46.7	14	29.1	25.5	0.3
> 1000 to ≤2000	15	45.5	6	40	21	43.8	5.5	0.8
> 2000 to ≤4000	8	24.2	2	13.3	10	20.8	10.9	
> 4000	3	9.1	0	0	3	6.3	9.1	NA
Mean number of patient visits	2201 ± 1421		1136 ± 753		1745 ± 1310		1065	0.0015
Patients visits /1000 catchment population per year (2017)								
≤ 250	16	48.5	8	53.5	24	50.0	5.0	0.8
> 250- to ≤500	10	30.3	3	20.0	13	27.1	10.3	0.7
> 500	7	21.2	4	26.7	11	22.9	5.5	0.8
Mean number of patient visits	316 ± 257		301 ± 350		312 ± 283		15	0.9
Patients aged over 50 years visits /1000 catchment population year (2017)								
≤ 10	17	51.4	8	53.3	25	52.1	1.9	0.9
> 10 to ≤20	6	18.2	1	6.7	7	14.6	11.5	0.8
> 20 to ≤50	5	15.2	3	20.0	8	16.7	4.8	0.8
> 50	5	15.2	3	20.0	8	16.7	4.8	0.8
Mean number of patient visits	21 ± 27		16 ± 19		19.5 ± 25.1		5	0.47

That is the problem with the system - they always focus on children under 5, pregnant women, women of childbearing age, that is mostly their work. .....there is no place for the elderly, the handicapped - here is spacious enough that we can put it in. HoF/PHC/U/3

In fact, thinking about it, I wonder why no one thought of including it (eye care) in primary health care. SUP/6

Eye care services

Staff were asked about their ability to deliver eye care services. Although most (84.1%) were confident in their ability to identify eye conditions, less than a third were confident in their ability to manage eye conditions and two thirds (63.4%) had not referred a patient with an eye condition in the previous month. In only a few facilities was someone available to remove a foreign body from the eye (27.3%) or who could irrigate the eyes (29.5%) for chemical injuries.

An unexpected finding that emerged during interviews was that eye care is provided in some facilities by visiting eye care professionals.

Sometimes, there are people that come here to treat the eyes....they tell us they are coming..... we do an announcement, tell the community that people who will treat the eyes are coming, that's what we do. HoF/HP/R/7

Let me give you an instance. Last year in June... there was a group of people who came.... They

wanted to provide eye care services. They came from [name of town]. They wanted to provide eye care services in every facility in this district. HoF/PHC/U2

One of the supervisors who had an eye problem herself wished to consult the eye care provider but could not because there were too many people.

Like the other day they did this free medical clinic, a lot of people were asking… I went into the hall where they were seeing people that have eye problems, there were a lot of people. Myself, I wanted to see the [eye] doctor [for reading glasses], I was not able to see the [eye] doctor. HoF/PHC/R/9

Supervisors generally granted permission for eye care providers to visit facilities and deliver services as they realized the importance of eye care:

We actually need this eye health thing. It is very, very important. We don't just allow anyone to enter into the community [to provide eye care]. SUP/1

They [the eye care providers from the named town] discussed with the supervisor - he approved. They gave us letters and issued dates [for their visit]. HoF/PHC/U2

However, it is unclear whether these service providers were regulated, as it appears that medication was initially provided at no cost but after some time the providers started to charge for medication, as reported by this head of facility:

When they started initially.... they said that it was free… but later they started taking money. So, after announcing that the treatment is free and they come and start charging for medication, the patients are not happy. They were coming out in large numbers initially, but when money became involved, they stopped coming out in their numbers. Only those who had serious eye problems started coming. HoF/HP/R/7

Health service data collection

All the facilities used paper-based data collection methods. Almost all kept patient registers and about two thirds had drug inventories. Inventories for consumables were generally lacking (Table 4). On observation of patient registers, no patients with eye conditions were recorded. This finding was explained by a head of facility, which was corroborated by a supervisor:

We don't treat eyes, so we don't record them. HoF/HP/U/1

They don't record [patients with eye conditions]. They refer immediately they see [them] because there is nothing (they can do)… but before they refer, at least they must have done some primary care, like asking questions, but because it is not in their daily register, they don't record the data. SUP/5

In addition to the registers, staff are also required to collect data in disease or programme specific registers, which entails a lot of work in documenting and compiling the data for monthly reports. One head of facility said that she had employed a volunteer to help with data management as it was so time consuming.

We have general attendance registers, out-patient department register, in-patient register, delivery register, we have immunisation register, we have growth monitoring register. All those registers… as they (patients) come, we register. At the end of the month, you summarize everything in the summary booklet and then submit (to the district) ….they have to submit it to the State. HoF/PHC/U/3

Table 4 Register and inventories and referral mechanisms in health centres and health posts

	Health centre		Health post		Total		Difference	
	N	%	N	%	N	%	%	*p* value
Registers / inventories								
Patient register	32	97.0	15	100	47	97.9	3	0.5
Medication inventory	23	69.7	9	60	32	66.7	9.7	0.6
Facility activities register	22	66.7	9	60	31	64.6	6.7	0.7
Consumable inventory	2	6.1	0	0	2	4.2	6.1	–
Referral mechanisms								
Referral register	9	27.3	0	0	9	18.8	27.3	–
Referral slips	9	27.3	0	0	9	18.8	27.3	–

I've been working alone.... (I need a volunteer) to help me, even if it's just to fill the registers... so that I can manage the treatment and other things. HoF/PHC/R/8

Other facility heads described the diseases they are required to report to the district.

We submit data on antenatal care, immunisation, total number of patients that come, notifiable diseases like measles, AFP (acute flaccid paralysis) if you have any cases, cough with acid fast bacilli in sputum, tetanus in adults and neonatal tetanus. HoF/PHC/R/8

One of the supervisors thought that if the number of patients attending with eye conditions were also to be reported this would either require a separate column in the general patient register, or a separate register.

So, you create a column for each condition; so that anyone that you see on daily basis - that will be noted and at the end of the month it will be compiled because there are a lot of registers with us. It has to be inclusive; the eye column should be included in the registers so as to make easy flow of the registers. Getting separate registers should be done. But if the Ministry of Health welcomes that in a primary health care setting, it should be included. SUP/2

Most of the facilities (73%) had designated referral centres. 43% of heads of facilities confirmed that their designated referral centres had eye clinics while 28% were unsure. Less than 20% of facilities used referral slips, and it seems that health workers refer patients by word of mouth, as mentioned by two facility heads:

We don't have referral slips in this facility. HoF/PHC/U/2

We refer by [word of] mouth. HoF/PHC/U/3

Discussion

Policy gaps

Recent national policies show that there is an enabling policy environment for eye care at PHC level, but there is not a specific policy for PEC. Currently no data are collected or reported on eye conditions, as they are not one of the indicators in the HMIS at primary level. However, this study shows that when eye care is provided, patients attend in large numbers, demonstrating an unmet need. The failure to implement the policies on eye care at primary level may have multiple causes, including lack of data which demonstrates demand, the inevitable lag between policy development and implementation, and/or lack of advocacy or leadership. The development of a specific PEC policy, which brings together and adds to existing policies (e.g., for new-born care, non-communicable diseases and care of the elderly) with indicators may help to drive the delivery of eye care at PHC level. If the uptake is high, eye data will help to assess the magnitude of eye conditions and whether and how they change over time, as recommended by the National Strategic Health Development Plan 2018–2022.

A policy gap exists in the new-born policy recommendation that erythromycin antibiotics be instilled in the eyes of every new-born to prevent neonatal conjunctivitis as the current essential drugs list for PHC facilities does not include erythromycin. There is need for eye health stakeholders to advocate for the inclusion of erythromycin at PHC level in the next revision of the essential drugs list to enable implementation of this policy.

It appears that eye medications should not be stocked by health posts, as they are only included in the essential drug list for health centres. The implication is that eye care will be delivered at higher level than health posts or there could be a policy change to accommodate this.

Survey findings

The key capacity gaps in relation to delivering PEC identified in the facility survey include a dearth of eye care equipment and drugs, patients with eye conditions are not being recorded in the patient registers and that a low number of elderly persons visit PHC facilities.

Infrastructure, equipment and drugs

There was no significant difference between health centres and health posts in terms of availability of equipment, infrastructure and consumables for PEC. Visual acuity charts were not available in the majority of facilities and less than a third had functioning torches. However, the majority had space for visual acuity assessment. This is in contrast to studies in East Africa where visual acuity charts were more likely to be available in facilities where staff had undergone pre-service training in PEC, and where supervisors had also been trained in PEC [29].

Maternal and child health is one of the priority functions of PHC. Therefore, vitamin A, which plays an important role in reducing under 5 mortality and morbidity, including blindness, should always be in stock in all PHC facilities. In this study vitamin A was not available in a minority of facilities, in contrast to another study in Anambra state, where vitamin A was only available in three quarters of PHC facilities [30]. Low vitamin A supplementation coverage has been shown to be associated with corneal blindness in children in Nigeria [31]. No facilities had topical medication for allergic conjunctivitis

which is included in the WHO AFRO PEC essential drug list [32] but is not on the drug list for PHC facilities.

Antibiotic eye medications (chloramphenicol eye drops and tetracycline ointment) are included in the Essential Medications List for PHCs in Anambra State but very few facilities had these in stock. This is likely to reflect the low demand, as until recently, eye care was not included in policies at PHC level. Erythromycin ointment has recently been recommended for ocular prophylaxis in new-borns [26], but this is not included in the essential drug list for PHC facilities in Nigeria [27], which needs to be addressed. For drugs of relevance to eye care to be available in PHC facilities they need to be included in the country's essential drug list for PHC, but this is not the case in many low-income countries [33], and their inclusion will require advocacy and multilevel coordination.

In this study staff in facilities reported that the drugs provided were insufficient in quantity, came from multiple sources, were too expensive or not acceptable to patients. To address these limitations staff bought drugs themselves. While it is commendable that staff used their initiative to address this critical gap, it suggests weak regulation of drug supplies. Whether the same would happen with topical eye medication remains to be seen. Most health centres had injectable antibiotics in stock, an essential drug for health centres but not health posts [27]. Staff also reported dissatisfaction with the quality of the drugs supplied. Although it is possible that some products may have been sub-standard, there is no evidence of any quality assurance to support or refute this claim. The Bamako initiative was launched by UNICEF in 1987 to improve the quality of PHC and increase access to medications at PHC level [34]. While there are several reports on the availability or non-availability of drugs at PHC facilities, there is limited data on the quality of drugs supplied [30, 35]. Policy makers should place additional emphasis on the quality of drugs procured.

Service delivery

The majority of services provided in PHC facilities focussed on maternal and child health which was reflected in the age of those attending the services i.e., very few over the age of 50 years. This is similar to a study in Enugu, Nigeria where the focus was on immunisation, treatment of minor ailments and maternal and child health services, and where less than 7% of people using PHC services were above 47 years of age [36]. In another study in North central Nigeria, almost 40% of patients attending health centres were infants aged 0–9 months [37]. These findings present a challenge to the delivery of PEC as the prevalence of visual impairment increases with age [38]. Assuming 8% of the population are aged 50 years and above and 4% are blind or visually impaired there will be approximately 64 affected individuals of this age group in the catchment population of a health centre (20,000). In addition, there will be a far larger number of adults with presbyopia, which affects most people over the age of 50 years, as well as children and adults with other non-visually impairing conditions. In order to increase access by individuals with eye conditions of all ages once PEC is in place, particularly by adults and the elderly, extensive health promotion and demand creation may be required.

Crede's prophylaxis to prevent neonatal conjunctivitis, a documented cause of blindness in children in southeast Nigeria [39], was not practised in any facility despite an enabling policy. Strategies to instate prophylaxis could include training health workers including supervisors, educating mothers and providing appropriate medication.

An unexpected finding was that some PHCs are visited by eye care professionals according to a pre-determined schedule. These services were attended by a large number of people when medication was provided at no cost. Once costs were introduced, only those with serious eye conditions continued to attend. These findings reflect the large unmet need for eye care in the community and suggest that people with eye conditions are likely to seek care if demand is created, they have confidence in the provider, and affordable services are provided. Many staff were confident in their ability to identify people with eye conditions but due to lack of in-service training they lacked confidence in how to manage them.

Almost half the facilities did not provide blood sugar testing despite being included in the minimum package for the prevention and control of non- communicable diseases in PHC facilities in Nigeria [13]. The implications are that diabetes and diabetic retinopathy may go undetected.

Health service data collection

The majority of facilities had patient registers, but up to a third lacked inventories for medication and even fewer had an inventory for consumables. None of the facilities recorded details of patients with eye conditions in their patient registers as they could not treat them. Staff could not, therefore generate or report data on the number of eye patients seen, despite this being an indicator for eye care for the African region. Similar findings have been reported from Tanzania [40] and South Africa where less than 5% of facilities collected eye health indicators [41]. However, in Rwanda, where PEC is integrated into national policies and programmes, eye health data are collected and reported at all levels to monitor progress and identify gaps that need to be addressed in secondary and tertiary eye care [42]. The lack of data from PHC level on eye care in Nigeria will impede public health decision making for PEC, as this requires robust, timely data [43].

A challenge in collecting data on eye care in PHC facilities is that this will add to the administrative workload of PHC staff who already have to compile and report data for numerous programmes and notifiable diseases.

In this study less than a fifth of facilities had referral slips or referral registers, and referrals are made orally, as had been found in other studies [44]. The lack of organised referral systems in PHC facilities, including feedback from higher level facilities, leads to lack of continuity of patient information which is likely to compromise care, particularly for patients requiring long term management [44]. Less than half of the facility heads knew whether their designated referral centre provided eye care services and almost a third were unsure. Many eye conditions which could be detected at PHC level e.g., refractive error and cataract, need to be treated at referral centres. To facilitate referrals, PHC facilities will need to be mapped to the nearest government eye care provider.

Strengths and limitations

This is the first study to assess the technical capacity of PHC to deliver the WHO AFRO PEC package. A potential limitation of this study is that the sample of PHC facilities was not adequately powered to detect statistically significant differences between health centres and health posts, but every effort was made to make the sample as representative as possible in terms of health centre to health post ratios and the location of facilities. Another limitation is that the data collected focussed on facility level and the views of district level supervisors and did not include community perspectives or an assessment of eye care facilities for referrals, nor upward transmission of facility level data.

Conclusions

The key gaps for delivering the WHO AFRO PEC package identified in this component of the study include a dearth of equipment and drugs for eye care, the non-inclusion of patients with eye conditions in facility registers, weak referral systems and low numbers of older adults and the elderly who visit PHC facilities. Many of these issues could be addressed by modifying and implementing existing policies, sustained advocacy, and leadership, with health promotion and community mobilization to increase demand.

Further research is needed to assess the need for and acceptability of PEC for people of all ages in communities in Anambra state and to assess whether secondary and tertiary level eye care facilities have the capacity to manage referrals. The findings will complement this PHC facility survey, providing contextually relevant data and information for decision makers.

Abbreviations

AFRO: Africa region; CHO: Community health officer; GAP: Global action plan; HMIS: Health management information system; HOF: Head of facility; HP: Health post; HRH: Human resources for health; (J)CHEW: (Junior) community health worker; LSHTM: London School of Hygiene & Tropical Medicine; NHREC: National Health Research Ethics Committee; NMW: Nurse mid wife; NPHCDA: National Primary Health Development Agency; NSHDP: National Strategic Health Development Plan; PEC: Primary eye care; PHC: Primary health care; SOML: Saving one million lives; SSA: Sub Saharan Africa; SUP: Supervisor; WHO: World Health Organization.

Supplementary Information

The online version contains supplementary material available at https://doi.org/10.1186/s12913-021-07359-3.

Additional file 1. National Health Policy Documents Reviewed. Health policies that support the implementation of PEC in Nigeria with regard to service delivery, HMIS, infrastructure, equipment and consumables.

Additional file 2. Framework for semi structured interviews.

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Authors' contributions

AA and CG conceived the study. AA, CG, HB, and SH made substantial contributions to the study design. AA, CG, HB, and SH designed the study tools. AA and NO were responsible for data curation as part of the fulfilment for a research degree for AA. CG and HB supervised the work. All authors made contributions and agreed to the final draft.

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Availability of data and materials

The dataset generated and analysed for this study are available from the corresponding author on reasonable request.

Declarations

Ethics approval and consent to participate

This research was performed in accordance with the Declaration of Helsinki and was approved by the Ethics Committees of the Federal Ministry of Health, Nigeria (NHREC Approval Number NHREC/01/01/2007–12/03/2018) and the London School of Hygiene & Tropical Medicine (LSHTM Ethics Ref: 14624). All participants gave informed written consent.

Consent for publication

Not Applicable.

Competing interests

There are no competing interests.

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Publisher's Note

Paper 6: Assessing the capacity of primary health care facilities in Nigeria to deliver eye health promotion. Results of a mixed methods feasibility study.

In this paper, we present our findings with respect to health promotion in primary health facilities in Anambra state and discuss what this means for the delivery of eye health promotion in the state.

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SECTION A – Student Details

Student	AGHAJI Ada Ejealor. ID No lsh 284966
Principal Supervisor	Professor Clare Gilbert
Thesis Title	Assessing the technical capacity of primary health care facilities in Anambra state to implement the World Health Organization's Primary Eyecare Package.

If the Research Paper has previously been published please complete Section B, if not please move to Section C

SECTION B – Paper already published

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SECTION D – Multi-authored work

For multi-authored work, give full details of your role in the research included in the paper and in the preparation of the paper. (Attach a further sheet if necessary)	AA led the conceptualization and design of the study, collected and analyzed the data, drafted the manuscript and edited it with consideration of input from her supervisors and co-authors.

Student Signature: [redacted] **Date:** 12th March 2023

Supervisor Signature: [redacted] **Date:** 17 March 2023

PLOS GLOBAL PUBLIC HEALTH

RESEARCH ARTICLE

Assessing the capacity of primary health care facilities in Nigeria to deliver eye health promotion: Results of a mixed-methods feasibility study

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Abstract

Over 25 million people in sub-Saharan Africa are blind or visually impaired, the majority from avoidable causes. Health promotion and disease prevention are important strategies for eye health, through good governance, health literacy and increasing access to eye care services. To increase equity in access for eyecare services, the World Health Organization Africa Region developed a package of interventions for primary eye care, which includes health promotion. The aim of this study was to assess the capacity of the primary healthcare system to deliver health promotion for eye care in Nigeria. Mixed methods were used during a survey of 48 government-owned primary health care facilities in Anambra state, Nigeria: interviews with district health supervisors, facility staff and village health workers, and a desk review of policy documents for primary health care and eye care in Nigeria. Findings were benchmarked against the capacities needed to deliver health promotion agreed through a Delphi exercise and were analysed using the World Health Organization's health system building blocks. Eye health promotion policies exist but are fragmented across different national health policies. Health promotion activities focussed on "mobilising" community members to access care provided in facilities, particularly for women of childbearing age and young children, and health education was limited. Only one in ten facilities engaged the elderly and a fifth delivered health promotion for eye care. Health promotion activities were supervised in 43.2% of facilities and transport to remote areas was limited. A robust eye health promotion strategy needs to be included in the National Eye Health Policy. The scope of existing health promotion will need to expand to include eye conditions and different age groups. Increasing eye health literacy should be emphasized. Governance, training health workers in eye health promotion, educational materials, and transport to visit communities will also be needed.

Competing interests: The authors have declared that no competing interests exist.

Abbreviations: (J)CHEW, Junior Community Health Extension Worker / Community Health Extension Worker; HoF, Head of Facility; PEC, Primary Eye Care; PHC, Primary Health Care; SSA, Sub-Saharan Africa; VHW, Village Health Worker; WHO, World Health Organization.

Introduction

It is estimated that in sub-Saharan Africa (SSA), 25 million adults have vision loss and a further 51.6 million have uncorrected presbyopia [1]. In addition, over 400,000 children in SSA are blind [2] and twice that number are visually impaired. Over 90% of the causes of vision loss are avoidable [3] and are amenable to health promotion or can be prevented. Primary health care (PHC) activities in facilities and communities are the vehicles through which health promotion and disease prevention are typically delivered. For example, many of the causes of blindness in children are preventable, through measles immunization, ocular prophylaxis of the new-born and vitamin A supplementation, with health education to promote exclusive breast feeding and a vitamin A-rich diet. Children with treatable causes such as cataract and glaucoma, need to be detected early and referred to specialist services [4, 5]. Health promotion also has a key role to play through policies which ensure that these services are accessible, and by health education to empower mothers to make the right choices about their child's eye health. In adults, refractive error, cataract and glaucoma are the most common causes of distance visual impairment while presbyopia causes near visual impairment. Although these conditions may not be treated at PHC level, they can be detected, and individuals counselled and referred for eye care. Creating awareness about these conditions and where to seek appropriate management may encourage community members to seek treatment. Trachoma, which is endemic in rural, northern Nigeria, is the most common cause of preventable vision loss in adults and has effective strategies for control. These entail facial and environmental hygiene, mass drug administration of azithromycin, and surgery for the sight-threatening lid complications. Diabetes and diabetic retinopathy are emerging epidemics in SSA particularly in urban settings and will require significant health promotion for their control. Many of the interventions for the control of visual impairment are highly cost effective, but in SSA many people become or remain blind as they do not access services even when they are available. Commonly reported barriers are cost [6–9], cultural and social factors, lack of trust in the services [6], and lack of knowledge and awareness that many eye conditions can be prevented or treated and where treatment is available [6, 7, 9]. Health promotion activities in eye health are key to overcoming these barriers.

The fundamental role of health promotion is to "*enable people to increase control over, and to improve their own health*" [10], as stated in the Ottawa Charter for Health Promotion in 1986. Recently, the objectives of health promotion have been realigned with the United Nation's Sustainable Development Goals, in response to globalisation and climate change [11]. Although strategies for health promotion have changed over time, the basic principle remains the same. In 2016, at the Shanghai Declaration on health promotion, the World Health Organization (WHO) identified three pillars for the delivery of health promotion; good governance, health literacy and healthy cities [11]. Good governance entails implementing clear policies, developing regulations and legislation to make healthy choices accessible and affordable to all, and creating sustainable systems for society. Health literacy entails empowering individuals to make the healthiest choices and decisions for themselves and their families by increasing their knowledge and social skills [12]. Healthy cities involves prioritising policies that create synergies between health and other city policies, supporting cities to promote equity and social inclusion of their diverse populations and re-orienting health and social services to make them more equitable [11]. The concepts articulated in the three pillars of health promotion apply directly to primary health care (PHC), and consequently can be applied to primary eye health care (PEC), the eye health component of PHC. Governance and policies (which increase access to services for eye care), and health literacy could address the high prevalence of visual impairment in SSA.

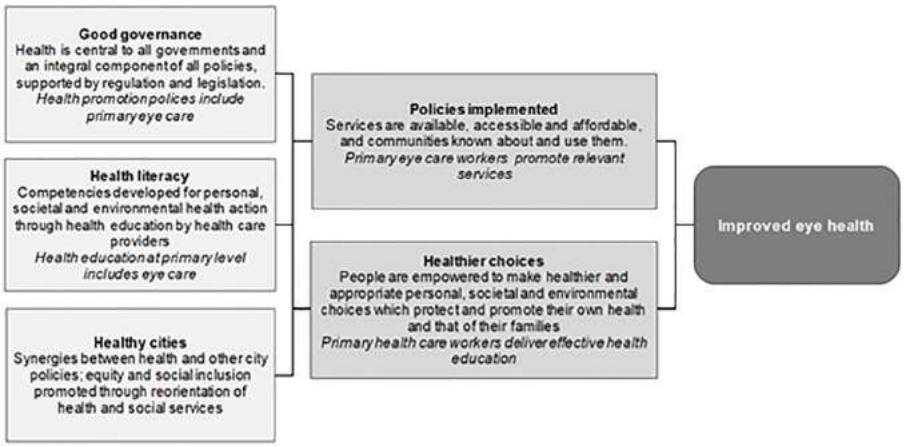

Fig 1. Conceptual model linking primary eye care to the World Health Organization's three pillars of health promotion.

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Concerning health literacy, PHC workers can promote relevant health services and in addition, provide appropriate health education messages to empower community members to make appropriate health choices and ultimately, have better eye health "Fig 1".

In terms of healthy cities, re orienting health facilities to optimize access to health services and fostering social inclusion is crucial in reducing barriers to accessing healthcare [11].

Some of these health promotion strategies have been implemented in SSA. Data from 43 countries in SSA have shown that improving the quality of governance improves health outcomes in terms of reducing under five mortality rates, for example [13]. In SSA, mobile phone technology has been used as an intervention to improve health literacy for sexual reproductive health, maternal and child health, Ebola, tuberculosis and malaria [14]. In terms of healthy cities, health faciities located close to communities have shown higher odds of facility delivery for pregnant women and lower odds of neonatal mortality [15].

The WHO have developed a framework for the social determinants of health, which includes (i) governance and policies, (ii) social status and education, and (iii) material circumstances, i.e., living and working conditions [16]. The pillars of health promotion—governance, health literacy and healthy cities (where people live and work) bear a strong relationship with the social structures that determine equity and the health of populations. Effective eye health promotion could, therefore, play an important role in addressing inequity in eye health.

To increase access to eye care, the WHO Africa Region recently launched a package of interventions for PEC (WHO AFRO PEC package) which has two broad components: facility based management and eye health promotion [17]. WHO AFRO recommend that all aspects of their PEC package, including health promotion, be undertaken by suitably trained PHC staff. The health promotion component comprises specific eye health promotion messages, and the training curriculum includes how to give a health talk and how to counsel patients. The messages target mothers and caregivers of young children, people of all ages particularly the elderly, people with diabetes and relatives of adults with glaucoma. It is recommended that the health promotion messages be delivered using posters, health talks and in one-to-one counselling, and could include the use of mass media, such as radio, to reach communities [17]. However, before eye health promotion can be effectively delivered, it is important to determine the capacities needed to deliver health promotion, and the extent to which they are available in PHC facilities.

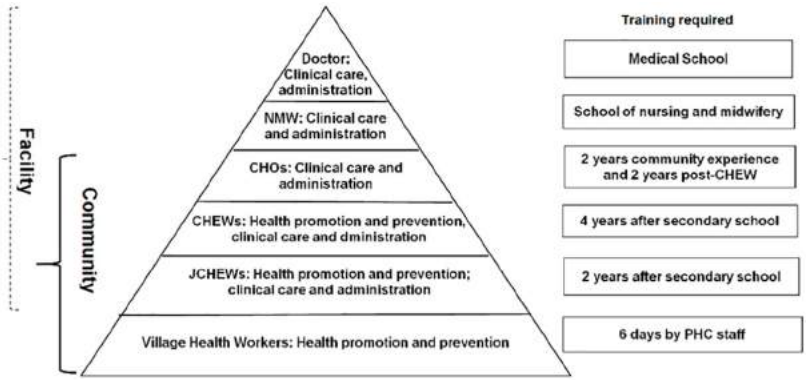

Fig 2. Roles of the different cadres of PHC staff [21].

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In PHC facilities in Nigeria (health centres and health posts), health promotion is mainly delivered by junior community health extension workers (JCHEWs) and village health workers (VHWs). JCHEWs undergo two years of training in approved schools of health technology after completing secondary education. They are employed by the government, are attached to health centres or health posts, and spend 90% of their time in the community. VHWs are volunteers nominated and remunerated by the community; they are trained from six days to up to three weeks by the JCEHWs [18, 19]. Sometimes, health promotion may be conducted by community health extension workers (CHEWS) who undergo four years post-secondary school training in approved schools of health technology "Fig 2". However, health promotion will require more than the human resource component to be effective. Key capacities required include relevant health promotion materials, supervision, transport, referral mechanisms, intersectoral communication and partnerships [20].

The overall purpose of this study was to assess capacity gaps in PHC facilities in Nigeria which would need to be addressed to effectively deliver the WHO AFRO PEC package. PHC capacity for facility case management has already been published [22, 23]. This paper reports the capacities available to deliver the health promotion component of the package.

Methods

Ethics statement

Ethical clearance was obtained from the National Research Ethics Committee of the Federal Ministry of Health, Nigeria, and the ethics review boards of the University of Nigeria Teaching Hospital and the London School of Hygiene & Tropical Medicine. Written informed consent was obtained from all participants and permission was taken to audio-record the interviews and to use anonymous quotes. All data collected were anonymised and every effort was made to ensure confidentiality.

Overview

The study had several stages, which have been described in detail [21]. In brief, the methods included a literature review of PEC in SSA and of technical feasibility frameworks to identify a suitable framework to assess the feasibility of delivering PEC [24], In addition, a two-round Delphi exercise was conducted to provide consensus on the technical complexity of each component of the WHO AFRO PEC package using Gericke's framework of technical complexity

[24], and the capacities needed to implement each of them. These were then mapped onto the WHO health system building blocks. The capacities needed, which were derived from the agreed technical complexities, formed the basis of the data collection methods and tools, and guided the selection of relevant participant groups. We conducted a survey in PHC facilities, interviews with district PHC supervisors, facility staff and VHWs, and a desk review of policy documents for PHC and eye care in Nigeria to identify statements of relevance to health promotion for eye health. All the findings were mapped onto WHO's health systems building blocks.

Policy review

A desk review of national health policy documents that could support eye health promotion was undertaken. Relevant statements from specific policy documents were extracted and tabulated in a Microsoft Excel spreadsheet for analysis.

Selection of PHC facilities and staff

The survey of PHC facilities (health centres and health posts) was conducted in Anambra state, Nigeria, between October 2018 and May 2019. Anambra is located in south-eastern Nigeria and has a population of 5.5 million [25]. The adult literacy rate is 78.2% compared with the national average of 62% [26]. There are 21 local government areas, or districts, which can be stratified into urban, semiurban, and rural. The main occupations are farming, manufacturing, and commerce as in many other states in Nigeria.

A representative sample of facilities was selected using two-stage stratified random sampling from a total of 235 PHC centres and 112 health posts. Six districts were selected to reflect their urban, rural or semi-urban location (ratio of 1:2:3, respectively). Within districts, facilities were selected to reflect the 2:1 ratio of health centres to health posts. Hence a representative sample of 33 health centres and 15 health posts was selected. Structured questionnaires and observational checklists were administered to one (J)CHEW in each facility by a trained research assistant. If a facility had more than one (J)CHEW, one was randomly selected. Nine facilities (three health posts and six health centres) were purposively selected based on an interim analysis to identify high and low performing facilities in relation to the health workforce, patient load and supervisory practices. In these facilities, facility heads (nurse-midwives, community health officers, or (J)CHEWs) were interviewed, and 18 VHWs (two VHWs attached to the selected facility) were administered a structured questionnaire to determine their health promotion practices. Finally, the supervisors for health in the six districts were interviewed using structured topic guides. Interview findings were triangulated with data from the observational checklists and structured questionnaires.

Data management

Data from the questionnaires were entered into a custom-made database in Microsoft Access and transferred to STATA V.15.1 (Statcorp, Texas) using STATransfer for analysis. Frequency tables were generated from the data and simple descriptive analyses were performed. Interview recordings, which were all in English, were transcribed verbatim by AA and checked for accuracy. Analysis entailed re-reading the transcripts for familiarisation with the data which were then indexed, charted, mapped and interpreted by AA. Open Code Software V. 4.02 was used to assist analysis.

