



REPORT OF END-TERM EVALUATION OF THE INAUGURAL HOSPITAL BASED COMMUNITY EYE HEALTH PROGRAMME (HBCEHP) IN KENYA

“THE KIRINYAGA COUNTY HBCEHP”

Project partners were:

1. Government of Kenya through Kirinyaga County Department of Health
2. Operation Eyesight Universal (OEU)
3. Seeing is Believing (SiB)

Principal Investigator (PI)

Prof. Jefitha Karimurio,

MB, Ch.B, M.Med, M.Sc-CEH, FEACO, PhD

Public Health Ophthalmologist,

Department of Ophthalmology

University of Nairobi, Kenya

Email: jkarimurio@gmail.com or karimurio@uonbi.ac.ke

Address: PO Box 2683-00202, Kenyatta National Hospital, Nairobi, KENYA

Internal investigators

1. Dr. Mark Nganga - Kirinyaga County
2. Alice Mwangi – Operation Eyesight Universal
3. Carol Ikumu – Operation Eyesight Universal

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3 ABBREVIATIONS

CHV	Community Health Volunteer
CHEW	Community Health Extension Worker
HBCEHP	Hospital Based Community Eye Health Project
HMIS	Health Management Information System
MOH	Ministry of Health
CPHO	County Public Health Officer
OCO	Ophthalmic Clinical Officer
OCO/CS	Ophthalmic Clinical Officer /Cataract Surgeon
OEU	Operation Eyesight Universal
ON	Ophthalmic Nurse
OSU	Ophthalmic Services Unit of the MOH
PACEH	Participatory Approach to Community Eye Health
PEC	Primary Eye Care
PPP	Public private partnership
SCPHO	Sub-County Public Health Officer

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5 EXECUTIVE SUMMARY

The 2019 World Report on Vision revealed that globally there is at least 2.2 billion people with vision impairment. The main causes of visual impairment included unaddressed refractive error (123.7 million), Cataract (65.2 million), Glaucoma (6.9 million), Corneal opacities (4.2 million), Diabetic Retinopathy (3 million), Trachoma (2 million) and Unaddressed presbyopia, (826 million). Concerted global effort for prevention of blindness commenced in with launch of VISION 2020, “The Right to Sight Global Initiative” in 1999 by World Health Organization (WHO) and International Agency for the Prevention of Blindness (IAPB). The mission of VISION 2020 is to eliminate the main causes of all preventable and treatable blindness as a public health issue by the year 2020. The recommended approaches (pillars) are disease control, human resource development, and infrastructure and technology. Kenya has been implementing all WHO and VISION 2020 guidelines.

Kenya is an Eastern African country which bordered by Ethiopia (north), Somalia (north-east), Indian Ocean (east), Tanzania (south), Uganda and Lake Victoria (west) and Sudan (northwest). The country has a devolved system of government with National and 47 County Governments. Each county is sub-divided into smaller administrative units such as sub-counties, wards, and villages. Health services in Kenya are provided by the government in collaboration with non-governmental organizations (NGOs), faith-based organizations, and private sector. The role of the National Government through, the Ministry of Health (MOH), is policy formulation and provision of technical support to the Counties. The County Government through their respective Departments of Health implements national policies and provides services to their respective communities. The Kenyan health referral system comprises of National Referral Hospitals (level 6 health facilities), Second level Referral Hospital (level 5), County Referral Hospitals (level 4), health centres (level 3), dispensaries (level 2), and community health units (level 1). Levels 2 and 3 are the primary care level health units. Eye health services are provided at all levels of the Kenya health system, but the extent of implementation is at different stages in different counties with some county eye health projects being more established than others.

Eye health services in Kenya are coordinated by the Ophthalmic Services (OSU) of MOH and there is an inter-agency coordinating (ICC) for eye health with representative from government, NGOs, professional groups, and private sector. The ICC is an advisory body for eye health policy issues and it also provides technical support to government and partners through the various ICC technical working groups (TWGs). OSU serves as the secretariat for the ICC and Operation Eyesight Universal (OEU) is represented at ICC meetings. Each County has health and management committees which coordinate and manage health services at the various levels of health delivery system in the County. The ICC give advises the government and partners on distribution of donor funded eye projects to the 47 Counties according to need. Similarly, Kirinyaga County was recommended by the ICC for eye health and the recommendation was endorsed by MOH. Consequently, this inaugural HBCEHP was being evaluated was part of national eye health services under the OSU coordination.

Between 1st July 2017 and 31st March 2020, Operation Eyesight Universal and Kirinyaga County in Kenya implemented a Hospital-based Community Eye Health Project (HBCEHP) with financial support from Seeing is Believing (SiB). The HBCEHP aimed at promoting avoidable blindness-free communities in 150 villages in selected wards in the catchment populations of Kerugoya County Referral Hospital, Kimbimbi Sub-County Hospital and Kianyaga hospital Sub-County Hospital. The activities of the project included construction of new eye health facilities at the 3 hospitals, human resource development at all levels of health services, provision of equipment and consumables, provision of integrated eye health services and

promotion of eye health among the local communities. The overall objective of this end-term evaluation was to assess the extent to which the project goal, outcomes, objectives and outputs had been met over the project duration in the project coverage area and examine the extent of impact of the project to the target beneficiaries.

The evaluation was conducted between 18th May and 10th June 2020 and it was not possible to conduct field visits because of Covid-19 pandemic. As a result, project data was reviewed, and 29 online key informant interviews conducted. A self-assessment questionnaire was used to conduct an audit of project facilities, human resources, equipment, and services. Operation Eyesight Universal provided logistics for online interviews, project data and reports for desk review.

This project was integrated into existing health care services and it was implemented in line with existing government policies and guidelines. New eye health facilities were built at the Kerugoya County Referral Hospital, Kimbimbi Sub-County Hospital and at Kianyaga Sub-County Hospital. The HBCEHP trained the additional skilled eye health workers (2 clinical officer cataract surgeons and 2 ophthalmic nurses). In addition, primary eye care (PEC) workers (18 public health officers), 1 health information officer and 46 community health volunteers (CHVs) were trained on HBCEHP. Also, the project provided equipment, consumables, and medicines to the eye units.

In this project the term “screening” was used to refer to examination of patients for eye conditions and not as defined by the World Health Organization. This term was used for all patients examined by specialist and other eye health workers irrespective of whether the examination was done at community level or at hospital. A total of 165,248 patients were screened for eye conditions exceeding the planned target of 150,016 people. The patients were screened during door to door surveys which were conducted in year 1 and year 2, at the static eye clinics, and during outreach camps conducted by eye health workers from the 3 eye clinics. Out of the 165,248 patients screened, 76,958 were males and 88,290 were females and the male to female ratio was 1:1.1.

A total of 31,476 people received treatment for various eye conditions and 11,778(37.4%) were men and 19,698(62.6%) were women which implies that more female patients were treated than male patients. Moreover, 21,857 (69.4%) of the patients were adults and 9,619 (30.6%) were children. It was challenging to track the patients referred to the clinics from door to door surveys because some patients did not present their referral notes.

This project conducted 726(44.8%) surgeries of the planned target of 1,620 and this performance was below average. Cataract surgery was the commonest major surgical procedure and it contributed to 61.7% of the surgical procedures performed in this project. Out of the 448 cataract surgeries conducted in this project 203 (45.3%) surgeries were conducted on male and 245 (54.7%) on female patients. The second was minor surgeries which contributed to 29.8% and the rest were other major surgeries. The surgeries which were categorized as major for this level of eye health services included cataract surgery, corneal repairs, trauma surgeries such as major eyelid and facial surgeries, eviscerations, large eyelid excisions. Minor surgeries included excision of chalazion, pterygium excisions, eyelid excisions (small), foreign body removals. This HBCEHP did not conduct paediatric surgical procedures and they referred such children to tertiary hospitals with paediatric ophthalmologists. This lower than expected performance was attributed to low surgical output at Kerugoya County Referral Eye Unit, periodic strikes by government health

workers and sacking of the two cataract surgeons who were trained by this project by the County Government. The HBCEH developed a Public Private Partnership (PPP) with Lions Club in second and third years of this project to mitigate against these challenges. The Club availed surgeons to assist in surgical eye camps organized by the HBCEHP and transported some of the patients for surgery at the ir Eye Hospital in Nairobi City but the number of patients who were operated on at Lions SightFirst Eye Hospital in Nairobi was not captured in project reports. The percentage of the patients who had good outcome (VA \geq 6/18) during week 2 postoperative review ranged between 51.9% in year 1 half 2 and 95.1% in year 2 half 2.

A total of 270 reading spectacles for adult patients were donated by OEU to the project in 2018 and they were all issued to patients with presbyopia. The three hospitals in this HBCEHP neither had optical shops nor reliable supply spectacles other than above donation. Patients (children and adult) who needed the different types of spectacles were given prescriptions to buy them at private eye clinics and optical shops. The target for number of patients refracted and issued with spectacle prescriptions was 2,116 and 3,995 (188.8%) prescriptions were issued. Likewise, the project had a target to supply 872 spectacles and the eye health workers estimated that 1,794 (205.7%) spectacles were supplied. Data for number of spectacles supplied was not captured in the health management information system and the eye care workers said that they estimated these figures after follow-up with the patients.

Mass health education activities was conducted in year two and the first half of year three. The whole population in Kirinyaga County was reached using the different methods. Targeted health education was conducted in the 150 project villages where villagers were gathered into groups of between 10-20 and educated.

To assess impact of HBCEHP, five villages in Kianyaga Sub-County were selected and a resurvey conducted and all cases found with eye diseases (100%) received treated; 67% of cataract cases identified during the resurvey (6/9) received surgery and the remaining 33% (3/9) refused surgery as described in section 8.4.6. Additionally, OEU Participatory Approach to Community Eye Health (PACEH) was used to assess the community's level of knowledge on eye health and most of the villagers had adequate knowledge on major causes of blindness and where to seek eye health services.

The potential for sustainability of the key activities of this project was assessed through key informant interviews and it was reported that all the activities were sustainable, but the potential varied from one activity to the other. The activities included infrastructure development, supply of equipment, and consumables, human resource development, delivery of integrated eye health services, and health education and promotion. The eye units (infrastructure, equipment, and consumables) are sustainable because their use continues beyond the project funding and they will be managed by the County Government. The skilled eye health workers (ophthalmologist, ophthalmic clinical officer cataract surgeons and ophthalmic nurses) plus the public health officers who served as Primary Eye Care (PEC) supervisors and CHEWs are employees of County Government. However, cataract surgeons may not be sustainable because they were sacked by the government and it was not clear whether they will be reinstated or not. It may not be difficult to sustain CHVs because they are not financially supported by the government. Provision of integrated eye health services is sustainable since the eye health system created by this HBCEHP will be rendered by eye health workers and the trained PEC workers. The County Public Health Officer confirmed that the County Government has accepted to implement PEC as part of PHC.

Health education and promotion are sustainable since they are key activities in both PEC and PHC. The challenge which may dampen this effort is lack of CHVs who are dedicated to PEC on fulltime basis.

Lessons learnt from this project indicated that it is possible to establish a fully functional eye health project within a relatively short period of two and a half years. Steps should be taken to mitigate against likely strikes by government workers. Manual tracking of patient referred from community level to eye clinics is challenging.

The lessons learnt from the Kirinyaga HBCEHP included the following:

- It is possible to establish a fully functional eye health project within a relatively short period of two and a half years
- The HBCEH approach brings services closer to the people and thereby reduces the distance and cost as barriers to health services
- Eye health services rendered at government Health facilities are sustainable since the eye workers are permanent government staff and the facilities are maintained by the government. However, the services are prone to frequent disruption by strikes and loss of investment when skilled eye care workers are sacked. This calls for strengthening of public private partnerships (PPP) to mitigate against the effects of strikes
- Deployment of a small number of CHVs to conduct community-based screening in phases is more effective and cheaper than deployment of many CHVs to conduct rapid screening over a short duration. The CHVs gain more experience with time and their attrition rate is reduced
- Accurate documentation of project activities is needed to monitor achievement of targets. This includes keeping accurate records for screening, medical interventions, surgeries, and spectacles
- Manual tracking to verify whether patients referred from community level receive treatment at eye units is challenging. Digitization of health information and use of mobile phone-based (M-health) patient tracking methods should be considered

The findings of this evaluation led to the following conclusion:

1. This project was implemented in compliance with existing regulations and guidelines of the Ministry of Health and VISION 2020
2. The project was integrated into health care system at County, Sub-County, and community levels and it was supported by local communities and leaders
3. All project objectives, and most of the output targets were achieved
4. Strike by government workers and Covid-19 pandemic were major threats to this HBCEHB
5. Public Private Partnerships are needed to enhance efficiency and effectiveness of a HBCEHB
6. Documentation of some project activities and supply of spectacles was weak
7. Manual tracking of patient referral was not effective
8. Most of the activities of this HBCEH are sustainable

The following recommendations were drawn from above conclusions:

1. The HBEHP is an effective model for integration of PEC into PHC
2. Collaboration with governments, local communities, and the private sector are recommended to enhance project performance and sustainability

3. Effective documentation is required for monitoring project achievements

6 BACKGROUND

In 2010, the WHO published estimates of the magnitude and distribution of blindness and visual impairment (<https://www.who.int/blindness/publications/globaldata/en/>) which indicated that globally, there were 285 million people with visual impairment, of whom 39 million were blind. Eighty two percent of blind people were 50 years and older. The major causes of visual impairment were uncorrected refractive errors (43%) while the leading cause of blindness was cataract (51%). About 80% of the total global burden visual impairment was due to preventable causes[1]. The 2010 estimates did not take into consideration the need for people with presbyopia who needed reading spectacles. In 2019, the WHO launched the World Report on Vision[2] which revealed that globally there is at least 2.2 billion people with vision impairment (including vision impairment that has been addressed). The main causes of visual impairment included unaddressed refractive error (123.7 million), Cataract (65.2 million), Glaucoma (6.9 million), Corneal opacities (4.2 million), Diabetic Retinopathy (3 million), Trachoma (2 million) and Unaddressed presbyopia, (826 million).

Concerted global effort for prevention of blindness commenced in with launch of VISION 2020, “The Right to Sight Global Initiative” in 1999 by World Health Organization (WHO) and International Agency for the Prevention of Blindness (IAPB). The mission of VISION 2020 is to eliminate the main causes of all preventable and treatable blindness as a public health issue by the year 2020[3]. The recommended approaches (pillars) are disease control, human resource development, and infrastructure and technology. For VISION 2020 to succeed, eye-care services should be comprehensive, encompassing eye-health promotion, prevention, treatment, and rehabilitation. Moreover, the services should be integrated into health-care systems and delivered to the population in a stepwise manner; ensuring that the underserved sectors that exist in all populations, such as ethnic minorities, women, disabled persons and very old people are reached[3].

To build on VISION 2020, WHO launched the “Universal Eye Health: A global action plan (GAP) 2014-2019[4] which added a dimension around “universal access to comprehensive eye care services” to VISION 2020 (<https://www.iapb.org/advocacy/global-action-plan-2014-2019/what-is-the-global-action-plan/>). GAP target was to reduce prevalence of avoidable blindness and visual impairment by 25% by 2019 from the baseline of 2010. This was considered to be a more realistic global target than the original target of global elimination by 2020 but the long-term goal of both the GAP and VISION 2020 remain the same. The main challenges identified in the GAP is that a high proportions of people cannot access eye health services around the world due to serious shortages in trained personnel (particularly in Africa), low surgical rates and irregular outreach to the poorest and rural populations, prohibitive cost of services to the poor and marginalized, and changing demographic and health trends. Measures to be taken to achieve the GAP target included:

- Collection of evidence (data) on prevalence of visual impairment and eye care systems
- Training of more eye care professionals to address existing shortages
- Provision of comprehensive eye care, which is well funded and integrated into health care, covers all major causes of visual impairment, and increase cataract surgical rate
- Eliminate social and economic obstacles

The key monitoring indicators in the GAP were prevalence and causes of visual impairment, numbers of Ophthalmologists, Optometrists and Allied Ophthalmic Personnel, and Cataract Surgical Rate (CSR) and Cataract Surgical Coverage (CSC).

Cataract is the most important cause of blindness in the world and in Kenya. The most common type of cataract is age-related, and it is preventable. However, cataract surgery and insertion of an intra-ocular lens to correct refractive error (aphakia) is highly effective. It results in almost immediate visual rehabilitation. In well-managed eye units, high-quality, high-volume surgery is possible, and one ophthalmologist can be able to perform 1000–2000 or more operations per year, as long as there are adequate support staff, infrastructure and patients who are able and willing to access the facilities [3]. The indicator for the quality of cataract surgery is cataract surgical outcome (CSO), which is the visual outcome in the operated eye. WHO guidelines requires that 6 to 12 weeks after surgery over 80% of the operated eyes should have good outcome (presenting visual acuity of 6/18 or better) or over 90% for best corrected visual acuity[5]. Less than 5% of surgeries should result in visual acuity less than 6/60 (poor outcome).

The World Health Report on Vision acknowledged that the interventions which received little attention in the field of eye care is health promotion[2]. Health promotion interventions have potential to increase adoption of healthy behaviors that affect eye conditions and vision impairment, as well as the uptake of eye care services. Health promotion aims to empower people to increase control over their health and its promotive factors through health literacy efforts, rather than by targeting specific risk factors or health conditions[2].

Operation Eyesight Universal (OEU) has developed the Hospital-Based Community Eye Health programme (HBCEHP) model with an inclusive approach that targets both medical and socio-economic causes of avoidable blindness[6]. This model enhances sustainability of elimination of avoidable blindness projects through strengthening of the health system and enhancing community participation and ownership of the project. HBCEHP methods are replicable because they are clearly articulated, tested, and standardized. The eye health project where this end-term evaluation was conducted was the inaugural HBCEHP in Kenya and the country has been implementing all WHO and VISION 2020 guidelines.

6.1 Kenya health and eye health services

Kenya (map in *Annex 1*) is an Eastern African country which lies between 5^o degrees North and 5^o South latitude and between 24^o and 31^o East longitude covers an area of approximately 586,600 KM². The country is bordered by Ethiopia (north), Somalia (north-east), Indian Ocean (east), Tanzania (south), Uganda and Lake Victoria (west) and Sudan (northwest). In 2010, Kenya promulgated a constitution with a devolved system of government with National and County Governments. The then 158 districts were abolished and replaced with 47 Counties. Each County has a County Government, headed by a Governor and there is a County Assembly. Currently, the county is the administrative unit where health policies are implemented. Each county is further sub-divided into smaller administrative units such as sub-counties, wards, and villages.

In Kenya, Health services are provided by the government in collaboration with non-governmental organizations (NGOs), faith-based organizations, and private sector. The role of the National Government through, the Ministry of Health (MOH), is policy formulation and provision of technical support to the Counties. The County Government through their respective Departments of Health implements national policies and provides services to their respective communities. The Kenyan health referral system comprises of National Referral Hospitals (level 6 health facilities), Second level Referral Hospital (level 5), County Referral Hospitals (level 4), health centres (level 3), dispensaries (level 2), and community health units (level 1). Levels 2 and 3 are the primary care level health units.

In Kenya, eye health services are coordinated by the Ophthalmic Services (OSU) of MOH and there is an Inter-agency Coordinating Committee for eye health (ICC-EH), with representative from government, NGOs, professional groups, and private sector. The ICC is an advisory body for eye health policy issues and it also provides technical support to government and partners through the various ICC technical working groups (TWGs). OSU serves as the secretariat for the ICC-EH and Operation Eyesight Universal (OEU) is represented at ICC-EH meetings. Each County has health and management committees which coordinate and manage health services at the various levels of health delivery system in the County.

At the time this report was written, the Ministry of Health of the Government of Kenya was finalizing the 2020-2025 National Strategic Plan for Eye Health. All National Eye Health plans are aligned to Government and VISION 2020 policies/guidelines and take into account the building blocks of the health system which include service delivery, health workforce, information, medical products, financing and governance/ leadership. The broad strategic objectives of the 2012-2018 strategic plan for eye health which was applicable during the implementation of Kirinyaga HBCEHP were:[7]

1. To strengthen strategies for control of blinding diseases in all levels
2. To strengthen human resource capacity and systems at all levels for effective delivery of eye care services
3. To improve and maintain appropriate infrastructure for provision of sustainable eye care services in the national, county, sub-county, and community levels
4. To strengthen networking coordination and policy framework in order to ensure maximum and efficient utilization of resources at all levels of eye care delivery systems.
5. To establish the magnitude and enhance systems of monitoring the pattern of blindness and low vision in Kenya

Eye health services are provided at all levels of the Kenya health system, but the extent of implementation is at different stages in different counties with some county eye health projects being more established than others. Community (level 1) primary eye health (PEC) services include eye health promotion, disease prevention and identification and referral of those found to have eye problems, visual impairment, and blindness. PEC is implemented as part of the National Community Health Strategy (CHS) and PEC activities are conducted by trained Community Health Volunteers (CHVs) who are supervised by Community Health Extension Workers (CHEWs). Level 2 and 3 eye health services are provided by skilled primary eye health workers who include ophthalmic nurses (ON) and Ophthalmic Clinical Officers (OCO) who treat minor eye conditions and refer major ones. Health team at level 4 and 5 health facilities include eye doctors (Ophthalmologists), Ophthalmic Clinical Officer/Cataract Surgeons (OCO/CS), Ophthalmic Clinical Officers and Ophthalmic Nurses. Ophthalmic sub-specialist services such as paediatric, retina, glaucoma, are provided at level 6 and some private hospitals.

So far, the government of Kenya has not included optometrists, opticians, refractionists as cadres in civil service and this has resulted in weak refractive services in the formal sector. However, these cadres are available in the private sector and NGOs eye health facilities.

Information provided by the Ministry of health indicated that the leading cause of blindness in Kenya is cataract and in 2019 the MOH estimated that the national cataract surgical rate (CSR) was 800 surgeries per million population per year. The World Health Organisation (WHO) recommends a CSR target is 3,000 surgeries per million population per year. In Kenya, the average outcome of cataract surgery is 65% of the operations resulting with good visual outcome (presenting visual acuity of 6/18 or better) and the national target is to improve this to at least 70% by 2023 through training and monitoring of surgical outcomes. The other important causes of blindness in Kenya include trachoma, glaucoma, childhood blindness, refractive errors, and diabetic retinopathy. There is an increasing burden of non-communicable diseases with diabetes being an emerging major cause of blindness. Like in many other developing nations, 80% blindness in Kenya is due to treatable and preventable causes.[7]

The Government of Kenya collaborates with a wide spectrum of partners in delivery of eye health services. Distribution of donor funded eye projects to the 47 Counties is prioritized according to need by the ICC-EH. Similarly, Kirinyaga County was recommended by the ICC-EH and the recommendation was endorsed by MOH. Consequently, this inaugural HBCEHP became part of national eye health services under the OSU coordination. This HBCEHP was then implemented by Kirinyaga County Department of Health with financial and management support from Seeing-is-Believing (SiB) and OEU.

6.2 Kirinyaga health and eye health services

The Kirinyaga HBCEHP was designed to strengthen eye health services at all levels of the health system in the County and implementation of all project activities was overseen by staff from OEU. The project was 80% funded by Seeing is Believing and 20% by Operation Eyesight Universal (OEU).

Kirinyaga is a County in Central Kenya (see maps *Annexes 1-2*) with a surface area of 1,478.1 km². The current National Population and Housing Census indicated that in 2019 Kirinyaga County had a population of 610,380 people[8]. The 2009 census was used for this HBCEHP[9] and in 2017 the projected population was 600,161 people, intercensal population growth rate was 1.6% and 33% of the population was less than 15 years old.

Kirinyaga County health referral system start from community (level 1) and ends at level 4. The Kerugoya County Referral Hospital is a level 4 hospital. In total, the County has the following government health facilities: 3 hospitals, 14 health centres and 34 dispensaries. Faith Based Organizations (FBO) in the County have 2 hospitals, 2 health centres and 28 dispensaries. Private health facilities include 1 hospital, 6 nursing homes, 130 clinics and 18 dispensaries owned by Non-Governmental Organizations. On average, the whole population in the County can access a health facility within a radius of at least 5Km in all other sub-counties except for Kirinyaga East which is served by only 10 public health facilities.

Before this HBCEHP, Kirinyaga did not have a functional eye care system and coordination structure. In addition, the County had the following two poorly developed eye health facilities:

1. The County Referral Hospital had an eye clinic of one room (6 by 4 metres) shared among 3 eye health staff (1 general ophthalmologist and 2 Ophthalmic clinical officer cataract surgeons-OCO/CS). The room served as the County Referral Eye Unit. Moreover, one of the two OCO/CS

retired in 2018 and the one who was left was not performing cataract surgery. The equipment at the clinic included 1 Slit lamp, 1 Operating microscope, 1 incomplete cataract surgical set, 1 eye lid surgical set, 2 refraction boxes, 1 trial frame and 1 computer. Eye patients were admitted in general ward and operations conducted in general surgical theater

2. Kimbimbi Sub-County Hospital in Mwea sub-County had a small room at medical outpatient clinic which served as an eye unit. The clinic was run by 1 ophthalmic clinical officer (OCO) and it only had a reading chart.

Other government hospitals in Kirinyaga County, including Kianyaga Sub-County Hospital, did not have eye clinics, and none of the public health care (PHC) workers in the County had been trained in primary eye care (PEC). As a result, there were no PEC services available to serve the local communities prior to this HBCEHP. Furthermore, the County had limited eye care medications and there were occasional stock-outs.

At the time of this evaluation, Kirinyaga did not have county-specific data on prevalence and distribution of blindness and visual impairment. The eye health services which were being offered prior to this HBCEHP are shown in *Table 1* below and they included eye examination, surgical procedures such as cataract surgery, corneal repair, lid repairs and screening for diseases such as diabetic retinopathy, glaucoma, and childhood eye cancer (retinoblastoma). Major surgeries included cataract surgery, corneal repairs, trauma surgeries such as major eyelid and facial surgeries, eviscerations, large eyelid excisions. Complicated and paediatric surgical procedures which required sub-specialists were referred to level 5-6 health facilities. Minor surgeries included excision of chalazion, pterygium excisions, eyelid excisions (small), foreign body removals. Eye health staff participated in general medical camps and outreaches organized by the County Referral Hospital and screen patients for eye conditions.

Table 1: Number of eye patients treated and operated on in Kirinyaga prior to the HBCEHP

Eye health service rendered	Number of patients		
	Year 2014	Year 2015	Year 2016
Patients treated for eye diseases*	4,744	4,900	4,654
Cataract surgeries	70	96	19
Other eye surgeries	84	90	23
Patients screened for eye conditions [^]	350	400	240

* Patients examined and treated at eye clinic of Kerugoya County Referral Hospital

[^] Patients screened during general medical camps and outreaches organized by the hospital

The HBCEHP aimed at promoting avoidable blindness-free communities in selected wards in the catchment populations of Kerugoya County Referral Hospital, Kimbimbi Sub-County Hospital and Kianyaga Sub-County in Kirinyaga County on a sustainable basis by end of March 2020. The project objectives of the HBCEHP are shown in *Table 2* below.

Table 2: Kirinyaga HBCEHP objectives and activities

Project objective	Activities to achieve the objective
1. To build the capacities of Kerugoya County Referral Hospital through infrastructure development, provision of ophthalmic equipment and human resources development so as to deliver quality eye care services at the secondary level.	Strengthen the Kerugoya County Referral Eye Unit through renovation of a more spacious building, provision of the required equipment and consumables, and training of a nurse in a diploma course in ophthalmic nursing.
2. To integrate primary eye care services into primary health care services through establishment of eye care units at both Sub-County hospitals of Kimbimbi and Kianyaga in Kirinyaga County through infrastructure, provision of ophthalmic equipment and human resources development so as to deliver quality eye care services at the primary level through advocacy.	Support renovation and establishment of two functional satellite eye clinics, equip the two satellite eye clinics with surgical instruments, diagnostic and theatre equipment. In addition, two ophthalmic nurses and two cataract surgeons were to be trained for the satellite units.
3. To empower the target communities in 150 villages to take responsibility of their eye health through health education and promotion activities.	Identify and train 132 community health volunteers (CHVs) on door-to-door survey methodology, taking of visual acuity and identification of common eye disease. To support the CHVs in supervision and quality assurance, 20 Community Health Extension Workers (CHEWs), 5 Public Health Officers and 3 Records Officer were to be trained. The latter team is part of Kenya Community Strategy (an MOH structure enacted to support the government in providing promotive and preventive health care at the community level). Quality of cataract surgery was to be monitored in all the three eye units as part of quality improvement. The project was to ensure that the eye units followed the WHO-recommended quality standards and protocols, such as comprehensive eye examination of all and adherence to standard clinical procedures and documentation, as well as ensure all the operated patients receive 100% follow-up.

The indicators for success of this HBCEHP were:

- A well-established PEC network at the community level spearheading community-based eye health initiatives and integrated into PHC.

- Increased number of walk-ins at the eye units as an indication of increased access and uptake of eye care services
- Improved surgical and spectacles compliance and conversion rates
- Ninety percent of the people identified with eye problems receive interventions
- Good cataract surgical outcomes based on WHO standards

The targets for eye health service delivery activities such as screening, medical interventions and surgery were based on anticipated performance of available personnel resources and resources and not on the burden of eye disease.

To ensure sustainability, the project was to be embedded into existing government structures and eye health personnel trained and equipment purchased. The project was to be aligned with Kenya Community Health Strategy which recognizes the role played by CHVs, CHEWs, Sub- County and County Public Health Officers in implementation of community-based health activities, supervision, and reporting.

6.3 2.1. Evaluation objectives

The overall objective in the terms of reference for this evaluation was to assess the extent to which the project goal, outcomes, objectives and outputs had been met over the project duration in the project coverage area and examine the extend of impact of the project to the target beneficiaries. In addition, the evaluation aimed to achieve the following:

- Evaluate community participation
- Analyze the process of implementation and assess if the key targets were met during the implementation period
- Evaluate criteria of effectiveness, efficiency, relevance and sustainability and impact of the project
- To generate key lessons and identify promising practices for learning to improve future program intervention

6.4 2.3. Scope of the evaluation

The evaluation covered the entire project duration from 1st July 2017 to 31st March 2020. It assessed project performance and outcomes at all levels. It also assessed outcomes at the county department of health both at the County and Sub-County levels. Moreover, the evaluation assessed impact of the project on both primary and secondary beneficiaries; community members, Community Health Volunteers (CHVs) Community Health Extension Workers (CHEWs), Ophthalmic workers, health workers and members of the project steering committee of County Department of Health.