Results

Review of policy documents

The National Health Act (2014) and the National Health Policy (2016) support health promotion (Table 1). In addition, eye health promotion is specifically mentioned in the Nigeria Eye Health Strategic Plan (2014–2019), the National Eye Health Policy (2019) and the National Health Policy (2016). Furthermore, the National Strategic Health Development Plan II (2018–2022) specifies that an element of the eye health package at community and PHC level should include health education to promote eye health and disease prevention. In addition, the NSHDP 2018–2022 recommends promoting the establishment of a multi-sectoral coordination platform for eye health. However, eye health is not included in the most recent National Health Promotion Policy (2019).

Facility survey

In the 48 facilities surveyed, all the heads of facility interviewed were female and representation was evenly distributed between urban, semi urban and rural facilities. However, four (J) CHEWs were not available; two were on study or maternity leave and two facilities did not have a (J)CHEW). All the (J)CHEWs were female, their mean age was 41.4 (SD± 8) years and 93.2% had completed training in schools of health technology.

The majority of health promotion, whether delivered in communities or facilities, focussed on young children and pregnant women, with very little time spent on health promotion for the elderly, general health for people of all ages or for people with diabetes "Fig 3A and 3B".

Health service data collection. There was no documented communication between the community and facilities as there were no referral slips, referral registers or evidence of two-way communication.

As there were some differences in health promotion activities undertaken in the community and in facilities they are described separately.

Health promotion in the community

Human resources for health. Sixteen VHWs were interviewed as one facility had no VHW attached to it. Their mean age was 47.4 (SD±10) years and 25% were male. All the VHWs lived in the community, knew it very well and spoke the local language. The mean number of years they had lived in the community was 29.8 (SD±12) years.

Less than half of the 48 facilities had a VHW who conducted health promotion in the community, while over 80% of facilities reported that community health promotion was conducted by (J)CHEWs (Table 2). 25% of the VHWs interviewed said they rarely conducted health promotion activities.

Health promotion in the community should, ideally, be conducted by VHWs, but this was mainly undertaken by facility staff, including facility heads. The term frequently used by staff to describe health promotion was "mobilization", by which they meant that they inform communities about the services available in the facility and encourage them to attend. The following comments from facility heads illustrate the work they do in communities:

> *My main work is mobilisation. To mobilise the community. . ..because most of them don't know what PHC is all about. So, my main work, my major work is to mobilise the community and tell them what PHC is all about. HoF/PHC/U/2*

> *If there is a village meeting, we go there and inform them about the activities in the health centre and why they should come to the health centre. . . HoF/HP/R/7*

Table 1. National health documents that support health promotion and eye health promotion in Nigeria.

Policy document	Policy for Health Promotion	Policy for eye health promotion
National Health Promotion Policy 2006 [27]	• Health promotion priorities should reflect the health needs in Nigeria, including both communicable and non-communicable diseases like injury prevention, mental health and oral health • Health promotion should empower individuals and communities to make informed decisions about their health	Not included
National Primary Health Care Development Agency; Guidelines for the development of PHC systems in Nigeria. 2012 [19]	• The Minimum Health Package for Non-Communicable Diseases will include health promotion/education materials on non-communicable diseases displayed in all facilities. The health education programme will provide information on health promotion, disease prevention at community and individual levels. This requires creating awareness, demand and utilization/patronage of health services and programmes • For the minimum package for health education and community mobilization, every facility should have relevant health promotion/ education materials conspicuously displayed in culturally acceptable language with graphics	Not included
National Health Act 2014 [28]	• The National Council on Health, is the highest policy making body in Nigeria on matters relating to health, to promote health and healthy lifestyles	Not included
National Primary Health Care Development Agency Management Guideline For Primary Health Care Under One Roof 2016 [29]	• The ward minimum health care package should include health promotion and community mobilisation	Not included
National Eye Health Policy 2016	• Strengthen the capacity for health promotion at all levels	• One of the activities is to improve public awareness of eye health
National Strategic Health Development Plan II. 2018–2022 [30]		• An element of the eye health package at community and PHC level is health education for eye health promotion and disease prevention • Strategic interventions to deliver eye care include: to strengthen advocacy, social mobilization and behaviour change communication on eye health and expand access (financial, geographical, social etc.) to comprehensive (promotive, preventive, curative and rehabilitative), appropriate and quality eye health services at all levels
Implementation guidelines for primary health care under one roof (PHCUOR) 2018 [31]	• The Local Government Health Authority Management Team will include a programme officer for health promotion	Not included
Nigeria Eye Health Strategic Plan. 2014–2019 [32]		• States to provide eye health education at community and PHC levels targeting those affected and those at risk of avoidable blindness. This should also focus on harmful eye practices, including *couching • The National Eye Health Programme Secretariat will design and produce the eye health education materials
National Eye health Plan 2019		• Healthcare facilities should deliver eye health promotion • PHC workers should be trained to deliver eye health promotion • Government will facilitate and regulate community participation in eye health promotion. • Intersectoral collaboration will be done to improve eye health promotion

*Couching: a traditional method of cataract surgery that often results in poor visual outcomes.

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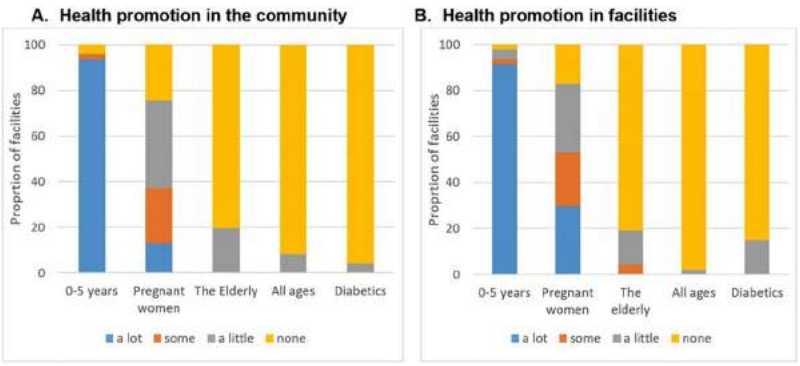

Fig 3. A and B amount of time staff spent with different groups on health promotion A in the community and B in facilities.

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During the interview with one facility head it became clear that UNICEF had engaged their own VHWs to undertake health promotion on maternal and child health topics:

[Concerning VHWs] the UNICEF group took two persons from each ward [community]. . . where they are mobilising people. . .. What they are mainly talking about to those people [community members] is family planning and immunisation. Those are the two major things they are mobilising people for. HoF/PHC/U/3

It appears that a shortage of staff was hampering health promotion activities, as one head of facility explained:

. . .Because we have a shortage of staff, we don't do house to house mobilization. HoF/PHC/U/3

Half (48%) of (J)CHEWs were confident about delivering eye health promotion and 96% were willing to undergo training (Table 2).

Health promotion activities. Health promotion activities by (J)CHEWS also mainly focused on mobilizing the community. For example, mothers of young children were informed that PHC facilities provide immunization and vitamin A supplements, or that medication was available for onchocerciasis, as explained by many heads of facility.

Table 2. Health workforce for community health promotion.

	Health centre N = 32		Health post N = 12		Total N = 44	
Health workforce	**N**	**%**	**N**	**%**	**N**	**%**
Health promotion conducted by VHWs	14	43.8	5	41.7	19	43.2
Health promotion conducted by (J)CHEWs	28	87.5	9	75.0	37	84.1
(J)CHEW fluent in local language	31	96.9	12	100	43	97.7
(J)CHEWs knowledge of community: good/moderately good	27	84.4	12	100	39	88.6
(J)CHEWs confidence in delivering eye health promotion						
A little or more confident	14	43.8	7	58.3	21	47.7
Not confident	18	56.2	5	41.7	23	52.3
Willing to be trained on eye health promotion	30	93.8	12	100	42	95.5

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Table 3. Health promotion activities in the community described by facility heads.

	Health centre N = 32		Health post N = 12		Total N = 44	
Frequency of health promotion by VHWs	**N**	**%**	**N**	**%**	**N**	**%**
At least weekly	4	12.5	3	25.0	7	15.9
At least monthly	3	9.4	3	25.0	6	13.6
Rarely/never	25	78.1	6	50.0	31	70.5
Community health promotion by (J)CHEWs:						
Measles immunisation	30	93.8	12	100	42	95.5
Vitamin A supplementation of young children	29	90.6	10	83.3	39	88.6
Exclusive infant breastfeeding	21	65.6	8	66.7	29	65.9
Diabetes prevention	8	25.0	2	16.7	10	22.7
Eye health	6	18.8	3	25.0	9	20.5
Care of the elderly	3	9.4	2	16.7	5	11.4
Safe water	12	37.5	3	25.0	15	34.1
Safe sanitation	15	46.9	5	41.7	20	45.5
Household waste disposal	16	50.0	2	16.7	18	40.9
How messages are communicated in the community						
Meetings with the target audience	29	90.6	12	100	41	93.2
Town criers/announcers	22	68.8	8	66.7	30	68.2
Home visits	8	25.0	3	25.0	11	25.0
Community leaders	7	21.9	1	8.3	8	18.2

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I will tell them [the community] the services that are available like treatment of minor ailments, antenatal care, deliveries, immunisation services, giving drugs like Mectizan, Albendazole, treatment of onchocerciasis, treatment of childhood illnesses. . .. . . we mostly target women of child-bearing age and children under 5, though we do general mobilisation. HoF/PHC/U/2

We go there and inform them about important things like checking BP [blood pressure] and checking their sugar and other things. . . HoF/HP/R/7

Most of the health promotion activities focussed on mothers and children (Table 3), which included health education about exclusive breast feeding. A key role of PHC staff was also to promote safe water and sanitation, and advise on household waste disposal, activities which were reported by a third to almost half of those interviewed.

A range of avenues were available for health workers to meet with target audiences in the community for health promotion, such as village meetings, and using town criers/announcers (Table 3), as two facility heads explained:

We raised awareness by calling the announcer and telling him to tell the community that insecticide treated nets are available and they should come and get them here. HoF/HP/U/1

But I do go to their meetings, like the men's meeting, the village men's meeting, the village women's meeting, I will attend. I talk to them, I tell them what, whatever I feel is conducive to them at that particular time. HoF/PHC/U/3

Health promotion materials and transport. Over two thirds of facilities had health promotion materials for use in the community, but only a fifth were in the local language

Table 4. Materials for health promotion and target audiences.

	Health centre N = 32		Health post N = 12		Total N = 44	
	N	%	N	%	N	%
Ease of acquisition materials for all health promotion						
Fairly easy or easy	30	93.8	12	100	42	95.5
Difficult to acquire / not available	2	6.2	0	0	2	4.5
Materials for health promotion in the community						
Available	20	62.5	10	83.3	30	68.2
With explanatory graphics	19	59.4	10	83.3	29	65.9
In local languages	5	15.6	4	33.3	9	20.5
Available for the following target populations:						
Mothers with children 0–5 years	19	59.4	9	75.0	28	63.6
Pregnant women	13	40.6	9	75.0	24	54.5
All ages	3	9.4	3	25.0	6	13.6
People with diabetes	0	0	0	0	0	0
The elderly	0	0	0	0	0	0

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(Table 4). The commonest audiences for the posters were mothers of young children (63.6%) and pregnant women (54.5%) with none for people with diabetes or the elderly. The only education materials which mentioned eyes were posters on vitamin A supplementation.

Less than 10% of facilities had transport for PHC staff to visit communities. A head of facility commented on the challenges faced when visiting some hard-to-reach communities:

> *We have gone across all the riverine and hard to reach areas. We went there and sensitised them. . ...there is no finance for our transportation. We use a flying boat to cross over. HoF/PHC/R/9*

Governance. A higher proportion of health promotion activities conducted in the community by (J)CHEWs were supervised if they worked in health posts (25%) than in health centres (9.4%), and supervision of VHWs was only reported by two heads of health centres (6.3%). It became clear that (J)CHEWs were largely not aware of what the VHWs were doing, and they had limited control over their activities, as explained by two facility heads:

> *No, nobody supervises them [VHWs]. The only way we know that they are doing it is that you may be here, and someone will come to me and say, "nurse somebody came to our meeting (in) our church and told us that this health centre now has a residential nurse." That is the evidence that the VHWs are doing their work. HoF/PHC/U/2*

> *[Concerning VHWs] They are invited. The government invites them, not me. They help in mobilising people in the communities to come out for immunisation. HoF/HP/U/1*

One of the reasons given for the lack of VHW supervision was that they no longer dispense medication:

> *In those days we gave them [VHW] drugs. . .but now, because we don't give them anything there is no more supervision. If you give them [drugs], you supervise how they give the drug . . . but we encourage them to keep talking to people. HoF/PHC/U/3*

All the health promotion materials observed for use in the community had the official logos.

Health promotion in facilities

Service delivery. Staff in all the facilities reported that they deliver health talks for measles immunisation and vitamin A supplementation but less than 10% of facilities gave health talks for the elderly or for the prevention of diabetes (Table 5). Only one facility, a health centre, had a list of topics to be covered in health talks, but this was not a weekly or monthly schedule.

Staff also engaged in health promotion and health education talks in the facility, as explained by a facility head:

But when they come to the health facility. . .. . .we educate them. We give them a health talk on how to manage their lives and how to manage the present condition. HoF/PHC/U/2

What we do here. . .. . .we give immunisation, health talks concerning prevention of malaria and to prevent common diseases, keep the environment clean to avoid mosquito bites. I tell them to use their nets to sleep. HoF/HP/SU/6

Another facility head thought that delivering eye care in the facility would be likely to lead to a reduction in the use of traditional eye remedies:

They use traditional medicines [for eye conditions]. . .. or if it is serious they go to [names two local towns]. . ..they squeeze them [local herbs] and drink them but if we start seeing eye patients here they will drop that practice and use orthodox medicine. HoF/PHC/R/8

Table 5. Materials to support health promotion in primary health care facilities.

	Health centre N = 32		Health post N = 12		Total N = 44	
Leadership and Governance	n	%	n	%	n	%
List of topics for health education in the facility	1	3.1	0	0	1	2.3
Supervision of health promotion in the facility	15	46.9	4	33.3	19	43.2
Facilities that conduct health talks	32	100	12	100	44	100
Topics covered in health talks						
Vitamin A supplementation of young children	32	100	12	100	44	100
Measles immunisation	32	100	12	100	44	100
Exclusive infant breastfeeding	30	93.8	6	50.0	36	81.8
Diabetes prevention	4	12.5	3	25.0	7	15.9
Care of the elderly	1	3.1	2	16.7	3	6.8
Materials for health promotion in facilities						
Available	32	100.0	12	100.0	44	100.
With explanatory graphics	30	93.8	11	91.7	41	93.2
In local languages	24	75.0	9	75.0	33	75.0
Target populations for materials						
Mothers of children 0–5 years*	28	87.5	12	100	40	90.9
Pregnant women	29	90.6	9	75.0	38	86.4
All ages	8	25.0	4	33.3	12	27.3
People with diabetes	0	0.0	0	0.0	0	0.0
The elderly	0	0.0	0	0.0	0	0.0

*Posters mentioned taking vitamin A for healthy eyes.

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Infrastructure, equipment and consumables. Posters to support health promotion in facilities were similar to those for use in the community, but posters in facilities were more likely to be in the local language (75%), and a high proportion had illustrative graphics suitable for audiences with low levels of literacy. There were no health promotion posters for the elderly or for people with diabetes (Table 5).

Governance. A total of 19 JCHEWs (43.2%) reported that their health promotion activities in the facility were supervised, which was slightly higher in health centres (46.9%) than in health posts (33.3%) (Table 5).

Discussion

Policy gaps

Eye health promotion is key to delivering WHO's Integrated People Centre Eye Care [33] and should be a crucial pillar of any eye health policy. However, our study shows that some although enabling national policies for eye health promotion are in place, these are limited, particularly at the PHC level. In addition, these policies are not being implemented possibly because they are fragmented across several other policies, and their relevance and importance may not be appreciated by non-eye care professionals. To address this, as recommended in the Nigeria National Strategic Health Development Plan II, 2018–2022 [30], as part of a multisectoral coordination platform for eye health, stakeholders from other health disciplines and non-health sectors need to work together to strengthen eye health promotion policies for the Nigeria National Eye Health Policy, addressing the current limitations particularly at the primary level. The resulting cohesive and comprehensive strategy would need to be ratified by the National Council on Health, the highest health policy making body in Nigeria, and relevant components integrated into other policies, such as child health, non-communicable diseases, care of the elderly and water and sanitation. The National Eye Health Policy is the main policy and therefore advocacy instrument for eye care. We recommend bringing together all eye health promotion strategies in the National Eye Health Policy because in South Africa, failure to implement eye health promotion at the primary level was attributed to the lack of a specific eye health promotion policy [34].

Human resource development for eye health promotion

Appropriately trained health workers are crucial in the delivery of a health intervention, and workers skilled in health promotion should be available to deliver appropriate health education messages. However, imparting health education to the community, which would improve heath literacy, was limited in our study. Instead, the thrust of health promotion activities in the community was to increase uptake of the services provided in health facilities. The reason for the apparent lack of health education could be that staff lacked training in health education and behaviour change communication.

In our study, less than half of the (J)CHEWs were confident about delivering eye health promotion but almost all were willing to be trained in this area. Similar findings were reported in a study of eye health promotion in Ethiopia, where 47% of PHC workers were confident in delivering PEC and 75% felt that more training was needed [35]. Addressing this training capacity gap is crucial because health workers delivering health promotion need to be purposefully trained and have the necessary skills to deliver clear and relevant messages to the appropriate audiences [36, 37].

Appropriate health promotion materials

Health promotion needs to be supported by appropriate educational materials. In our study, although health promotion materials were readily available and easy to acquire, over a third of facilities did not use them in the community and most were not in the local language. While this may have contributed to the lack of health education in communities, the majority of the posters had self-explanatory graphics. However, the focus of the health promotion posters was on maternal and child health. One of the posters, on vitamin A supplementation, included a message that supplements keep children's eyes healthy, and there is scope for a similar message to be included in materials for measles immunization. Advocacy will be needed to ensure that messages for people with diabetes include that diabetes can causes serious eye complications, with messages which would increase their health literacy on what they could do to reduce the risk [38]. In addition, posters on eye conditions in older adults e.g. on presbyopia and cataract, could create awareness and stimulate conversations around accessing appropriate care for these conditions. More recently there have been calls for innovative methods of delivering health promotion messages [39]. A recent study in India demonstrated the effectiveness of using mobile phones to improve eye health literacy [40]. With increasing mobile phone penetration and internet connectivity in SSA, mobile phones could become an important tool for disseminating health promotion messages, including for eye health.

Service delivery

To be effective, health promotion should be delivered to the appropriate target audience. Health promotion activities were mainly targeted at women of child-bearing age and their young children. Similar findings were reported in a study of community based health workers in Ethiopia where health promotion for measles immunisation, vitamin A supplementation and Crede's prophylaxis was conducted by over 70% of PHC workers, while eye health promotion was conducted by less than a third [35]. Maternal and child health has been and remains a major and important focus of health promotion activities as a component of PHC. However, over the last decade or so there has been a global shift towards promoting the health of everyone in the community [41]. For health promotion to contribute towards a reduction in visual impairment and blindness, there needs to be an awareness of all the appropriate target groups. The elderly, who have the highest prevalence of blinding eye conditions, and people with diabetes who are at risk of diabetic retinopathy are very important target audiences. In addition, women, especially widows who have lower access to eye care in low- and middle-income countries (LMICs), should also be targeted [42]. Delivering targeted eye health promotion at community level may be one step on the ladder to reduce health inequities in accessing appropriate eye care. Indeed, health promotion has been identified as a key strategy to reduce health inequalities and it has been suggested that targeted health promotion should be prioritised [43]. In this study, the (J)CHEWs used a range of mechanisms to reach different target audiences, including talking to village, town criers and community leaders. One of the PHC workers in our study indicated that the topics of the health talks were spontaneous, depending on what seems to be relevant at the time. While this is a form of "people-centredness," a prepared list of topics, including eye conditions, would ensure relevant health topics are covered. Other mechanisms for reaching the elderly and those with visual impairment could be informal providers of health care, such as Propriety Patent Medicine Vendors who are ubiquitous in Nigeria [44] and traditional healers, and religious leaders who played a key role in promoting the polio immunization campaign in Nigeria, for example [45]. One head of facility reported that oral herbal remedies were used to treat eye conditions in her community and suggested that introducing PEC may reduce their use. The use of traditional eye remedies is

widespread in SSA, some of which are harmful [46]. In addition, the use of such remedies may delay seeking treatment from orthodox sources. This emphasizes the need for accessible eye care services and targeted eye health promotion.

Supervision

Supervision is an important aspect of leadership and governance in health service delivery. However, supervision of health promotion in facilities and in the community was very limited. In the facilities, this may explain why none of the facilities had a schedule for health education talks and topics, with only one having a list of topics which should be covered in health talks.

Concerning community health promotion, VHWs were hardly supervised at all and the (J) CHEWs interviewed had very limited awareness of what the VHWs were doing. An explanation given for this was that VHWs do not require supervision as they are no longer permitted to treat patients. Lack of supervision may also explain why materials were not available in the local languages, particularly for activities in the community where it could be argued that they are more important. There was anecdotal evidence that a United Nations agency had appointed VHWs for health promotion, so by-passing the supervisory function of staff in health facilities. The fragmented structure of health promotion and its supervision may lead to the dissemination of disparate messages, and so there is need to develop a unified managerial structure for health promotion. Although there is conflicting evidence about the impact of supervision on health outcomes [47], it has been suggested that health system challenges, particularly a shortage of human resources in poor countries, make supportive supervision even more important, and that it is the quality of the supervision which is more important than the frequency [48].

Infrastructure

Health promotion and its supervision in communities will require appropriate transport arrangements, which was a challenge in this study, particularly in hard-to-reach areas. Local transport will be needed by staff to visit communities [49] and lack of transport for field work in eye care has been a recurring problem [50]. Transport promotes access to health centres by community members as well as access to communities by health workers. Policy makers need to recognise the impact of lack of transport on the delivery of health services, and inter-sectoral collaborations which align health and transport policies, may help to address this. Creating synergies between health and transport policies aligns with the "healthy cities" policy of the Shanghai declaration on health promotion [11]. This is in line with the good governance pillar of the Shanghai Health Promotion Policy and the Nigerian health policy which encourage the promotion of inter-sectoral action for health and effective partnerships among all relevant stakeholders for health development by mainstreaming 'Health-in-All' policies [51].

Generalizability to other settings

Eye health promotion, which encompasses good governance, health literacy and healthy cities with equitable access to health care, cannot exist in a vacuum and can only be embedded in existing health promotional structures. Although there are many critical gaps for health promotion, one of the strengths is the focus on maternal and childhood conditions, and eye health promotion for young children can be integrated into this. This can be an entry point for eye health promotion. Indeed, there are efforts underway to embed eye health and eye health prevention activities into WHO's Integrated Management of Childhood Illnesses (IMCI) [52]. In many countries, eye health is not included in national health plans [33]. To implement and deliver eye health promotion effectively, eye health policies need to be intentional about

including specific policies for PEC and eye health promotion which align with existing national policies. For SSA countries that will be implementing the WHO AFRO PEC, including the eye health promotion component, it is important to assess the capacity of the health system at the community and primary health care level to implement it.

Strengths and limitations

To the best of our knowledge, this is the first study to assess the capacity of the health system to deliver eye health promotion. Assessment tools were developed based on a rigorous process that involved a review of the literature, appropriate technical capacity frameworks and consensus from experts in eye health in SSA using a Delphi exercise. The findings may be generalizable to other countries in SSA. A limitation of this study is that it did not assess community participation, which is central to the success of health promotion.

Further studies will be needed on the impact of health promotion on the uptake of eye care services in health facilities.

Conclusions

Our study identified several capacity gaps in health promotion which will need to be addressed to implement eye health promotion effectively. A robust eye health promotion strategy needs to be included in the National Eye Health Policy. The scope of existing health promotion will need to expand to include those with eye conditions, the elderly and people with diabetes. This will require trained health workers, targeted health promotion supported by relevant health promotion materials in the local languages which are suitable for populations with low levels of literacy, transport to visit communities and supportive supervision.

Supporting information

S1 Data. JCHEW data form and checklist.
(XLSX)

S2 Data. JCHEW questionnaire.
(XLSX)

S3 Data. VHW questionnaire.
(XLSX)

S4 Data. Criteria for selection of facilities for semi structured interviews.
(XLSX)

S1 Text. Topic guide for facility heads and district level supervisors.
(DOCX)

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Paper 6A: Delivering Eye health promotion: Why and how.

In this paper, we present why eye health promotion is important, and based on the experiences from our study, we identify opportunities for how eye health promotion can be delivered.

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RESEARCH PAPER COVER SHEET

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SECTION A – Student Details

Student	AGHAJI Ada Ejealor. ID No Ish 284966
Principal Supervisor	Professor Clare Gilbert
Thesis Title	Assessing the technical capacity of primary health care facilities in Anambra state to implement the World Health Organization's Primary Eyecare Package.

If the Research Paper has previously been published please complete Section B, if not please move to Section C

SECTION B – Paper already published

Where was the work published?	Community Eye Health Journal		
When was the work published?	March 2022		
If the work was published prior to registration for your research degree, give a brief rationale for its inclusion			
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Stage of publication	Choose an item.

SECTION D – Multi-authored work

For multi-authored work, give full details of your role in the research included in the paper and in the preparation of the paper. (Attach a further sheet if necessary)	AA led the conceptualization and design of the study, collected and analyzed the data, drafted the manuscript and edited it with consideration of input from her supervisors and co-authors.

Student Signature: [redacted] **Date:** 12th March 2023

Supervisor Signature: [redacted] **Date:** 17 MArch 2023

Delivering eye health promotion: why and how

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Eye health promotion is vital for supporting the health and wellbeing of eye patients and the community, and there is a lot we can all do to help.

Time spent outdoors needs to be built into the school day, as this reduces the risk that children will develop myopia. NEPAL

In low- and/or middle-income countries, nine out of ten people who are blind or visually impaired have a condition that could have been prevented or treated.[1] This suggests that preventive measures and eye health promotion could play an important role in reducing blindness and vision impairment. However, in most countries, little attention is paid to eye health promotion.[2]

Why is eye health promotion needed?

Whether people remain healthy or become sick is influenced by many factors, including the conditions in which people live, their level of income, and their education. People are also more likely to become ill if they do not know how to keep themselves and their families healthy, or how and where to seek care if they become sick. The same applies to many eye conditions. For example, people are more likely to develop type 2 diabetes and vision loss from diabetic retinopathy if they do not know what causes diabetes, if they cannot afford or cook healthy food, if it is difficult for them to exercise, or if they do not understand the importance of taking their medication regularly and having their eyes examined on a regular basis. People are also more likely to become sick if there are no policies in place for affordable housing, clean water, and workplace safety, for example.

What is health promotion?

Health promotion is the process of enabling people to increase control over, and improve, their health.[3] Even when there is a good health system in place, three more factors are needed to ensure that people are healthy and have a good sense of wellbeing:

1 **A healthy environment** for people to live and work in.
2 **Health literacy:** knowledge and awareness of what people can do to keep themselves healthy and safe, and how and where to get help if they need it.
3 **Government policies** that support health, such as ensuring there are safe places in urban areas where people can exercise.

Health promotion is more effective when there is a focus on living standards as well as lifestyle, and when we realise that good health involves more than just the absence of disease. It is just as important for groups of people (e.g., people living with diabetes and medical experts) to work together to find relevant, workable, and acceptable solutions and to build skills so that people can bring about effective change in their own lives. These concepts and actions need to be adapted to the local setting and reach those who are hardest to reach.[4]

Where to start

A good place to start is to think about the different groups of people who will benefit from health promotion to improve their eye health (such as pregnant women, children, people with diabetes, and the elderly) and the setting where they can be reached. For each group, think about what should be in place to support their health in the three key areas of a healthy environment, health literacy, and government policies (see Figure 1).

- **A healthy environment.** What needs to be added to the environment, and what is harmful and should be removed? For example, access to water for drinking and washing is essential for a community's eye health, as is the removal of waste.
- **Health literacy**. What are the knowledge gaps and what misconceptions or false beliefs exist in the community? For example, for community members to have good eye health, they need information about diet and exercise, the importance of eye tests and blood sugar test, the benefits of cataract surgery and spectacle correction, and where to go if there is a problem with their eyes.
- **Government policies.** What policies can be put in place to support health, and which policies are potentially harmful and should be eliminated?

Figure 1 Examples of eye health promotion

Who? Pregnant women *Where?* Antenatal clinics

1 **A healthy environment.** Ensure that health facilities that provide antenatal care are accessible to all women, regardless of disability or income. Ensure that pregnant women have access to vitamin A rich food or vitamin supplements.

2 **Health literacy.** Provide information that encourages healthy behaviours and reduces the risk of preterm delivery, such as smoking cessation, abstinence from alcohol, and a healthy diet, including vitamin A rich foods. Encourage exclusive breast feeding from birth.

3 **Government policies.** Provide free or affordable antenatal care for all pregnant women on a regular basis.

Impact: Less visual loss from retinopathy of prematurity, vitamin A deficiency, and neonatal conjunctivitis.

Who? Young children *Where?* Immunisation clinics

1 **A healthy environment.** Ensure that health facilities that provide immunisation and vitamin A supplementation are accessible to all parents of young children.

2 **Health literacy.** Provide information on the benefits of immunisation, a healthy diet, and the need for vitamin A supplements. Encourage exclusive breast feeding for infants as well as environmental and personal hygiene (including face washing).

3 **Government policies.** Provide free or affordable antenatal care for all pregnant women on a regular basis.

Impact: Less trachoma and less visual loss from measles and vitamin A deficiency.

Who? Schoolchildren, adolescents, and teachers *Where?* Schools

1 **A healthy environment.** A healthy school environment with water and sanitation as well as safe outdoor spaces for play as time outside reduces the risk of developing myopia.

2 **Health literacy.** Provide health education in schools about a healthy diet, personal and environmental hygiene, safe play, and the consequences of smoking and risky sexual behaviours. Encourage the use of spectacles, if required, and tell children what to do if they have an eye problem. Train schoolteachers to screen children for eye conditions and to take care of their own eyes and vision, e.g., correction of presbyopia.

3 **Government policies.** All children aged 5-15 years should be in school. Education policies on school health should include eye health.

Impact: Less myopia, obesity, and Type 2 diabetes; less trachoma and ocular injuries; less visual loss in children and teachers from uncorrected refractive errors; prompt management of eye conditions.

Who? People of working age *Where?* Workplaces

1 **A healthy environment.** A healthy and safe work environment with appropriate infrastructure to encourage good hygiene and to prevent ocular injuries.

2 **Health literacy.** Provide information on a healthy diet, regular exercise, how to protect the eyes from injury, and the benefits of smoking cessation. Emphasise the need for regular blood sugar and blood pressure tests and eye examinations to detect potentially blinding eye conditions. Provide information about where to access eye care, if needed.