7 METHODS

This was a participatory evaluation conducted between 18th May and 10th June 2020. Both qualitative and quantitative methods were used to gather the required information. It was not possible to conduct field visits and physical interviews due to Covid-19 pandemic.

The project sites included 150 villages in conveniently selected wards in the catchment areas of Kerugoya County Referral Hospital, Kianyaga Sub County Hospital and Kimbimbi Sub County Hospital. The villages were within a radius of about 5 to 7 kilometres from each of the 3 base hospitals. Financial limitations could not allow expansion of the project beyond the above limits. Door to door surveys and screening was conducted in the 150 villages. In addition to the above project sights, periodic community-based outreach camps and school-based screening were organized to extend services to the rest of the population in Kirinyaga County. Public Health Officers (PHOs) were trained in PEC and they used pre-existing Primary Health Care (PHC) systems and approaches to mobilize local communities to attend the eye camps.

The Health Management Information System (HMIS) was to be strengthened to ensure that records of all patients examined are kept at all levels. The project HMIS was to be integrated with the county HMIS. The county and sub-county Health Records Officers were part of the team to be trained on door-to-door surveys to familiarise themselves with the new concept for ease of integration. Project data was to be collected at the different points on the referral pathway cascaded from CHVs to CHEWs to Sub-County Eye Units to County Eye Unit to Health Records Officer to OEU Health Information Officer.

Data collection included the following activities:

1. Desk evaluation to review project proposal, reports, and other relevant documents. Information on the number of patients examined and treated in the project was extracted from project reports. Raw Health Information Management System (HMIS) data with patient and treatment details was not available for this evaluation
2. Use of discussion guide in *Annex 3* to conduct online interviews with project management (OEU) and Ministry of Health to gather background information of the project and establish whether it complied with existing policies
3. Use of discussion guide in *Annex 3* to conduct online key informant interviews (KII) with County Executives, Eye Care Workers, Community Health Workers/Volunteers, and beneficiaries to assess their perceptions on how the project was implemented, its benefits and potential for sustainability

4. Use of facility assessment tool in *Annex 4* to audit resources (staff, physical facilities, equipment, and services) at project sites (Kerugoya, Kimbimbi and Kianyaga). The information was provided by the County ophthalmologist
5. Online debriefing meeting to collate inputs from project partners

Purposive selection methods were used to the selection the respondents to be interviewed to ensure that only respondents with the required information were selected. The respondents were identified by OEU and County project team. Standard procedures for qualitative studies requires that a minimum of 4 respondents be interviewed[10] and if necessary more participants interviewed until the saturation level is reached where participants repeats the same facts with no additional new information.

The 29 key informants selected from national, county, project, and community levels are shown in *Table 3* below and details of their involvement in the project are in in *Annex 5*).

Table 3: Key informants who were interviewed in Kirinyaga HBCEHP

Organization/County	Department/Health facility	Key informants interviewed
Ministry of Health	Ophthalmic Services Unit	Head of Ophthalmic Services Unit
Operation Eyesight Universal (OEU)	OEU Kenya	<ul style="list-style-type: none"> • Country Manager • Programme Coordinator
County Leadership	Kirinyaga County Department of Health	<ul style="list-style-type: none"> • County Director of Health • County Public Health Officer
Kirinyaga Central	Kerugoya County Referral Hospital	<ul style="list-style-type: none"> • County Ophthalmologist • Ophthalmic Clinical Officer • Community Health Extension Worker • 2 Community Health Volunteers • 2 Community members (beneficiaries)
Kirinyaga South	Kimbimbi Sub-County Hospitals	<ul style="list-style-type: none"> • Sub-County Public Health Officer • Sub-County Health Administrator • Sub-County Ophthalmic Clinical Officer • Community Health Extension Worker • 3 Community Health Volunteers • 2 Community members (beneficiaries)

Kirinyaga East	Kianyaga Sub-County Hospital	<ul style="list-style-type: none"> • Sub-County Public Health Officer Sub-County Health Administrator • Sub-County Ophthalmic Clinical Officer • Community Health Extension Worker • 3 Community Health Volunteers • 2 Community members (beneficiaries)
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Data management was done by the principal investigator to assess the level of attainment of objectives and targets. Quantitative data was analysed using excel spread sheets to compute the required totals and proportions. The qualitative data was captured through audio recording and later transcribed to capture the emerging issues and themes. Quantitative data for each project activity was analysed to verify the inputs invested in the activity plus the outputs and outcomes of the activity. Analysis of qualitative data was to verify whether and how the activity was conducted and impact of the activity on health services and health of the beneficiaries.

Operation Eyesight Universal provided logistics for this end-term evaluation which was conducted for a duration of 12 fulltime day equivalent (FTE) in May and June 2020 as shown in *Table 4* below.

Table 4: Evaluation workplan

Activity	FTE (Fulltime days equivalent)
Prepare of EOI and data collection tools	1
Review of project reports and other relevant documents	2
Interview project partners (OEU/MOH/County Representatives)	1
Visit 3 project sites (Kerugoya, Kimbimbi and Kianyaga) to conduct audit and interviews	3
Manage data	2
Prepare of preliminary report	1
Debrief meeting to collate inputs from partners and experts	1
Preparation of final report	1
Total	12

Application for ethical approval was not required since this was a routine project implementation activity approved by Ministry of Health and County government. The evaluation did not involve clinical examination and no data on individual patient medical records were reviewed.

8 FINDINGS

The findings presented in this report were aligned with project implementation cycles where the first half of the year started on 1st July and ended 31st December of the same year and the second half started on 1st January and ended on 30th of June of the same year. There were 5 half year project implementation periods. The sixth half was not completed since it started on 1st January 2020 and ended on 31st March 2020. These final 3 months had no targets and were set aside for end-term evaluation and to allow the project to top-up any unachieved targets.

8.1 Project start-up

Project partners spent the first half of year 1 (1st July to 31st December 2017) on project planning and set-up. A project management team was created whose membership included the County Director of Health, County Public Health Officer, County Health Records and Information Officer, County Ophthalmologist, and a representative of Operation Eyesight. This team met once a month to plan and review the progress of project activities. Memoranda of understanding (MOU) also signed between Operation Eyesight and Seeing-is-Believing and Operation Eyesight and Kirinyaga County Department of Health.

Other important start-up activities were to identify suitable staff and volunteers to be trained to ensure adequate human resource for eye health at all levels of health system and to identify the buildings to be renovated to serve as eye clinics.

This was the inaugural HBCEHP in Kenya and due to lack of previous local experience to refer to, some plans were re-adjusted during the implementation period as the team gained experience. Key informants from County government and Operation Eyesight commented that, *“This project was challenging..... we started from zero. There was no other HBCEHP in Kenya and Kirinyaga County had no previous eye projectno infrastructure, and no community level activities.... Lions Club used to conduct monthly eye care outreach in the County and transport patient to their hospital in Nairobi City for surgery”*.

The Head of Ophthalmic Services Unit (OSU) of the Ministry of Health (MOH) confirmed that:

- The MOH was fully involved during the start-up and identified Kirinyaga County as the priority project area for this HBCEHP because it was one of the Counties with scanty eye health services
- Kirinyaga HBCEHP was part of National Eye Health services and it was implemented in compliance with existing MOH and World Health Organization (WHO) policies and guidelines
- At inception Kirinyaga County had few eye health workers and Health Management Information System (HMIS) data indicated that the county eye care outputs were low

- Kirinyaga County did not have Primary Eye Care (PEC) services and community eye health workers prior to this project. Primary Health Care (PHC) workers and volunteers in the County had not been trained in PEC
- Operation Eyesight “*created a working workforce*” at county and community levels, built eye clinics and strengthened eye health partnerships

All the key informants from the County confirmed that this project had attracted support of the County Government, local leaders, and communities and added that “.....*the County leaders are very supportive to this project and they are appealing to the donor to consider extending the geographical coverage of the project when they get more funding....*”. Due to budgetary constraints, this project only included 150 villages in the catchment population of Kerugoya County Referral and Kimbimbi and Kianyaga Sub-County Hospitals.

8.2 Infrastructure and equipment

All the planned renovations in Kerugoya County Referral Hospital Eye Unit, Kimbimbi Sub-County Hospital Eye Unit and Kianyaga Sub-County Hospital Eye Unit were done and the required equipment supplied. Photos of the 3 eye units are in *Annexes 6-8. Table 5* below shows the space and equipment at the three eye health facilities which were strengthened by this HBCEHP and further details on how functional the equipment was at during this end term evaluation are in *Annexes 9-11*. The completion was as follows:

The eye team from Kerugoya Referral Hospital conducted outreach visits to sub-county hospitals as they waited for sub-county eye units to be completed.

Table 5: Renovation and equipping of eye units serving the 3 Kirinyaga HBCEHP project sites

Budge item	Before this HBCEHP	Additional (new) provided
<i>Kerugoya County Referral Hospital</i>		
Space	A small room in medical outpatient served as the County referral eye clinic	Eye clinic with a waiting bay, 1 reception/records office, 2 consultation rooms, 1 refraction room, 1 laser room, doctor's office, 1 eye theatre, 1 recovery room, instrument room and 1 pharmacy
Diagnostic equipment	1 Slit lamp, 1 eye lid surgical set, 2 refraction boxes, 1 trial frame and 1 computer	1 Slit lamp, 2 visual acuity charts, 2 applanation tonometers, 1 indirect ophthalmoscope, 1 direct ophthalmoscope, 1 retinoscope, 1 keratometer, 2 trial lens sets, 1 paediatric trial frame, 1 autorefractor, 1 lensometer, 1 A-scan ultrasound machine
Surgical equipment	1 Operating microscope (later allocated to Kianyaga), 1 incomplete cataract surgical set,	1 Operating microscopes, 3 cataract surgical sets, 1 enucleation set, an autoclave
<i>Kimbi Sub-County Eye Unit</i>		
Space	A small room in medical outpatient served as the Sub-County referral eye clinic	Eye clinic with a waiting bay, 1 consultation room, 1 minor theatre, 1 refraction room, doctors office, visual acuity room
Diagnostic equipment		1 Slit lamp, 2 visual acuity chart, 1 slit lamp, 1 applanation tonometer, 1 indirect ophthalmoscope, 1 direct ophthalmoscope, 1 retinoscope
Surgical equipment		1 operating microscopes, 2 cataract surgical sets, an autoclave
<i>Kianyaga Sub-County Eye Unit</i>		
Space	None	Eye clinic with a waiting bay, 3 consultation rooms, 1 sluice room, 1 minor theatre, 1 pharmacy
Diagnostic equipment	The old operating microscope in Kerugoya was allocated to Kianyaga	2 cataract surgical sets

Surgical equipment	1 Slit lamp, 2 visual acuity charts, 1 applanation tonometer, 1 indirect ophthalmoscope, 1 direct ophthalmoscope, 1 retinoscope,
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8.3 Human resource development

Table 6 below shows the number of old and newly trained skilled PEC workers trained by this HBCEHP, the distribution of the workers in the 3 eye units is in *Annexes 9-11*. At inception, Kirinyaga County had 1 ophthalmologist and 2 ophthalmic clinical officer cataract surgeons (OCO/CS) and 1 OCO. One of the OCO/CS retired in the first year (2018) of the HBCEHP. The County did not have ophthalmic nurses (ON), public health officers (PHOs) and community health volunteers (CHVs) who are trained in PEC.

The targets for skilled eye care workers (OCO/CS and ON) were achieved but the 2 OCO/CS were sacked by the County Government for participating in a health worker’s strike. The HBCEHP did not plan to train ophthalmologists. The number of PEC workers and CHVs to be trained was revised from time to time according to need. Initially, the project had targeted to train a large number of CHVs (132) to conduct the door-to-door surveys within a short time-period of two weeks but this approach was found to be less effective and less economical than using a smaller number and conduct the surveys and screening in phases. The key informants from OUE and the County added that *“use of a small number of CHVs for a longer duration increased their experience and also reduced attrition”*.

Table 6: The old and additional workers trained by the Kirinyaga HBCEHP

Cadres	Number at inception of HBCEHP	Target			Number trained			% of target achieved
		Male	Female	Total	Male	Female	Total	
Skilled eye care trained								
Ophthalmologists	1	0	0	0	0	0	0	-
Cataract surgeons*	2	1	1	2	1	1	2	100
ophthalmic clinical officers	1	0	0	0	0	0	0	-
Ophthalmic nurses	0	1	2	3	2	1	3	100
Sub-total	4	2	3	5	3	2	5	100
Public Health Officers (PHO) trained in primary eye care (PEC)								
Supervisors#	0	4	1	5	4	5	9	180
Community Health Community Health Extension Workers (CHEWS)#^	0	10	10	20	4	5	9	45
Sub-total	0	14	11	25	8	10	18	90
Community health volunteers (CHV) trained in PEC								
CHV^	0	66	66	132	22	24	46	35
Sub-total	0	66	66	132	22	24	46	35
Health information management workers								
Health Record Officers	0	2	2	4	2	2	4	100
Sub-total	0	2	2	4	2	2	4	100
TOTAL	0	84	82	166	34	39	73	44

*The 2 Ophthalmic Clinical Officers Cataract Surgeons (OCO/CS) were suspended by County Government

#The County level PHOs were trained as supervisors and Sub-County PHOs and CHEWs

^Targets for CHEWs and CHVs were revised from time to time according to need

8.4 Eye health services

8.4.1 Screening for eye conditions

In this project the term “screening” was used to refer to examination of patients for eye conditions and not as defined by the World Health Organization. This term was used for all patients examined by specialist and other eye health workers irrespective of whether the examination was done at community level or at hospital. Moreover, this HBCEHP was reported as one project and data were not disaggregated by eye units and Sub-Counties.

A total of 165,248 patients were screened for eye conditions in the project and the target of 150,016 people was achieved as shown in *Table 7* and *Figure 1* below. A total of 128,932 people (99.2% of the target) were examined in year 1 and year 2 during door to door surveys. The screening targets for eye the clinics were achieved and out of the 36,316 patients screened at the 3 eye clinics, 20,360 (56.1%) were adults and 15,956 (43.9%) were children. Community outreach camps were conducted by eye health worker from the 3 hospitals. The data for number of patients screened during outreach camps was reported under the respective static clinics and there were no specific targets for outreach.

Table 7: Number of patients examined for eye conditions in Kirinyaga HBCEHP

Place*	Year 1 [^]		Year 2 [^]		Year 3 [^]		Project	
	Target	Output	Target	Output	Target	Output	Target	Output
Door to door survey	80,000	65,720	50,000	63,212	0	0	130,000	128,932
Static clinic (adults)	4,440	4,305	4,884	9,216	2,686	6,839	12,010	20,360
Static clinic (children)	2,960	1,919	3,256	7,538	1,790	6,499	8,006	15,956
Total examined	87,400	71,944	58,140	79,966	4,476	13,338	150,016	165,248

**Data for static clinics included data for outreach camps*

[^]Year 1 was July 2017 to June 2018, year 2 July 2018 to June 2019 and year 3 July 2019 to March 2020

The level of achievement of the targets for screening is displayed in *Figure 1* below. In year 1, the project had a performance of 82.3% but none of the targets for screening was exceeded. In year 2 all the targets were achieved. No door-to-door screening were planned in year 3 but the other targets were achieved. The door-to-door surveys and screening were scheduled for year 1 half 1. Thereafter, repeat visits were conducted to mop-up the patients who may not have been screened in previous visits. The nationwide strikes by health workers did not affect community level eye health activities. Key informants from OEU and County team added that *“The trained public health officers and CHVs who were trained in PEC contributed a lot in door-to-door surveys, community mobilization and health education. PEC activities were not interrupted during strikes by health worker”*.

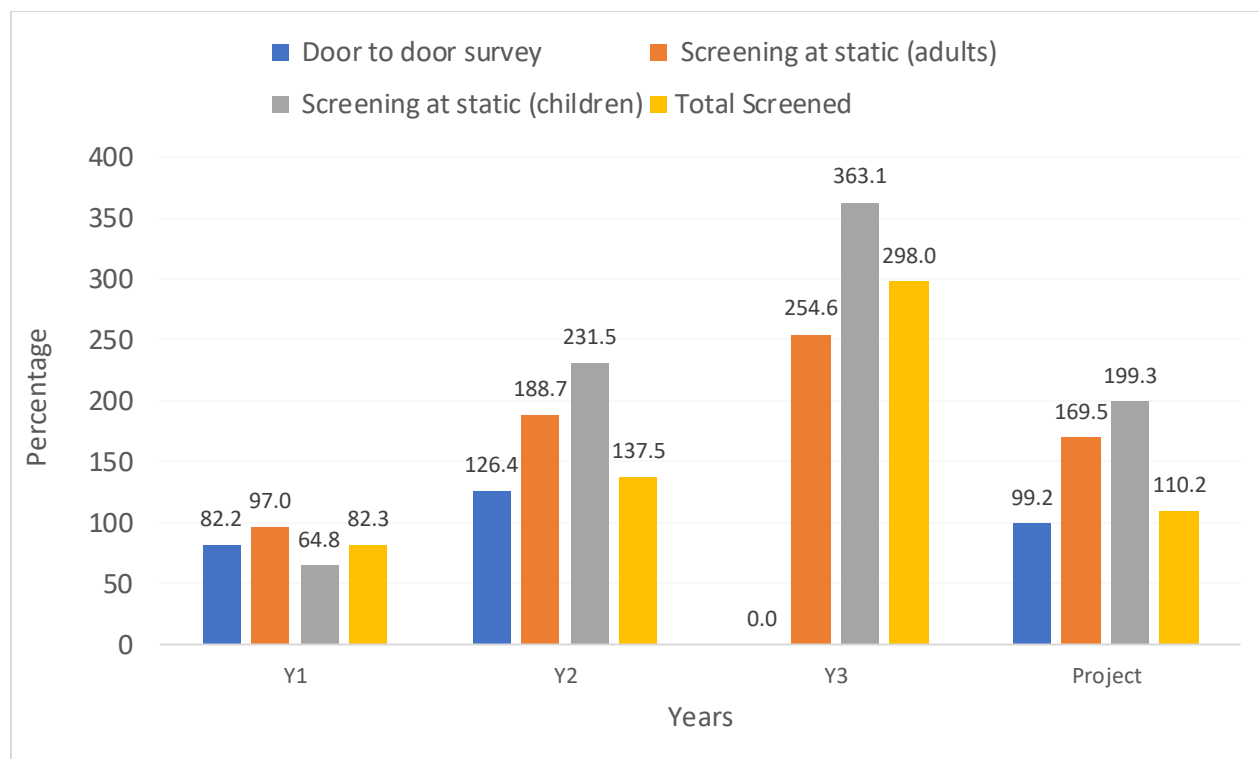


Figure 1: Percentage achievement of screening targets

Key: Y1 = July 2017 to June 2018, Y2 = July 2018 to June 2019 and Y3 = July 2019 to March 2020

Distribution of the 165,248 patients who were screened by sex is displayed in Table 8 and percentage achievement of the screening targets by sex is displayed in Figure 2 below. The male to female ratio was 76,958 males to 88,290 females = 1:1.1. Targets for women were achieved in all the 3 years. Targets for men were achieved in year 2 and year 3. Key informants said, “it was difficult to trace men during the door to door surveys because they left early and returned home late”.

Table 8: Distribution of targets and patients screened in Kirinyaga HBCEHP by sex

	Male		Female	
	Target	Screened	Target	Screened
Door to door survey	65,000	62,173	65,000	66,759
Screening at static (adults)	6,005	7,105	6,005	13,255
Screening at static (children)	4003	7680	4003	8276
Total Screened	75,008	76,958	75,008	88,290

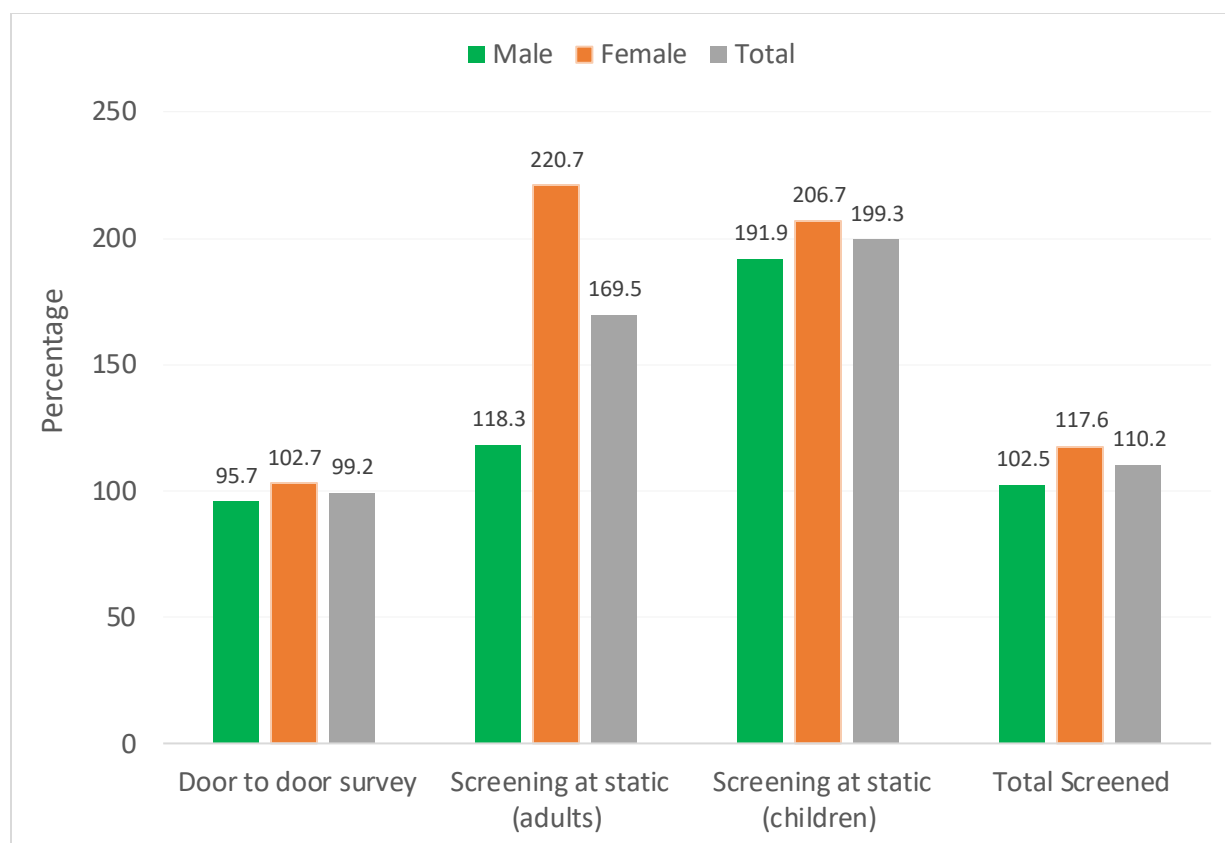


Figure 2: Percentage achievement of screening targets by sex

Distribution of the 3,923 (2.4% of the total 165,248 patients) who were screened during outreach by sex is shown in Table 9 below. The male to female ratio was 1,280:2,643 = 1:2.

Table 9: Distribution of the number of patients examined at outreach eye camps

Year	Male	Female	Total
2018	393	908	1301
2019	887	1,735	2,622
Total	1,280	2,643	3,923

*No eye camps were conducted in years 2017 and 2020

8.4.2 Medical interventions

A total of 31,476 patients received treatment for various eye conditions as shown in Table 10. Out of those, 21,857 (69.4%) were adults and 9,619 (30.6%) and children. The targets for medical interventions were achieved as shown in Figure 3 below. In year 1, the number of children treated were 71.6% of the planned target but there after that the target was achieved.

Table 10: Number of patients who were treated in Kirinyaga HBCEHP

People	Year 1*	Year 2*	Year 3*	Project
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treated	Target	Output	Target	Output	Target	Output	Target	Output
Adults	4,292	4,630	6,864	9,593	3,004	7,634	14,160	21,857
Children	2,855	2,043	4,576	4,674	2,002	2,902	9,433	9,619
Total	7,147	6,673	11,440	14,267	5,006	10,536	23,593	31,476

[^]Year 1 was July 2017 to June 2018, year 2 July 2018 to June 2019 and year 3 July 2019 to March 2020

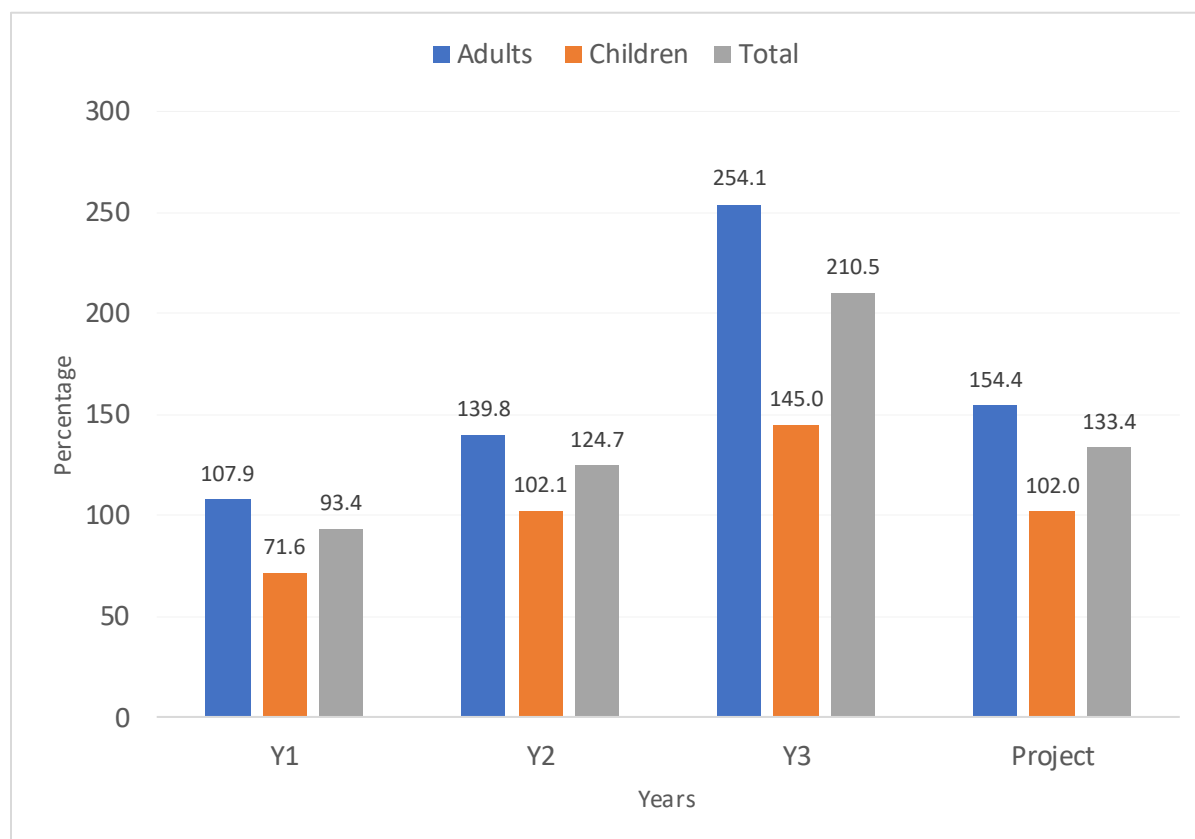


Figure 3: Percentage achievement of the targets for medical interventions

Key: Y1 = July 2017 to June 2018, Y2 = July 2018 to June 2019 and Y3 = July 2019 to March 2020

The distribution by sex of the 31,476 people who were treated is displayed in *Table 11*. Out of these, 11,778(37.4%) were men and 19,698(62.6%) were women. In this HBCEHP, the number of females who received eye treatment were almost double the number of males. Figure 4 below shows the percentage achievement of the targets for medical intervention by sex. All the targets were achieved except the target for male children with achievement of 89.5%.