3 **Government policies.** Occupational health (or health and safety) policies which protect the eye health of workers.

Impact: Fewer people develop diabetes or sustain eye injuries as well as earlier detection of blinding eye conditions.

Who? Older people/the elderly *Where?* Care homes, social activities for the elderly, health clinics for the elderly

1 **A healthy environment.** A healthy and safe living environment with appropriate infrastructure. Accessible health facilities.

2 **Health literacy.** Provide information on a healthy diet, regular exercise, with regular blood sugar tests and eye examinations. Information on where to access eye care, if needed.

3 **Government policies.** Include eye health in policies on health care for the elderly.

Impact: Fewer people develop diabetes. Early detection of blinding eye conditions such as cataract and glaucoma.

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What role can we play in eye health promotion?

As ophthalmologists, optometrists, ophthalmic nurses, and allied eye health personnel, we may have access to groups such as pregnant women, children, people with type 2 diabetes, and the elderly, either where we work or in the community where we live. We can train other health care workers to deliver appropriate eye health promotion. e.g., at antenatal care clinics, in diabetes clinics, or in schools. For example, eye health workers have successfully trained staff members who were working in maternal and child health clinics to deliver primary eye care, which included eye health promotion and prevention, with appreciable success.[5] Children in school are a captive audience for eye health promotion, and the International Agency for the Prevention of Blindness has developed a school activity pack containing eye health promotional materials that can be downloaded free of charge (**https://bit.ly/IAPBpack**).[6]

The role of health education in eye care is to encourage the uptake of eye health promoting behaviours and increase the use of eye care services.[7] In the course of our work, health education can be directed at individuals, families, and communities. This could include encouraging family members to have their eyes examined, particularly if there is a history of eye disease, such as glaucoma. For patients

"The role of health education in eye care is to encourage the uptake of eye health promoting behaviours and increase the use of eye care services."

Continues overleaf ➤

with diabetes, we could explain the importance of annual eye examinations and work with them to find ways in which they could adopt a healthier lifestyle.

Improvement in the quality and quantity of services is an area of health promotion[8] which we can also influence by making eye care services more accessible, affordable, and acceptable.

Outreach activities provide an excellent opportunity to discuss eye health promoting behaviours. We can encourage managers and regional policy makers to invest in new ways of working that prioritise health promotion. We can also advocate for policies that encourage healthy behaviours, such protective eye wear in the workplace and safe play areas in schools. World Sight Day is an excellent opportunity for eye health service providers to advocate for these policies, whether in the media, in the workplace, or in schools.

As eye health workers, we should do our best to incorporate eye health promotion into our routine eye health service delivery and become ambassadors of eye health care.

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1 Burton MJ, Ramke J, Marques AP, Bourne RRA, Congdon N, Jones I, et al. The Lancet Global Health Commission on Global Eye Health: vision beyond 2020. The Lancet Global health. 2021;9(4):e489-e551.

2 World Health Organization. World report on vision. Geneva: World Health Organization; 2019. **bit.ly/world-report-on-vision**

3 World Health Organisation. Health Promotion. **https://www.who.int/health-topics/health-promotion**

4 Grabowski D, Aagaard-Hansen J, Willaing I, Jensen BB. Principled promotion of health: implementing five guiding health promotion principles for research-based prevention and management of diabetes. Societies. 2017;7(2):10.

5 Mafwiri MM, Jolley E, Hunter J, Gilbert CE, Schmidt E. Mixed methods evaluation of a primary eye care training programme for primary health workers in Morogoro Tanzania. BMC Nursing. 2016;15:41.

6 International Agency for the Prevention of Blindness. Love Your Eyes Education Activity Pack. **https://bit.ly/IAPBpack**

7 Hubley J, Gilbert C. Eye health promotion and the prevention of blindness in developing countries: critical issues. Br J Ophthalmol. 2006;90(3):279-84.

8 Hubley J. Communicating health: an action guide to health education and health promotion. 2nd ed. Oxford: Macmillan 2004.

Paper 7: Capacity gaps at primary health care level to deliver the WHO AFRO package for primary eye care in Nigeria**: implications for policy and implementation.**

Prepared for submission to British Journal of Ophthalmology.

In this paper, we use a health systems approach to discuss the capacity gaps we identified for facility- based case management and for health promotion. We proffer solutions to how these gaps can be addressed and the policy implications for the implementation of the WHO AFRO PEC package.

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RESEARCH PAPER COVER SHEET

PLEASE NOTE THAT A COVER SHEET MUST BE COMPLETED FOR EACH RESEARCH PAPER INCLUDED IN A THESIS.

SECTION A – Student Details

Student	AGHAJI Ada Ejealor. ID No lsh 284966
Principal Supervisor	Professor Clare Gilbert
Thesis Title	Assessing the technical capacity of primary health care facilities in Anambra state to implement the World Health Organization's Primary Eyecare Package.

If the Research Paper has previously been published please complete Section B, if not please move to Section C

SECTION B – Paper already published

Where was the work published?			
When was the work published?			
If the work was published prior to registration for your research degree, give a brief rationale for its inclusion			
Have you retained the copyright for the work?*	Choose an item. No	Was the work subject to academic peer review?	Choose an item. Yes

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SECTION C – Prepared for publication, but not yet published

Where is the work intended to be published?	British Journal of Ophthalmology
Please list the paper's authors in the intended authorship order:	Aghaji A, Burchett H, Gilbert C.
Stage of publication	Choose an item. Ready to submit

SECTION D – Multi-authored work

For multi-authored work, give full details of your role in the research included in the paper and in the preparation of the paper. (Attach a further sheet if necessary)	AA led the conceptualization and design of the study, collected and analyzed the data, drafted the manuscript and edited it with consideration of input from her supervisors and co-authors.

Student Signature: [redacted] **Date:** 12th March 2023

Supervisor Signature: [redacted] **Date:** 17 March 2023

Addressing capacity gaps at primary health care level to deliver the WHO AFRO package for primary eye care in Nigeria: implications for policy and implementation.

ABSTRACT

There is a high prevalence of vision loss in sub-Saharan Africa, principally from conditions which are preventable or readily treatable. However, many Africans do not have access to eye care services as these are concentrated in urban areas; primary eye care has the potential to increase access. The World Health Organisation recently launched a package of interventions for primary eye care in sub-Saharan Africa, which has been adopted by the Nigerian Ministry of Health. However, before it can be implemented, there is need to assess the capacity of the health system at primary level to deliver it. Evidence from a recent facility-based feasibility study in Anambra state, Nigeria found a range of capacity gaps, and we propose three strategies to address them. Firstly, advocacy will be needed for government support to strengthen the primary eye care component of the National Eye Health Policy and to implement multisectoral and other health policies that support primary eyecare in recent primary health care policies. Second, health system strengthening, including implementing pre-service training in primary eye care, providing relevant equipment and the inclusion of eye conditions in the national health management information system is crucial. And lastly, health promotion in communities to increase demand for eye care and to increase eye health literacy will be needed. Primary eye care is a complex intervention and delivering it will be challenging. Strong advocacy and political will, and studies to determine the effectiveness of the package in Nigeria will be needed.

Key words. Primary eye care; Nigeria; Policy; primary health care

BACKGROUND

An estimated 60 million Africans are blind or visually impaired and a further 51 million have near vision impairment.(1) The majority of those affected, 85% of whom are aged 50 years and above, (2) have conditions which could either have been prevented (such as trachoma), or managed to prevent loss of vision (such as glaucoma) or treated to restore sight (such as cataract and refractive errors). The high magnitude of vision impairment reflects lack of access to eye care services which is also inequitable, as rural, non-literate women, and widows have lower access than other subgroups in the population.(3) The challenge of differential access to eye care and inequities in eye health has been highlighted in the World Health Organization's (WHO) Global Action Plan (2014-2019),(4) which advocates for the inclusion of eye health into national health policies and plans, including at the primary health care (PHC) level to facilitate universal access to eye care.

Primary eye care (PEC) delivered at PHC level entails the following: health protection, health promotion, detection and treatment of common eye conditions, detection of more complex conditions such as cataract with referral to a higher level, and rehabilitation of those who are irreversibly blind. In Nigeria, services at PHC level are delivered in health centres and health posts by the following cadres in order of seniority: nurse midwives, community health officers, junior and senior community health extension workers and village health workers.

However, lack of a defined scope of what PEC should entail has hampered implementation on the scale required.(5) To address this, WHO's Africa regional office recently developed a package of interventions for the delivery of PEC by PHC health workers in sub-Saharan Africa (the WHO AFRO PEC package)(6). The package has two broad components - eye health promotion/ disease prevention and facility-based eye care.(7, 8) The former includes health messages for appropriate target groups such as young children and their carers, people at risk of eye diseases, people with diabetes and people of all ages. The facility-based component has five algorithms of symptom and signs which lead to a management decision, such as treat, refer or urgent referral. The algorithms would cover the majority of common eye conditions in the population. The algorithms include the red eye, ocular trauma, vision loss and childhood eye diseases. The package has protocols for practical procedures, such as how to make an eye shield and remove a foreign body, and there is a list of essential consumables, technologies and medicines together with standards and indicators for monitoring services. As the majority of Africans live within 10 kilometres of a PHC facility, WHO AFRO PEC package has the potential to reach the majority of people with eye conditions and strengthen eye health systems.(9)

For any new intervention it is important to assess the feasibility of delivering it in a given context, and ideally this should be done before pilot testing.(10) In this paper we summarize the findings of a study undertaken in Anambra State, Nigeria, the purpose of which was to assess the capacities

of PHC facilities to deliver the WHO AFRO PEC package.(11) The capacities to be assessed were identified through the following iterative process. First, a literature review was undertaken to identify suitable frameworks for the study. The technical feasibility component of Snowdon's feasibility construct was chosen,(12) which was explored using Gericke's technical feasibility framework which comprises user, delivery and usage characteristics, and government capacity requirements.(13) Next, a two stage Delphi exercise was undertaken to reach a consensus on the technical complexity of each element of the WHO AFRO PEC package, and then the capacities needed for implementation.(14) The resulting framework guided the development of study tools (observation, check lists; questionnaires and topic guides) and participant groups (staff and facility heads working in health centres and health posts and their supervisors, and village health workers). Field work was undertaken in 48 facilities in six districts which were selected so as to be representative of the state. Data were analysed for the facility- based management of eye conditions, and health promotion component of the WHO AFRO PEC package using WHO's health system framework. In this paper we highlight the key capacity gaps and recommend how they might be addressed (Figure 1). The gaps can broadly be classified as 1. policy gaps, 2. health system gaps and 3. gaps in demand for eye care.

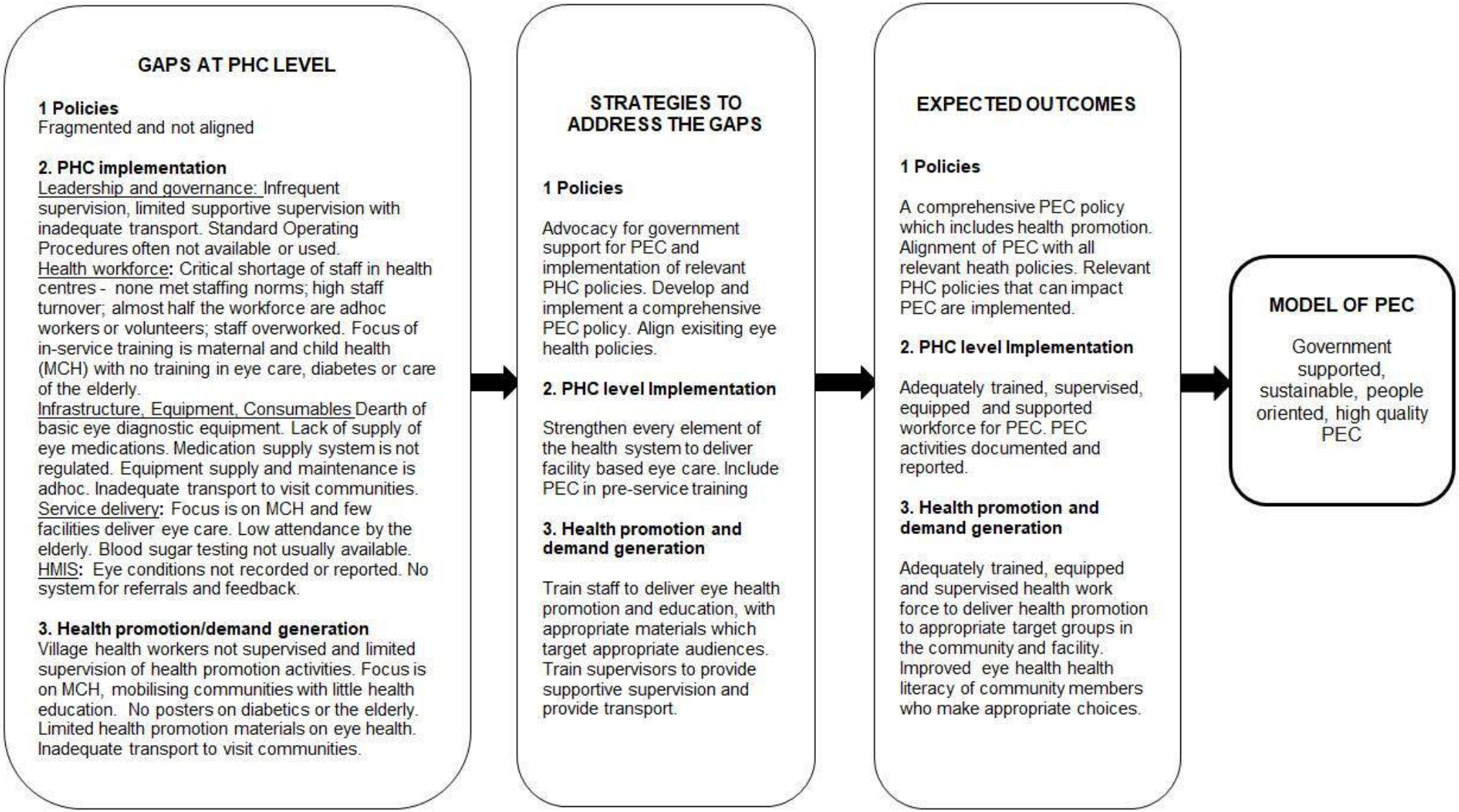

Figure 1. Conceptual framework to address capacity gaps in primary health care to deliver primary eye care in Nigeria

1. Policy gaps

In the majority of low- and middle-income countries, plans for eye care are not currently included in national health strategic plans.(15) However, this is not the case in Nigeria, as eye care is mentioned in the National Strategic Health Development Plan (NSHDP) 2018-2022.(16) Despite this, elements of eye care of relevance to PEC at PHC level are scattered across a number of different policies, including the minimum package of services for non-communicable diseases at PHC level; the National Health Policy 2016, PHC Under One Roof; Management Guidelines 2016 to deliver PEC and the Essential Drugs List. There are also inconsistencies between policies; for example, medications recommended for PEC in the NSHDP, such as topical erythromycin to prevent neonatal conjunctivitis, are not in the Essential Drugs List for PHC. The National Council on Health's 2010 resolution directed that centres for the elderly be established in all government health institutions,(16) but this is yet to be implemented at PHC level.

Recommendations to address policy gaps.

Delivery of PEC in Nigeria will require advocacy for political commitment, and fragmented policies for PEC will need to be aligned. The national eye health policy (NEHP) was launched in 2022 in Nigeria and is the main eyecare advocacy document. Future revisions of the NEHP should adopt a multidisciplinary and multi sectoral approach to eye health and bring together all policies regarding eye health, particularly at the PHC level to address the current limitations in PEC. This should include the policies for the elderly, by establishing centres to address the low attendance by older adults. More importantly, a comprehensive policy for PEC as a separate component of the NEHP will need to be developed and implemented to address all the challenges of PEC delivery. Indeed, there is a precedent for a dedicated policy for eye care at primary level, as these are already in place in Nigeria for mental and oral health.

In Nigeria, PHC is undergoing change, as far reaching reforms are being implemented.(17) One change is that implementation of PHC has been devolved to the states from a central authority, giving regions autonomy to implement policies. This is a two-edged sword, as implementation will depend on the quality of the leadership for PHC at state level. It has been reported that PHC-oriented health systems have consistently produced better health outcomes, but focused leadership is critically important.(18)

The delivery of PEC can only be as strong as the PHC system into which it is embedded, and recent national policies for PHC, if implemented, have the potential to revolutionize PHC in Nigeria. For example, the National Health Act 2014 stipulated that a Basic Health Care Provision Fund be established, and that the National Primary Healthcare Development Agency, which is the central policy making body for PHC, disburse the funds to state PHC

development authorities. Ten per cent of the fund is to build the capacity of human resources for PHC, and 20% is for essential drugs, vaccines and consumables for eligible PHC facilities. 15% of the Fund is to provide and maintain facilities, equipment and transport. If this policy is appropriately implemented, it can strengthen the health workforce at PHC level which is currently heavily dependent on volunteers and ad hoc staff.(19) Advocacy with relevant authorities will be needed to increase the health workforce for PHC, particularly given the increase in other non-communicable diseases in SSA.(20)

2. Health system gaps

Leadership and governance

In our study, almost half the health facilities were supervised infrequently, with limited supportive supervision or feedback from supervisors. Only a third of staff reported being taught during supervision, (19) and lack of transport was an important factor which limited supervisory visits. Village health workers were largely unsupervised, as they no longer dispense medication. Standard Operating Procedures (SOPs) were often not available and were used by staff in less than half of the facilities. Use was lower in facilities headed by nurse/midwives who are not required to use SOPs, which is likely to impede the use of the algorithm-driven SOPs in the WHO AFRO PEC package.

Supportive supervision is intended to build capacity in PHC and improve health outcomes, but robust evidence to support this is lacking. This may be due to the high level of external inputs required for effective supervision, which may be unsustainable.(21) However, there are reports of modest improvements in PEC delivery when supportive supervision is provided.(22)

Health workforce

Our study in Anambra State highlighted considerable understaffing of PHC facilities, with high staff turnover, in part because staff were being redeployed to new facilities.(19) To mitigate this, several facility heads had taken on ad hoc staff (under a government scheme to give graduates short term employment), and volunteers, but neither group had received any formal training. Lack of staff meant that existing staff were overworked, particularly in health centres, and trained staff also had to spend more time in the community. The addition of eye health to PHC may increase the workload further, which may hamper effective implementation. In addition to the lack of staff, existing PHC staff were not confident in managing eye conditions and few had had any pre-service training in eye care.

Medication, equipment and Infrastructure

We found that the system to supply medication was not regulated, as there were multiple sources of supply and some staff reported purchasing drugs from the open market. Medication to manage simple eye conditions were lacking in many facilities (Figure 1), and some of those needed to deliver PEC are not on the essential drug list for PHC. Many facilities lacked basic equipment for eye examination such as a visual acuity chart and functioning torch. There was limited transport to visit communities, particularly in hard-to-reach areas.

Health information systems

Collecting and monitoring data on the number of people with eye conditions is essential for needs-based planning and the management of eye care services. However, our study showed that data on eye conditions were not recorded, collated, or reported at PHC level, as they are not included in the national health management information system (HMIS) at PHC level. There was also poor documentation of referrals.(23)

Service delivery

In our study maternal and child health services were the main focus of primary level activities in facilities and the community, reflecting the prominence this is given in policy at national and state level.(24) While this allows for the integration of eye care into child health services,(25) the majority of people with visually impairing eye conditions are over the age of 50 years. However, in our study attendance by community members aged ≥50 years was very low. Currently, approximately 10% of the 200 million people living in Nigeria are aged 50 years and above (i.e., 20 million) which is projected to increase to 15% of 400 million by 2050 (i.e., 60 million).(26, 27) This will inevitably lead to an increase in blindness and visual impairment unless access to services is rapidly increased.

Staff in most facilities were unable to provide services for people with eye conditions, and staff lacked confidence in managing them. Our study showed that some facilities addressed this gap by allowing local eye health professionals to deliver eye care on an ad hoc basis. These services were often oversubscribed and sometimes unaffordable,(28) which demonstrates the need for affordable eye care services at PHC level.

Recommendations to address the health system gaps.

Leadership and governance

To deliver effective supervision for PEC, supervisors will need to be appropriately skilled and motivated. There is need to develop the role of a state officer for eye care who would also

have oversight of PEC, and again there is a precedent for this, as there are state immunisation and nutrition officers. Developmental partners could work with government to support these roles. Creating a department for eye care in government health management organograms would attract a budget line, enhance government commitment to eye health and give PEC the priority it deserves, which is essential for sustainability.(17, 29) Strong advocacy is needed to generate and maintain this support.

In addition to the state officer for eye care, each district should appoint and train a programme officer for eye care, who would oversee the PEC programme in the district, supervise staff facilities and report to the state officer for eye care. If funding is not available to support these posts initially, the eye health non-government organizations (NGOs) could play a role, as stated in the WHO GAP 2014-2019, in which NGOs are requested to "support national leadership in identifying the financial and technical resources required for implementing the policies/plans and inclusion of primary eye care in primary health care". (4)

Health workforce

For PEC to be sustainable a well-trained workforce of adequate size is key. Training staff of inadequate size may limit the impact of the training.(30) We propose high level advocacy to policy makers to implement existing funding policies to support the recruitment and retention of PHC staff. In addition, we recommend including the WHO AFRO PEC package in the curriculum of pre-service training for all community health extension workers and community health officers, which is likely to mean that PHC staff view eye care as an integral component of their work.

Medication, equipment and technology

Eye care professionals need to contribute to the next revision of the Essential Drugs List to ensure the inclusion of medication for PEC. There is also need to source high quality drugs from reliable sources and ensure that these drugs are available and affordable at PHC level. This will require a strong organisational system for drug procurement and management.(18) In addition, the Basic Health Care Provision Fund could be accessed to provide basic equipment for eye examination (i.e., visual acuity charts and torches).

Health Management Information System

Eye conditions need to be included in the national HMIS at all levels of care, and the WHO AFRO PEC package recommends three simple indicators for PEC (number of patients assessed, treated or referred).(8) Systems need to be put in place for referrals, and for feedback on referrals which may help PHC workers develop their capacity to manage eye patients appropriately.

Service delivery

High quality services for PEC will be needed to attract and build the trust of older members of the community who perceive PHC as being primarily for women and children. Many of the eye conditions in this age group will require referral to the nearest secondary level hospital with an eye department, and clear referral pathways and mechanisms will be needed. In addition, these hospitals will need to be adequately resourced to manage the higher number patients with more complex eye conditions. However, as in Kenya, we anticipate that fewer patients with less serious eye conditions which could be managed at PHC level would attend secondary care leading to a more rational use of services.(31)

3. Health promotion gaps

In our study less than 10% of facilities provided any eye care, and older adults and the elderly accessed PHC services in very low numbers.(23) However, the need for eye care was demonstrated by a facility head who reported that large numbers of patients with eye conditions attended PHCs facilities when private eye professionals held informal clinics. Challenges in delivering health promotion to create demand were also noted. First, the focus of health promotion was on maternal and child health, and there were no health promotion materials for the elderly, for people with diabetes or on eye conditions. Staff shortages and inadequate transport limited health promotion activities in the community by facility staff, who were not confident in delivering eye health promotion. Health promotion activities by facility staff and village health workers were rarely supervised, and health promotion activities were not documented. Health promotion activities consist mainly of “mobilisation” i.e. creating awareness of the services available in the facilities, with little health education.(32)

Recommendations for health promotion

Health literacy, which is one of the pillars of health promotion,(33) entails empowering community members with the relevant knowledge, skills and capacities to change their behaviour and to make informed health choices.(34) Primary health workers need to be trained, have relevant educational materials and access to transport to increase the eye health literacy of community members, targeting appropriate audiences such as the elderly, people with diabetes, relatives of people with glaucoma and young children and their carers. However, promoting healthy behaviours in people with chronic conditions such as diabetes, can be challenging. In high- and middle-income countries multiple interventions used in combination are more effective at improving self-management of diabetes than single interventions, such as a combination of counselling, peer support or walking groups, cooking demonstrations, daily pill boxes and mobile phone messages.(35) Research is needed to

explore which combination of interventions is feasible, acceptable and effective at PHC level in low-income countries. Despite cataract being the commonest cause of blindness, there is very little evidence on which interventions are effective at improving the uptake of cataract surgery in low-income settings.(36) Supplementary immunization activities, whereby measles immunization and vitamin A supplementation are taken into communities by PHC staff, is an effective strategy to improve coverage of both interventions.(37) PHC facilities need to be adequately resourced to continue these activities. Other approaches to improve eye health promotion could include using local radio, and eye health education of school children by teachers, who could then take health messages home and use of mobile phone technology.(38)

DISCUSSION

The feasibility study undertaken in Nigeria not only identified gaps in all elements of the health system, which would need to be addressed to deliver the WHO AFRO PEC package but has also provided tools which could be used in other countries in the region. This study could not have been more timely as Nigeria launched her version of the WHO AFRO PEC package in February 2020.(39) The WHO AFRO PEC package has been pilot tested in Bauchi State Nigeria, where similar health system challenges were identified.(40)

Our study assessed the technical feasibility of delivering the WHO PEC package and did not include any of the other components of feasibility i.e., political, cost, legal and cultural feasibility.(41) However, a recent study explored the political feasibility of including the WHO AFRO PEC Package in the pre-service training curricula of PHC workers in Nigeria by interviewing policy makers.(42)

Although financial feasibility was beyond the scope of our study, WHO has developed the OneHealth tool for governments and health sector planners to use for national strategic health planning and to cost health plans.(43) However, eye care is not yet included.(15) We assessed the technical complexity and capacities needed to deliver a specific package for PEC. However, there are other approaches to delivering PEC which we did not assess. These include providing services at stand-alone vision centres with or without telemedicine links to the base hospital, (44, 45) training community health workers to deliver basic eye care, as in Pakistan,(46) community vision and eye screening with messaging using social media to improve uptake of referrals in Kenya,(47) and integrating eye care for children into WHO's Integrated Management of Childhood Illness in Tanzania.(48) Other models to

improve access to eye care include outreach, where services are delivered intermittently in the community by eye care professionals.(49) (50)

Conclusions

Primary eye care is a complex intervention and delivering it will be challenging. Strong commitment will be needed to implement the WHO AFRO PEC package in Nigeria, and further studies will be needed to determine the effectiveness of implementation and the most effective means of generating demand for eye care services. The package may need to be adapted for other contexts as 'one size may not fit all'.

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CHAPTER 5. DISCUSSION & CONCLUSION

Celebrating the birth of a new baby at a rural primary health care centre with talcum powder: where there is new life, there is a future and there is always hope.

This thesis follows the LSHTM research paper format and consists of nine papers, eight of which have been published in peer reviewed journals. In this chapter, we summarise the key findings of the study, critique the methodology and published papers, and assess the generalizability of our findings. Finally, we discuss the implications of our findings and plans for future research. Topics are discussed under the following headings:

1. Summary of the study and key findings
2. Critique of the content of the WHO package
3. Critique of the methodology
4. Critique of published papers
5. Generalisability
6. Dissemination of findings and their impact
7. Implications of the findings for policy and service delivery (see Paper 7)
8. Implications of the findings for research
9. Development of rapid assessment tools for Africa

1. Summary of the study and key findings

The purpose of this study was to assess the feasibility of integrating the WHO AFRO PEC package into the health system at PHC level in Nigeria, to allow policy makers and planners to make informed decisions about the health system capacity gaps that will need to be addressed to deliver PEC. A strength of our methodology was that it was iterative, with the findings from one component feeding into the next.

Our approach was framed by awareness of the limited published literature on the effectiveness of PEC in SSA and the need to adopt a systematic method of enquiry which could identify key capacity elements needed to implement the package. Both technical complexity and technical capacity profiles were based on internationally recognised health system frameworks (Gericke's framework and the WHO health system building blocks) and were developed using a literature review on PEC in SSA. Furthermore, we developed tools to assess health system capacity gaps which are context specific for Nigeria but could be adapted to other SSA contexts. Finally, we assessed primary healthcare facilities in Anambra state Nigeria to identify capacity gaps in the delivery of the WHO AFRO PEC package.

From the desk review of relevant policies on eye health and primary health care, we identified several enabling policies for the implementation of PEC. These include that

capacity for eye services should be developed at all levels of the health system, including at primary level, that PEC should be part of the minimum service package for non-communicable diseases at PHC level, and eye medications should be available in primary health centres. However, these policies are yet to be implemented as <10% of facilities provided eye care.

Over 40% of facilities did not meet the norm for at least once quarterly supervision and compulsory guidelines for clinical management of patients at PHC level were observed in only 40% of facilities. There was a critical shortage of HRH with only 29% of facilities meeting the staffing norms for PHC and almost half of the staff were ad hoc workers or fulltime volunteers. Less than 30% of facilities had a functioning torch, and <5% had a visual acuity chart. The HMIS system did not record eye conditions, less than 20% of facilities used referral slips or had referral registers. Few elderly patients visited the facilities; <20 elderly patients /1000 population per year. Health promotion activities for eyecare were very limited and the focus was on maternal and child health. Our study identified large capacity gaps which will need to be addressed if PEC is to be delivered effectively.

2. Critique of the content of the WHO package

The WHO package algorithms use a combination of symptoms and signs to make a management decision (i.e., treat, refer or refer urgently); a diagnosis is not made. Referring to the table of eye conditions in Table 1, Chapter 1, the only common eye condition which would be missed by the package, are the symptoms for dry eye (i.e., no redness but burning, gritty sensation).
In addition, the WHO package also does not mention the important role of supervisors.

3. Critique of the methodology

3.1 Limitations of Gericke's framework

The Medical Research Council of the United Kingdom recommends conducting feasibility studies as formative research in the monitoring and evaluating of new health interventions. (Ref) Feasibility is a multi-faceted construct and includes technical, political, cultural, financial and legal feasibility.[1] One of the limitations of our study was that it focused on technical feasibility. Further research will be needed to assess other key facets of feasibility e.g., cultural feasibility or acceptability; indeed, the authors have secured funding to assess

this. Nevertheless, it has been suggested that the argument for integration of a health intervention must be founded on technical grounds.[2]
Gericke's framework of technical feasibility formed the basis for the study. It has been suggested that this framework be used as a tool for policymakers when introducing new interventions.[3]One of the drawbacks of this framework is that it does not include financial input which is a key element of the WHO health system building blocks. However, non-financial resources, e.g., human resources are often crucial factors that influence the implementation of a new intervention in developing countries, and Gericke's framework focuses on the quality and quantity of non-financial inputs.[3]

3.2 Sample size

A larger sample size would have allowed a comparison between the capacities available to deliver PEC between health centres and health posts.

3.3 Location of the study

Our survey was conducted in Anambra state Nigeria, which may not be typical of all the states in Nigeria (see Introduction section). Nigeria is ethnically and geographically diverse, Christian dominated, tropical rainforest region in the south, whereas the north of Nigeria is largely Muslim, arid with higher levels of poverty. Indeed, no single state is representative of the entire country. However, the challenges of PHC, in terms of health workforce, provision of consumables, etc are similar across the country.[4-6]

3.4 Data collection

All data were collected on paper forms which were then entered into a database which was time consuming. An electronic system would have been quicker and could have reduced data entry errors. An advantage would have been that the preliminary analysis to identify the nine facilities for further study would have quicker.