Table 11: Distribution of the number of people treated by sex

People treated	Male		Female	
	Target	Output	Target	Output
Adults	7,080	7,553	7,080	14,304

Children	4,719	4,225	4,714	5,394
Total Medical interventions	11,799	11,778	11,794	19,698

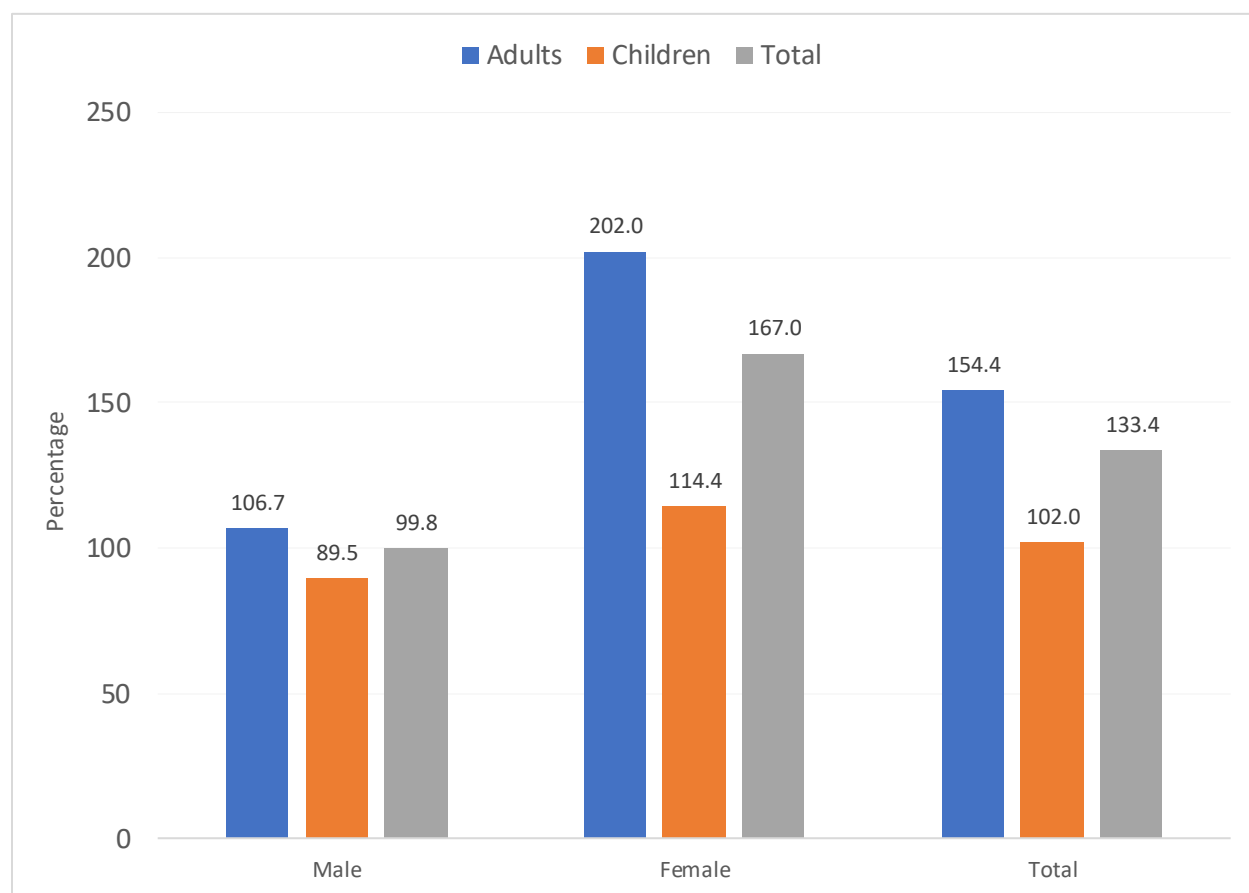


Figure 4: Percentage achievement of targets for medical interventions by sex

Out of the 31,476 patients who were treated in this HBCEHP, 6,758(21.5%) were referred by CHVs from the 150 villages where door-to-door surveys were conducted, and the patients were tracked as shown in Table 12. The project was able to track 82% of the referred patients and 18% were lost to follow-up.

Table 12: Patients referred from the 150 HBCEHP villages to eye clinics by CHVs

Patients	Number	Percentage
Tracked through eye unit reports	2,789	41
Tracked through CHV follow up and contacting by phone	2,781	41
Lost to follow-up	1,188	18
Total referrals	6,758	100

Key informants observed that “it was challenging to track the patients referred to the clinics from door to door surveys because some patients did not present their referral notes. As a result, the proportion of the patients referred from the project villages could not be accurately computed because their data was combined with data for self-referrals”.

8.4.3 Surgeries

The targets and output for surgeries conducted in this HBCEHP are shown in *Table 13* and the percentage achievement of the respective surgical targets are displayed in *Figure 5* below. A total of 726 (44.8%) surgeries were conducted against the target of 1,620 surgeries. Cataract surgery was the commonest surgical procedure and it contributed to $448/726 \times 100 = 61.7\%$ of all the surgical procedures. This was followed by minor surgeries which contributed to $216/726 \times 100 = 29.8\%$ of the total.

Table 13: Targets and outputs for Kirinyaga HBCEHP

Type of surgery	Year 1*		Year 2*		Year 3*		Project	
	Target	Output	Target	Output	Target	Output	Target	Output
Cataract surgeries	200	56	480	246	340	146	1,020	448
Other major surgeries	60	17	120	34	60	11	240	62
Other minor surgeries	90	65	180	68	90	83	360	216
Total	350	138	780	348	490	240	1,620	726

*Year 1 was July 2017 to June 2018, year 2 July 2018 to June 2019 and year 3 July 2019 to March 2020

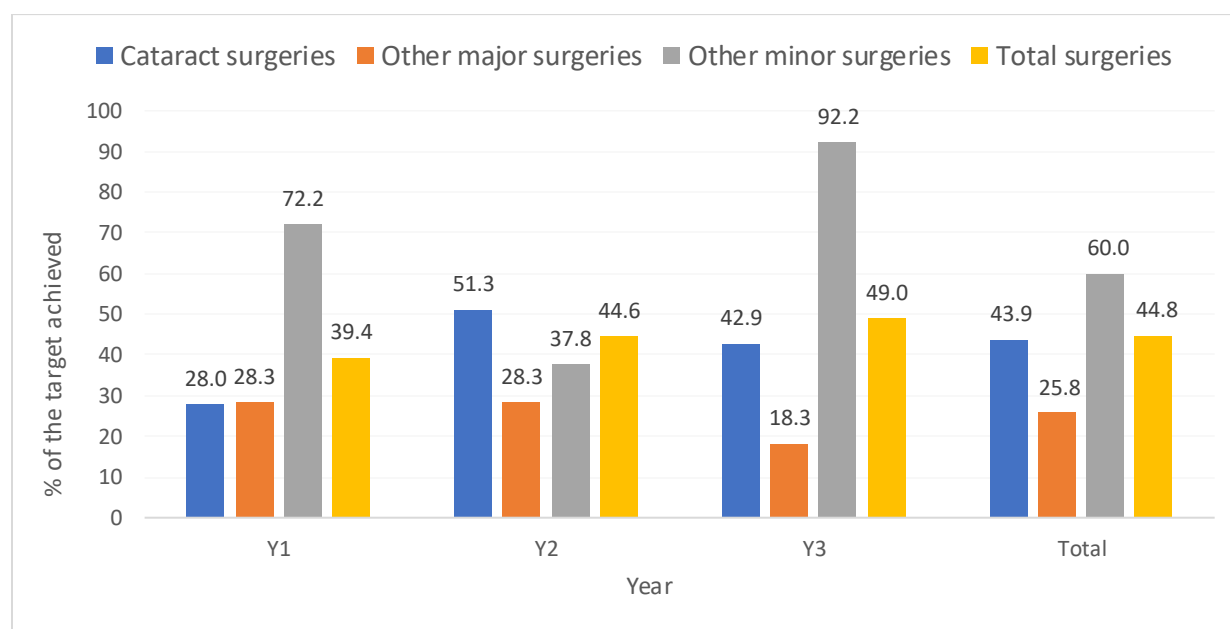


Figure 5: Percentage achievement of the surgical targets of the Kirinyaga HBCEHP

Key: Y1 = July 2017 to June 2018, Y2 = July 2018 to June 2019 and Y3 = July 2019 to March 2020

This HBCEHP had one general ophthalmologist and patients who required services of a sub-specialist were referred to other tertiary eye health facilities. Moreover, children were not operated on in this HBCEHP and they were referred to facilities with paediatric ophthalmologists.

The Kerugoya County Referral Eye Unit was not able to perform high output surgery as it was anticipated during the inception of this HBCEHP. Key informants added that “Surgical services in the county were interrupted by periodic industrial action by government workers. The situation was further complicated by sacking of the 2 cataract surgeons who were trained for this HBCEHP. They were sacked by the County Government for participating in one of the strikes by health workers. The ophthalmologist was left as the only surgeon to conduct all cataract operations since the remaining 1 OCO/CS at Kerugoya hospital does not perform cataract surgery”. To save this worsening situation in second and third years of this HBCEHP, the management started a public-private partnership (PPP) with Lions Club and the Lions sent cataract surgeons to assist during surgical eye camps. Moreover, the Club transported the excess patients to their hospital in Nairobi City for surgery. The data for the patients from this project who were operated on at the Lions SightFirst Eye Hospital in Nairobi was not captured in this report.

Cataract is the leading cause of avoidable blindness in the world and this project paid special attention to cataract surgery. The distribution of the cataract surgeries conducted in this HBCEHP is shown in *Table 14* below. A total of 448 (43.9%) cataract surgeries was performed out of the targeted 1,020 and the targets were not achieved. The first half of year 1 was used to set-up the project and no cataract surgeries were conducted during that period. Thereafter, the project was able to render cataract surgical services despite the above challenges.

Table 14: Distribution of Cataract surgeries conducted in Kirinyaga HBCEHP by half-year periods

Years (Y) and Half years (H)	Targets	Cataract surgeries done	Achievement of targets
Y1H1 (July-December 2017)	60	0	0.0%
Y1H2 (January – June 2018)	140	56	40.0%
Y2H1 (July-December 2018)	240	118	49.2%
Y2H2 (January – June 2019)	240	128	53.3%
Y3H1 (July-December 2019)	340	109	42.9%
Y3H2 (January – March 2020)*		37	
Total (July 2017-March 2020)	1,020	448	43.9%

*There were no targets for Year 3 Half 3 since the period was reserved for end-term evaluation

The distribution of the 448 cataract surgeries conducted in this project by sex is shown in *Table 15* below. 203 (45.3%) surgeries were conducted on male and 245 (54.7%) on female patients. Achievement of cataract surgery target for males was 39.8% and for females 48.0%.

Table 15: Distribution of the cataract surgeries by sex and achievement of set targets

Year*	Male patients			Female patients		
	Target	Surgeries done	% achievement	Target	Surgeries done	% achievement
Y1	100	24	24.0	100	32	32.0
Y2	240	108	45.0	240	138	57.5
Y3	170	71	41.8	170	75	44.1
Total	510	203	39.8	510	245	48.0

*Year 1 was July 2017 to June 2018, year 2 July 2018 to June 2019 and year 3 July 2019 to March 2020

Documents from Kirinyaga County indicated that the population of the County was approximately 600,161 people at the project inception in 2017 and the average number of cataract surgeries per year was 448

surgeries in 2.5 years = 179 surgeries per year. This translated to a Cataract Surgical Rate (CSR) of 298 surgeries/600,161 people x 1,000,000 = 248 cataract surgeries per million population per year.

This HBCEHP started to audit quality of cataract surgery in the second half of year 1 (January- June 2018) and the audit are displayed in *Table 16* below. The number of patients reviewed 2 weeks after cataract surgery ranged from 72.3% to 100% which implies that patients lost to follow-up at 2 weeks were less than 30%. Project reports captured the number and proportion of patients with good visual outcomes (presenting VA \geq 6/18) but borderline (VA <6/18 – 6/60) and poor (VA <6/60) were not reported. The percentage of cataract surgeries with good visual outcome at two weeks after surgery ranged between 51.9% in year 1 half 2 (January-June 2018) and 95.1% in year 2 half 2 (January – June 2019). There was improvement of quality of cataract surgery with time.

Table 16: Follow-up after cataract surgery and percentage of surgeries with good visual outcome

Output type	Outputs		
	Male	Female	Total
Year 1 half 2 (January – June 2018)*			
Cataract Op Adult	24	32	56
Cataract patients reviewed after 2 Weeks	22	30	52
Number with presenting VA $\geq 6/18$ after 2 weeks	12	15	27
Percentage of patients checked VA after 2 weeks	91.7%	93.8%	92.9%
Percentage with presenting VA of $\geq 6/18$ after 2 weeks^#	54.5%	50.0%	51.9%
Year 2 half 1 (July-December 2018)			
Cataract Op Adult	59	59	118
Cataract patients reviewed after 2 Weeks	56	56	112
Number with presenting VA $\geq 6/18$ after 2 weeks	38	43	81
Percentage of patients checked VA after 2 weeks	94.9%	94.9%	94.9%
Percentage with presenting VA of $\geq 6/18$ after 2 weeks^#	67.9%	76.8%	72.3%
Year 2 half 2 (January-June 2019)			
Cataract Op Adult	49	79	128
Cataract patients reviewed after 2 Weeks	48	74	122
Number with presenting VA $\geq 6/18$ after 2 weeks	45	71	116
Percentage of patients checked VA after 2 weeks	98.0%	93.7%	95.3%
Percentage with presenting VA of $\geq 6/18$ after 2 weeks^#	93.8%	95.9%	95.1%
Year 3 half 1 (July-December 2019)			
Cataract Op Adult	57	109	166
Cataract patients reviewed after 2 Weeks	40	87	127
Number with presenting VA $\geq 6/18$ after 2 weeks	29	66	95
Percentage of patients checked VA after 2 weeks	72.5	75.9	74.8
Percentage with presenting VA of $\geq 6/18$ after 2 weeks^#	70.2	79.8	76.5
Year 3 half 2 (January-March 2020)			
Cataract Op Adult	19	18	37
Cataract patients reviewed after 2 Weeks	19	18	37
Number with presenting VA $\geq 6/18$ after 2 weeks	14	13	27
Percentage of patients checked VA after 2 weeks	100%	100%	100%
Percentage with presenting VA of $\geq 6/18$ after 2 weeks^#	73.7%	72.2%	73.0

*Cataract surgical audit was not conducted in year 1 half 1 (July-December 2017)

^Only those presenting VA of $\geq 6/18$ were reported, those with different VA outcomes were not reported

#Those with VA of $\geq 6/18$ were a proportion of those whose VA was checked

8.4.4 Refraction and provision of spectacles

OEU donated a total of 270 reading spectacles for adult patients to this HBCEHP in 2018 and the spectacles were all issued to patients with presbyopia. The 3 hospitals in this HBCEHP neither had optical shops nor reliable supply spectacles other than above donation. Patients (children and adult) who needed the different types of spectacles were given prescriptions to buy them at private eye clinics and optical shops. Table 17 below shows the target for number of patients refracted and issued with spectacle prescriptions; 3,995(188.8%) people were issued with prescriptions. These findings indicate that more patients were refracted and issued with prescriptions than it was anticipated. Likewise, the project had a target to supply 872 spectacles and the eye health workers estimated that 1,794 (205.7%) were supplied. Data for number

of spectacles supplied was not captured in the health management information system. A key informant from Kerugoya hospital said that “...The exact number of spectacles and proportions of patients who acquired spectacles was based on the patients we contacted and they said they had bought the prescribed spectacles there was no patient tracking system.....”

Table 17: Spectacle prescribed and supplied to patients by Kirinyaga HBCEHP

Service	Year 1 [^]		Year 2 [^]		Year 3 [^]		Project	
	Target	Output	Target	Output	Target	Output	Target	Output
Prescriptions issued								
Adults	552	722	592	1,135	392	706	1,536	2,563
Children	200	280	240	735	140	417	580	1,432
Total	752	1,002	832	1,870	532	1,123	2,116	3,995
Spectacles supplied*								
Adults	220	613	236	474	156	208	612	1,295
Children	100	71	102	317	58	111	260	499
Total	320	684	338	791	214	319	872	1,794

*Number of spectacles supplied were estimates from eye care workers

[^]Year 1 was July 2017 to June 2018, year 2 July 2018 to June 2019 and year 3 July 2019 to March 2020

The distribution of prescribed and supplied spectacles by sex is displayed in Table 18 below and all the targets were reported to have been achieved.

Table 18: Distribution of the prescribed and supplied by sex

Service	Male			Female		
	Target	Output	% achieved	Target	Output	% achieved
Spectacle prescriptions issued						
Adults	768	901	117.3	768	1,662	216.4
Children	290	592	204.1	290	840	289.7
Total	1,058	1,493	141.1	1,058	2,502	236.5
Spectacles supplied*						
Adults	306	457	149.3	306	838	273.9
Children	130	214	164.6	130	285	219.2
Total	436	671	153.9	436	1,123	257.6

*Number of spectacles supplied were estimates from eye care workers

8.4.5 Health Education and promotion

Health education activities were conducted in year 2 and the first half of year 3. Population beyond the targeted 150 villages in Kirinyaga County was reached using the different methods shown in Table 19; while population in the 150 villages were reached directly with targeted health education.

Table 19: Number of people reached through health education

Method	Male		Female		Total	
	Target	Output	Target	Output	Target	Output
Targeted health education*	65,000	54,178	65,000	81,832	130,000	136,010
Radio/TV/other media programming	234,015	243,536	234,016	247,454	468,031	490,990

Total direct and indirect beneficiaries [^]	299,015	297,714	299,016	329,286	598,031	627,000
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**Targeted health education activities included community classes and street plays*

[^]*Direct beneficiaries were from the selected 150 villages in catchment population of the 3 hospitals*

8.4.6 Declaration of avoidable blindness-free communities

To assess impact of HBECHP, five villages in Kianyaga Sub-County were selected and a resurvey conducted, and all cases found with eye diseases (100%) were treated by an ophthalmic clinical officer during an outreach and those requiring surgery referred to Kianyaga Sub County Eye Unit. Six out the of nine patients identified with cataracts received surgery and three refused to be operated citing different reasons such as “loss of vision is inevitable in old age” and other cultural beliefs. Follow up and counselling was conducted to these patients and their relatives by CHVs and CHEWS, but they were adamant. These refusals were documented in the presence of a public health officer.

Participatory Approach to Community Eye Health (PACEH) was used to assess the community’s level of knowledge on eye health and teach them in the gaps identified. The PACEH report indicated that a large proportion (over 80%) of the villagers had adequate knowledge on major causes of blindness and where to seek eye health services.

Patients with visual impairment and blindness were among those who were treated (Table 21 below). Out of the 3,102 patients screened during baseline door-to-door survey, 42(1.35%), had visual impairment and 5(0.16%) were blind. During repeat surveys 2,779 people were screened out of whom 44 (1.58%) had visual impairment and 2(0.07%) were blind. The causes of blindness were Corneal Opacity and Glaucoma; this was confirmed and certified by the ophthalmologist. Certification will enable the patients to register with National Council for Persons with Disability hence they can access services for persons with disabilities.

The project beneficiaries, community members, local administrators, County Officials and OEU team conducted a avoidable blindness free declaration ceremony which was graced by the Head of Ophthalmic Services Unit of the Ministry of Health. The County officials assured the community that eye care services will be sustained in their Sub County and in the whole County. Signposts that indicated that the villages were avoidable blindness free and where to seek treatment in case of eye diseases were placed in strategic areas in the five villages. The key informants from Kianyaga said the villagers were very excited about the ceremony “.....we have never seen such things at our villages before.....we will never forget it.....may God bless people who made this happen” .

Table 20: Results of the 5 villages which were declared as avoidable blindness free

Name of village	Baseline door-to-door survey			Repeat door-to-door survey		
	Screened	Referred	Treated*	Screened	Referred	Treated
Kathugu	418	68	33	379	26	26
Kanyaga	629	53	32	520	34	34
Kibingo	380	33	18	277	19	19
Ngenya	765	65	65	766	23	23
Rwathai	910	43	29	837	59	59
Total	3,102	262	177	2,779	161	161

*At baseline, the number treated was less than number referred due to weak tracking system

Patients with visual impairment and blindness were among those who were treated (Table 21 below). Out of the 3,102 patients screened during baseline door-to-door survey, 42(1.35%), had visual impairment and 5(0.16%) were blind. During repeat surveys 2,779 people were screened out of whom 44 (1.58%) had visual impairment and 2(0.07%) were blind.

Table 21: Number of patients treated and those with visual impairment and blindness

Name of village	Baseline door-to-door survey			Repeat door-to-door survey		
	Treated	Visual impairment	Blind	Treated	Visual impairment	Blind
Kathugu	33	14	1	26	11	1
Kanyaga	32	12	3	34	12	1
Kibingo	18	7	0	19	7	0
Ngenya	65	2	0	23	5	0
Rwathai	29	7	1	59	9	0
Total	177	42	5	161	44	2

The community level key informants who were interviewed confirmed that the impact of this HBCEHP was also felt in the neighboring villages. The community was now more aware about eye health and where to seek for treatment. Mary Njeru, a CHV from neighboring Kimbimbi Sub-County had the following to say:

“.....There was this lady from Kimbimbi who was blind, and both her and other community members believed that she was blind because she was cursed by her dead husband..... they had separated and the husband declared that she should not be allowed to see his body when he died after he died, the wife attended the funeral, viewed his body..... and later became blind..... when she was examined, she was diagnosed with cataracts..... and when cataract surgery was done, she was able to see again..... the whole community was extremely excited!” This CHV further added *“.....you know, a blind person cannot be given work..... but when they are made to see again, they become viable.....”*

8.4.7 Integration of eye health into mainstream health systems

Prior to this project Kirinyaga County did not have functional community level eye health facilities and workers. Integration of eye health into health services was achieved through the construction of the 2 Sub-County level eye clinics at Kimbimbi and Kianyaga. Moreover, this project trained the required staff (18 public health officers and 46 CHVs) to conduct eye health promotion and provide primary eye care services to local communities. The local community members were also actively involved in this project.

The main challenge which may be faced after this project is to continue the activities of CHVs because this cadre is not financially facilitated by the government.

8.5 Health information management

OEU hired management information system (MIS) officer to enter data from the door to door survey data and screening activities into a computerised excel sheet. This was done because the data from the field was voluminous and required more time than the Health Management Information Officers from the County could allocate to the project due to other official responsibilities. Among the workers trained in door to door survey methodology and data management (*Table 6 above*) were four Health Records Officers (two from the County Records Office and two from the Sub-county Record Office) The Health Records Officers only keyed in data into the project tool (excel sheet) at the pilot stage of the project, thereafter, OEU MIS officer took over this responsibility. The compiled project data was shared with all county officials including the County Records Officer.

Eye care workers compiled data for patients attended to at eye clinics and outreaches and submitted monthly reports to Operation Eyesight for data analysis and reporting. Furthermore, the CHVs were given manual data collection and recording tools and they submitted data and reports to the CHEWs. CHEWs then collated the data and reports from CHVs and submitted them to sub-County Public Health Officers who forwarded the same to OEU's MIS Officer. The MIS Officer compiled data for the whole project and submitted it on regular bases to OEU for analysis and compilation of reports.

The only information which was not effectively captured in this project was number of patients who were referred from the community level who reported for treatment at the 3 eye clinics. Some patients did not present referral notes and they were treated to be self-referrals.

8.6 Summary of achievement of project targets and objectives

A summary achievement of project targets is presented in *Table 22* and it indicate that most of the targets were either achieve or exceeded. The challenges which led to low performance of surgical services and the mitigation measures put in place are explained above. The target for community health volunteers was revised from time to time and training done according to need.

Table 22: Achievement of project performance targets

Type of output	Number		Achievement
	Target	Output	
Eye clinics constructed and equipped	3	3	100 %
Cataract surgeons trained	2	2	100%
Ophthalmic nurses trained	3	3	100%
Public Health Officers trained in primary eye care	18	18	100%
Health information officers trained	1	1	100%
Community eye health volunteers trained*	132	46	34.8%
People screened for eye conditions	150,016	165,248	110.2%
Medical interventions to people with eye conditions	23,593	31,476	133.4%
Eye surgeries performed	1,620	726	44.8%

Spectacle prescriptions dispensed	2,116	3,995	188.8%
Spectacles supplied to patients with refractive errors+	872	1,794	206%
People reached with various methods of health education^	598,031	627,000	104.8%
Villages declared as avoidable blindness free	150	5	3.3%

*Community volunteers were trained according to need and the output of 46 was adequate

+ Part of the spectacles distributed were donated by OEU. Due to lack of optical services at the eye units, patients had to source spectacles privately. Numbers reported here were gathered during follow-up

^Methods of health education included community classes, street plays, radio/TV talks and posters

Table 23 below provides evidence of achievement of the 3 specific project objectives based on the findings of this end-term evaluation.

Table 23: Achievement of project objectives

Project objective	Evidence of achievement of the objective
1. To build the capacities of Kerugoya County Referral Hospital through infrastructure development, provision of ophthalmic equipment and human resources development so as to deliver quality eye care services at the secondary level.	<ul style="list-style-type: none"> • County Referral Eye Unit was constructed, equipped, consumables supplied, and skilled eye workers trained • Targets for screening and medical interventions were achieved. Target for surgeries was partially achieved • The unit will continue to offer eye health services • Sacking of trained cataract surgeons dampened achievement of targets for surgeries
2. To integrate primary eye care services into primary health care services through establishment of eye care units at both Sub-County hospitals of Kimbimbi and Kianyaga in Kirinyaga County through infrastructure, provision of ophthalmic equipment and human resources development so as to deliver quality eye care services at the primary level through advocacy.	<ul style="list-style-type: none"> • The two Sub-County Eye clinics were constructed, equipped and eye workers trained • Eye Care team from the County Referral Hospital conducts surgical outreaches at the Sub-County Hospital • Skilled eye health workers were trained to screen and treat the patients referred from the community level • Primary Eye Care (PEC) workers including PHOs and CHVs were trained and they offer PEC as part of PHC • The above services continued after this HBCEHP • Sacking of trained cataract surgeons dampened eye care services at Sub-County hospitals
3. To empower the target communities in 150 villages to take responsibility of their eye health through health education and promotion activities.	<ul style="list-style-type: none"> • Eye health education and promotion were used to reach the entire population of Kirinyaga County to empower them to take responsibility of their eye health. The activities were more intensified in the 150 project villages and the by end of this project, 5 villages were declared to be avoidable blindness free • Community-own resource persons were trained as CHVs and they will continue to promote PEC in their respective communities

8.7 Sustainability

The potential for sustainability of the key activities of this project was assessed through key informant interviews. The activities included infrastructure development, supply of equipment, and consumables, human resource development, delivery of integrated eye health services, and health education and promotion.

Infrastructure, equipment, and consumables

The eye units are sustainable because they will be funded and managed by the County government. Key informants at National and County levels said that *“.....this project was fully supported by all levels of government. Moreover, the project is integrated into existing health systems... this gives the project access to government supported health facilities, staff, and supplies.....”*. However, supply of medicines and other consumables may be partially sustainable. Key informants at county and community levels said that the amounts supplied by County government were not enough and there are occasional sock-outs. The County level informants observed that *“..... the amounts supplied by County government are not enough due to inadequate budgetary allocation from the Central Government.....”*. The beneficiaries (community members) of this project said that: *“.....when we go for treatment at government hospital, we are given prescriptions to go and buy the drugs at private chemists.... This project treated and gave us medicines free of charge.....”*

Human resource development

Most of the workers in this HBCEHP are sustainable since they are employees of County Government. These included skilled eye health workers (ophthalmologist, ophthalmic clinical officer cataract surgeons and ophthalmic nurses) plus the public health officers who served as PEC supervisors and CHEWs. The cataract surgeons may not be sustainable because they were sacked by the government and it was not clear whether they will be reinstated. The other workers who will be difficult to sustain are CHVs because they are not financially supported by the government. The CHVs who were interviewed said that *“..... the Government does not provide money to support our activities, we are employed on temporary bases and paid stipends any donor who come to fund projects in the County”*. Kirinyaga County Director of Health added that *“..... The County Government values the work of CHVs, and we are looking allocation of funds to pay their stipends..... there is a bill which was submitted to the County Assembly the bill aims to recognize CHVs as health workers (not volunteers) but the timelines for the passing of the bill is not clear”*.

Delivery of integrated eye health services

The eye health system created by this HBCEHP are sustainable because eye health services will be rendered by health workers and the trained PEC workers as part of the health system at county, sub-county, and community levels. The County Public Health Officer asserted that *“..... In Kirinyaga County, PEC is now part of PHC, and we will continue to render eye care services at community level....”*. Moreover, Public Private Partnerships such as the one this HBCEHP had with Lions Club will boost the potential for sustainability and scale-up of the project because the private sector has resources which can be tapped to supplement government efforts.

The County Government provides free services to children under 5 years old and there is a waiver system for patients who are unable to pay. The County team added that *“..... there is low subscription to the*

National Hospital Insurance Fund (NHIF) by patients in this county.... However, there is a proposed local health insurance known as Kiri-Care which when passed, may mitigate against this challenge.....". The Referral Hospital has some income generating activities such as sale of eye drops but the key informants said that revenue collected is deposited in a central kitty and is disproportionately ploughed back to eye care services.

Health education and promotion

Health education and promotion are sustainable since they are key activities in both PEC and PHC. As it is stated above, public health workers will continue to promote PEC as part of PHC. The challenge which may dampen this effort is lack of CHVs who are dedicated to PEC on fulltime basis. The interviewed CHVs said that *"During this project we used to cover large geographical areas.... when the project ended, we continued to educate the community members we interact with, but our activities are limited to our immediate neighbourhood due lack of budget for telephone calls and transport....."*.

8.8 SWOT analysis

The strengths, weaknesses, opportunities, and threats of this HBCEHP are summarized in *Table 24* below and the information was collected through review of project documents and key informants' interviews. Strengths and weaknesses are internal to the project while opportunities and challenges are external.

Table 24: Findings of SWORT analysis

<p>Strengths</p> <ul style="list-style-type: none"> • The project was endorsed and supported by the Ministry of Health, County Government, leaders, hospital administration, and local communities • The HBCEHP was integrated into the County health care systems with all community level activities effectively coordinated by Public Health Officers and implemented by CHVs • Moreover, three new eye units were constructed, staffed, and equipped to serve the patients referred from community level • The project was supported by generous donor (SiB) and NGO partner (OEU) 	<p>Weaknesses</p> <ul style="list-style-type: none"> • The project had a small geographical coverage and only the 150 villages within 5-7 KMs from the three health facilities in the project were included. There were few outreaches to the rest of the areas • The County Referral Eye Unit did not perform high output cataract surgery as planned. This resulted in desperation and patients started to look for alternative service providers • The government does not provide material and financial support to CHVs because the government considers them to be volunteers and not health workers • Weak documentation to track referrals and spectacles issued
<p>Opportunities</p> <ul style="list-style-type: none"> • Public Private Partnerships especially with Lions Club. The presence of the Club in the County should not be perceived as a threat to eye care services at government hospitals since the goal of the project is to ensure access to services for those who require them • Patients should be encouraged to register with National Hospital Insurance Fund (NHIF) to minimize the more expensive out of pocket payments for health services • There is a proposed county medical insurance scheme referred to as Kiri-Care which includes eye care services 	<p>Threats</p> <ul style="list-style-type: none"> • Covid-19 pandemic affected Kenya in March 2020 and it disrupted the entire health care system. All non-emergency medical/surgical services were suspended, and community eye health were halted. This and similar projects may require to be jump-started after the pandemic • Frequent and disruptive industrial action by health workers which led to strikes and sacking of skilled eye health workers

Some of the comments by key informants on SWOT were as stated below.