3.5 Researcher's background

All the interviews with facility heads and supervisors were untaken by the PhD student, a consultant ophthalmologist who introduced herself as a eye health worker from a teaching hospital. This imbalance of power could have made some reticent to discuss problems on one hand but could also have encouraged openness as it gave them the opportunity to talk about the challenges they faced on the other. All the interviews were conducted in English as all those interviewed would have been educated in English. However, this could be a limitation if the interviewees were less comfortable speaking English than their mother tongue.

4. Critique of published papers

4.1 Paper 3, Delphi exercise

The technical complexity and technical capacity profile of the WHO AFRO PEC package were agreed in a Delphi exercise, by nine experts in PEC in SSA to increase the validity of our findings. There are advantages and disadvantages of a Delphi exercise. Selecting the expert panel is a key part of the Delphi as the output is based on their expert opinion. Indeed, our expert panel was a non-random sample, and this may have led to hidden biases. All our experts were senior level eye health practitioners, researchers or administrators. However, none were PHC workers, and it may have been useful to recruit PHC workers from states where NGOs had trained staff in PEC. Anonymity, which is an inherent strength of Delphi exercises was maintained throughout.

Other consensus methods, like face-to-face or electronic meetings with real time voting, were not explored. Although these methods could have generated healthy debate and a richer interaction amongst participants, there is the risk of an imbalance of power or the drowning out of dissenting voices.

4.2 Paper 4 Human resources and governance

Our HRH findings were benchmarked against PHC staffing norms in Nigeria, which showed that less than a third of PHCs had the recommended number of staff, which is typical of PHC health facilities in LMICs.[7] Another finding was that none of 33 health centres and 14 of the 15 health posts met staffing norms. Although reasons for this disparity were not explored in depth which is a limitation, our study showed that staff in health centres were often transferred to new facilities and were not replaced.

A strength of the interviews with supervisors was that the interviews were undertaken after preliminary data analysis and so the interviewer was aware of the situation. A limitation was that the supervision of externally funded, disease-specific activities were not counted separately from general supervision, which is likely to have underestimated the latter.

Our study did not assess the potential additional workload of implementing PEC or the additional number of HRH needed to implement it. The WHO has developed a tool to assess staffing levels needed in health facility based on services provided and number of patients attending the facility.[8] Additional research would be needed to assess the staffing implications of implementing PEC.

4.3 Paper 5 Equipment, consumables, service delivery and HMIS

In terms of service delivery, >80% of facility staff were confident in their ability to identify common eye conditions and less than a third reported being able to manage same. However, these were subjective metrics. A more objective method would have been to assess the knowledge and skills of PHC workers in eye care as has been done in other studies in Nigeria and Tanzania.[9, 10]
In addition, an unexpected finding was the provision of eyecare services by private providers; we did not envisage that private providers would deliver eye services in a government run PHC facility. Although it was out of the scope of the study, data on the age and sex of these attending, and types of eye conditions they presented with would have been of value as an indicator of the communities' health seeking behaviour. In addition, interviewing the private providers for their experience of providing eyecare in PHCs would be useful and could be included in further research.

4.4 Paper 6 Health promotion

The Shanghai Declaration on health promotion (2016) identified three pillars of health promotion: good governance, health literacy, and healthy cities. The WHO PEC package mentions radio, but as this is not a facility level intervention, it was not included in the Delphi exercise or data collection tools. Our study focused on good governance (policies and supervision) and the health education component of health literacy i.e., health posters and health messages which could be delivered in facilities or in the community, as these were the only health promotion activities described in the WHO package. A limitation of our study was that health talks were not observed.

4.5 Paper 7. Summary and implications for policy and implementation.
This paper summarises the gaps in PHC that will need to be addressed to deliver PEC. These are broadly classified into eye health policy gaps, health system gaps and, gaps in demand for eye care. There is still need to assess the effectiveness of Pec when all the gaps have been addressed.

5. Generalizability
Paper 3, which presents the results of a Delphi exercise, was based on a literature search on PEC in sub-Saharan Africa and the technical capacities were agreed by eye health

experts from all over Africa. This increases the external validity of our findings and makes the tools developed for this study broadly applicable for use in other sub-Saharan African countries.

Paper 1 'Strengths, challenges and opportunities of implementing primary eye care in Nigeria', which gives an overview of the PEC situation in Nigeria using published data and data from NGOs who support PEC in Nigeria, broadly mirror our findings in Anambra state. This suggests that the results of our study are generalisable to Nigeria despite the cultural and socio-economic differences between States. However, the findings may not be generalisable to other sub-Saharan countries where PHC is likely to vary depending on the political priority it is afforded and the resources available to support it. For example, a paper on human resources at PHC level in five African countries showed considerable variation and change over time. [11]

6. Dissemination of findings and their impact

Our findings have been disseminated to key target audiences which include eye health policy makers such as the National Eye Health Coordinator at the Federal Ministry of Health, and PHC policy makers in the NPHCDA. Towards the end of this study, Nigeria adapted and adopted the WHO AFRO PEC package which means there is a real opportunity to implement some of the recommendations arising from this study. Indeed, a further study, undertaken as a Masters' dissertation by a LSHTM student on the feasibility of integrating the WHO PEC Package into pre-service training of primary health care workers in Nigeria, which built on the findings of our study, led to the WHO-AFRO PEC package being included in the pre-service training curriculum of J/CHEWs and CHOs.

7. Implications for policy and service delivery See Paper 7

8. Implications for research

8.1 Population based survey of eye health needs.

Primary eye care will continue to evolve based on contextual factors such as the magnitude and types of eye diseases in a community, and community members health seeking behaviour. For example, in northern Nigeria, trachoma is endemic, whereas in the southeast glaucoma is a more important cause of blindness. In addition, there are very limited data on the prevalence and types of eye conditions which do not usually lead to vision loss, such as conjunctivitis and dry eye, but which cause troublesome symptoms which warrant treatment

which could be provided at the primary level. The findings may influence the future modifications of the WHO PEC package.

We are planning a population-based study of ocular morbidity in Anambra state, Nigeria. Ocular morbidity includes both visually impairing and non-visually impairing conditions (NVICs). However, there are no standardized definitions or assessment methods to determine the prevalence of NVICs in population-based surveys. As a first step, we conducted a Delphi exercise and have developed a set of agreed definitions and assessment methods for NVICs in an African context. The latter has undergone preliminary pre-testing in a clinical setting before being tested in a community setting.

The next step will be to add these instruments to a standard Rapid Assessment of Avoidable Blindness (RAAB) survey,[12] funding for which is already available, to estimate the prevalence of ocular morbidity in a defined population in Anambra state. The RAAB methodology has been used in over 200 population-based surveys globally and is now available using electronic data capture with automated data analysis (RAAB7). Our long-term goal is that NIVCs will be included in the RAAB survey methodology and database, allowing a more comprehensive assessment of the eye heath needs of populations.

8.2 Increasing demand for eye care

We know from our study and from those conducting free outreach, that when eye care is taken to communities, many people with eye conditions attend. We also know that the focus of PHC is maternal and child health, and that adults and the elderly who are more likely to have eye conditions only attend PHC facilities in low numbers.

We are planning a series of studies to explore how demand for PEC can be increased, which will have the following phases:

1 Assessing the eye health seeking behaviour of individuals identified in the survey with eye conditions.
2 Use participatory approaches with co-production of interventions to be tested to increase demand for eye care at PHC level.
3 Testing these interventions in communities surrounding PHC facilities where staff have been trained using the WHO package. This could take the form of a cluster randomized trial where some communities are randomized to receive the interventions and others are not. The outcome would be the number, age and sex of people attending the PHC facilities with eye conditions. Secondary facilities would need to be appropriately resourced to manage the extra workload as a result of referrals from PEC.

8.3 Evaluating the implementation of the WHO PEC package.

Evaluating the effectiveness of pre-service training in the WHO PEC package is fraught with difficulty, as the numbers trained each year is relatively small and they will be deployed all over any given State. A before and after study is not possible, as eye conditions are not included in PHC facility records, and a cluster randomised trial would not be possible as where trained health workers work would not be under the control of the researchers. A study comparing the existing PEC training with the revised pre-service training using the WHO PEC package [13] would probably be the best design, to assess the following:

- number of people trained in the WHO PEC package who were deployed to a PHC facility, and the number still in post.
- fidelity of the pre-service training and their views on the training they received.
- knowledge of eye conditions and skills in assessing the eye
- number of eye patients seen, and number treated or referred.

8.4 Feasibility study of introducing district and State Programme Officers for eye health.

As these would be new posts, a feasibility study in the first instance would be useful, to assess the views of district and State managers, and whether the NGOs would be willing to support the posts.

9. Develop of rapid assessment tool for Africa

The WHO AFRO PEC package, if properly implemented, has the potential to strengthen eye health systems and increase eye health coverage.[14] To effectively implement this intervention, relevant capacity gaps at health policy and PHC level will need to be identified and addressed. Failing to address these relevant capacity gaps may result in challenges in sustaining the intervention as has recently occurred in Bauchi state, Nigeria.[15]

Our study has developed technical capacity profiles and a series of tools to assess capacity gaps, but data collection was very time consuming. We plan to develop rapid assessment tools which could be used in other States in Nigeria and other countries in Africa.

We will work with WHO AFRO and identify a panel of experts from African countries who are willing to work on this. We will disseminate the WHO AFRO PEC package, publications from our study and our technical capacity profile. We will conduct a Delphi exercise/electronic

meetings/in person meetings or a combination, to decide on the minimum essential elements to include in an assessment tool. Following this, we will develop the first draft of the assessment tool and pilot test it in at least three countries in SSA (to be decided), after which the tool will be revised. The revised draft will be pilot tested in the same or different SSA countries (to be decided) after which the tool will be finalized and published.

Concluding remark

Although our study did not directly assess the political commitment of policy makers towards PEC, the existence of related policies might suggest some level of government interest. However, it's crucial to note that the mere presence of policies does not guarantee their effective implementation. Therefore, a more reliable indicator of government commitment would be the tangible enactment and execution of these policies. Indeed, the Federal Ministry of Health is developing a National Strategic Eye Health Plan with key stakeholders (including funders) that includes PEC. While our study does not provide sufficient evidence to conclusively predict the government's commitment to actualising these policies and plans, we expect that executing the plan could deliver PEC in Nigeria that is robust: accessible, affordable and of sufficient quality to deliver integrated people-centered eyecare, so that people like the 8-month-old baby described at the beginning of the thesis can access timely, quality eye care which will change the trajectory of their lives. Nevertheless, the real test of commitment will be observed in the long-term practical application and effectiveness of the PEC policies in enhancing timely, high-quality eye care.

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APPENDICES


Federal Government of Nigeria
SECOND NATIONAL STRATEGIC HEALTH DEVELOPMENT PLAN
2018 – 2022
Ensuring healthy lives and promoting the wellbeing of Nigerian populace at all ages


FEDERAL
MINISTRY
OF HEALTH


NATIONAL PRIMARY HEALTH CARE DEVELOPMENT AGENCY
INTEGRATING PRIMARY HEALTH CARE GOVERNANCE IN NIGERIA
(PHC Under One Roof)
IMPLEMENTATION MANUAL

Appendix 1 Ethical Approvals

London School of Hygiene & Tropical Medicine
Keppel Street, London WC1E 7HT
United Kingdom
Switchboard: +44 (0)20 7636 8636

www.lshtm.ac.uk

Observational / Interventions Research Ethics Committee

Dr Ada Aghaji
LSHTM

1 February 2018

Dear Dr Aghaji

Study Title: Assessing the Technical Feasibility of Integrating the Proposed World Health Organisation Primary Eye Care Package for sub-Saharan Africa into Primary Health Care in Nigeria

LSHTM Ethics Ref: 14624

Thank you for responding to the Observational Committee's request for further information on the above research and submitting revised documentation.

The further information has been considered on behalf of the Committee by the Chair.

Confirmation of ethical opinion

On behalf of the Committee, I am pleased to confirm a favourable ethical opinion for the above research on the basis described in the application form, protocol and supporting documentation as revised, subject to the conditions specified below.

Conditions of the favourable opinion

Approval is dependent on local ethical approval having been received, where relevant.

Approved documents

The final list of documents reviewed and approved by the Committee is as follows:

Document Type	File Name	Date	Version
Protocol / Proposal	Study Protocol WHOAFROPEC 14.11.2017	14/11/2017	14112017
Protocol / Proposal	Topic Guides WHOAFROPEC 14.11.2017	14/11/2017	14112017
Protocol / Proposal	Questionnaires & Checklists WHOAFROPEC 14.11.2017	14/11/2017	14112017
Investigator CV	Prof Clare Gilbert CV	14/11/2017	14112017
Investigator CV	Ada Aghaji CV	14/11/2017	14112017
Information Sheet	Information Sheets and Consent Forms district supervisor 14.11.2017	14/11/2017	14112017
Information Sheet	Head of facility Information Sheets and Consent Forms 14.11.2017	14/11/2017	14112017
Information Sheet	JCHEW Information Sheets and Consent Forms 14.11.2017	14/11/2017	14112017
Information Sheet	VHW Information Sheets and Consent Forms 14.11.2017	14/11/2017	14112017
Covering Letter	Ethics Response	28/01/2018	version 3

After ethical review

The Chief Investigator (CI) or delegate is responsible for informing the ethics committee of any subsequent changes to the application. These must be submitted to the Committee for review using an Amendment form. Amendments must not be initiated before receipt of written favourable opinion from the committee.

The CI or delegate is also required to notify the ethics committee of any protocol violations and/or Suspected Unexpected Serious Adverse Reactions (SUSARs) which occur during the project by submitting a Serious Adverse Event form.

An annual report should be submitted to the committee using an Annual Report form on the anniversary of the approval of the study during the lifetime of the study.

At the end of the study, the CI or delegate must notify the committee using an End of Study form.

All aforementioned forms are available on the ethics online applications website and can only be submitted to the committee via the website at: http://leo.lshtm.ac.uk

Additional information is available at: www.lshtm.ac.uk/ethics

[redacted]

Professor John DH Porter
Chair

ethics@lshtm.ac.uk
http://www.lshtm.ac.uk/ethics/

Improving health worldwide

National Health Research Ethics Committee of Nigeria (NHREC)

Promoting Highest Ethical and Scientific Standards for Health Research in Nigeria

Federal Ministry of Health

NHREC Protocol Number NHREC/01/01/2007-09/02/2018
NHREC Approval Number NHREC/01/01/2007-12/03/2018
Date: 12 March 2018

Re: Assessing the Technical Feasibility of Integrating the Proposed World Health Organization Primary Eye Care Package for Sub-Saharan Africa into Primary Care in Nigeria

Health Research Committee assigned number: NHREC/01/01/2007

Name of Principal Investigator: Dr Ada Aghaji
Address of Principal Investigator: Department of Ophthalmology
College of Medicine
University of Nigeria, Enugu Campus
Enugu, Nigeria
Tel: 08033135567
Email: aaghaji@yahoo.co.uk

Date of receipt of valid application: 09/**02/2018**
Date when final determination of research was made: 10-03-2018

Notice of Expedited Committee Review and Approval

This is to inform you that the research described in the submitted protocol, the consent forms, advertisements and other participant information materials have been reviewed and *given expedited committee approval by the National Health Research Ethics Committee.*

This approval dates from 12/03/2018 to 11/03/2019. If there is delay in starting the research, please inform the HREC so that the dates of approval can be adjusted accordingly. Note that no participant accrual or activity related to this research may be conducted outside of these dates. *All informed consent forms used in this study must carry the HREC assigned number and duration of HREC approval of the study.* In multiyear research, endeavour to submit your annual report to the HREC early in order to obtain renewal of your approval and avoid disruption of your research.

The National Code for Health Research Ethics requires you to comply with all institutional guidelines, rules and regulations and with the tenets of the Code including ensuring that all adverse events are reported promptly to the HREC. No changes are permitted in the research without prior approval by the HREC except in circumstances outlined in the Code. The HREC reserves the right to conduct compliance visit your research site without previous notification.

Signed

[redacted]

Professor Zubairu Iliyasu MBBS (UniMaid), MPH (Glasg.), PhD (Shef.), FWACP, FMCPH
Chairman, National Health Research Ethics Committee of Nigeria (NHREC)

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UNIVERSITY OF NIGERIA TEACHING HOSPITAL

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Chairman UNTH Management Board

Barr. S. IKE NKUME,
LLB (Hons), BL, MPA, B.Ed(Pol. Sc.), AHAN
Director of Administration/Secretary
UNTH Management Board

Dr. C. C. AMAH, MBBS, FWACS, FICS, FNIM, FCE
Chief Medical Director

Dr. OBINNA D. ONODUGO, MBBS, FWACP
Chairman Medical Advisory Committee

Our Ref: UNTH/CSA/329/OL.5

Date: 19th February, 2018.

NHREC/05/01/2008B-FWA00002458-1RB00002323

ETHICAL CLEARANCE CERTIFICATE

TOPIC: ASSESSING THE TECHNICAL FEASIBILITY OF INTEGRATING THE PROPOSED WORLD HEALTH ORGANIZATION PRIMARY EYE CARE PACKAGE FOR SUB-SAHARAN AFRICA INTO PRIMARY HEALTH CARE IN NIGERIA.

BY: **DR. ADA AGHAJI-*Dept. of Ophthalmology, university of Nigeria Teaching Hospital***
PROF. CLARE GILBERT-*Prof. of Inter. Eye Health LSHTM*
DR. HELEN BURCHETT-*Asst. Prof. Health Policy LSHTM*

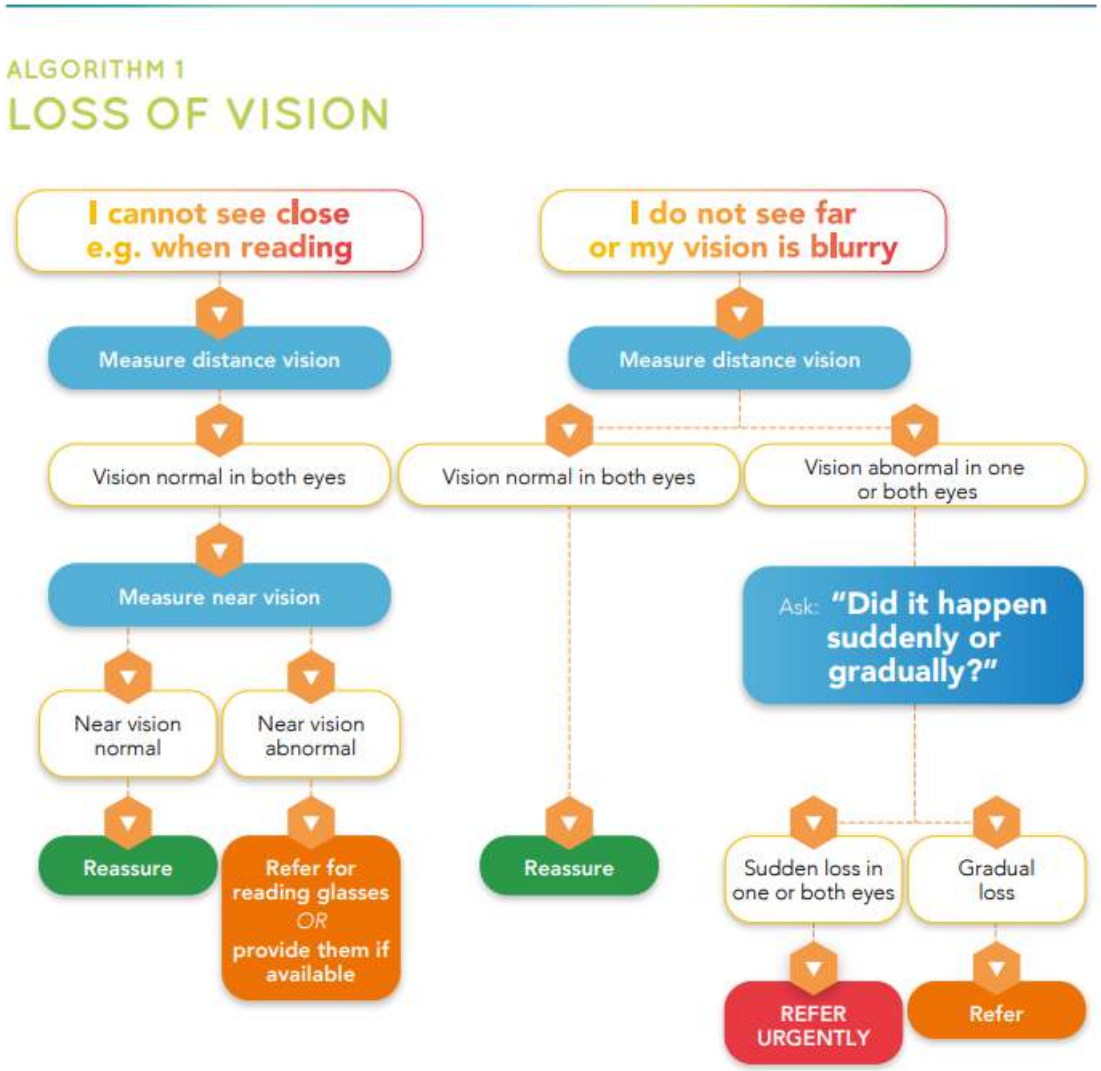
FOR RESEARCH PURPOSE.

This research project on the above topic was reviewed and approved by the University of Nigeria Teaching Hospital Health Research Ethics Committee. This certificate is valid for **one year** from date of issue. Please note that the Committee Reserves the Right to monitor the Conduct of the study at any time for strict Compliance to the Protocol.

[redacted]

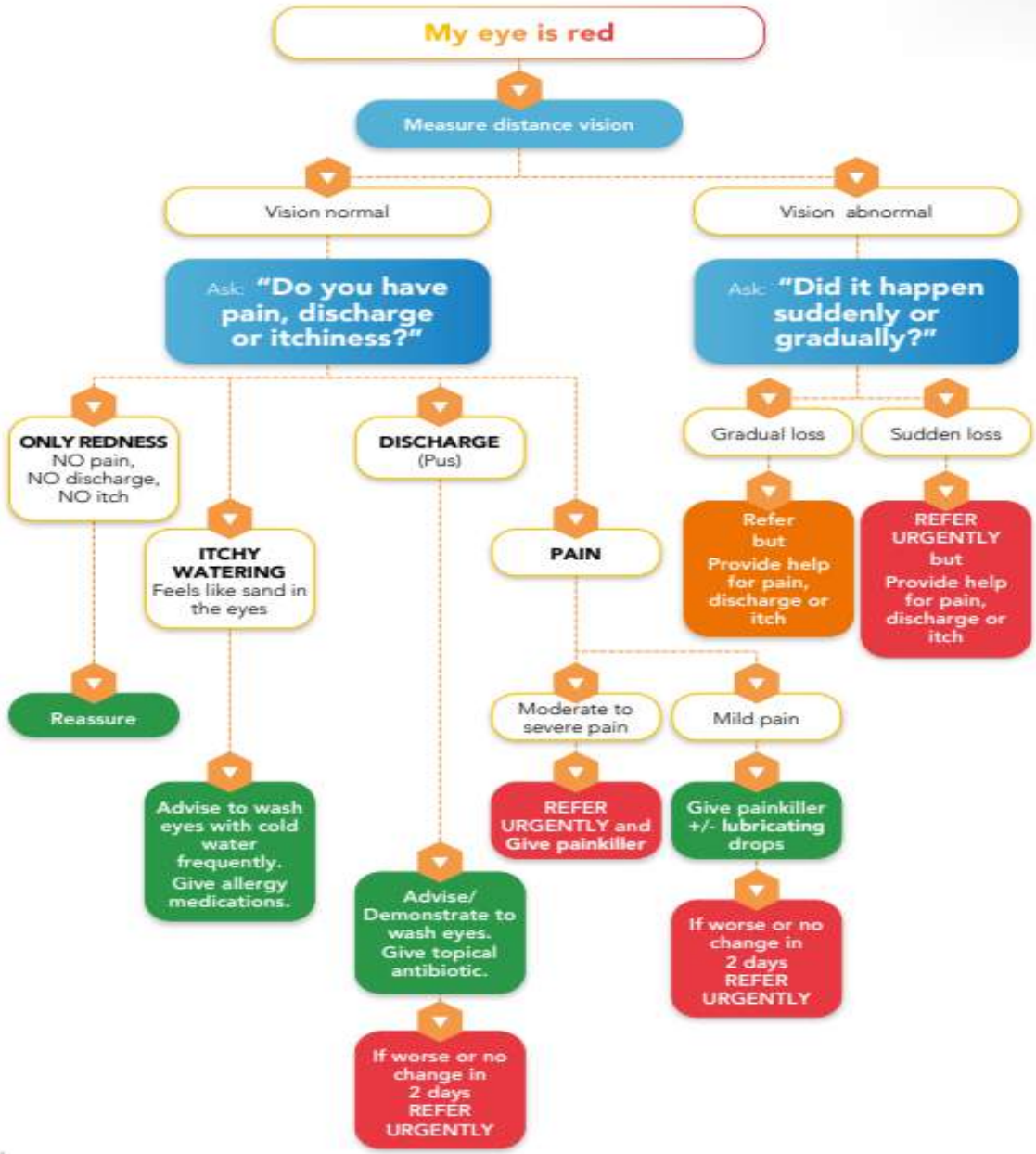
Prof. R.E. Umeh
Chairman, Health Research Ethics Committee

Date: 20/2/18


ALGORITHM 1
LOSS OF VISION
I cannot see close e.g. when reading
Measure distance vision
Vision normal in both eyes
Measure near vision
Near vision normal
Near vision abnormal
Reassure
Refer for reading glasses OR provide them if available
I do not see far or my vision is blurry
Measure distance vision
Vision normal in both eyes
Vision abnormal in one or both eyes
Reassure
Ask: "Did it happen suddenly or gradually?"
Sudden loss in one or both eyes
Gradual loss
REFER URGENTLY
Refer

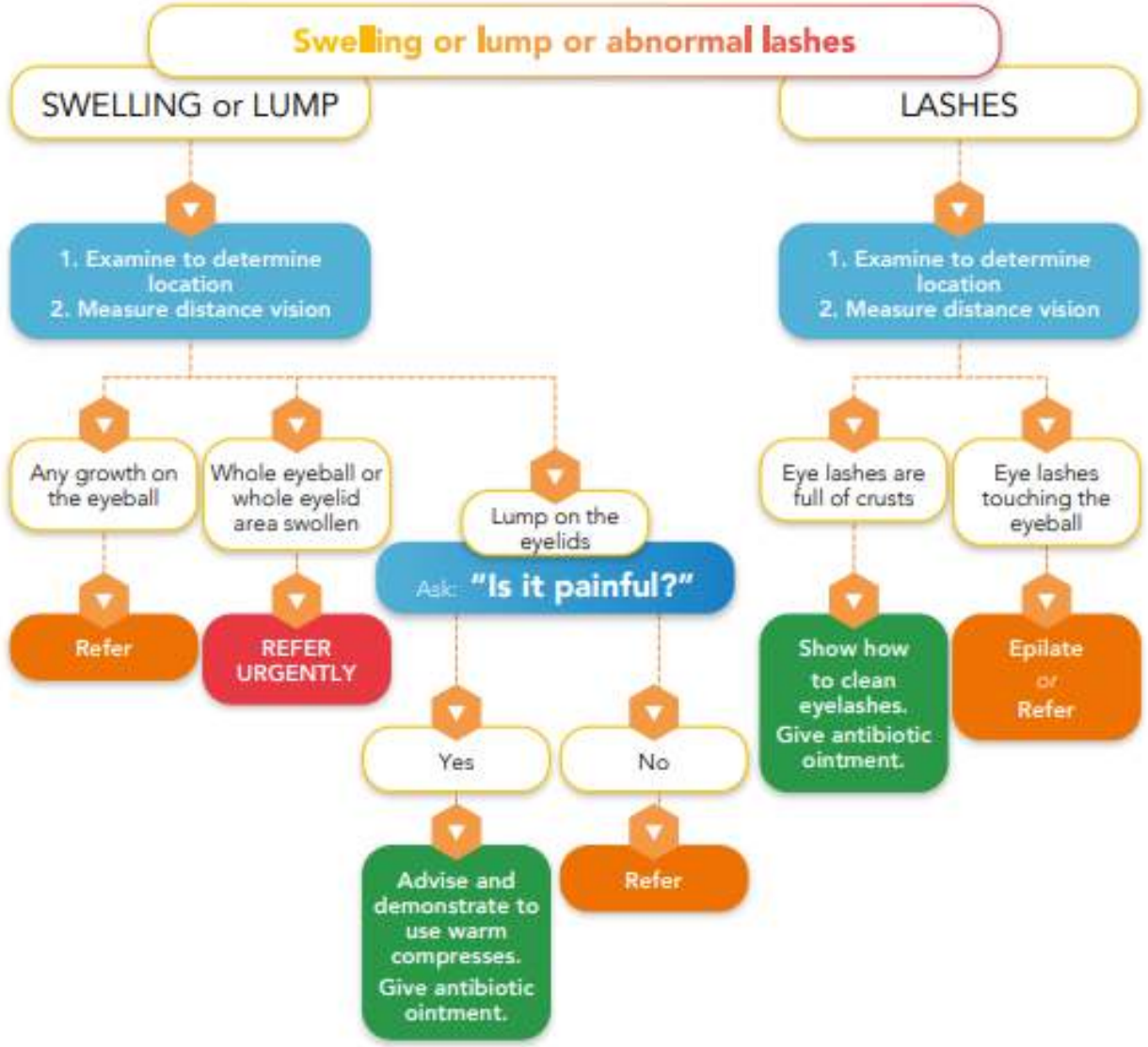
ALGORITHM 2

RED EYE



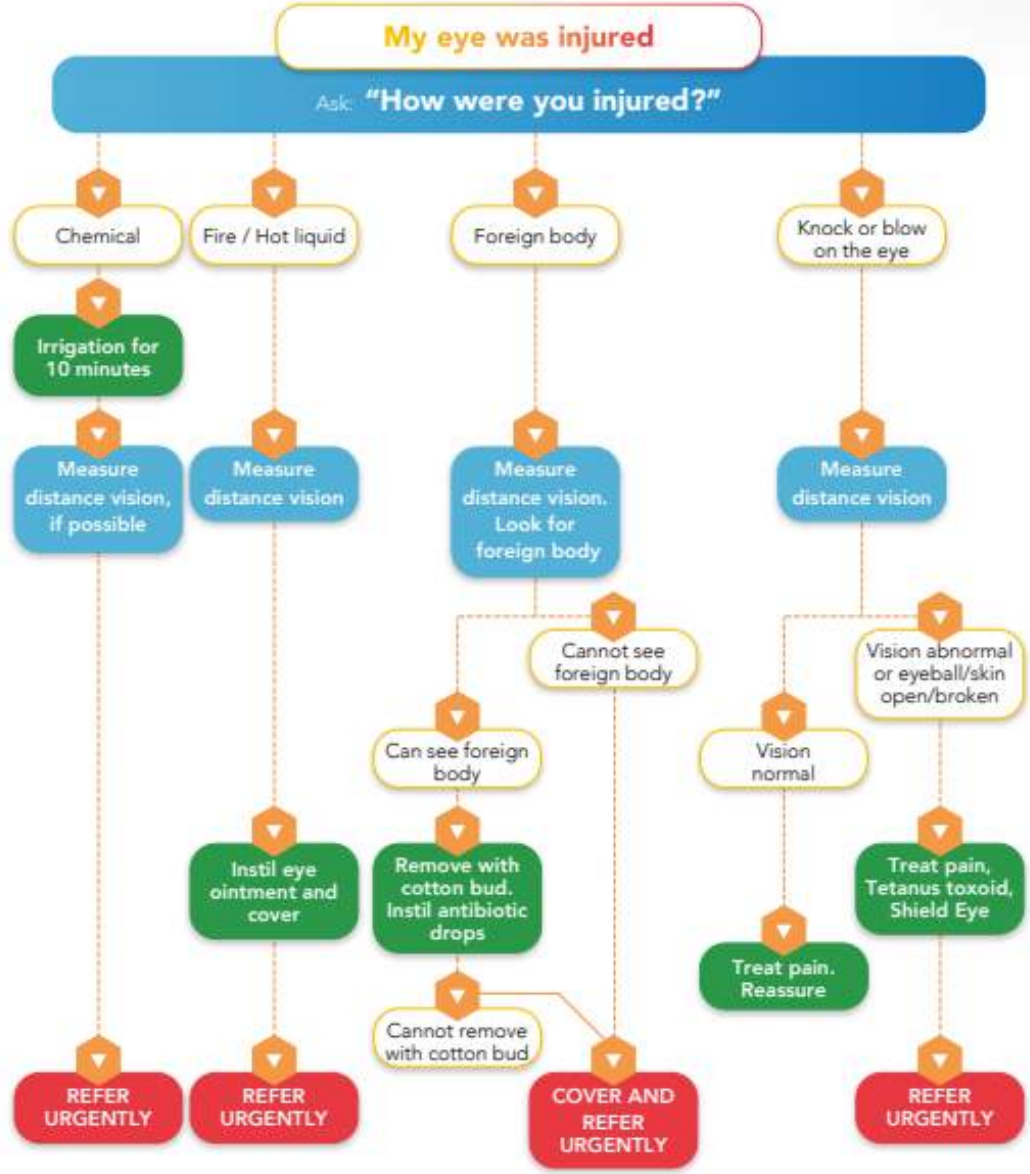
ALGORITHM 3

SWELLING/LUMP ON EYE OR ABNORMAL LASHES



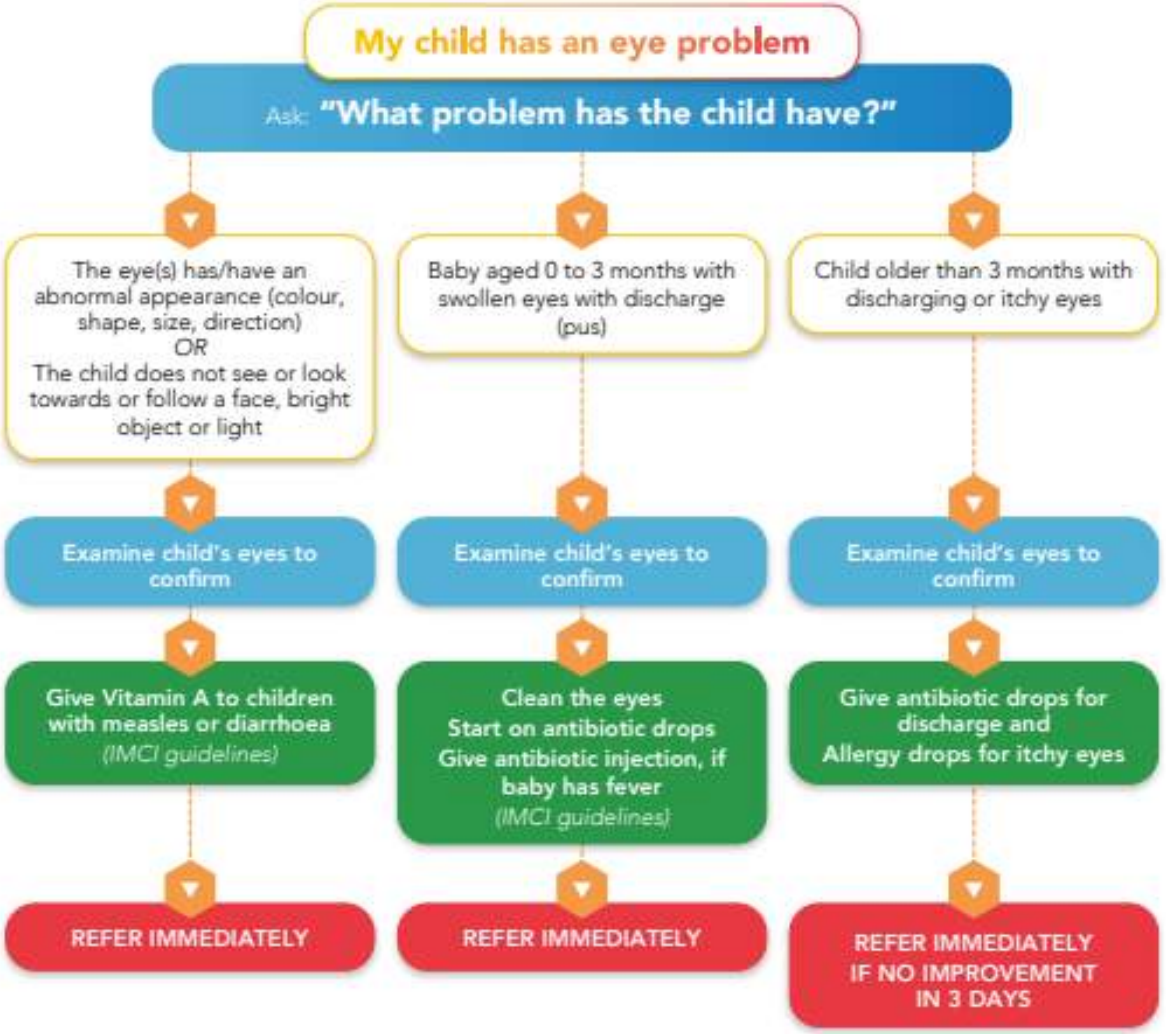
ALGORITHM 4

TRAUMA



ALGORITHM 5

CHILDREN AGED 5 YEARS AND UNDER



Healthy eyes — Messages for all ages

1. Use protective eyewear when working with objects that might damage your eyes: welding, chemicals, projectile metal or wood, etc.
2. If chemicals, or substances that burn or sting, come into contact with your eye, immediately rinse your eye with clean water for at least 15 minutes.
3. If you have an eye problem go to your nearest health care facility as soon as possible. Go ***immediately*** if you have an eye injury, if your eyes are painful or if your vision suddenly becomes poor.
4. Do not put any medication into your eyes unless prescribed by a health care provider.
5. Protect your eyes from excessive sunlight with, for example, hats, scarves, sunglasses or umbrellas.
6. If you have diabetes prevent your eyes from going blind by having a complete eye examination at least once a year, and by checking your blood sugar regularly.
7. If you have a relative with glaucoma, have an eye examination for glaucoma at least once a year.
8. If you have problems seeing small nearby objects or when reading, you may need glasses for near work.

HEALTH MESSAGES WHICH ARE IMPORTANT FOR EYE HEALTH BUT ARE ALSO INTEGRATED INTO OTHER PROGRAMMES:

9. Wear seat belts to avoid injuries including eye injuries.
10. Keep hands and faces clean to avoid infections, including eye infections.
11. Protect your health, including your eye health, by not smoking.

Healthy eye messages for children, mothers and caregivers

1. Prevent serious eye infections in newborn infants: clean their eyes immediately after birth and if available, instil antibiotic eye medication.
2. A baby with swollen eyelids and severe eye discharge needs treatment immediately: seek help from the nearest health facility.
3. To avoid your child being lifelong blind, seek help from an eye care provider as soon as possible if:
   - the child's eyes do not look normal
   - the child does not look towards or follow a face, bright object or light source
   - or if someone thinks the child may have eye or vision problems.
4. Children should not play with or near sharp objects to avoid eye injuries.

HEALTH MESSAGES WHICH ARE IMPORTANT FOR EYE HEALTH BUT ARE ALSO INTEGRATED INTO OTHER PROGRAMMES:

1. Promote exclusive breastfeeding for six months.
2. Mothers and children should be fully immunized including against rubella and measles.
3. Regular vitamin A supplementation of pre-school children is important for good vision and healthy growth.
4. Children should eat foods like fish, dark green leafy vegetables, carrots and fruits to keep their eyes healthy.
5. Children should be secured in car seats and with seat belts.

Appendix 3 Head of Facility Checklist

Check list for head of facility questionnaire

1 Study No | | |

2 District/LGA | 1 | 2 | 3 | 4 | 5 | 6 |

3 Facility ID | | |

4 Name of Ward/Village _____ **5** Name of facility _____

1 Staff register & Rota for HP and daily facility coverage
2 Documents on leadership and governance
3 Documents on collaboration with NGOs
4 Review of space, consumables, medication and HMIS
5 Availability of eye care related equipmetn and consumables
6 Notifiable conditions
7 Review of data from register and/or reports

6 Human Resources

	Expected No (documents)	On register (employed)	Actual no		% actual/expected
				Doctor	*(For weighting)*
				Midwife	
				Nurses	
				CHO	
W				CHEW	%
W				JCHEW	%
W				VHWs	%
				M & E Officers	
				Volunteers	

7 Staff turnover

Employed in last one year	Left (died) in last year	
		Doctor
		Midwife
		Nurses
		CHO
		CHEW
		JCHEW

8 Rota showing daily facility coverage by PHC staff

1 Yes
0 No

Documentation for leadership and governance

	Observed	Reported not seen	Not Available	
10	2	1	0	Job description for head of facility
11	2	1	0	Evidence of supervision of PHC activities by district supervisor in last 6 months eg visitors book, reports
12	2	1	0	Evidence of supervision of Health Promotion activities in this Facility in last 6 months eg register
13	2	1	0	Standing orders
14	2	1	0	Documentation or communication of intersectoral linkage with education sector eg school visits, water and sanitation
15	2	1	0	Rota for staff to deliver Health Promotion on schedule.
16	(Specify) _____			

Potential for collaboration

NGOs active in the following (MOUs)

	Observed	Reported not seen	Not available	
17	2	1	0	Child health
18	2	1	0	Elderly care
19	2	1	0	Diabetes
20	2	1	0	Eye care
21	2	1	0	Other, sp _____

Space, consumables and medication

22 Space for counselling patients 1 Yes 2 No

23 Space for health talks 1 Yes 2 No

24 Drug storage:

Rel. cool drug storage area 1 Yes 2 No

25 Clean drug storage area 1 Yes 2 No

Secure drug storage area 1 Yes 2 No

	Observed	Reported not seen	Not available	
26	3	2	1	Functioning cold storage/fridge
				Vitamin A
27	3	2	1	200,000 IU
28	3	2	1	100,000 IU
29	3	2	1	Tetanus toxoid
30	3	2	1	Antibiotic injections

		Observed	Reported not seen	Not available	
					Measles vaccine
31		3	2	1	Available
32		3	2	1	Syringes available
33		3	2	1	In cold storage
					Basic consumables
34		3	2	1	Saline
35		3	2	1	Cotton wool
36		3	2	1	Gauze
37		3	2	1	Plaster
38		3	2	1	Bandages
					HMIS
39		3	2	1	Inventory for medications
40		3	2	1	Inventory for consummables
41		3	2	1	Patient register
42		3	2	1	Register for facility activities
43		3	2	1	Referral register
44		3	2	1	Referral slips

	Which of these are available in this	Observed	Reported not seen	Not Available	
45		3	2	1	Sign posts to eye care
46		3	2	1	Health promotion materials on eyes
47		3	2	1	Standing Orders for eye conditions
					Visual Acuity measurement
48		3	2	1	At least 3 metres
49		3	2	1	Well lit
50		3	2	1	Distance vision testing chart
51		3	2	1	Near vision testing chart
					Equipment
52		3	2	1	Torches
53		3	2	1	Torches in working condition
					Eye medication
54		3	2	1	Antibiotic eye drops
55		3	2	1	Antibiotic eye ointment

	Register of notifiable conditions in	Observed	Reported not seen	Not Available	
56		3	2	1	Measles cases
57		3	2	1	Neonatal conjunctivitis

Data from reports / register

How many of the following patients attended this facility in 2017?

58 Total number | | | | | *{9999=not known}*

59 Children (0-15years) | | | | | *{9999=not known}*

60 Diabetics | | | | | *{9999=not known}*

61 Pregnant women | | | | | *{9999=not known}*

62 Post partum women | | | | | *{9999=not known}*

63 Eye patients | | | | | *{9999=not known}*

64 How many referrals have you received from the community in the last 12 months?

65 | | | | *{9999=not known}*

Thank you for your time

Appendix 4 Head of Facility Questionnaire

Head of Facility Questionnaire

1 Study No [ ][ ]

2 District/LGA [1][2][3][4][5][6] **3 Facility ID** [ ][ ]

4 Name of Ward/Village _____ **5 Facility catchment Area**

6 Name of facility _____

7 Type of facility
- [1] Health Centre
- [2] Health post

8 Health worker interviewed
- [1] VHW
- [2] JCHEW
- [3] Head of Facility
- [4] JCHEW acting as HoF

9 Age [ ][ ] yrs

10 Sex
- [1] Male
- [2] Female

11 Live in the community
- [1] Yes
- [0] No

12 Years as Head of Facility [ ][ ] *[00 if JCHEW acting up]*

13 Designation
- [1] Doctor
- [2] Midwife
- [3] Nurse
- [4] CHO
- [5] CHEW
- [6] JCHEW
- [7] Oper, sp _____

Human Resources

14 In this facility who can prescribe intramuscular antibiotics for newborns with serious eye infection?
- [1] JCHEW
- [2] CHEW
- [3] CHO
- [4] Midwife
- [5] Doctor

15 In this facility who can administer intramuscular antibiotics for newborns with serious eye infection?
- [1] JCHEW
- [2] CHEW
- [3] CHO
- [4] Midwife
- [5] Doctor

16 Infants with congenital opacity of the lens of the eye (cataract) in one or both eyes need urgent referral to an eye department for surgery

Who in this facility could make this referral?
- [1] JCHEW
- [2] CHEW
- [3] CHO
- [4] Midwife
- [5] Doctor

In-service training for JCHEWs/CHEWs

Have any JCHEW/CHEW received any in service training or updates?

		Service Provider (If applicable)	
0	None within last 24 montsh	1	Government
1	Yes, but over 24 months ago	2	NGO
2	Yes, within the last 24 months	3	Other(Specify)

Have any JCHEW/CHEW received any in service training or updates in the following?

18	Health Management	0	None within last 24 montsh	**19**	1 Government
		1	Yes, but over 24 months ago		2 NGO
		2	Yes, within the last 24 months		3 Other, sp.
20	Child health	0	None within last 24 montsh	**21**	1 Government
		1	Yes, but over 24 months ago		2 NGO
		2	Yes, within the last 24 months		3 Other, sp.
22	Maternal health	0	None within last 24 montsh	**23**	1 Government
		1	Yes, but over 24 months ago		2 NGO
		2	Yes, within the last 24 months		3 Other, sp.
24	Diabetes	0	None	**25**	1 Government
		1	Yes, but over 24 months ago		2 NGO
		2	Yes, within the last 24 months		3 Other, sp.
26	Care of the Aged	0	None within last 24 montsh	**27**	1 Government
		1	Yes, but over 24 months ago		2 NGO
		2	Yes, within the last 24 months		3 Other, sp.
28	Eye Health	0	None within last 24 montsh	**29**	1 Government
		1	Yes, but over 24 months ago		2 NGO
		2	Yes, within the last 24 months		3 Other, sp.
30	Other (Specify)			**31**	1 Government
					2 NGO
					3 Other, sp.

32 Are any clinical staff available to provide 24 care **33** 1 Yes / 0 No

34 If yes, which staff are available 24 hours?

Yes	No	
1	0	JCHEW
1	0	CHEW
1	0	CHO
1	0	Midwife
1	0	Doctor
1	0	None

Leadership and Governance

35 How often are you supervised in this facility?

1	Monthly
2	Quarterly
3	Twice yearly
4	Irregularly
5	Other, sp. _____

36 If available, how often are SOs used by staff when managing patients?

1	Always
2	Frequently
3	Sometimes
4	Rarely
5	Never

37 At the last supervision what did the supervisor do?

Yes	No	
1	0	Check supplies of medication
1	0	Check supplies of consumables
1	0	Collect data (monitor outputs)
1	0	Teaching
1	0	Observed case management
1	0	Made recommendations (feedback)
1	0	Checking cold chain management
1	0	Other, Sp

Service Delivery

38 Which of these activities are available, supervised and reported

		Available	Supervised	Reported	
39	Clinical services	3	2	1	Antenatal care
40		3	2	1	Deliveries
41		3	2	1	Postnatal care
42		3	2	1	Child health
43		3	2	1	Diabetes management
44		3	2	1	Non obstetric emergencies
45		3	2	1	Care of the elderly
46		3	2	1	Eye care
47		3	2	1	Eye emergencies

		Available	Supervised	Reported	
48	Other services	3	2	1	Counselling
49		3	2	1	Refer patients to referral centre
50		3	2	1	Feedback from referral centre
51		3	2	1	Supported referrals
52		3	2	1	Transport to referral centre
53		3	2	1	Phone call to referal centre
54		3	2	1	Drug prescribling by appropriate staff
55		3	2	1	Dispensing of drugs by appropriate staff
56		3	2	1	Cold Chain Management

57 How many of the following patients attended this facility in 2017?

Total number		*{9999=not known}*
58 Children (0-15years)		*{9999=not known}*
59 Diabetics		*{9999=not known}*
60 Pregnant women		*{9999=not known}*
61 Post partum women		*{9999=not known}*
62 Eye patients		*{9999=not known}*
63 Referrals from facility		*{9999=not known}*

64 How many referrals have you received from the community in the last 12 months?

	{9999=not known}

65 Is there a designated referral centre for this facility?

1	Yes
0	No

66 If yes, type of referral centre

1	Government General Hospital
2	Government Tertiary Hospital
3	Private Hospital
4	Private Clinic
5	Other, sp.

67 Is transport available for those referred?

1	Yes
2	No

68 Does this centre have an eye department/clinic?

1	Yes
0	No
2	Does not know

69 If yes, is eye surgery available in this eye department/clinic?

1	Yes
0	No
2	Does not know

70 Have any eye patients been referred?

1	Yes
0	No
2	Does not know

71 If so, how many were referred in 2017

	{9999=not known}

Thank you for your time

Appendix 5 Checklist for (J)CHEWs

Check list for JCHEWs questionnaire

1 Study No ☐☐

2 District/LGA ☐1 ☐2 ☐3 ☐4 ☐5 ☐6

3 Facility ID ☐☐

4 Name of Ward/Village _____

5 Name of facility _____

		Check list
1	**List of VHWs employed by the facility**	☐
2	**Health promotion materials available - for the community**	☐
3	**Health promotion materials available - for the facility**	☐
4	**Check list of areas covered when JCHEWs supervise VHWs**	☐
5	**List of topics covered in health talks in the facility**	☐
6	**Referrals from VHW to the facility - register / referral slips**	☐

Staffing

6 List of VHWs attached to this facility

☐2	Observed
☐1	Reported, not seen
☐0	Not available

HP materials for the community

Types of material for different target groups in the community

7

	Pregnant women	Postp. women	Children 0-5 yrs	Adolescents	Diabetics	Elderly	All ages	Other sp.
Poster	☐	☐	☐	☐	☐	☐	☐	☐
Leaflet/flyer	☐	☐	☐	☐	☐	☐	☐	☐
Flip-chart	☐	☐	☐	☐	☐	☐	☐	☐
None	☐	☐	☐	☐	☐	☐	☐	☐
Others	☐	☐	☐	☐	☐	☐	☐	☐

8 Topics covered by health promotion materials

Yes	No	
☐1	☐0	Eye health
☐1	☐0	Vitamin A supplementation of pregnant women
☐1	☐0	Exclusive breast feeding of infants (0-12 months)
☐1	☐0	Vitamin A supplementation of young children
☐1	☐0	Measles immunization
☐1	☐0	Child nutrition
☐1	☐0	Diabetes prevention
☐1	☐0	Care of the elderly
☐1	☐0	Use of seat belts

9 Language of materials

☐0	Local language
☐1	English
☐2	Both
☐3	Other sp. _____

Quality of materials

10

Yes	No	
1	0	Durable
1	0	Good graphics/self explanatory for non literate
1	0	Vernacular
1	0	Easy to maintain
1	0	Logos of authorities who issued materials

Supervision of VHWs by JCHEW

11 Do the VHWs report whether they have delivered health promotion to the following groups

Recorded	Reported, not	Not available	
2	1	0	Antenatal care
2	1	0	Postpartum women
2	1	0	Children 0-5 years
2	1	0	Adolescents
2	1	0	Diabetics
2	1	0	Elderly
2	1	0	All ages
2	1	0	Other sp.

12 What mode of transport is available for you to travel around the community during supervision?

1	Foot
2	Bicycle
3	Motor bike
4	Other

13 Are some communities hard to reach?

1	Yes
2	No

Health promotion in the facility

14 Type of health promotion materials for different target groups <u>in the health facility</u>

	Pregnant women	Postp. women	Children 0-5 yrs	Adolescents	Diabetics	Elderly	All ages	Other sp.
Poster								
Leaflet/flyer								
Flip-chart								
None								
Others								

15 Health talks: register/schedule available

1	Yes
0	No

16 If yes, topics:

Yes	No	
1	0	Eye health
1	0	Vitamin A supplementation of pregnant women
1	0	Exclusive breast feeding of infants (0-12 months)
1	0	Vitamin A supplementation of young children
1	0	Measles immunization
1	0	Child nutrition
1	0	Diabetes prevention
1	0	Care of the elderly
1	0	Use of seat belts

17 Language of health Promotion materials in

0	Local language
1	English
2	Both
3	Other sp. _____

18 Quality of health promotion materials for the community

Yes	No	
1	0	Durable
1	0	Good graphics/self explanatory for non literate
1	0	Vernacular
1	0	Easy to maintain
1	0	Logos of authorities who issued materials

19 Referrals from VHWs to facility

Observed	Reported, not seen	Not available	
2	1	0	Referral Register
2	1	0	Referral slips
2	1	0	Evidence of feedback to VHWs

Thank you for your time.

Appendix 6 (J)CHEW Questionnaire

JCHEW Questionnaire

1 Study No ☐☐

2 District/LGA ☐1 ☐2 ☐3 ☐4 ☐5 ☐6 **3 Facility ID** ☐☐

4 Name of Ward/Village _____

5 Facility catchment pop ☐☐☐☐

6 Name of facility _____

8 Type of facility

7 Health worker interviewed
- ☐1 VHW
- ☐2 JCHEW
- ☐3 Head of Facility
- ☐4 JCEW acting as head of facility

9
- ☐1 Health Centre
- ☐2 Health post

10 Age ☐☐ yrs

11 Sex
- ☐1 Male
- ☐2 Female

12 Live in this community
- ☐1 Yes
- ☐0 No

13 Years lived in community ☐☐

14 Completed Sch of Tech
- ☐1 Yes
- ☐0 No

15 Years as JCHEW ☐☐

General services

16 Which of the following services are provided in this facility

Yes	No	
☐1	☐0	Antenatal care
☐1	☐0	Deliveries
☐1	☐0	Postnatal care
☐1	☐0	Child health
☐1	☐0	Diabetes care
☐1	☐0	Care of the elderly

Health Promotion in the community

17 Who conducts health promotion activities in this community?

18 How often do VHWs undertake these activities?

Yes	No		
☐1	☐0	Village Health Workers	☐1 Daily
☐1	☐0	JCHEWs	☐2 Weekly
☐1	☐0	CHEWs	☐3 Monthly
☐1	☐0	Community leaders	☐4 Irregularly
☐1	☐0	Other sp _____	☐5 Other sp.

19 How many VHWs do you work with in the community? ☐☐

20 How many are active in terms of health promotion in the community? ☐☐

21 In your opinion, how skilled are the VHWs in communicating health promotion to the community?

1	Very skilled
2	Some skills
3	Poor skills
4	Unskilled
5	Cannot comment

22 How well do you know this community?

1	Very well
2	Moderately well
3	Not very well

23 Are you fluent in the local language?

1	Yes
2	No

24 About how much of <u>your time</u> do you spend on each of the following groups in the community?

A lot	Some	A little	None	
3	2	1	0	Antenatal care
3	2	1	0	Postpartum women
3	2	1	0	Children 0-5 years
3	2	1	0	Adolescents
3	2	1	0	Diabetics
3	2	1	0	Elderly
3	2	1	0	All ages
3	2	1	0	Other sp. _____

25 Do you carry out any health promotion activities in schools?

1	Yes
0	No

26 What type of transport is available for you to visit communities for health promotion?

0	None
1	Bicycle
2	Motorbke
3	Car/bus
4	Other sp. _____

27 Are some communities hard to reach?

1	Yes
2	No

28 Do your health promotion activities in the community include promoting the following

Yes	No	
1	0	Eye health
1	0	Vitamin A supplementation of pregnant women
1	0	Exclusive breast feeding of infants (0-12 months)
1	0	Vitamin A supplementation of young children
1	0	Measles immunization
1	0	Child nutrition
1	0	Diabetes prevention
1	0	Care of the elderly
1	0	Safe water
1	0	Safe sanitation
1	0	Household waste disposal
1	0	Supervising VHWs

29 What health promotion materials are available for use in the community?

Yes	No	
1	0	Posters
1	0	Fliers
1	0	Flip charts
1	0	None
1	0	Other sp. _____

30 How easy is it to get health promotion materials for the community?

1	Easy
2	Fairly easy
3	A bit difficult
4	Unavailable

31 Have you been instructed on how to dispose of old health promotion materials?

0	No
1	Yes
2	Other sp. _____

32 How do you disemminate health promotion messages to community members?

Yes	No	
1	0	Home visits
1	0	Community meetings with target population
1	0	Community leaders
1	0	Town Criers
1	0	Other sp. _____

Supervision of health promotion in the community

33 Are health promotion activities undertaken by staff in this faciltiy supervised?

Yes	No	If no, go to section on reporting
1	0	

34 How often are your health promotion activities in the community supervised by the head of facility?

1	Weekly
2	Monthly
3	Quartlerly
4	Irregularly
5	Never/very rare

35 How often are do you supervise the HP activities of VHWs?

1	Weekly
2	Monthly
3	Quartlerly
4	Irregularly
5	Never/very rare

36 Do you supervise health promotion activities with the following groups?

Yes	No	
1	0	Antenatal care
1	0	Postpartum women
1	0	Children 0-5 years
1	0	Adolescents
1	0	Diabetics
1	0	Elderly
1	0	All ages
1	0	Other sp.

37 Do you have a check list which you use during supervision?

1	Yes
2	No

38 Which of the following do you include in supervision of VHWs?

1	0	Observation of interactions with the community
1	0	Teaching
1	0	Referral mechanisms
1	0	Other, sp

Reporting by VHWs

39 Do the VHWs report their activities to you?

1	Yes
0	No

40 If yes, how frequenty do they report?

1	Daily
2	Weekly
3	Monthly
4	Irregularly

Health Promotion in the facility

41 Does health promotion take place in this facility

1	Yes
0	No

42 If yes, what methods of health promotion take place in this facility?

Yes	No	
1	0	Health talks to groups of patients
1	0	Counselling one on one
1	0	Posters
1	0	Leaflets/fliers

43 Is there an agreed timetable of topics to be covered

Yes	No
1	0

44 About how much of <u>your time</u> do you spend on health promotion for each of these groups in this facility?

A lot	Some	A little	None	
3	2	1	0	Antenatal care
3	2	1	0	Postpartum women
3	2	1	0	Children 0-5 years
3	2	1	0	Adolescents
3	2	1	0	Diabetics
3	2	1	0	Elderly
3	2	1	0	All ages
3	2	1	0	Other sp. _____

45 What topics are covered in the health promotion in the facility?

Yes	No	
1	0	Vitamin A supplementation of pregnant women
1	0	Exclusive breast feeding of infants (0-12 months)
1	0	Vitamin A supplementation of young children
1	0	Measles immunization
1	0	Child nutrition
1	0	Diabetes prevention
1	0	Care of the elderly
1	0	Use of seat belts

46 Which of the following specific activities take place in this facility

Yes	No	
1	0	Vitamin A supplementaiton of pregnant women
1	0	Cleaning the eyes and instilling ointment after birth
1	0	Rubella immunization
1	0	Measles immunization
1	0	Vitamin A supplementation of young chidren
1	0	Blood sugar testing
1	0	Blood pressure measurement

Referrals from VHWs

47 Is there a referral system from the community (VHWs) to the facility?

1	Yes
2	No

48 If yes, how are patients referred

1	Verbally
2	Referral slip
3	Telephone call
4	SMS

49 Do you give feedback on referrals to the VHWs?

1	Always
2	Sometimes
3	Never

Eye Health promotion

50 Do you do any health promotion specifically for eye health?

1	Yes, in the community
2	Yes, in the health facility
3	Yes, in both
0	No

51 If yes, what topics are covered

Yes	No	
1	0	Poor near vision needs reading glasses
1	0	Diabetics need yearly eye examination
1	0	Other, specify _____

52 How confident are you about delivering health promotion for Eye Health?

1	Very confident
2	A little confident
3	Not confident at all
4	I don't know

53 How willing would you be to deliver eye health promotion in this facility after training?

1	Very willing
2	Willing
3	Reluctant
4	Not at all

Detecting and managing eye conditions

54 How confident are you about identifying eye problems?

1	Very confident
2	A little confident
3	Not confident at all
4	I don't know

55 How confident are you about managing eye problems?

1	Very confident
2	A little confident
3	Not confident at all
4	I don't know

56 Are staff available who can remove a foreign body from the eye?

1	Always
2	Sometimes
3	Never
4	I don't know

57 Are staff available who can irrigate the eye?

1	Always
2	Sometimes
3	Never
4	I don't know

58 Have you received any training in eye conditions?

1	Yes
2	No

59 How confident are you in knowing which eye conditions need urgent referral

1	Very confident
2	A little confident
3	Not confident at all
4	I don't know

60 How many people with eye conditions have you referred to the PHC in the last month?

1	None
2	1 to 2
3	>2 to 5
4	>5
5	I don't know

61 What is your perception about undergoing training for eye care?

1	Welcome it and do the training
2	Welcome it but no time for training
3	Health workers are already overburdened
4	Other _____

Thank you for your time

Appendix 7 Village Health Workers Questionnaire

Village Health Worker Questionnaire

2 Study No VHW / [ ][ ]

1 District/LGA [1][2][3][4][5][6]

3 Facility ID [ ][ ]

4 Name of Ward/Village _____

5 PHC attached to _____

6 Type of Facility
- [1] PHC
- [2] Health Post

7 Cadre Interviewed
- [1] VHW
- [2] JCHEW
- [3] Head of Facility
- [4] JCHEW acting up

8 No of villages covered [ ]

Demographics

9 Age in years [ ]

10 Sex
- [1] Male
- [2] Female

11 Do you live in the community where you practice health promotion?
- [1] Yes
- [2] No

12 If yes, years lived in the community [ ][ ]

13 Years lived in community [ ]

14 Years primary school education [ ]

15 Years practising as VHW [ ]

16 How well do you know this community?
- [1] Very well
- [2] Moderately well
- [3] Not very well

17 Are you fluent in the local language?
- [1] Yes
- [2] No

18 How often do you carry out health promotion activities in this community?
- [1] Daily
- [2] Weekly
- [3] Monthly
- [4] Irregularly
- [5] Other sp. _____

19 How do you travel around the community?
- [1] By foot
- [2] Bicycle
- [3] Motor bike
- [4] Other

20 Are some communities inaccessible by road?
- [1] Yes
- [2] No

21 What health promotion materials are available for use in the community?

Yes	No	
1	0	Posters
1	0	Fliers
1	0	Flip charts
1	0	None
1	0	Other sp. _____

29 Do you keep a register of the community activities you carry out?

1	Yes
0	No

30 Do your health promotion activities include promoting the following

Yes	No	
1	0	Eye conditions
1	0	Vitamin A supplementation of pregnant women
1	0	Exclusive breast feeding of infants (0-12 months)
1	0	Vitamin A supplementation of young children
1	0	Measles immunization
1	0	Child nutrition
1	0	Diabetes prevention
1	0	Safe water
1	0	Safe sanitation
1	0	Household waste disposal

31 Experience of response to key health care messages by community

Well	So-so	V poor	Not applic	
3	2	1	0	Vitamin A supplementation: pregnant women
3	2	1	0	Exclusive breast feeding infants 0-12mn
3	2	1	0	Vitamin A supplementation: young children
3	2	1	0	Measles immunization
3	2	1	0	Child nutrition
3	2	1	0	Diabetes prevention
3	2	1	0	Safe water
3	2	1	0	Safe sanitation
3	2	1	0	Household waste disposal

32 What has been your experience with creating demand for health care in the community?

1	There is a lot of need in the community
2	There is moderate need in the community
3	It is important for a few people in the community
4	The community does not need it.
5	Other sp. _____

33 What do you usually do after identifying people in the community with health problems?

1	Refer orally
2	Refer with referral slip
3	Accompany to health centre
4	Other sp. _____

34 How well do you think patients comply with referral?

1	Good compliance
2	Fair compliance
3	Poor compliance
4	Other sp. _____

Do you make follow up home visits to encourage compliance?