The County team members said that “.....this HBCEHP was fully supported by the County Government, local leaders and community members....” They further added that “..... the County referral eye unit did not perform high output cataract surgery as it was anticipated..... This was worsened by the sacking of

The CHVs noted that “..... it is hard to believe that this project has ended the implementation period was too short.... please go and tell them to come back and continue....). The CHV further added that that they had initially faced resistance from community members but when the community realized the

benefits of the project, they started to demand for more visits to their homes “.....initially the community members asked us where were learnt about medicine to educate them about illnesses and examine eyes?....but with time they realized we were properly trained and we understood what we were talking about....they now call as doctors.... as the community benefited, we also benefited since we are now respected....and consulted even after the project ended” .

The CHVs further asserted that “.... the donor (OEU) was trustworthy and reliable.... if they said they will pay you on a specified date, they kept their word, they did not change goal posts or pay you less than what they promised...like some others we have worked with in the past...”

8.9 Lessons learnt

The lessons learnt from the Kirinyaga HBCEHP were:

- It is possible to establish a fully functional eye health project within a relatively short period of two and a half years
- The HBCEH approach brings services closer to the people and thereby reduces the distance and cost as barriers to health services.
- Eye health services rendered at government Health facilities are sustainable since the eye workers are permanent government staff and the facilities are maintained by the government. However, hospital-based services are prone to frequent disruption by industrial action which results in prolonged strikes and loss of investment when skilled eye care workers are sacked. Strengthening of public private partnerships (PPP) is necessary to mitigate against the effects of repeated industrial actions. This project partnered with Lions Club to mitigate against the poor surgical output at the government hospital
- Primary eye health activities were not disrupted by strikes by health workers, but sustainability of these activities will be difficult without financial support to community health volunteers (CHVs)
- Deployment of a small number of CHVs to conduct community-based screening in phases is more effective and cheaper than deployment of many CHVs to conduct rapid screening over a short duration. The CHVs gain more experience with time and attrition rate reduces. The project should however avoid overworking the CHVs. Some who were interviewed said that they were covering large areas and sometimes they got exhausted
- Accurate documentation of project activities is needed to monitor achievement of targets. This includes keeping accurate records for screening, medical interventions, surgeries, and spectacles
- Manual tracking of referrals to verify whether patients referred from community level receive treatment at eye units is challenging. Digitization of health information and use of mobile phone-based (M-health) patient tracking methods should be considered during project rollout. This method has been tried in other projects in Kenya and found to be effective
- Income generating activities are needed to supplement the supply of medicines and spectacles provided by the government. The eye units should negotiate with the hospital to be allowed to retain and use the money they generate to improve eye care services.

9 DISCUSSION

This evaluation established that the inaugural HBCEHP in Kenya achieved its objectives and most of its targets. The findings further proved that HBCEHP model is effective in integration of eye health services into PHC. The achievements were made against major challenges which included strikes by health workers which disrupted hospital-based activities and Covid-19 pandemic which made some activities planned for March 2020 to end prematurely. Moreover, the project implementation team had no prior experience on how to manage a HBCEHP.

The HBCEHP was implemented in line with government policies and VISION 2020 guideline. It included the VISION 2020 pillars which are control of priority diseases such as blinding cataract, human resource development for eye health, and infrastructure and equipment development. This project strengthened the infrastructure for eye health in Kirinyaga County by renovation of 3 eye units, provided the required diagnostic and surgical equipment and adequate consumables.

This HBCEHP trained all the required skilled eye care workers needed to strengthen the human resources in the County but unfortunately, the two Ophthalmic Clinical Officers Cataract Surgeons (OCO/CS) who were trained to work at two newly renovated Sub-County eye clinics were sacked by County Government before they could render services to this project. The two were sacked because of participating in an industrial action (strike) which was organized by health workers and at the time of writing this report there was no indication that they will be reinstated. The sacking hampered attainment of targets for surgical services as the County was left with one ophthalmologist to do all the surgeries. The one of the old OCO/CS who is working at the County Referral Hospital was not doing cataract surgery as her surgical skills were rusty and she was not willing to go for a refresher course in skills upgrading.

The project trained existing PHOs and CHVs in PEC. The targets for training of PHOs as CHEWs and CHVs were revised from time to time to suit the need for ongoing activities. It was observed that it is more economical to train and deploy a small number of CHVs for an extended period of time than to deploy a large number for a short period. This approach was noted to give the workers enough time to gain experience and it reduced attrition.

Prior to the project, very few patients were being screened and treated for eye conditions in Kirinyaga County. The HBCEHP introduced screening at community level, educating the community members on eye diseases and where to seek treatment and strengthened the referral system from community to primary and secondary health facilities. These activities increased demand for eye health services and the patients reporting to the eye clinics for treatment. The male to female ratio of the patients attended to in the HBCEHP indicated that more female patients were screened, treated, and operated on than men. This difference may be partly explained by the fact that Kenya and Kirinyaga County have slightly more women than men [8, 9]. The most recent national census indicated that in 2019 Kirinyaga County had 308,369 (50.5%) females and 302,011 (49.5%) males [8]. The other probable reason is health seeking behaviour. The CHVs reported that men were difficult to trace since they left home early and returned late. Also, fewer men than women turned up during the free eye camps which were conducted in this HBCEHP.

Eye care outreaches and health promotion were conducted in other villages beyond the initial 150 villages to ensure that no one was left behind. The findings of this evaluation revealed that outreaches

were few and they contributed a small proportion of the patients who were screened in this project. However, patients from outside the selected villages had free access to health services offered by eye units in HBCEHP. The whole population was reached with health promotion messages through various health promotion modalities and therefore most people knew where to seek eye care services. It was also reported that due to the increased demand for eye health services generated through health education and promotion, local leaders and community members were appealing for expansion of the geographical coverage of this HBCEHP.

Cataract is the leading cause of blindness and provision of cataract surgery is a priority in the VISION 2020 mission to eliminate the main causes of preventable and treatable blindness [3]. In this project, cataract surgery was offered free of charge and more women were operated on than men on for reasons discussed above. The cataract surgical output at County Referral Eye Unit was lower than anticipated and it has been reported elsewhere that in well-managed eye units, high-quality, high-volume surgery has been conducted with one ophthalmologist performing 1,000–2,000 or more cataract operations per year, as long as there are adequate support staff, infrastructure and patients who are able and willing to access the facilities [3]. Due to the underlying challenges, the project did not achieve expected surgical numbers. To bridge this gap, some patients accessed services Public Private Partnership (PPP) with Lions Club. Surgeons from the Club assisted in the surgical camps organized by this HBCEHP and carried the excess patients and operated on them at their Lions SightFirst Eye Hospital in Nairobi City. This implies that there is a need to factor in PPP when rolling out the project in similar settings in Kenya to enhance efficiency and effectiveness of the HBCEHP model.

Cataract Surgical Rate (CSR) is a WHO indicator for assessment of the performance of eye care programmes [3] and the CSR of 298 cataract surgeries per million people per year which was achieved in this project was lower than the national average for Kenya which is 800 and WHO target of 3,000 surgeries per million population per year. However, the cataract surgical output of this HBCEHP was a huge improvement compared to the output prior to the HBCEHP. In 2016, prior to project inception, only 19 cataract surgeries were conducted at the Kirinyaga County Referral Eye Unit and the CSR was negligible.

WHO guidelines for monitoring cataract surgical outcomes require that 6 to 12 weeks after surgery over 80% of the operated eyes should have good outcome (presenting visual acuity of 6/18 or better) or over 90% for best corrected visual acuity. Less than 5% of surgeries should result in visual acuity less than 6/60 (poor outcome) [5]. The Kirinyaga HBCEHP audited the quality of cataract surgical outcomes but the audit reports were incomplete since the only data which was captured in project reports was for surgeries with presenting visual acuity of 6/18 or better (good outcome) in the operated eye 2 weeks after the surgery. Data for surgeries with borderline (VA <6/18 – 6/60) and poor (VA <6/60) visual outcomes were not captured in project reports. The audit indicated that the proportion of surgeries with good outcomes improved with time as recommended. Monitoring of cataract surgical outcomes at 6-12 weeks has higher patient attrition rate than doing it at 2 weeks as in this project. The other aspect of cataract surgical audit which was not documented in this project is the reasons for poor surgical outcomes which provided information on the factors to be addressed to improve outcomes. These likely causes of poor outcomes which need be documented when monitoring surgical outcomes are grouped as follows [5]:

- Selection of patients for cataract surgery: eyes with cataract and other blinding diseases may remain with poor visual acuity even after cataract surgery
- Correction of the residual refractive errors which may remain after surgery: some of the patients with poor presenting vision have uncorrected refractive errors which can be corrected with appropriate spectacles
- Surgical complications: complications may occur during cataract surgery and thereby diminish postoperative visual acuity. Individual surgeons are expected to audit their outcomes to ensure that their rate of surgical complications reduces as they gain experience. The audit is not meant to compare surgeons because the learning curves are different, and surgeons may be operating under different circumstances
- Poor post-operative follow-up: It is important to monitor the patients after surgeries to ensure that post-operative complications which may result in poor outcomes are promptly attended to

This HBCEHP had a limited donation of reading spectacles and the number of prescriptions which were issued during the screening and refraction of patients was high. Furthermore, most of the patients who need different types of spectacles were said to have acquired them from private clinics and optical shops but the documentation of supply of spectacles was poor. These findings indicate that there is a vibrant market for supply of spectacles in Kirinyaga County which met the demand created by the project. Sale of spectacles can be used to raise income for eye care projects and there is need to explore this possibility when rolling out the HBCEHP model. The prescription and supply of spectacles should be accurately documented to enhance accountability.

This HBCEHP had two autonomous information systems which made it challenging to access some of the information which was not routinely reported in project reports such as diagnosis of the treated patients. The first system was government Health Management Information System (HMIS) where skilled eye health workers entered clinical data for patients screened and treated at the eye clinics and eye camps. The second system was used by PEC workers to capture data from the door-to-door screening activities at the community level and the data was entered by management information system (MIS) officer hired by OEU. Ways should be explored on how to harmonize the information system. Moreover, the CHVs entered data on manual templates which they forwarded to the CHEWs who also manually collated the data entry. In Kenya, mobile health technology has been successfully used to improve efficiency of reporting and tracking of referrals. This should also be considered to mitigate against the documentation challenges reported in this end-term evaluation.

At the end of the relatively short two and a half years period within which this HBCEHP was implemented, 5 out of the 150 project villages were declared to be avoidable blindness free following a repeat door-to-door survey. In addition, OEU Participatory Approach to Community Eye Health (PACEH) (<https://operationeyesight.com/communities-become-part-of-the-solution/>) was used to assess the community's level of knowledge on eye health that indicated that over 80% of the villagers had adequate knowledge on major causes of blindness and where to seek eye health services. PHO and CHVs in the whole project area will continue to offer PEC as part of PHC. Both the continued PEC activities by the PHC team and increased awareness will contribute to continued utilization of eye health services started by this HBCEHP.

In all the key activities of this HBCEHP, potential for sustainability is high because PEC was integrated into PHC and most of the eye health and PEC workers were government employees, and the facilities and equipment will be maintained and used by the government.

10 CONCLUSIONS AND RECOMMENDATIONS

10.1 Conclusions

The following conclusions were derived from this end-term evaluation of Kirinyaga County Hospital-based Community Eye Health Project:

1. This project was implemented in compliance with existing regulations and guidelines of the Ministry of Health and VISION 2020
2. The project was integrated into health care system at County, Sub-County, and community levels and it was supported by local communities and leaders
3. All project objectives, and most of the output targets were achieved
4. Documentation of some project activities and supply of spectacles was weak
5. Manual tracking system was not effective in verifying whether the patients who were referred got treated or not
6. Frequent health worker's strikes and Covid-19 pandemic were major threats to this project
7. Public Private Partnerships are needed to enhance efficiency and effectiveness of a HBCEHB in a setting where strikes pose a threat
8. Hospital-based eye care services are sustainable because they are funded by government, but PEC activities are partially sustainable due to lack of continued funding for CHVs

10.2 Recommendations

The following recommendations were drawn from above conclusions:

4. The HBEHP is an effective model for integration of PEC into PHC
5. Collaboration with governments, local communities, and the private sector are needed to enhance project performance and sustainability
6. Effective documentation is required for monitoring project achievements

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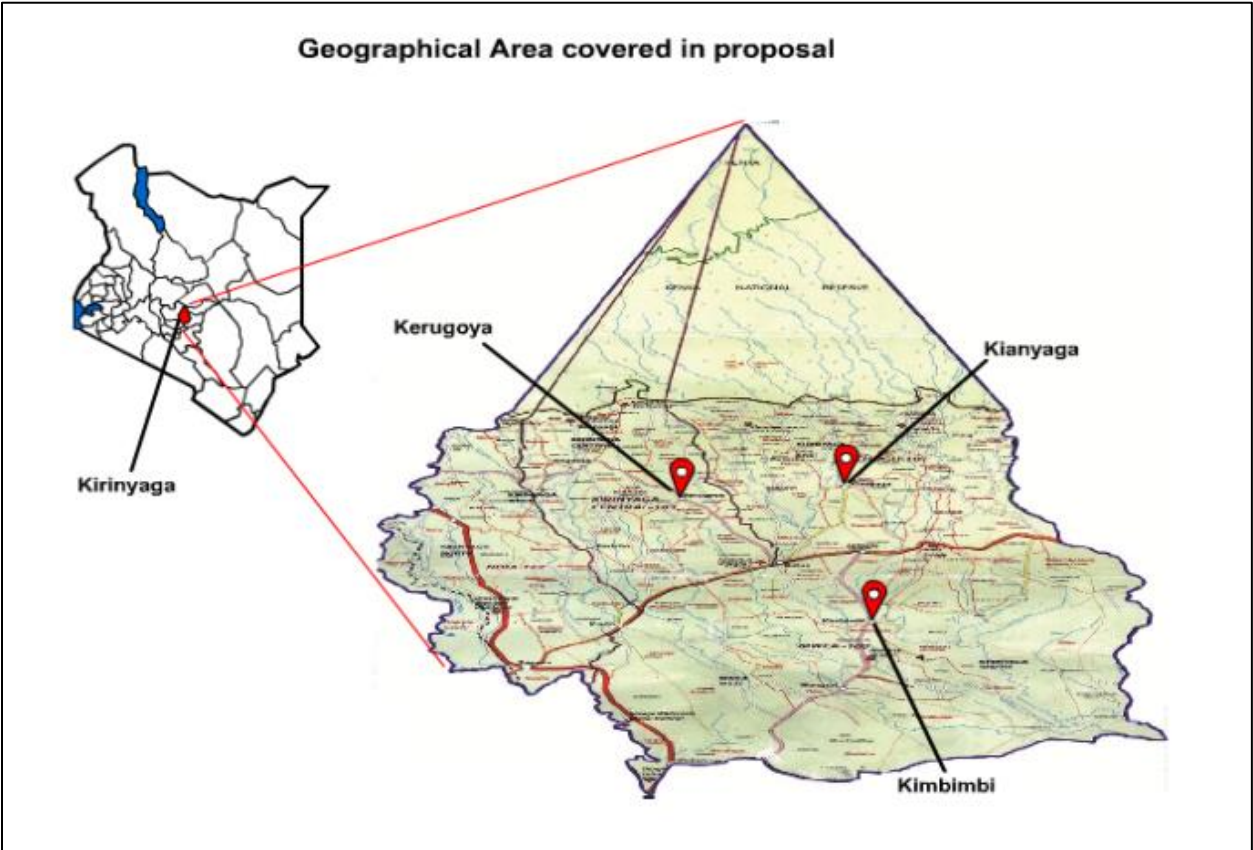
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12 ANNEXES

12.1 Annex 1: Map of Kenya with arrow showing the project area (Kirinyaga County)



12.2 Annex 1: Map of project area (Kirinyaga County)



12.3 Annex 3: Discussion guide for key informant interviews

Note: select the relevant questions for each key informant

Individual or Group interviewed _____

Sub-County _____

Place/Health Facility _____

Date of visit/interview _____

Introduction (icebreaker)

Q1. In what capacity are you involved in the Kirinyaga Hospital Based Community Eye Health Project?