1	Yes
0	No

35 Do you get feedback from the facility about referrals?

0	Never
1	Sometimes
2	Always
3	Other sp. _____

36 How often are you supervised by the JCHEW?

1	Weekly
2	Monthly
3	Quartlerly
4	Irregularly
5	Never/very rare

37 What is the opinion of the supervision you receive?

1	Very helpful
2	Helpful
3	A bit helpful
4	Not helpful
5	Not applicable - not supervised

38 The most challenging part of your health promotion activities. Choose the 2 most important.

1st	2nd	
1	1	Poor supervision
2	2	Lack of knowledge about health conditions
3	3	Heavy workload
4	4	No/Poor financial or non-financial incentives.
5	5	Lack of needed needed supplies
6	6	Transport around the community.
7	7	Other sp. _____

Now, I would like to ask you some questions on health promotion for eye health.

39 Where do patients with eye complaints go for treatment? *(Tick all that apply)*

Yes	No	
1	0	Government Hospital
1	0	Private Hospital
1	0	Private Clinic
1	0	PHC Centre
1	0	PMV/ Community pharmacist
1	0	Traditional healer
1	0	Don't know
1	0	Other sp. _____

40 What has been your experience with health promotion for eye care?

1	There is a lot of need in the community
2	It is important for a some peope in the community
3	I have no experience with it
4	The community does not need it.
5	Other sp. _____

41 How confident are you about identifying (not treating) eye problems

1	Very confident
2	A little confident
3	Not confident at all
4	I don't know
5	Other sp. _____

42 What is your perception about undergoing training for eye health promotion?

1	Will welcome it and do the training
2	Will welcome it but no time for training
3	Health workers are already overburdened
4	Other sp. _____

43 What kind of support will you need to carry out health promotion for eye health. Choose 2 most important

1st	2nd	
1	1	Support from the supervisor
2	2	More knowledge in eye care from training
3	3	Employ more staff to reduce the workload
4	4	More financial or non-financial incentives
5	5	Make sure our tool kit is well stocked with the needed suppli
7	7	Provide transport for referred patients to access health centr
8	8	Other sp. _____

Thank you for your time

Appendix 8 Head of Facility Topic guide

Topic Guide: Head of Facility

Aim: To assess the perceptions/experiences of facility heads about PEC implementation in the facility.

Introduction

How long have you worked here?

What is your main role in this facility?

Next, I would like to ask you some questions about your role as the Head of this Facility.

Please can you describe the activities which take place in this facility over the course of a usual week. For example, what happens on Mondays?

1. **Leadership and Governance**
   - Do you supervise Health Promotion Activities in this community?
   - If yes, what has your experience been like?
     - *Probe: What groups are targeted? e.g. new-borns, mothers and their young children, the elderly*
     - *Probe: What health promotion activities are supervised*
     - *Probe: What have been your challenges and opportunities. Ask for personal examples*
     - *Probe for how eye health activities are supervised*
     - *Who supervises outreach in this community?*
2. **Human Resources for Eye Health**
   - As a member of this community, can you tell me who people usually consult first when they have a health problem?
     - *What about people with eye conditions – who do they usually consult first? What do you think about that?*
     - *What would you feel about working with these groups to encourage them to refer eye patients to this facility?*
   - Could you describe what happens when a patient with an eye problem comes to this facility? Give an example of when it happened.
     - *Probe for what knowledge and skills staff have to handle eye cases*
     - *Probe for how confident (s)he is in supervising primary eye care and what resources (s)he may need to effectively carry out primary eye care supervision-training, time, supervision*

- *Probe for what in service training is available for health workers and whether any is available for primary eye care*

3. Service Delivery

- I understand that the facility sometimes produces key messages for health promotion. Can you explain the process of how you do this? Give examples from your personal experience
    - *What do you think about incorporating key messages for promoting eye health?*
    - *What has been your experience in demand creation for a new intervention? Give an example. e.g. insecticide treated mosquito nets*
- Are any NGOs supporting services in this facility or in the community?
    - *Probe: what do they support?*
    - *How effective has their support been?*
    - *In what way can these NGOs support eye care?*

4. Equipment Technology Consumables.

- Do you face any difficulties in sourcing equipment for this facility?
    - *Probe for how one gets equipment fixed when it breaks down*
- Based on your experience, do you think there will be any problems sourcing eye care equipment in this facility? *(Snellen distance visual acuity chart; near visual acuity chart, torches and batteries).*
- How are drugs stocked I this facility? Do you have any problems with drugs being out of stock in this facility?
    - *Probe: how often are drugs out of stock?*
    - *Probe: what is done about this?*
    - *Probe for an example*
- How often are drugs you want to prescribe not provided in the central medical store?
    - *Probe: What do you do under these circumstances?*
- Based on your experience, are there problems sourcing consumables in this facility? *(saline, cotton wool, gauze, plaster)*
- How easy will it be to stock medications for eye conditions in this facility?
    - *Probe for how easy it will be to stock eye medications, what the cost of medications are, what the demand for eye medications is like.*
- How is eye care medication dispensed to patients in this facility with eye conditions who need them?
    - *Probe for who prescribes the medication.*

- *Probe for how much the drugs cost*

- Who in the facility is responsible for maintaining stocks of medication?
  - *Probe for what training if any they have had in this?*

5. Health Management Information Systems

I now would like to ask you some questions about the information you record in this facility.

- Please can you explain to me who is responsible for completing the patient registers?
  - *Probe: How is patient attendance documented?*
  - *Probe: Few eye conditions are registered in this facility (from Quant tool), why is this the case?*
- What is the process for referring patients to referral centres?
  - *Probe for how compliant patients are.*
  - *Probe for assisted referrals-phone calls or transportation.*
  - *Probe in what way if any feedback is given from the referral centre.*
- In what way are staff shifts managed*?*
  - *Probe: Is this a 24 hour facility?*
- Probe: Is there an inventory for drugs and consumables?
  - *Probe: who is responsible for maintaining it*
  - *Probe: whether staff have received training in inventory management.*
- I understand that you collate data on the number of patients who attend the facility to send to the district on a monthly basis. Does this include patients with eye conditions?
  - *Probe for who determines what data are sent to the district supervisor.*

Closing

- How do you think demand for eye care in the community can be created?
- Some Primary Health Facilities in other states deliver primary eye care in their facilities. What is your opinion about that? Do you think it can work in your facility? Why do you say so?
- Name 3 of the most important things that would make delivery of primary eye care successful in your facility?
- Finally, is there anything I have left out or something else you would like to mention regarding primary eye care in this facility?
- If you think of something later, please feel free to contact me.

Thank you for your time

Appendix 9 District Supervisor Topic Guide

Topic Guide: District Level Supervisors

Aim: To assess (i) the extent to which eye health is supervised or can be supervised by district supervisors (ii) the perceptions/experiences of supervisors about PEC implementation in the district.

How long have you worked here?

What is your main role in this district?

Next, I would like to ask you some questions about your role as a supervisor.

Leadership and Governance

- How do you carry out the supervision of primary health facilities in this district?
    - *Probe for how often each facility is supervised, how often (s)he goes on supervisory visits.*
    - *Are supervisory visits regular? Planned or impromptu?*
    - *Is there a supervisor's manual for District level supervision? Probe for what activities are supervised.*
    - *Probe for what have been the challenges for supervision e.g. transport, time, funding. Ask for personal examples.*
    - *What do you usually do during a supervisory visit? (check register, drugs in store; teaching, observation of case management; solving problems; giving feedback and recommendations)*
- Do you supervise eye health activities at primary health care facilities in this district?
    - *If yes, what has been your experience?*
    - *If no, is there any reason why you don't? Please explain.*
    - *Do any of the facilities you make supervisory visits to deliver eye care by visiting eye care professionals? If so, is this activity included in your visits?*
    -

Human Resources for Health.

- How would you describe your workload?
    - Probe for what happens on a normal working day.
- How confident are you about supervising PEC activities in this district?
    - *Probe: What training if any have you undergone in supervision of PEC?*
    - *Probe: What is your opinion of you and other district supervisors undergoing in-service training to supervise primary eye care in the districts?*
- Do most facilities have the full complement of staff?
    - *Probe: if not why not*

- *Probe: it seems as if many facilities use volunteer CHEWs/JCHEWs i.e., they are not registered on the payroll. Why is this the case?*

- What is staff turnover like in this district?
  - *Probe for how easy it is to recruit staff. Give an example of when this happened.*
  - *Is absenteeism a problem? Why?*
- How is in-service training of newly recruited staff done?
  - *Probe: Who does the training? How can staff to undergo in service training for eye care in this district?*
  - Probe: Do any *NGOs work in this community? How could they facilitate PEC training for health workers-VHWs, JCHEWs, CHEWs, etc?*

Service Delivery

- I understand that some districts in other states deliver primary eye care in their facilities. What do you think about making eye care available to community members at primary health facilities in this district? Why do you say so?
  - *Probe: What do you think will make it work?*
  - *What do you see as the problems in delivering effective eye care?*
- I understand that community members sometimes seek eye care from inappropriate sources such traditional health practitioners or patent medicine vendors.. What is your opinion on working with these sources to train them to refer patients to you?.
- Is there any relationship between the health department and the education department at district level?
  - *Probe for how school eye health can be incorporated in schools?*

Equipment, technology and consumables.

- How are regular supplies of standard drugs and consumables ensured for facilities in this district?
  - *Probe: How regular or irregular is the supply?*
  - *Probe: What affects this supply?*
  - *Probe: How might eye drugs be supplied regularly to facilities in this district?*
- What processes would be required to supply equipment for eye care which is not currently listed as essential for PHCs, such as for examining the eyes or measuring vision?
  - *Probe for how basic eye equipment e.g. Snellen's chart can be procured.*
  - *Probe for how new equipment is procured (sourced and supplied).*
- What processes would be required to supply medication for eye medication which not currently listed as essential for PHCs, such as for allergic eye disease?
- How are health promotion materials developed in this district?
- What processes would be required to develop new health promotion materials for eye care?

HMIS

- What data do you collect from the primary health facilities in your district?

- *Probe: Who determines what data is collected?*
- *Who collects it?*
- *What happens to this data*?
- *How can eye care data be included in the data collected from the facilities?*

Conclusion

- What do you see as the main problems that might prevent primary eye care from being delivered well in this district?
- Name 3 of the most important things that would make delivery of primary eye care successful in your district.
- Finally, is there anything I have left out, or something you would like to mention regarding primary eye care in this district?

Thank you for your time.

Appendix 10 Information Sheets and Consent Forms

Information Sheets and Consent Forms

Assessing the technical feasibility of integrating eye care into primary health care.

INFORMATION SHEET for District Supervisor.

My name is Ada Aghaji and I am a research degree student working on a project with staff at the London School of Hygiene and Tropical Medicine, under the supervision of Prof Clare Gilbert and Dr Helen Burchett. I am carrying out research on Primary Eye Care in your state and would like you to participate.

What is the purpose of the project? Studies from Nigeria have shown that eye diseases are quite common, but the majority of people do not have access to eye care services, especially in rural areas. Providing eye care services at PHC level may improve access to eye care. The purpose of this project is to find out if it is possible to provide eye care at Primary Health Centres in Nigeria.

Why have I been selected to take part? You have been selected to take part because you are the District Supervisor in the district that we are studying and you can give us important information on the workings of PHC in your state and how it will affect the implementation of Primary Eye Care. We will appreciate it if you take part in this project. However, participation is voluntary. You can decline to take part or withdraw from the study at any point without having to give a reason.

What will happen if I agree to take part?

You will be interviewed in your office or any convenient place you may choose. It may take between 45 minutes to an hour. With your permission, we would like to record the interview so that we do not have to rely on notes or our memory on what you say. After we have typed up the interview the recording will be destroyed.

Are there any benefits to my taking part?

You will be contributing to the body of information on primary health care and helping to shape policy. Also, we understand that you may have other business today. You will be compensated for your time.

Will what I say remain confidential? All information is confidential. We may use a tape recorder, but strict anonymity will be maintained as we will not use any names in the reporting.

Are there any risks to my taking part? There may be a slight risk of your quote being recognised, but we will ensure that no names or specific titles will be used.

What will happen to the information you obtain during this project?

Information from this project will be analysed and the results will be disseminated to the World Health Organisation, government, health workers and by publication.

Consent. If you have agreed to participate, please read the consent form below and sign it. Thank you.

Further Questions. If you have further questions about this project, please contact Ada Aghaji at any of the addresses below:

International Centre for Eye Health, London School of Hygiene and Tropical Medicine, Keppel Street. WC1E, 7HT.
Ada.Aghaji@lshtm.ac.uk or call +2348033135567

Assessing the technical feasibility of integrating eye care into primary health care.

INFORMED CONSENT FORM for District Supervisor

Investigators name and contact details.

Dr Ada Aghaji
International Centre for Eye Health, London School of Hygiene and Tropical Medicine, Keppel Street. WC1E, 7HT.
Ada.Aghaji@lshtm.ac.uk
+2348033135567

To be completed by participant. Please tick as appropriate	Yes	No
I have read the information above and I understand what is expected of me if I take part	☐	☐
I have had the opportunity to ask questions about the study and any questions I have asked has been answered to my satisfaction	☐	☐
I agree that if I am interviewed, my interview can be recorded	☐	☐
I agree that anonymous quotes of what I say can be used in reports and publications	☐	☐
I agree to take part in the study	☐	☐

Print Name of Participant_____ **Name of researcher**_____

Signature of Participant _____ **Signature of researcher**_____

Date _____ **Date**_____

Day/month/year

Assessing the technical feasibility of integrating eye care into primary health care.

INFORMATION SHEET for Primary Health Centre Head of Facility.

My name is Ada Aghaji and I am a research degree student working on a project with staff at the London School of Hygiene and Tropical Medicine, under the supervision of Prof Clare Gilbert and Dr Helen Burchett. We are carrying out research on Primary Eye Care in your facility and would like you to participate.

What is the purpose of the project? Studies from Nigeria have shown that eye diseases are quite common, but the majority of people do not have access to eye care services, especially in rural areas. Providing eye care services at PHC level may improve access to eye care. The purpose of this project is to find out if it is possible to provide eye care at Primary Health Centres in Nigeria.

Why have I been selected to take part? You have been selected to take part because you are the head of the PHC that we are studying and you can give us important information on the workings of your facility and how they will affect the implementation of primary eye care. We will appreciate it if you take part in this project. However, participation is voluntary. You can decline to take part without having to give a reason and you can also withdraw from the study at any point without having to give a reason.

What will happen if I agree to take part? You will be assisted to fill a questionnaire on the health activities in your facility. In addition, you may be asked to participate in a short, structured interview- either alone or with other PHC participants in your office or any agreed on convenient location. It may take between 45 minutes to an hour. With your permission, we would like to record the interview so that we do not have to rely on notes or our memory on what you say. After we have typed up the interview the recording will be destroyed. In addition, photographs will be taken of this facility which may be used for publication or electronically in a manner in which you may or may not appear and in which you may or may not be identified.

Are there any benefits to my taking part?

You will be contributing to the body of information on primary health care and helping to shape policy. Also, we understand that you may have other business today. You will be compensated for your time.

Will what I say remain confidential? All information is confidential. We may use a tape recorder, but strict anonymity will be maintained as we will not use any names in the reporting.

Are there any risks to my taking part? There may be a slight risk of your quote being recognised, but we will ensure that no names or specific titles will be used.

What will happen to the information you obtain during this project? Information from this project will be analysed and the results will be disseminated to the World Health Organisation, government, health workers and by publication.

Consent. If you have agreed to participate, please read the consent form below and sign it. Thank you.

Further Questions. If you have further questions about this project, please contact Ada Aghaji at any of the addresses below:

International Centre for Eye Health, London School of Hygiene and Tropical Medicine, Keppel Street. WC1E, 7HT.
Ada.Aghaji@lshtm.ac.uk or call +2348033135567

Assessing the technical feasibility of integrating eye care into primary health care.

INFORMED CONSENT FORM for Primary Health Centre Head of Facility.

Investigators name and contact details.
Dr Ada Aghaji
International Centre for Eye Health, London School of Hygiene and Tropical Medicine,
Keppel Street. WC1E, 7HT.
Ada.Aghaji@lshtm.ac.uk
+2348033135567

To be completed by participant. Please tick as appropriate	Yes	No
I have read the information above and I understand what is expected of me if I take part	☐	☐
I have had the opportunity to ask questions about the study and any questions I have asked has been answered to my satisfaction	☐	☐
I agree that if I am interviewed, my interview can be recorded	☐	☐
I agree that you can take photos of the facility	☐	☐
*I agree that you can take photos of me in the facility during our discussions or in the course of my work in the facility	☐	☐
I agree that anonymous quotes of what I say can be used in reports and publications	☐	☐
I agree to take part in the study	☐	☐

*Participant may decide not to consent to have his/her picture taken. All other fields must be filled for the participant to take part in the study.

Print Name of Participant_____ **Name of researcher**_____

Signature of Participant _____ **Signature of researcher**_____

Date _____ **Date**_____

Day/month/year

Assessing the technical feasibility of integrating eye care into primary health care.

INFORMATION SHEET for Junior Community Health Extension Workers

My name is Ada Aghaji and I am a research degree student working on a project with staff at the London School of Hygiene and Tropical Medicine, under the supervision of Prof Clare Gilbert and Dr Helen Burchett. We are carrying out research on Primary Eye Care in your facility and would like you to participate.

What is the purpose of the project? Many people in Nigeria have eye problems and do not know where to go for treatment, especially people living in villages. If eye care is provided at PHCs, many people will be able to receive treatment. We want to find out if it is possible for PHCs to provide some eye care, so that people who need eye care can benefit.

Why have I been selected to take part? You have been selected to take part because you are a health worker in the PHC that we are studying and you can give us some information on how you go about your job in the health centre and how eye care could benefit from it. We will appreciate it if you take part in this project. However, your taking part is up to you. You can decline to take part or withdraw from the study at any point without having to give a reason.

What will happen if I agree to take part? You will be assisted to fill a questionnaire and an observational checklist on your activities in the facility.

Are there any benefits to my taking part? You will be giving us information that could help us make eye care available at PHCs. Also, we understand that you may have other business today. You will be compensated for your time.

Will what I say remain confidential? All information is confidential. Strict anonymity will be maintained as we will not use any names in the reporting.

Are there any risks to my taking part? You may find the process time consuming.

What will happen to the information you obtain during this project? Information from this project will be analysed and the results will be disseminated to the World Health Organisation, government, health workers and by publication.

Consent. If you have agreed to participate, please read the consent form below and sign it. Thank you.

Further Questions.

If you have further questions about this project, please contact Ada Aghaji at any of the addresses below:

International Centre for Eye Health, London School of Hygiene and Tropical Medicine, Keppel Street. WC1E, 7HT.
Ada.Aghaji@lshtm.ac.uk or call +2348033135567

Assessing the technical feasibility of integrating eye care into primary health care.

INFORMED CONSENT FORM for Village Health Workers.

Investigators name and contact details.

Dr Ada Aghaji
International Centre for Eye Health, London School of Hygiene and Tropical Medicine, Keppel Street. WC1E, 7HT.
Ada.Aghaji@lshtm.ac.uk
+2348033135567

To be completed by participant. Please tick as appropriate	Yes	No
I have read the information above and I understand what is expected of me if I take part	☐	☐
I have had the opportunity to ask questions about the study and any questions I have asked has been answered to my satisfaction	☐	☐
I agree that if I am interviewed, my interview can be recorded	☐	☐
I agree that anonymous quotes of what I say can be used in reports and publications	☐	☐
I agree to take part in the study	☐	☐

Print Name of Participant_____ **Name of researcher**_____

Signature of Participant _____ **Signature of researcher**_____

Date _____ **Date**_____

Day/month/year

Appendix 11. Additional Files from Paper 3: Results of a Delphi Exercise.

Appendix 1

Search Strategy for Technical Feasibility Frameworks

Search number	Query	Filters	Search Details	Results
3	(technical feasibility AND (2000/1/1:2018/4/30[pdat])) AND (framework* AND (2000/1/1:2018/4/30[pdat]))	from 2000/1/1 - 2018/4/30	("technical"[All Fields] OR "technicalities"[All Fields] OR "technicality"[All Fields] OR "technically"[All Fields]) AND ("feasibilities"[All Fields] OR "feasibility"[All Fields] OR "feasible"[All Fields] OR "feasiblity"[All Fields]) AND 2000/01/01:2018/04/30[Date - Publication] AND ("framework*"[All Fields] AND 2000/01/01:2018/04/30[Date - Publication])	274
2	framework*	from 2000/1/1 - 2018/4/30	"framework*"[All Fields]	192,596
1	technical feasibility	from 2000/1/1 - 2018/4/30	("technical"[All Fields] OR "technicalities"[All Fields] OR "technicality"[All Fields] OR "technically"[All Fields]) AND ("feasibilities"[All Fields] OR "feasibility"[All Fields] OR "feasible"[All Fields] OR "feasiblity"[All Fields])	16,587

Search Strategy for Primary Eye Care in sub-Saharan Africa

Search number	Query	Filters	Search Details	Results
5	((("primary eye care" AND ((humans[Filter]) AND (1980/1/1:2018/4/30[pdat]) AND (english[Filter]))) OR ((eye disease) AND (primary healthcare) AND ((humans[Filter]) AND (1980/1/1:2018/4/30[pdat]) AND (english[Filter])))) OR ((eye) AND (primary healthcare) AND ((humans[Filter]) AND (1980/1/1:2018/4/30[pdat]) AND (english[Filter])))) AND ((Africa) OR ("sub-Saharan Africa") AND ((humans[Filter]) AND (1980/1/1:2018/4/30[pdat]) AND (english[Filter])))	Humans, English, from 1980/1/1 - 2018/4/30	(("primary eye care"[All Fields] AND ("humans"[MeSH Terms] AND 1980/01/01:2018/04/30[Date - Publication] AND "english"[Language])) OR (("eye diseases"[MeSH Terms] OR ("eye"[All Fields] AND "diseases"[All Fields]) OR "eye diseases"[All Fields] OR ("eye"[All Fields] AND "disease"[All Fields]) OR "eye disease"[All Fields]) AND ("primary health care"[MeSH Terms] OR ("primary"[All Fields] AND "health"[All Fields] AND "care"[All Fields]) OR "primary health care"[All Fields] OR ("primary"[All Fields] AND "healthcare"[All Fields]) OR "primary healthcare"[All Fields]) AND ("humans"[MeSH Terms] AND 1980/01/01:2018/04/30[Date - Publication] AND "english"[Language])) OR (("eye"[MeSH Terms] OR "eye"[All Fields]) AND ("primary health care"[MeSH Terms] OR ("primary"[All Fields] AND "health"[All Fields] AND "care"[All Fields]) OR "primary health care"[All Fields] OR ("primary"[All Fields] AND "healthcare"[All Fields]) OR "primary healthcare"[All Fields]) AND ("humans"[MeSH Terms] AND 1980/01/01:2018/04/30[Date - Publication] AND "english"[Language]))) AND (("africa"[MeSH Terms] OR "africa"[All Fields] OR "africa s"[All Fields] OR "africas"[All Fields] OR "sub-Saharan Africa"[All Fields]) AND ("humans"[MeSH Terms] AND 1980/01/01:2018/04/30[Date - Publication] AND "english"[Language]))	217
4	(Africa) OR ("sub-Saharan Africa")	Humans, English, from 1980/1/1 - 2018/4/30	"africa"[MeSH Terms] OR "africa"[All Fields] OR "africa s"[All Fields] OR "africas"[All Fields] OR "sub-Saharan Africa"[All Fields]	194,607
3	(eye) AND (primary healthcare)	Humans, English, from 1980/1/1 - 2018/4/30	("eye"[MeSH Terms] OR "eye"[All Fields]) AND ("primary health care"[MeSH Terms] OR ("primary"[All Fields] AND "health"[All Fields] AND "care"[All Fields]) OR "primary health care"[All Fields] OR ("primary"[All Fields] AND "healthcare"[All Fields]) OR "primary healthcare"[All Fields])	2,330
2	(eye disease) AND (primary healthcare)	Humans, English, from 1980/1/1 - 2018/4/30	("eye diseases"[MeSH Terms] OR ("eye"[All Fields] AND "diseases"[All Fields]) OR "eye diseases"[All Fields] OR ("eye"[All Fields] AND "disease"[All Fields]) OR "eye disease"[All Fields]) AND ("primary health care"[MeSH Terms] OR ("primary"[All Fields] AND "health"[All Fields] AND "care"[All Fields]) OR "primary health care"[All Fields] OR ("primary"[All Fields] AND "healthcare"[All Fields]) OR "primary healthcare"[All Fields])	2,635
1	"primary eye care"	Humans, English, from 1980/1/1 - 2018/4/30	"primary eye care"[All Fields]	192

Appendix 2

Delphi Round 1 Health Promotion

Technical Complexity of community based interventions which comprises health promotion and prevention

Health promotion includes health messages for healthy people; health prevention comprises health messages for people at risk for eye diseases targeting children and their carers, those aged 40 years and above, people of all ages and those with diabetes.

Category	Criteria	Technical Complexity (Elements that need to be addressed)	Strongly Agree n	Strongly Agree %	Agree n	Agree %	Disagree n	Disagree %	Strongly disagree n	Strongly disagree %
Intervention characteristics										
Basic product design	Stability: usable lifetime and risk of destruction	Posters for health Prevention and promotion are needed.	7	77.8	2	22.2	0	0	0	0.0
		Posters should be made durable by lamination.	5	55.6	2	22.2	2	22.2	0	0.0
	Standardizability: the degree to which an intervention can be standardized	The Posters should be standardised by having the same message per target group.	6	66.7	3	33.3	0	0	0	0.0
		This should be translated into the language of the community as is done for other health promotion posters.	7	77.8	2	22.2	0	0	0	0.0
	Safety profile of the intervention in terms of adverse effects, and risks associated with inappropriate use, e.g. from over-the-counter sales of prescription-only medications	No risk of serious side effects.	5	55.6	1	11.1	2	22.2	1	11.1
		Messages should be clear, unambiguous and understandable displaying appropriate information.	8	88.9	1	11.1	0	0	0	0.0
	Ease of storage e.g. the need for refrigeration. Ease of transport	Health promotion materials do not have any specific requirements for storage and transportation.	4	44.4	4	44.4	1	11.1	0	0.0
Supplies	Need for regular supplies, and the number and types of different supplies needed. Ease of acquisition.	No requirements for regular supplies.	2	22.2	6	66.7	1	11.1	0	0.0
		Different types of posters are be needed for different target groups, e.g. diabetics, the elderly, carers of young children.	7	77.8	2	22.2	0	0	0	0.0
Equipment	High-technology equipment and infrastructure needed. Ease of acquisition	High technological equipment not required.	4	44.4	4	44.4	1	11.1	0	0.0
	Number of different types of equipment needed. Maintenance needed	Low maintenance	6	66.7	3	33.3	0	0	0	0.0
		Health promotion materials relatively easy to acquire.	3	33.3	4	44.4	2	22.2	0	0.0
Delivery characteristics			Strongly Agree n	Strongly Agree %	Agree n	Agree %	Disagree n	Disagree %	Strongly disagree n	Strongly disagree %
Facilities	Retail sector, Outreach services, First-level care, Hospital care	Should be delivered in the community through outreach services for diabetics, carers of young children during maternal and child health activities.	3	33.3	4	44.4	2	22.2	0	0.0
		Should be delivered to specific **groups** that attend the primary health facility e.g. people over 40 years,	4	44.4	1	11.1	4	44.4	0	0.0
		Should be delivered to specific **people** that attend the primary health facility e.g. people over 40 years,	4	44.4	1	11.1	3	33.3	1	11.1
Human resources	Skill level required for service provision	Low skill requirement	2	22.2	3	33.3	1	11.1	3	33.3
		Will require knowledge about community, eye diseases and where to access care.	6	66.7	2	22.2	1	11.1	0	0.0
		Village Health Workers who live in the community should be trained to deliver health promotion in the communities.	6	66.7	3	33.3	0	0	0	0.0
		Facility based workers should deliver health prevention to groups/individuals in the facility.	2	22.2	6	66.7	1	11.1	0	0.0
		Development of the health promotion materials and staff training will require professional instruction.	5	55.6	4	44.4	0	0	0	0.0
	Skill level required for staff supervision. Degree of supervision required.	Mid-level skill required to supervise health promotion/prevention activities.	3	33.3	5	55.6	0	0	0	0.0
	Intensity of professional services in terms of frequency or duration e.g. on schedule/periodic or continuous to	Health Promotion and prevention activities should be delivered on schedule.	6	66.7	3	33.3	0	0	0	0.0
	Need for managerial staff: Management and planning requirements.	Planning will be required to organise target audience to be sensitised in appropriate locations e.g. Mothers or care givers of young children.	7	77.8	2	22.2	0	0	0	0.0
Communication and transport	Dependence of delivery on communication and transport infrastructure: roads, telephones, need for substantial exchange of information between different sectors or levels of care.	Local transport infrastructure will be needed to visit communities.	4	44.4	3	33.3	2	22.2	0	0.0
		Communication between the communities and the Front Line Health Facilities required.	7	77.8	2	22.2	0	0	0	0.0
		Communication in local language required.	7	77.8	2	22.2	0	0	0	0.0
Government capacity requirements			Strongly Agree n	Strongly Agree %	Agree n	Agree %	Disagree n	Disagree %	Strongly disagree n	Strongly disagree %
Regulation/legislation	Need for legislation/regulation, monitoring regulatory measures. Need for enforcement of regulation.	No special legislation required.	3	33.3	3	33.3	1	11.1	2	22.2
		A national prevention of blindness strategy will be ideal as is advocated in the Global Action Plan.	7	77.8	2	22.2	0	0	0	0.0
Management systems	Need for sophisticated management systems. Need for managerial staff. Level of management and planning requirements.	No need for sophisticated management systems.	2	22.2	6	66.7	1	11.1	0	0.0
		Health Promotion logistics should be managed by managerial structure at frontline health facilities.	5	55.6	2	22.2	1	11.1	1	11.1
Collaborative action	Need for inter-sectoral action within government. Need for partnership between government and civil society. Need for partnership between government and external funding agencies	There is need for intersectoral action within government in trachoma endemic areas to implement water sanitation and hygiene programmes.	8	88.9	1	11.1	0	0	0	0.0
		Eye health promotion could be effectively done in schools.	6	66.7	3	33.3	0	0	0	0.0
		Health Promotion will require collaboration with NGOs.	4	44.4	4	44.4	1	11.1	0	0.0
		Collaboration between communities and Front Line Health Facilities is required.	7	77.8	2	22.2	0	0	0	0.0
Usage characteristics			Strongly Agree n	Strongly Agree %	Agree n	Agree %	Disagree n	Disagree %	Strongly disagree n	Strongly disagree %
Ease of use	Need for information and education	Information and education of the target population in the community is necessary.	7	77.8	1	11.1	1	11.1	0	0.0
	Need for supervision	Supervision of the Village Health Workers is important.	8	88.9	1	11.1	0	0	0	0.0
Pre-existing demand	Need for promotion	The burden of ocular morbidity/BLVI has been established in many setting in LMICs, but the demand for eye care services is low. Significant level of health promotion needed.	7	77.8	1	11.1	1	11.1	0	0.0
Black market risk	Need to prevent resale/counterfeiting	In some communities, itinerant couchers and traditional healers may compete with orthodox eye care practitioners for the patients. Need to limit harmful practices of traditional eye healers by engaging them in eye health prevention activities.	4	44.4	4	44.4	1	11.1	0	0.0

Delphi Round 1 Facility Case Management

Technical Complexity of facility-based intervention

Category	Criteria	Technical Complexity (elements that need to be addressed)	Strongly Agree		Agree		Disagree		Strongly disagree	
Intervention characteristics			n	%	n	%	n	%	n	%
Basic product design	Stability/ease of storage/ease of transport	Batteries for torches are not stable in hot climates. Will require frequent replacement.	1	11.1	2	22.2	5	55.6	2	22.2
		Eye drops will require cold storage	1	11.1	5	55.6	2	22.2	1	11.1
		Tetanus toxoid will require cold storage (refridgeration)	6	66.7	1	11.1	1	11.1	0	0.0
		Topical antibiotic ointment does not need cold storage	4	44.4	4	44.4	1	11.1	0	0.0
		Injectable antibiotics for ophthalmia neonatorum will require cold storage	2	22.2	4	44.4	1	11.1	1	11.1
		Sterile saline solution for eye irrigation is needed and is stable	6	66.7	3	33.3	0	0	0	0.0
		High dose vitamin A is needed and is stable	4	44.4	5	55.6	0	0	0	0.0
		All the above consummables will be transported by pre existing PHC transport channels	8	88.9	1	11.1	0	0	0	0.0
	Standardizability	The WHO AFRO; PEC package as 5 algorithms for facility-based care with 12 protocols and 7 standards. Hence the intervention is standardized.	6	66.7	3	33.3	0	0	0	0.0
	Safety profile	None of the products cause any harm. If delivered correctly	4	44.4	4	44.4	1	11.1	0	0.0
Supplies	Need for regular supplies	Regular supplies of eye medication are needed.	8	88.9	1	11.1	0	0	0	0.0
Equipment	High-technology equipment and infrastructure needed	Diagnostic equipment needed: Snellen distance visual acuity chart; near visual acuity chart, torches and batteries.	6	66.7	3	33.3	0	0	0	0.0
		Infrastructure: 6m distance to measure visual acuity.	1	11.1	4	44.4	3	33.3	1	11.1
		Space for counselling required.	4	44.4	5	55.6	0	0	0	0.0
	Number of different types of equipment needed	One set of diagnostic equipment per facility is needed	3	33.3	5	55.6	1	11.1	0	0.0
	Maintenance needed	Torch batteries will need to be charged.	2	22.2	5	55.6	0	0	1	11.1
Delivery characteristics			Strongly Agree		Agree		Disagree		Strongly disagree	
			n	%	n	%	n	%		%
Human resources	Retail sector	Not applicable	0	0	1	11.1	6	66.7	2	22.2
	Outreach services	None (see health promotion framework)	1	11.1	0	0.0	5	55.6	3	22.2
	First-level care	Diagnosis of management of uncomplicated cases can be delivered in Primary Health Centres and Health Posts.	5	55.6	4	44.4	0	0	0	0
	Hospital care	Hospital services are needed for referrals, severe cases and treatment failures , further investigations and management, as required.	7	77.8	2	22.2	0	0	0	0
	Skill level required for service provision	Mid-level skill is required to make a diagnosis (eliciting a history; measuring visual acuity; basic eye examination)	7	77.8	1	11.1	0	0	0	0
		Mid-level skill is required for management of some conditions e.g., eye irrigation; removal of foreign bodies; giving intramuscular injections (tetanus toxoid; antibiotics)	5	55.6	2	22.2	0	0	1	11.1
		Mid-level skill is required for identifying which cases to refer and the level of urgency	5	55.6	2	22.2	0	0	0	0.0
	Skill level required for staff supervision. Degree of supervision required.	Primary Health Care supervisors need a good level of knowledge of eye conditions and their management and be skilled in the above, activity needed.	5	55.6	3	33.3	0	0	1	11.1
		Regular supervision of PEC required.	8	88.9	1	11.1	0	0	0	0
	Intensity of professional services in terms of frequency or duration, e.g., on schedule /periodic or continuous to accommodate emergencies.	Primary Health Care workers trained in eye care should be available continuously to manage emergencies	7	77.8	2	22.2	0	0	0	0
	Management and planning requirements. Need for managerial staff	Managerial staff needed to manage supplies of consumables and plan purchasing	3	33.3	5	55.6	1	11.1	0	0
		Managerial staff needed to establish and maintain referral and feedback mechanisms between the PH centre and eye department/clinic.	4	44.4	2	22.2	3	33.3	0	0
		Managerial systems to coordinate staff rotations to ensure daily facility coverage by trained PEC staff.	5	55.6	3	33.3	1	11.1	0	0
Communication and Transport	Depends on delivery of communication and transport infrastructure	Depends on communication to establish and maintain referral and feedback mechanisms between PH centres and eye department/clinic. Respond to feedback from referrals.	7	77.8	2	22.2	0	0	0	0
		Transportation between PH Centre and referral centre imperative.	6	66.7	2	22.2	1	11.1	0	0
Government capacity requirements			Strongly Agree		Agree		Disagree		Strongly disagree	
			n	%	n	%	n	%	n	%
Regulation/legislation	Need for regulation	Appropriate medication & equipment need to be on the national essential drug list to facilitate availability.	8	88.9	1	11.1	0	0	0	0
	Need for monitoring regulatory measures. Need for enforcement of regulation.	There is need for regulation of drug prescription and dispensing by appropriate staff.	7	77.8	2	22.2	0	0	0	0
		Measles is a notifiable condition and should be reported to appropriate regulatory authorities.	8	88.9	0	0.0	1	11.1	0	0
		Ophthalmia neonatorum is a notifiable condition and should be reported	6	66.7	1	11.1	2	22.2	0	0
Management systems	Need for sophisticated management systems	No need for sophisticated management systems	2	22.2	5	55.6	2	22.2	0	0
Collaborative action	Need for inter-sectoral action within government. Need for partnership between government and civil society.	Intersectoral action within government or partnerships between government and civil society are desirable but not mandatory.	4	44.4	4	44.4	1	11.1	0	0
	Need for partnership between government and external funding agencies	Need for partnerships between governments and NGOs.	4	44.4	5	55.6	0	0	0	0
		NGOs are responsible for the bulk of eye care in LMICs.	2	22.2	5	55.6	2	22.2	0	0
Usage characteristics			Strongly Agree		Agree		Disagree		Strongly disagree	
	XXXXXXNEED FOR INFORMATION		n	%	n	%	n	%	n	%
Ease of use	Need for supervision	Outcomes of consultation at the PH Centre will be reassurance, treatment (and) or referral. At this level, prescribed treatments may not require supervision at home.	3	33.3	3	33.3	3	33.3	0	0
		Referrals to secondary centres may require supervision to ensure compliance and may have to be supported.	7	77.8	2	22.2	0	0	0	0
Pre-existing demand	Need for promotion	The burden of ocular morbidity/BLVI has been established in many setting in LMICs but the demand for eye care services is low. Significant level of health promotion needed.	7	77.8	2	22.2	0	0	0	0
Black market risk	Need to prevent resale/counterfeiting	Need to limit harmful practices of traditional eye healers by training them to identify and refer eye conditions.	6	66.7	3	33.3	0	0	0	0

Appendix 3

Modifications made in the technical complexity requirements after Delphi round 1

Gericke's Framework Dimensions	WHO AFRO PEC Package Component	
	Health Promotion and Prevention	Case Facility Management
	Statements Modified	
Intervention Characteristics		
Basic Product Design	Community Health Workers should be instructed on the potential side effects of any health Promotion materials.	Torches can be solar- powered and are stable. Appropriate and secure storage for drugs and consummables should be available. Eye drops that do not require cool storage should be stocked. Injectable antibiotics for ophthalmia neonatorum may require cool storage but should be available to treat other conditions.
Equipment		Adequate space to support the use of appropriate and standardized visual acuity charts eg 3m or 6m
Delivery Characteristics		
Type of Facility needed	Availability of community leaders to deliver eye health promotion when required Opportunistic eye health promotion can be delivered to groups in the facility Opportunistic health promotion can be delivered to individual people in the facility- if time permits.	
Human Resource Requirement		
Communication and Transport		Existing managerial facility staff should be able to establish and maintain referral and feedback mechanisms between the PH centre
Government Capacity Requirements		
Regulation/Legislation	Health promotion materials should be approved and endorsed by local regulatory authorities. Eye health promotion activities should be recorded and monitored.	
Usage Characteristics		
Ease of use& Need for Supervision		Staff who are available to make supervisory home visits.

Appendix 4

Delphi Round 2 Health Promotion

Technical Capacity for community based interventions which comprises health promotion and prevention

Category	Criteria	Technical Complexity (Elements that need to be addressed)	Technical Capacity needed (Elements that need to be available)	Strongly Agree n	Strongly Agree %	Agree n	Agree %	Disagree n	Disagree %	Strongly disagree n	Strongly disagree %
Intervention characteristics											
	Stability: usable lifetime and risk of destruction	Posters for health Prevention and promotion are needed.	Posters that promote eye health should be available.	7	77.8	2	22.2	0	0	0	0
		Posters should be made durable by lamination.	The availability of durable posters.	4	44.4	5	55.6	0	0	0	0
	Standardizability: the degree to which an intervention can be standardized	The Posters should be standardized by having the same message per target group.	The availability of standardized posters, delivering the same message per target group.	5	55.6	4	44.4	0	0	0	0
		This should be translated into the language of the community as is done for other health promotion posters.	Available posters should be in the language of the community.	6	66.7	1	11.1	2	22.2	0	0
Basic product design	Safety profile of the intervention in terms of adverse effects, and risks associated with inappropriate use, eg. from over-the-counter sales of prescription-only medications.	No risk of serious side effects.	Community Health Workers should be instructed on the potential dangers, such as few, of wall posters of any health Promotion materials. Mechanisms for the proper disposal of old posters should be in place.	3	33.3	3	33.3	2	22.2	1	11.1
		Messages should be clear, unambiguous and understandable displaying appropriate information.	Posters with self explanatory graphics should be available to accommodate the illiterate.	8	88.9	1	11.1	0	0	0	0
	Ease of storage e.g. the need for refrigeration. Ease of transport	Health promotion materials do not have any specific requirements for storage and transportation.	NA								
	Need for regular supplies, and the number and types of different supplies needed. Ease of acquisition.	No requirements for regular supplies.	NA								
Supplies		Different types of posters are be needed for different target groups, e.g. diabetics, the elderly, carers of young children.	Availability of different types of posters for different target groups which are appropriately displayed.	5	55.6	3	33.3	1	11.1	0	0
	High technology equipment and infrastructure needed. Ease of acquisition.	High technological equipment not required.	NA								
Equipment	Number of different types of equipment needed. Maintenance needed.	Low maintenance.	The availability of health promotion materials that are easy to maintain.	5	55.6	4	44.4	0	0	0	0
		Health promotion materials relatively easy to acquire.	A system for the easy procurement of health promotion materials.	6	66.7	3	33.3	0	0	0	0
Delivery characteristics				Strongly Agree n	Strongly Agree %	Agree n	Agree %	Disagree n	Disagree %	Strongly disagree n	Strongly disagree %
	Retail sector, Outreach services , First level care, Hospital care	Should be delivered in the community through outreach services for diabetics, carers of young children during maternal and child health activities.	Availability of health promotion in the community that includes young children and their carers, diabetics and the elderly as their target audience.	4	44.4	5	55.6	0	0	0	0
			Availability of community leaders to deliver eye health promotion when required	3	33.3	2	22.2	3	33.3	1	11.1
Facilities		Should be delivered to specific **groups** that attend the primary health facility e.g. people over 40 years.	The availability of time, space and willingness to deliver opportunistic eye health promotion to groups in the facility	7	77.8	1	11.1	1	11.1	0	0
		Should be delivered to specific **people** that attend the primary health facility e.g. people over 40 years.	The availability of time and the willingness to deliver opportunistic eye health promotion to targeted individuals in the facility e.g. diabetics.	5	55.6	2	22.2	2	22.2	0	0
	Skill level required for service provision	Low skill requirement.	Availability of staff skilled in communicating with community members	7	77.8	2	22.2	0	0	0	0
		Will require knowledge about community, eye diseases and where to access care.	Availability of staff who are knowledgeable about community, eye diseases and where to access care	7	77.8	2	22.2	0	0	0	0
		Village Health Workers who live in the community should be trained to deliver health promotion in the communities.	Availability of village health workers resident in the community who are able to deliver health promotion.	6	66.7	3	33.3	0	0	0	0
		Facility based workers should deliver health prevention to groups/individuals in the facility.	Facility based staff who are able to deliver health promotion.	5	55.6	4	44.4	0	0	0	0
Human resources		Development of the health promotion materials and staff training will require professional instruction.	Availability of professionals to train staff on eye health promotion and develop health promotion materials.	9	100	0	0	0	0	0	0
	Skill level required for staff supervision. Degree of supervision required.	Mid-level skill required to supervise health promotion/prevention activities.	Availability of supervisors who are able to supervise health promotion activities including eye health.	7	77.8	2	22.2	0	0	0	0
	Intensity of professional services in terms of frequency or duration e.g. on schedule periodic or continuous to	Health Promotion and prevention activities should be delivered on schedule.	Availability of staff who regularly deliver health promotion on schedule.	7	77.8	2	22.2	0	0	0	0
	Need for managerial staff. Management and planning requirements.	Planning will be required to organise target audience to be sensitised in appropriate locations eg. Mothers or care givers of young children.	Availability of existing managerial staff who plan and organise target audience to be sensitised in appropriate locations e.g. carers of young children.	5	55.6	4	44.4	0	0	0	0
Communication and transport	Dependence of delivery on communication and transport infrastructure: roads, telephones, need for substantial exchange of information between different sectors or levels of care.	Local transport infrastructure will be needed to visit communities.	The availability of local transport infrastructure to visit communities.	6	66.7	1	11.1	2	22.2	0	0
		Communication between the communities and the Front Line Health Facilities required.	The availability of appropriate communication channels between the community and frontline health facilities.	8	88.9	1	11.1	0	0	0	0
		Communication in local language required.	The availability of staff who are able to communicate in the local language.	9	100	0	0	0	0	0	0
Government capacity requirements				Strongly Agree n	Strongly Agree %	Agree n	Agree %	Disagree n	Disagree %	Strongly disagree n	Strongly disagree %
Regulation/legislation	Need for legislation/regulation, monitoring regulatory measures. Need for enforcement of regulation.	No special legislation required.	Health promotion materials which have been approved and endorsed by local regulatory authorities.	5	55.6	3	33.3	1	11.1	0	0
			Eye health promotion activities that are recorded and monitored.	4	44.4	4	44.4	1	11.1	0	0
		A national prevention of blindness strategy will be ideal as is advocated in the Global Action Plan.	Availability of a national blindness prevention strategy that incorporates eye health promotion.	8	88.9		0	1	11.1	0	0
	Need for sophisticated management systems. Need for managerial staff. Level of management and planning requirements.	No need for sophisticated management systems.	NA								
Management systems		Health Promotion logistics should be managed by managerial structure at frontline health facilities.	Availability of existing managerial structures for Health Promotion that can be used to manage eye health promotion.	4	44.4	3	33.3	1	11.1	1	11.1
	Need for inter-sectoral action within government. Need for partnership between government and civil society. Need for partnership between government and external funding agencies	There is need for intersectoral action within government in trachoma endemic areas to implement water sanitation and hygiene programmes.	Availability of intersectoral activities within government or partnerships between government and civil society.	6	66.7	3	33.3	0	0	0	0
Collaborative action		Eye health promotion could be effectively done in schools.	The availability of existing school health programmes	3	33.3	4	44.4	1	11.1	1	11.1
		Health Promotion will require collaboration with NGOs.	The availability of collaborations with NGOs to provide health promotion	1	11.1	6	66.7	2	22.2	0	0
		Collaboration between communities and Front Line Health Facilities is required.	Availability of collaboration between communities and frontline health communities is required.	7	77.8	2	22.2	0	0	0	0
Usage characteristics				Strongly Agree n	Strongly Agree %	Agree n	Agree %	Disagree n	Disagree %	Strongly disagree n	Strongly disagree %
	Need for information and education	Information and education of the target population in the community is necessary.	Communication channels with community that are available to inform target population	8	88.9	1	11.1	0	0	0	0
Ease of use	Need for supervision	Supervision of the Village Health Workers is important.	Staff who are available to to supervise health promotion activities.	8	88.9	1	11.1	0	0	0	0
	Need for promotion	The burden of ocular morbidity/BLVI has been established in many setting in LMICs, but the demand for eye care services is low. Significant level of health promotion needed.	Staff who are able to engage in health promotion which includes the uptake of eye care when required.	8	88.9	1	11.1	0	0	0	0
Pre-existing demand											
	Need to prevent resale/counterfeiting	In some communities, itinerant couchers and traditional healers may compete with orthodox eye care practitioners for the patients. Need to limit harmful practices of traditional eyehealers by engaging them in eyehealth prevention activities.	Staff who are able and willing to engage with traditional healers and train them to identify and refer eye conditions. A system that supports this training.	7	77.8	2	22.2	0	0	0	0
Black market risk											

Delphi Round 2 Facility Case Management

Technical Capacity for facility-based intervention

Category	Criteria	Technical Complexity (elements that need to be addressed)	Technical Capacities (elements that need to be assessed)	Strongly Agree n	Strongly Agree %	Agree n	Agree %	Disagree n	Disagree %	Strongly disagree n	Strongly disagree %
Intervention characteristics											
Basic product design	Stability/ease of storage/ease of transport	Batteries for torches are not stable in hot climates. Will require frequent replacement	Torches can be solar powered and are stable. They should be available.	6	66.67	3	33.3	0	0	0	0
			Appropriate ambient storage for drugs and consumables should be available	8	88.89	1	11.1	0	0	0	0
		Eye drops will require cold storage.	Eye drops that do not require cold storage should be stocked	5	55.56	3	33.3	0	0	0	0
		Tetanus toxoid will require cold storage (refrigeration)	Tetanus toxoid will require cold storage and should be available from the facility childhood immunization activities	6	66.67	2	22.2	0	0	0	0
		Topical antibiotic ointment does not need cold storage	Topical antibiotic ointment does not require cold storage and should be available	6	66.67	2	22.2	0	0	0	0
		Injectable antibiotics for ophthalmia neonatorum will require cold storage	Injectable antibiotics for ophthalmia neonatorum may require cold storage but should be available to treat other conditions	4	44.44	3	33.3	1	11.1	0	0
		Sterile saline solution for eye irrigation is needed and is stable	Sterile saline solution for eye irrigation is stable and should be available	4	44.44	3	33.3	1	11.1	0	0
		High dose vitamin A is needed and is stable	High dose vitamin A is stable and should be available from Maternal and Child health activities	5	55.56	4	44.4	0	0	0	0
		All the above consumables will be transported by pre-existing PHC transport channels	Pre-existing PHC transport channels should be available to transport PEC consumables.	7	77.78	2	22.2	0	0	0	0
	Standardisability	The WHO AFRO PEC package has 5 algorithms for facility-based care with 12 protocols and 7 standards. Hence the intervention is standardised.	The WHO AFRO PEC Package is standardised and can be available in all Primary Care facilities	6	66.67	3	33.3	0	0	0	0
	Safety profile	None of the products cause any harm, if delivered correctly	Available staff who are trained/can be trained to deliver the intervention correctly so as not to cause harm.	8	88.89	1	11.1	0	0	0	0
Supplies	Need for regular supplies	Regular supplies of eye medication are needed	A medication supply system that can support the regular supply of eye medications and consumables	8	88.89	1	11.1	0	0	0	0
Equipment	High technology equipment and infrastructure needed	Diagnostic equipment needed: Snellen distance visual acuity chart, near visual acuity chart, torches and batteries.	Diagnostic equipment is available: Snellen distance visual acuity chart, near visual acuity chart, torches and batteries.	7	77.78	2	22.2	0	0	0	0
		Where is there 6m distance to measure visual acuity	Adequate space to support the use of appropriate and standardised visual acuity charts.	6	66.67	2	22.2	0	0	0	0
		Space for counselling required.	Adequate space for counselling patients should be available.	8	88.89	1	11.1	0	0	0	0
	Number of different types of equipment needed	One set of diagnostic equipment per facility is needed	The availability of one set of diagnostic equipment.	6	66.67	2	22.2	1	11.1	0	0
	Maintenance needed	Torch batteries will need to be changed	An available system for the maintenance of facility equipment	5	55.56	4	44.4	0	0	0	0
Delivery characteristics				Strongly Agree n	Strongly Agree %	Agree n	Agree %	Disagree n	Disagree %	Strongly disagree n	Strongly disagree %
	First-level care	Diagnoses and management of uncomplicated cases can be delivered in Primary Health Centres and Health Posts.	The availability of eye care services to manage uncomplicated eye conditions.	6	66.67	3	33.3	0	0	0	0
	Hospital care	Hospital services are needed for referrals, severe cases and treatment failures, further investigations and management, as required.	The availability of a referral hospital to manage complicated eye conditions.	8	88.89	1	11.1	0	0	0	0
Human resources	Skill level required for service provision	Mid-level skill is required to make a diagnosis (eliciting a history, measuring visual acuity, basic eye examination)	Staff who are able to make a diagnosis (eliciting a history, measuring visual acuity, basic eye examination)	8	88.89	1	11.1	0	0	0	0
		Mid-level skill is required for management of some conditions e.g. eye irrigation; removal of foreign bodies; giving intramuscular injections (tetanus toxoid, antibiotics)	Staff who are able to manage some conditions e.g. eye irrigation, removal of foreign bodies, giving intramuscular injections (tetanus toxoid, antibiotics)	8	88.89	1	11.1	0	0	0	0
		Mid-level skill is required for identifying which cases to refer and the level of urgency	Staff who are able to identify which cases to refer and the level of urgency	8	88.89	1	11.1	0	0	0	0
	Skill level required for staff supervision. Degree of supervision required.	Primary Health Care supervisors need a good level of knowledge of eye conditions and their management and be skilled in the above activity needed	Primary Health Care supervisors who are knowledgeable of eye conditions and their management.	6	66.67	3	33.3	0	0	0	0
		Regular supervision of PEC required	Supervisors who regularly supervise PHC activities and can supervise PEC activities	6	66.67	3	33.3	0	0	0	0
	Intensity of professional services in terms of frequency or duration, e.g. on schedule (periodic or continuous) to accommodate emergencies.	Primary Health Care workers trained in eye care should be available continuously to manage emergencies	Staff trained in PEC who are available continuously to manage eye conditions, especially emergencies.	8	88.89	1	11.1	0	0	0	0
	Management and planning requirements. Need for managerial staff	Managerial staff needed to manage supplies of consumables and plan purchasing	Existing managerial facility staff who are able to manage the supply of consumables and plan purchasing.	6	66.67	3	33.3	0	0	0	0
		Managerial staff needed to establish and maintain referral and feedback mechanisms between the PH centre and eye department/clinic.	Existing managerial facility staff who are able to establish and maintain referral and feedback mechanisms between the PH centre and eye department/clinic.	5	55.56	2	22.2	1	11.1	0	0
		Managerial systems to coordinate staff rotations to ensure daily facility coverage by trained PEC staff	Existing managerial systems to coordinate staff rotations to ensure daily facility coverage by trained PEC staff.	7	77.78	2	22.2	0	0	0	0
Communication and Transport	Depends on delivery of communication and transport infrastructure	Depends on communication to establish and maintain referral and feedback mechanisms between PH centres and eye department/clinic. Respond to feedback from referrals.	The availability of communication channels to maintain referral and feedback mechanisms between the primary health facility and the referral centre.	6	66.67	3	33.3	0	0	0	0
		Transportation between PH Centre and referral centre imperative	The availability of transportation between the Primary health facility and the referral centre	3	33.33	4	44.4	1	11.1	0	0
Government capacity requirements				Strongly Agree n	Strongly Agree %	Agree n	Agree %	Disagree n	Disagree %	Strongly disagree n	Strongly disagree %
Regulation/legislation	Need for regulation	Appropriate medication & equipment need to be on the national essential drug list to facilitate availability	The inclusion of appropriate medication & equipment need to be on the national essential drug list to facilitate availability.	6	66.67	3	33.3	0	0	0	0
	Need for monitoring regulatory measures. Need for enforcement of regulation	There is need for regulation of drug prescription and dispensing by appropriate staff.	A system that regulates drug prescription and dispensing by appropriate staff	7	77.78	2	22.2	0	0	0	0
		Measles is a notifiable condition and should be reported to appropriate regulatory authorities.	The availability of communication channels to report measles sufferers to relevant authorities.	9	100	0	0	0	0	0	0
		Ophthalmia neonatorum is a notifiable condition and should be reported	The availability of communication channels to report sufferers of ophthalmia neonatorum to relevant authorities.	7	77.78	2	22.2	0	0	0	0
Management systems	Need for sophisticated management systems	No need for sophisticated management systems	Existing managerial structures for Primary Health Care that can be used to manage PEC.	7	77.78	2	22.2	0	0	0	0
Collaborative action	Need for inter-sectoral action within government. Need for partnership between government and civil society	Intersectoral action within government or partnerships between government and civil society are desirable but not mandatory	Availability of intersectoral action within government or partnerships between government and civil society	6	66.67	3	33.3	0	0	0	0
	Need for partnership between government and external funding agencies	Need for partnerships between governments and NGOs	Availability of health care NGOs in the community	0	0	5	55.6	4	44.4	0	0
		NGOs are responsible for the bulk of eye care in LMICs	Availability of eye care NGOs in the community.	1	11.11	5	55.6	2	22.2	1	11.1
Usage characteristics				Strongly Agree n	Strongly Agree %	Agree n	Agree %	Disagree n	Disagree %	Strongly disagree n	Strongly disagree %
	Need for supervision	Outcomes of consultation at the PH Centre will be resolution on treatment (and) or referral. At this level, prescribed treatments may not require supervision at home.	Staff who are available to make supervisory home visits.	5	55.56	2	22.2	2	22.2	0	0
		Referrals to secondary centres may require supervision to ensure compliance and may have to be supported.	Staff who are able to supervise referrals to secondary centres to ensure compliance.	4	44.44	4	44.4	1	11.1	0	0
Pre-existing demand	Need for promotion	The burden of ocular morbidity/BL/VI has been established in many settings in LMICs but the demand for eye care services is low. Significant level of health promotion needed.	Staff who are able to engage in eye health promotion to target audience.	4	44.44	4	44.4	1	11.1	0	0
Black market risk	Need to prevent resale/counterfeiting	Need to limit harmful practices of traditional eye healers by training them to identify and refer eye conditions.	Staff who are able and willing to engage with traditional healers and train them to identify and refer eye conditions. A system that supports this training.	6	66.67	2	22.2	1	11.1	0	0

Appendix 12. Additional Files from Paper 4. BMC HSR Human Resources & Governance.

ADDITIONAL FILE 1

Health posts and primary health care centres: coverage, cadres of staff and their expected responsibilities

Source **Minimum Standards for Primary Health Care In Nigeria. National Primary Heath Care Development Agency. 2015**

	Health posts	**Health Centres**
Population covered	500	10-20,000
Staff	JCHEW (1)	Doctor, if available
		CHO (1)
		CHEW (3)
		JCHEW (6)

Health attendants

The Health Post should be headed by a JCHEW. The JCHEW in addition to other duties see below should supervise Community Resource Persons (CORPs)

CORPs include voluntary village health workers, traditional birth attendants and other community based health service providers recognised by the appropriate health authorities

CORPs should provide health education and health promotion to support antenatal care, post-natal care and encourage institutional deliveries. They should not assist deliveries.

TYPE OF SERVICE	RECOMMENDED PROVIDERS				
	Community Health Officer (CHO)	**Nurse Midwife (NMW)**	**Communirty Health Extension Worker (CHEW)**	**Junior Community Health Extension Worker (JCHEW)**	**Doctor**
A. Health education and promotion	X	X	X	X	X
B. Health management information system	X	X			X
C. Routine home visits; community outreach	X	X	X	X	X
D. Maternal, newborn and child care	Identification of pregnant women, antenatal care, deliveries, post natal care, early childhood nutrition and growth monitoring. Only doctors and nurse midwives will take deliveries or perform basic emergency obstetric care				
	X	X	X	X	X
E. Family planning	Counselling and motivation for family planning and dispensing of contraceptives. Only doctors, CHOs and nurse midwives can insert intrauterine contraceptive devices and give injectibles.				
	X	X	X	X	X
F. Promote proper nutrition; food education	X	X	X	X	X

G. Immunization	X	X	X	X	X
H. HIV AIDS	Voluntary counselling and testing, Follow up care for people living with AIDS. Only doctors and, nurse midwives and CHOs can treat opportunistic infections. Only trained personnel will conduct testing.				
	X	X	X	X	X
I. Tuberculosis	Diagnosis, case tracing and case management in TB centres. JCHEWS do not undertake case management.				
	X		X	X	X
J. Malaria	Treatment of children and distribution of insecticide treated nets. Only doctors and nurse midwives can give intermittent preventive treatment to pregnant women				
	X	X	X	X	X
K. Curative care	Treatment of health conditions should be according to the appropriate standing order for JCHEWs, CHEWs and CHOs				
	X	X	X	X	X
L. Essential drugs	Drug dispensing. Stock management is done by the CHO and Pharmacy technician				
	X	X			X
M. Water and sanitation					
	X	X	X	X	X
N. Oral health	Advice on care of the mouth and teeth. JCHEWS cannot treat oral or dental conditions				
	X	X	X	X	X
O. Community mental health	CHOs, nurse midwives and doctors can give mental health education and identify mental health disorders. All cadres can give advice and counsellig on drugs and substance abuse				

	X	X	X	X	X
P. Referrals	Doctors, CHOs and nurse midwives to give counselling and motivation for referrals.				
	X	X	X	X	X
Q. Maintaining PHC records	Only doctors, nurse midwives and CHO analyse data				
	X	X	X	X	X
R. Monitoring					
	X	X	X		X
S. Supervision	Each cadre may supervise a lower cadre. JCHEWs supervise CORPs				
	X	X	X	X	X
T. Waste disposal	Use of safety boxes and colour coded bins based on WHO standard recommendations.				
	X	X	X	X	X
U. Others	Provision of DOTs treatment and support for TB, malaria and leprosy				
	X	X	X		X
V. Adolescent health	Counselling and support. Treatment of minor ailments				
	X	X	X		X

Health Policy Documents reviewed:

1. National Health Policy, 2016; Promoting the Health of Nigerians to Accelerate Socioeconomic Development.
2. National Health Act 2014

3. National Strategic Health Development Plan (NSHDP) 2010 - 2015
4. National Strategic Health Development Plan 2018-2022,
5. National Guidelines for the Development of Primary Health Care System in Nigeria 2012.
6. National Primary Health Care Development Agency; Minimum Standards for Primary Health Care in Nigeria, 2015
7. National Primary Health Care Development Agency Management Guideline for Primary Health Care Under One Roof. (PHCUOR) 2016
8. National Primary Health Care Development Agency; Implementation guidelines for Primary Health Care Under One Roof (PHCUOR) 2018
9. National Standing Orders for Community Health Officers 2015
10. Essential Medicines List 2016. 6th edition.
11. National Eye Health Strategic Plan, 2014-2019

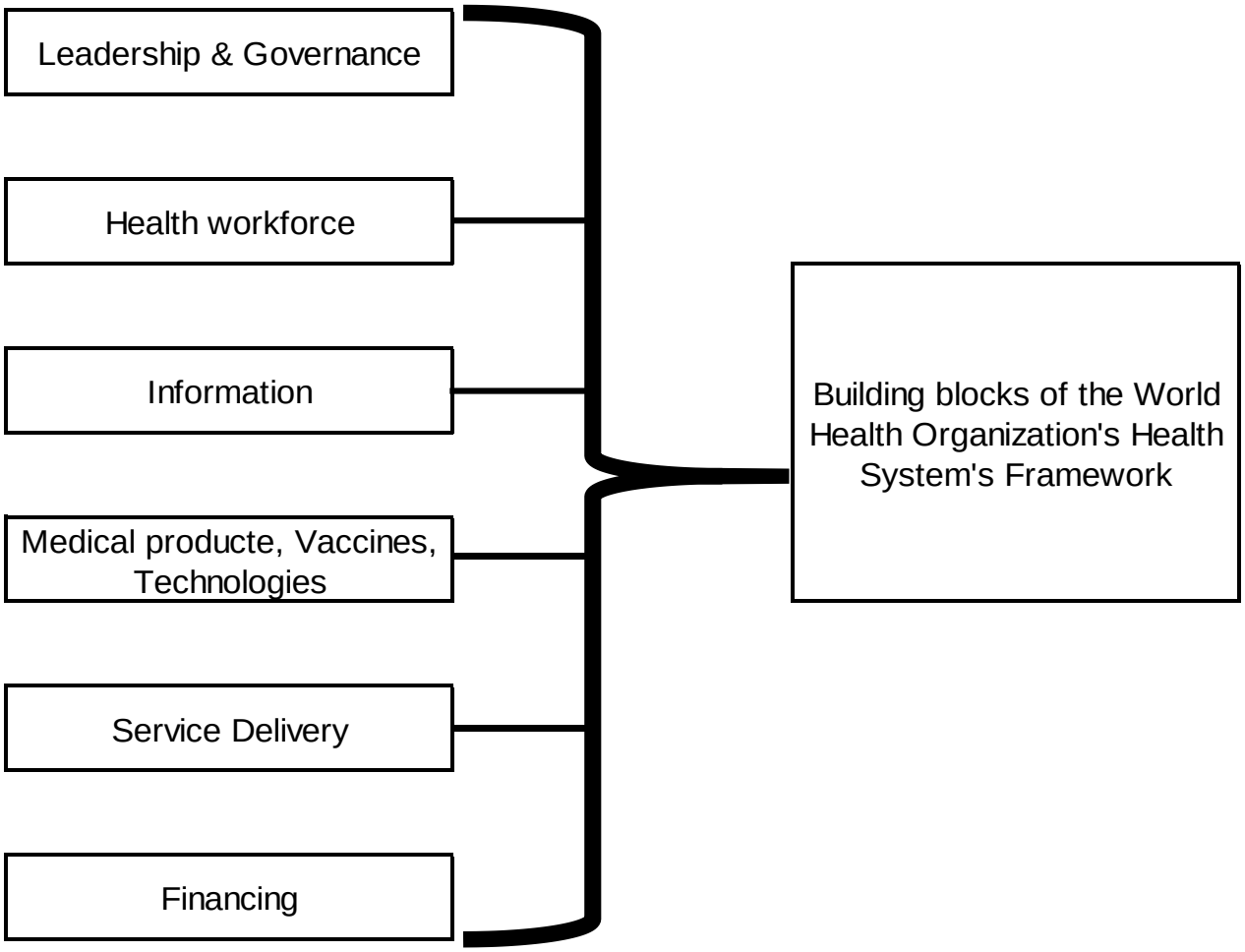
Findings of policy document review, highlighting references to primary health care and eye care, for human resources for health and governance.

Policy document	**Governance**		**Health workforce**	
	Primary Health Care	**Eye health**	**Primary Health Care**	**Eye health**
National Primary Health Care Development Agency; Guidelines for the development of PHC systems in Nigeria, 2012.	Supervision of health facilities to be conducted quarterly by the local government management team. Standing orders ensure quality of care and provide legal backing for health workers, and are advisable for nurses/midwives, doctors, dentists and dental assistants working in PHC.		The state ministry of health is responsible to establish a formal continuing education system for upgrading the knowledge and skill of all practicing health workers within the State and LGAs	
National Health Act, 2014	The Basic Health Care Provision Fund shall be established and the NPHCDA shall disburse this fund to state primary health care development authorities.		Mandates the development and implementation of a Basic Health Care Provision Fund. 10 per cent of the fund shall be used for the development of human resources for PHC	
Minimum Standards For Primary Health Care in Nigeria, 2015	Supervisors should be at least one level above those supervised		There should be a minimum number, mix and skill sets required in each facility type. [details of cadres listed]. It is recommended that the cadres are	

Policy document	Governance		Health workforce	
	Primary Health Care	Eye health	Primary Health Care	Eye health
			matched to services based on their competencies.	
National Eye Health Strategic Plan, 2014-2019		Objective: to advocate for policy that includes PEC as an integral part of PHC.		PHC workers will be integrated into PEC through workshops and seminars on the identification and management of some basic eye care conditions.
National Primary Health Care Development Agency Management Guideline For Primary Health Care Under One Roof. (PHCUOR) 2016		Objective: to implement a minimum package for prevention and control of non-communicable diseases including the provision of PEC to reduce preventable blindness which contributes to increased morbidity and mortality.	PHC management team should develop a sustainable system for human resources for health advancement and capacity-building.	
National Health Policy 2016	PHC shall remain the basic philosophy and central focus for national health development. The overall policy directives for PHC shall include strengthening of PHC management through a unified governance system at the state and LGA levels.	Objective: to integrate eye care services into the existing national health programs.	To provide appropriate and adequate human resources for healthcare at all levels of the health system.	

Policy document	Governance		Health workforce	
	Primary Health Care	**Eye health**	**Primary Health Care**	**Eye health**
Implementation guidelines for Primary Health Care Under One Roof (PHCUOR) 2018	The State PHC Board is an administratively autonomous and self-accounting PHC entity established by law to manage PHC in the State as recommended by the 54th National Council on Health through Resolution 29, backed up by the National Health Act of 2014.			
National Strategic Health Development Plan II, 2018- 2022		Develop/adapt policies, plans and programmes for eye health and prevention of visual impairment. Establish a functional unit for eye health at the Federal and State Ministries of Health. Promote establishment of a multi-sectoral coordination platform for eye health.		

The World Health Organization's Health System's Framework Building Blocks



(1) World Health Organization. Everybody's business--strengthening health systems to improve health outcomes: WHO's framework for action. 2007

Codes for data analysis of semi-structured interviews.

	Code	Interpretation
	Health workforce	Any information relating to the Employment, Attrition, staff turnover, staff training, number and distribution of staff, staff workload,
	Governance	Any information relating to Policy, Supervision, Discipline, Leadership, clinical guidelines, oversight and accountability
	Information	Any information relating to data collection; staff and patient registers, data transmission and dissemination, referral data
	Service Delivery	Any information pertaining to services delivered in the facilities or communities, types of interventions, target clients, location
	Medical Products, Vaccines, Technology	Any information pertaining to the availability, procurement and maintenance of equipment and technologies and supply delivery mechanisms for consumables.
	Financing	* Out of the scope of this research

1. World Health Organization. Everybody's business--strengthening health systems to improve health outcomes: WHO's framework for action. 2007.

Appendix 13. Additional Files from Paper 5 BMC HSR Equipment Service Delivery

Document	Service Delivery		HMIS		Drugs, Equipment, Infrastructure	
	PHC policy	PEC policy	PHC policy	PEC policy	PHC policy	PEC policy
National Strategic Health Development Plan 2018-2022.	Objective: to strengthen Nigeria's health system, particularly the PHC subsystem, to deliver quality, effective, efficient, equitable, accessible, affordable, acceptable and comprehensive health care services to all Nigerians	· Part of the package for key non-communicable diseases includes screening for eye disease at primary level, the diagnosis and provision of basic eye treatment services and referrals, and rehabilitation for the visually impaired. · A scale-up provision of comprehensive (preventive, curative and rehabilitative) and equitable eye care services across all levels of the health system, from PHC level, with emphasis on vulnerable groups such as children and the elderly is planned/recommended. · Erythromycin ointment for ocular prophylaxis of the new-born included in the package for new-born health at all levels		Recommends assessment of the prevalence and causes of vision loss to generate more current data and track trends over time	· Accelerate revitalization of PHC infrastructure for improved access to health services · Endorses the integration of essential eye health medicines, equipment and technologies into the logistics supply chain management system at all levels	Erythromycin ointment for ocular prophylactic of the new-born included in the package for new-born health at all levels.
NPHCDA Minimum standards for PHC in Nigeria 2015			· Data are generated by maintaining records which includes completion of cards, routine and notifiable disease forms, HMIS register and summary forms. · All health facilities are to submit hard copies of routine data to LGA M & E officers for entry into the DHIS2 platform on a monthly basis, while LGAs are to submit to States quarterly.			· Recommends that Chloramphenicol eye drops and ointment, and Chlortetracycline ointment be available at health centres as part of the minimum standards for PHC · Snellen's chart and pen torches should be available in health centres but not in health posts.
National Essential Medicines List 2016.						Chloramphenicol eye drops and ointment, and Chlortetracycline ointment to be

Document	Service Delivery		HMIS		Drugs, Equipment, Infrastructure	
	PHC policy	PEC policy	PHC policy	PEC policy	PHC policy	PEC policy
						available at primary health centres. Erythromycin not included.

Appendix 13

Additional file 1. National Health Policy Documents Reviewed. Health policies that support the implementation of PEC in Nigeria with regard to service delivery, HMIS, infrastructure, equipment and consumables.

Document	Service Delivery		HMIS		Drugs, Equipment, Infrastructure	
	PHC policy	PEC policy	PHC policy	PEC policy	PHC policy	PEC policy
National Health Act 2014.	50% of the Basic Health Provision Fund to provide basic minimum package of health services to citizens, in eligible primary or secondary health care facilities through the National Health Insurance Scheme (NHIS).		· The Federal Ministry of Health shall facilitate and co-ordinate the establishment, implementation and maintenance by State Ministries, LGA Health Authorities and the private health sector of the health information systems at national, state and local government levels to create a comprehensive National Health Management Information System. · The Minister may, for the purpose of creating, maintaining or adapting databases within the national health information system….prescribe categories or kinds of data for submission and collection and the manner and format in which and by whom the data are to be compiled or collated and shall be submitted to the Federal Ministry of Health.		· Mandates the establishment of the Basic Health Care Provision Fund: 20% to be used for essential drugs, vaccines and consumables for eligible PHC facilities. · Recommends that 15% of the Basic Healthcare Fund be used to provide and maintain facilities, equipment and transport for eligible PHC facilities.	

Document	Service Delivery		HMIS		Drugs, Equipment, Infrastructure	
	PHC policy	PEC policy	PHC policy	PEC policy	PHC policy	PEC policy
					· A compendium of drugs approved for use in health facilities throughout the Federation (in this Act referred to as the "Essential Drugs List"), to be reviewed periodically by National Drugs Formulary, and Essential Drugs List Review Committee.	
National Health Policy 2016	to provide and ensure access to, and use of, high quality and equitable health care services by all Nigerians, particularly at PHC level.	To build capacity for eye care services delivery at all levels	· Objective: to provide timely reliable and accurate data that will inform policy making, evidence-based decisions and resource allocation for improved health care at all levels. · The NPHCDA has been mandated to provide annual reports on the status of PHC implementation nationwide. · Objective: To strengthen data infrastructure, including ICT infrastructure at all levels · To institutionalize an integrated and sustainable health information system for decision-making at all levels in Nigeria		Supports the NHA that 15% of the Basic Healthcare Fund be used to provide and maintain facilities, equipment and transport for eligible PHC facilities	
National PHC Development Agency: Integrating PHC Governance in Nigeria: PHC under one roof. 2016.		As part of the minimum package for prevention and control of non-communicable diseases, the NPHCDA recommends the provision of primary eye care to reduce preventable blindness which contributes to increased morbidity and mortality.				

Additional file 2. Framework for semi structured interviews.

Topic Guide: Head of Facility

Aim: To assess the perceptions/experiences of facility heads about PEC implementation in the facility.

Introduction

How long have you worked here?

What is your main role in this facility?

Next, I would like to ask you some questions about your role as the Head of this Facility.

6. **Leadership and Governance.**

- I understand that you supervise Health Promotion Activities in this community. What has your experience been like?
    - *Probe: What groups are targeted? e.g. new-borns, mothers and their young children, the elderly.*
    - *Probe: What health promotion activities are supervised.*
    - *Probe: What have been your challenges and opportunities. Ask for personal examples.*
    - *Probe for how eye health activities are supervised.*

7. **Human Resources for Eye Health**

- As a member of this community, can you tell me who people usually consult first when they have a health problem?
    - *What about people with eye conditions – who do they usually consult first? What do you think about that?*
    - *What would you feel about working with these groups to encourage them to refer eye patients to this facility?*
-
- Could you describe what happens when a patient with eye problems comes to this facility? Give an example of when it happened.
    - *Probe for what knowledge and skills staff have to handle eye cases.*
    - *Probe for how confident (s)he is in supervising PEC and what resources (s)he may need to effectively carry out PEC supervision-training, time, supervision.*
    - *Probe for what in service training is available for health workers and whether any is available for PEC.*

8. Service Delivery

- I understand that the facility sometimes produces key messages for health promotion. Can you explain the process of how you do this? Give examples from your personal experience.
    - *What do you think about incorporating key messages for promoting eye health?*
    - *What has been your experience in demand creation for a new intervention? Give an example. e.g. Insecticide treated mosquito nets.*
- Are any NGOs supporting services in this facility or in the community?
    - *Probe: what do they support?*
    - *How effective has their support been?*
    - *In what way can these NGOs support eye care?*

9. Equipment Technology Consumables.

- Do you face any difficulties in sourcing equipment for this facility?
    - *Probe for how one gets equipment fixed when it breaks down.*
- Based on your experience, do you think there will be any problems sourcing eye care equipment in this facility? *(Snellen distance visual acuity chart; near visual acuity chart, torches and batteries).*
- Based on your experience, do you think there will be any problems sourcing consumables in this facility?? *(saline, cotton wool, gauze, plaster)*
- How would easy will it be to stock eye medications in this facility.
    - *Probe for how easy it will be to stock eye medications, what the cost of medications are, what the demand for eye medications is like.*
- How is eye care medication dispensed to patients in this facility with eye conditions who need them?
    - *Probe for who prescribes the medication. Probe for how much the drugs cost.*
    - *Probe: What happens when stock outs occur? Please give an example of when this occurred.*
- Who in the facility is responsible for maintaining stocks of medication?
    - *Probe for what training if any they have had in this?*

10. Health Management Information Systems

I now would like to ask you some questions about the information you record in this facility.

- Please can you explain to me who is responsible for completing the patient register?
    - *Probe: How is patient attendance documented?*
    - *Probe: If eye conditions have not been registered in this facility (from Quant tool), why is this the case?*

- What is the process for referring patients to referral centres?
    - *Probe for how compliant patients are.*
    - *Probe for assisted referrals-phone calls or transportation.*
    - *Probe in what way if any feedback is given from the referral centre.*
- In what way are staff shifts managed*?*
    - *Probe: Is this a 24-hour facility?*
- Probe: In what way do staff manage an inventory for drugs and consumables?
    - *Probe for record keeping.*

- *Probe whether staff have received training for inventory management.*

- I understand that you collate data and send to the district. Is eye health data included?
- *Probe for who determines what data is sent to the district supervisor.*

Closing.

- How do you think demand for eye care in the community can be created?
- Some Primary Health Facilities in other states deliver PEC in their facilities. What is your opinion about that? Do you think it can work in your facility? Why do you say so?
- Name 3 of the most important things that will be necessary to make PEC work successfully in your facility.
- Finally. Is there anything left out or something you would like to mention regarding primary eye care in this facility?
- If you think of something later, please feel free to contact me.

Thank you for your time.

Appendix 14. Additional Files from Paper 6: Health Promotion PLOS Global Health

S1 Data. JCHEW data form and checklist.
https://doi.org/10.1371/journal.pgph.0000645.s001
(XLSX)
Please see Appendix 5. Page 170

S2 Data. JCHEW questionnaire.
https://doi.org/10.1371/journal.pgph.0000645.s002
(XLSX)
Please see Appendix 6. Page 173

S3 Data. VHW questionnaire.
https://doi.org/10.1371/journal.pgph.0000645.s003
(XLSX)
Please see Appendix 7. Page 180

S1 Text. Topic guide for facility heads and district level supervisors.
https://doi.org/10.1371/journal.pgph.0000645.s005
(DOCX)
Please see Appendix 8. Pages 184-189

S4 Data. Criteria for selection of facilities for semi structured interviews.
https://doi.org/10.1371/journal.pgph.0000645.s004
(XLSX)

	Factor	Source	Measure	Score
1	**Leadership and Governance**			
	Observed evidence of PHC Facilitysupervision in last 6 months	HoF Checklist	Yes/No	Yes=1; no=2
	Availability of SOPs in Facility	HoF Checklist	Yes/No	Yes=1; no=2
	Use of SOPs at least frequently	HoF Questionnaire	Yes/No	Yes=1; no=2
2	**HReH**			
	Have requisite number of formally trained CHEWs (whether salaried or not)	HoF Checklist	Yes/No	Yes=1; no=2
	Have requisite number of active health workers (JCHEW)		Yes/No	Yes=1; no=2
3	**Service Delivery**			
	Health Promotion in community 2x monthly	HP Questionnaire		
	Health Promotion Facility (health talks) x4 monthly	JCHEW Questionnaire		
	Number of patients attending all ages / 1000 population		data	highest
	Number of patients attending 50+ years / 1000 population		data	highest
	Blood glucose measurement		Yes/No	Yes=1; no=2
4	**HMIS**			
	Any eye patients recorded	HoF Questionnaire	Yes/No	Yes=1; no=2
	Referral slips		Yes/No	Yes=1; no=2
5	**Equipment/Infrastructure**			
	Space for counselling	HoF Checklist		
	Space for VA measurement	HoF Checklist		
	Observed inventory for medication	HoF Checklist		
	Medication available for eye care		Yes/No	Yes=1; no=2
	Functioning refridgerators for cold chain for measles vaccine		Yes/No	Yes=1; no=2
	Functioning torches		Yes/No	Yes=1; no=2

Selection of 9 Facilities

PHC 1 "Top performing" and 1 "under- performing" from urban, semi urban and rural districts. Sub-total=6

Health Posts 1 "top performing" from rural and semi urban districts and 1 "under-performing" from urban. Sub-total 3

Criteria for selecting Facilities for Semi structured interviews and Village Health Worker Assesment

					Governance				HR		Service delivery								HMIS	Infratructure & Equipment							
	Facility ID	District	Type of District	Name of facility	PHC/ Post	Supervision often	Have SOPs	Use SOPs often	Enough CHEWs	Enough JCHEWS	Catchment pop	Patients all ages	Rate all ages	>200=1, <200=0	Patients aged 50+years	Rate in patients aged 50+years	>20=1. <20=0	Glucose testing	Any eye patients	Referral slips	Eye medication	Fridge (working)	Torch (working)	**Total score**		Criteria
					PHC or HP	yes=1/ no=0	yes=1/ no=0	yes=1/ no=0	yes=1/ no=0	yes=1/ no=0								yes=1/ no=0	yes=1/ no=0	yes=1/ no=0	yes=1/ no=0	yes=1/ no=0	yes=1/ no=0			
	PRIMARY HEALTH CENTRES																									
1	30	Redacted	Urban	Redacted	PHC	1	1	1	1	0	6444	4037	626	1	456	71	1	1	0	1	0	1	0	9	Selected	Top performing urban PHC
2	6	Redacted	Semi urban	Redacted	PHC	1	0	0	1	0	24609	5036	205	1	1769	72	1	1	1	1	0	1	0	8	Selected	Top performing semi urban PHC
3	13	Redacted	Semi urban	Redacted	PHC	1	1	0	0	0	6197	778	126	0	170	27	1	1	1	1	0	0	1	7		
4	25	Redacted	Urban	Redacted	PHC	1	0	0	0	0	3330	2087	627	1	112	34	1	1	0	0	1	1	1	7		
5	37	Redacted	Rural	Redacted	PHC	1	1	0	0	0	7500	1995	266	1	44	6	0	1	0	0	1	1	1	7	Selected	Top performing rural PHC
6	1	Redacted	Semi urban	Redacted	PHC	1	1	0	0	0	3000	1384	461	1	69	23	1	1	0	1	0	0	0	6		
7	11	Redacted	Semi urban	Redacted	PHC	1	0	1	0	0	10500	626	60	0	110	10	0	1	1	1	0	1	0	6		
8	14	Redacted	Semi urban	Redacted	PHC	1	1	0	0	0	3479	654	188	0	75	22	1	1	0	1	0	1	0	6		
9	20	Redacted	Urban	Redacted	PHC	1	1	1	0	0	11562	NA	NA	0	NA	NA	0	1	0	0	0	1	1	6		
10	29	Redacted	Urban	Redacted	PHC	1	0	0	0	0	2960	1873	633	1	281	95	1	1	0	0	1	1	0	6		
11	32	Redacted	Urban	Redacted	PHC	1	1	1	0	0	7345	1914	261	1	54	7	0	1	0	0	0	0	1	6		
12	35	Redacted	Rural	Redacted	PHC	1	0	0	0	0	3746	830	222	1	52	14	0	1	1	1	0	1	0	6		
13	40	Redacted	Rural	Redacted	PHC	1	1	0	0	0	9895	1412	143	0	27	3	0	1	0	1	1	0	1	6		
14	12	Redacted	Semi urban	Redacted	PHC	1	1	0	0	0	7197	445	62	0	125	17	0	1	0	1	0	1	0	5		
15	19	Redacted	Urban	Redacted	PHC	1	0	0	0	0	2451	1401	572	1	256	104	1	1	1	0	0	0	0	5		
16	27	Redacted	Urban	Redacted	PHC	0	0	0	0	0	2051	2793	1362	1	96	47	1	1	0	0	0	1	1	5		
17	34	Redacted	Rural	Redacted	PHC	0	0	0	0	0	7200	2665	370	1	111	15	0	1	1	1	1	0	0	5		
18	28	Redacted	Urban	Redacted	PHC	1	0	0	0	0	12519	2544	203	1	NA	NA	0	1	0	0	0	0	1	4		
19	31	Redacted	Urban	Redacted	PHC	1	1	0	0	0	7222	NA	NA	0	NA	NA	0	1	0	0	0	1	0	4		
20	33	Redacted	Rural	Redacted	PHC	1	0	0	0	0	4852	1037	214	1	40	8	0	0	0	1	1	0	0	4		
21	36	Redacted	Rural	Redacted	PHC	0	1	0	0	0	5008	1419	283	1	26	5	0	1	0	0	0	0	1	4		
22	41	Redacted	Rural	Redacted	PHC	1	1	1	0	0	4808	1638	341	1	37	8	0	0	0	0	0	0	0	4		
23	43	Redacted	Rural	Redacted	PHC	1	0	0	0	0	13370	1606	120	0	NA	0	0	0	0	0	1	1	1	4		
24	4	Redacted	Semi urban	Redacted	PHC	1	0	0	0	0	6617	845	128	0	39	6	0	1	0	0	0	0	1	3		
25	5	Redacted	Semi urban	Redacted	PHC	1	0	0	0	0	23190	7048	304	1	256	11	0	1	0	0	0	0	0	3		
26	9	Redacted	Semi urban	Redacted	PHC	1	0	0	0	0	9867	626	63	0	110	11	0	1	0	0	0	1	0	3		
27	18	Redacted	Rural	Redacted	PHC	1	0	0	0	0	7024	1360	194	0	48	7	0	0	1	0	0	1	0	3		
28	7	Redacted	Semi urban	Redacted	PHC	0	0	0	0	0	10000	419	42	0	24	2	0	1	1	0	0	0	0	2	Selected	Under-performing semi urban PHC
29	10	Redacted	Semi urban	Redacted	PHC	1	0	0	0	0	16324	1747	107	0	135	8	0	1	0	0	0	0	0	2		
30	24	Redacted	Urban	Redacted	PHC	0	0	0	0	0	4782	3075	643	1	164	34	1	0	0	0	0	0	0	2		
31	26	Redacted	Urban	Redacted	PHC	1	0	0	0	0	7896	2884	365	1	84	11	0	0	0	0	0	0	0	2	Selected	Under-performing urban PHC
32	42	Redacted	Rural	Redacted	PHC	1	0	0	0	0	14007	3579	256	1	87	6	0	0	0	0	0	0	0	2		
33	38	Redacted	Rural	Redacted	PHC	0	0	0	0	0	10208	1305	128	0	43	4	0	0	0	0	0	1	0	1	Selected	Under-performing rural PHC
	HEALTH POSTS																									
1	2	Redacted	Semi urban	Redacted	HP	1	1	1	1	1	11185	277	25	0	39	3	0	1	1	0	0	1	1	9	Selected	Top performing semi urban HP
2	23	Redacted	Urban	Redacted	HP	0	0	0	1	1	1317	1752	1330	1	84	64	1	1	1	0	0	0	0	6		
3	48	Redacted	Rural	Redacted	HP	0	1	1	0	1	5025	1724	343	1	26	5	0	1	0	0	0	0	1	6	Selected.	Top performing rural HP
4	15	Redacted	Semi urban	Redacted	HP	0	1	1	1	0	2115	545	258	1	103	49	1	1	0	0	0	0	0	6		
5	3	Redacted	Semi urban	Redacted	HP	1	1	0	1	1	8791	231	26	0	29	3	0	0	0	0	0	0	0	4		
6	8	Redacted	Semi urban	Redacted	HP	0	0	0	1	0	6000	1237	206	1	62	10	0	1	0	0	0	1	1	5		
7	16	Redacted	Semi urban	Redacted	HP	1	0	0	1	1	NA	836	NA	NA	66	NA	0	1	0	0	0	0	0	4		
8	22	Redacted	Urban	Redacted	HP	1	1	1	1	0	9047	NA	NA	NA	NA	NA	0	1	0	0	0	0	0	5		
9	44	Redacted	Rural	Redacted	HP	1	0	0	1	1	5850	963	165	0	43	7	0	0	1	0	0	0	0	4		
10	45	Redacted	Rural	Redacted	HP	0	1	0	1	0	9253	2571	278	1	197	21	1	1	0	0	0	0	0	5		
11	17	Redacted	Semi urban	Redacted	HP	0	0	0	1	0	5754	433	75	0	141	25	1	1	1	0	0	0	0	4		
12	39	Redacted	Rural	Redacted	HP	1	0	0	0	0	22500	NA	NA	0	NA	NA	0	0	1	0	0	1	0	3		
13	46	Redacted	Rural	Redacted	HP	0	1	1	0	1	14004	2346	168	0	26	2	0	0	0	0	0	0	0	3		
14	47	Redacted	Rural	Redacted	HP	0	0	0	1	0	5233	1262	241	1	26	5	0	0	0	0	0	1	0	3		
15	21	Redacted	Urban	Redacted	HP	0	0	0	1	0	3847	1309	340	1	NA	NA	NA	0	0	0	0	0	0	2	Selected	Under-performing urban HP

Rates = persons visiting facility/1000 population
Names of Facilities and their districts have been redacted to maintain anonymity

SOP=Standard Operating Proceedures? Standing Order/ Practice Guidelines
(J)CHEW= (Junior) Community Health Extension Worker