Adequacy of the project

Q2. Does the project cover all the villages in your Sub-County/County?

Q3. Does it meet all eye health needs of your community?

Relevance

Q3. Does the County Government and local Communities consider this to be a priority project?

Q4. If Yes in Q3, are project activities included in the County Plan/budget?

Q5. Do the local communities participate in project activities?

Performance in relation to objectives/targets and identified needs

Q5. In your opinion, how did the project perform in terms of capacity building (personnel development and motivation, infrastructure, equipment and supplies)?

Q6. In your opinion, how did the project perform in terms of provision of eye health services?

Q7. How often has the project met the set targets?

Q8. How often have you been unable to meet the targets?

Sustainability

Q9. Does the project have a coordination structure in place (provide a sketch)?

- Q10. How does the structure fit into the structure of the County Health System ?
- Q11. Are project activities integrated into Primary Health Care/Community Health Strategy?
- Q12. What is the Government contribution to the project?
- Q13. What is the community contribution?

Equity & Humanity

- Q14. Does the project cover women, men, children and persons with disability equitably?
- Q15. Do all communities in your catchment area have equal access to services offered by the project?
- Q16. How does the project reach communities in hard-to-reach areas and those?
- Q17. Does the project have a “good Samaritan kitty” to pay for the poor/needy patients?

Reporting Monitoring and Evaluation

- Q18. Describe how is project data passed from community to County and National levels?
- Q19. How effective are community and health workers in reporting of project activities?
- Q20. Does the project analyze the data and use the information for planning?
- Q21. Does the project provide regular feedback to the community and how is it done?

Impact (perception by community/community representatives)

- Q22. How has the project has impacted the health, social and economic life?

SWOT

Please describe the items about the project in the Table below (SWOT).

Note:

- Strengths and weaknesses are internal to the project
- Opportunities and threats are external to the project

<i>Strengths</i>	<i>Weaknesses</i>
<i>Opportunities</i>	<i>Threats</i>

12.4 Annex 4: Tool for auditing health facilities and services

AUDIT OF KIRINYAGA HBCEHP FACILITIES AND SERVICES				
Name of the health eye unit				
Location of the facility (Sub-Country)				
1. STAFF				
Cadre	Number	Comments		
Ophthalmologists				
OCO Cataract surgeons				
Ophthalmic Clinical Officers (OCS)				
Ophthalmic Nurses (ON)				
General Nurses				
Opticians				
Refractionists				
Low Vision Therapists				
Counsellors				
Project manager				
Instrument technician				
Driver for outreach				
Community health workers (list)				
Other staff list)				
2. EQUIPMENT				
Diagnostic	Total number	Functional	Non-functional	Comment
Visual acuity charts				
Slit lamps				
Applanation tonometers				
Non-contact tonometers				
Schiotz tonometers				
Indirect Ophthalmoscopes				
Direct Ophthalmoscopes				
20 diopres lenses				
78 diopres lenses				
90 diopres lenses				
Gonioscopy lenses				
Retinoscopes				
Keratometers				
Trial lens sets				
Paediatric trial frames				
Autorefractors				

Lensometers				
Ultrasounds				
Biometry equipment				
Fundus cameras				
Others (provide separate list)				
Surgical	Total number	Functional	Non-functional	Comment
Operating microscopes				
Cataract sets				
Enucleation sets				
Vitreotomy machines				
Retinal lasers				
Yag lasers				
Cryo machines				
Paediatric anaesthetic sets				
Others (provide separate list)				
Optical and LV				
Frames				
Lenses				
Contact lenses				
Low vision devises				
Others (list)				
CONSUMABLES				
Do you receive adequate supply of medicines and other consumables throughout the year?				Yes___ No___
Who pays for them (Government, donors, patients etc)?				
PHYSICAL FACILITIES				
Type	Adequate	Inadequate	Needs renovation	Not available
Eye clinic				
Eye ward				
Eye theatre				
Vehicle for outreach				
SERVICES				
Which of the following services are offered at this facility?			Tick	
1. Prevention of blindness at community level				
2. Treatment of minor eye illnesses and referral of complex ones				
3. Diagnosis and treatment; referral of sight threatening conditions				
4. Refraction				
6. Training of health workers in prevention of blindness				
7. Provision of low vision services				
8. Research				
Static clinic				

1. Please provide outpatient HIMS data on for the conditions diagnosed during the project period				
2. Please provide in patient HIMS data for patients admitted during the project period				
3. How many days/week is eye clinic open?				
3. How many days/week is operating theatre operational?				
Outreach				
1. Please provide HIMS data for outreach				
2. Is the static clinic closed when your team go on outreach?				
COORDINATION				
Structure				
1. Do you a County focal person for Eye Health?				
1. Do you have a Sub-County focal person for Eye Health?				
1. Does your County have a functional Eye Health coordination structure?				
2. Does your Eye Project have a functional management structure?				
3. Do you have an effective referral system for patients in need of specialised services?				
4. Please provide sketch of the coordination and management structures				
Integration of services				
How are your Eye Health services integrated into the following services?				
1. Primary Health Care/Community health strategy?				
2. New-born health (breast feeding, TEO for ophthalmia neonatorum etc)				
3. Children under 5 (immunisation, Vitamin A etc)				
4. School health (refractive errors, low vision etc)				
Human Resource Development: How many workers were trained during the project period				
Cadre of staff trained	Men	Women	Total	Comment
Ophthalmologists				
OCO Cataract surgeons				
OCO				
Nurses				
optometrist/Refractionists				
Community health workers				
Others (specify)				
Cost of services (US\$)				
1. Please provide list of user fees/charges for your eye services				
2. What proportion of patients have Hospital Insurance cards?				
3. Does your facility exempt children under 5 years from paying hospital charges?				
4. Are there other category of patients or services which are exempted?				
5. Please provide a list of your theatre charges?				
6. Are there patients exempted from paying theatre charges?				
7. Are Eye Care services affordable to the majority of the patients?				
8. Do you have special provision for the poor patients (good Samaritan fund)?				
9. If yes, who pays for the poor patients?				
10. What are the community's contributions to the Eye Health? For example, cost sharing, volunteers, County insurance scheme etc				
11. List the 3 major successes achieved by your facility during the project period				
12. List the 3 major challenge you are facing after the project ended				

13. List 3 strategies you plan to use to overcome these challenges?

12.5 Annex 5: List of the key informants who were interviewed

Cadre	Role in the program	Name & Contact	Location
Ministry of Health, Ophthalmic Services Unit (OSU)	Head of Ophthalmic Services Unit has background of eye health in Kerugoya, he was involved in implementation, launching of the eye unit, declaration of villages	Dr. Michael Gichangi 0701572109	Nairobi
Operation Eyesight Universal (OEU)	Implementing partner representatives	<ul style="list-style-type: none"> • Alice Mwangi • Carol Ikumu 	Nairobi
County Director of Health	Supported in construction of the eye units and ensured that they are functional, addressed challenges that the program was facing, he was part of the project steering committee that met regularly to discuss project progress.	George Karoki 0722340044	Kerugoya County Referral Hospital
County Public Health Officer	Supported in coordinating D2D survey and health education, received and compiled reports from SCPHOs, coordinated training of CHVs and spearheaded customization of training content. He was part of the project steering committee that met regularly to discuss project progress.	Evans Kago 0722873631	Kerugoya County Referral Hospital
EYE UNIT STAFF			
Ophthalmologist	Supported in organizing for surgeries, eye camps and is in charge of Kerugoya County Referral Hospital. Has been supported to attend COECSA conference.	Dr. Mark Nganga 0721536198	Kerugoya County Referral Hospital
Ophthalmic Services Unit		Dr. Gichangi 0701572109	OSU
Ophthalmic Clinical Officer- Kimbimbi	In charge of Kimbimbi eye unit, supported in validation of blind patients, supported in	Eric Gatheru- 0725589943	Kimbimbi Sub County Hospital

	screening and treatment of patients during eye camps, during school screening and Participatory Community Eye Health (PACEH). For a long time, he treated patients in Kianyaga on a designated clinic day. Was supported to attend OCOA conference.		
Ophthalmic Nurse- Kianyaga	In charge of Kianyaga eye unit. Screening and treatment of patients. Played a major role in school screening and eye camps. Was deployed to Kianyaga in the <u>last</u> three months of the program. The project supported his training at KMTC.	Peter Ngare- 0722648672	Kianyaga Sub County Hospital
SUB COUNTY PUBLIC HEALTH OFFICERS			
Sub county PHO- Kerugoya	Played a major role in training of CHVs on Primary Health Care. In charge of supervising 2 CHEWs during D2D and health education, conducted social mobilisation during eye camps, compiled reports from CHEWs for sharing with CPHO. Participated in project review meetings with CHVs.	Racheal Sila- 0722868389	Kerugoya County Referral Hospital
Sub county PHO- Kimbimbi	In charge of supervising 2 CHEWs during D2D and health education, conducted social mobilisation during eye camps, compiled reports from CHEWs for sharing with CPHO. Participated in project review meetings. Supported in PACEH exercise. Participated in project review meetings with CHVs.	Kathenwa- 0722892527	Kimbimbi Sub County Hospital
Sub county PHO- Kianyaga	In charge of supervising 2 CHEWs during D2D and health education, conducted social mobilisation during eye camps, compiled reports from CHEWs for sharing with CPHO. Participated in project review meetings. Was holding for a	Jane- 0720845457	Kianyaga Sub County Hospital

	colleague who was unwell. The current SCPHO is new and have limited knowledge of the project.		
SUB COUNTY HOSPITAL ADMINISTRATORS			
Kimbi Sub County Hospital Administrator	Played a role in decision making on construction of eye units, provision of space and monitoring construction. They supervise to see that the eye unit is functional.	Diana- 0726575209	Kimbi Sub County Hospital
Kianyaga Sub County Hospital Administrator	Same as above.	Annette- 0722466656	Kimbi Sub County Hospital
COMMUNITY HEALTH EXTENSION WORKERS			
Community Health Extension Worker- Kerugoya	In charge of supervising community health workers during D2D survey, health education in Kirinyaga Central Sub County. Coordinated school screening, supported in validation of blind patients. Compiled reports from CHVs submitted to SCPHO. Coordinated beneficiaries groups that participated in PACEH in Kerugoya.	Margaret Wahito- 0721626493	Kerugoya County Referral Hospital
Community Health Extension Worker- Kimbi	In charge of supervising community health workers during D2D survey, health education in Kirinyaga Central Sub County. Coordinated school screening, supported in validation of blind patients. Compiled reports from CHVs submitted to SCPHO. Coordinated beneficiaries groups that participated in PACEH in Kimbi.	Mary Njeru- 0720719591	Kimbi Sub County Hospital
Community Health Extension Worker- Kianyaga	In charge of supervising community health workers during D2D survey, health education in Kirinyaga Central Sub County. Coordinated school screening, supported in validation of blind patients. Compiled reports from CHVs	Mary Wangui- 0721245077	Kianyaga Sub County Hospital

	submitted to SCPHO. Coordinated beneficiaries groups that participated in PACEH in Kianyaga. Played a major role in Resurveying of five villages in Kianyaga, conducting of PACEH, validation and certification of blind and declaration of avoidable blindness free villages in Kianyaga. She coordinated the declaration ceremony.		
COMMUNITY HEALTH WORKERS			
KERUGOYA			
Community Health Volunteer	Was trained on D2D survey and Health Education & Awareness Creation. (Module I and II). Conducted D2D survey to identify people with Vision Impairment, referred people with VI and other eye diseases using a referral, followed up to see that patients sought medical care. Referred cataract and other patients to eye camps. Filled in data in the D2D register and submitted to CHEWS. Supported in identifying blind people for certification. Conducted health education and awareness creation in the community.	Antony Muchiri- 0722977725	Kerugoya County Referral Hospital
	Same as above	Patrick Wanjohi- 0721158248	Kerugoya County Referral Hospital
	Same as above	Tabitha Wambui- 0712459218	Kerugoya County Referral Hospital
KIMBIMBI			
	Was trained on D2D survey and Health Education & Awareness Creation. (Module I and II). Conducted D2D survey to identify people with Vision Impairment, referred people with VI and other eye diseases using a referral, followed up to see that patients sought	Nicholas Murimi- 0728642524	Kimbimbi Sub County Hospital

	medical care. Referred cataract and other patients to eye camps. Filled in data in the D2D register and submitted to CHEWS. Supported in identifying blind people for certification. Conducted health education and awareness creation in the community.		
	Same as above	Naomi Wangari- 0700130209	Kimbimbi Sub County Hospital
	Same as above	Peter Muturi- 0720344859	Kimbimbi Sub County Hospital
KIANYAGA (where five villages were declared avoidable blindness free villages)			
	Was trained on D2D survey and Health Education & Awareness Creation. (Module I and II). Conducted D2D survey to identify people with Vision Impairment, referred people with VI and other eye diseases using a referral, followed up to see that patients sought medical care. Referred cataract and other patients to eye camps. Filled in data in the D2D register and submitted to CHEWS. Supported in identifying blind people for certification. Conducted health education and awareness creation in the community. Participated in conducting resurvey of community members in five villages, organizing for PACEH, identifying blind patients for certification. Mobilized community members and beneficiaries for Avoidable Blindness Free Villages declaration ceremony.	Penina Kangeri- 0728277747	Kianyaga Sub County Hospital
	Same as above	Naftaly Muriithi- 0716836207	Kianyaga Sub County Hospital
	Same as above	Peter Njuguna- 0703255186	Kianyaga Sub County Hospital
COMMUNITY LEVEL			

Interview of beneficiaries	Name	Telephone	Hospital where surgery was done
	Peter Thiaka Muri- Kerugoya	0718783476	Kerugoya
	Josephine Wanjiru Beneficiary	0729804594	Kerugoya
	Nancy Njeri Karuga	0725113640	Kimbimbi
	Esther Wamiru Githae	0700842835	Kimbimbi
	Jane Wanjiru Kimengi	0703239990	Kimbimbi
	Seresio Mwangi Gatoro	0714895349	Kianyaga
	Mary Njoki Mithamo (Mama Wangui)	0722786706	Kianyaga

12.6 Annex 6: The old and new Kerugoya County Referral Hospital

The old Kerugoya County Referral Eye Unit before this HBCEHP



New Kerugoya County Referral Eye Unit during the launch in 2018



Launch of the new Eye Unit



12.7 Annex 7: Kimbimbi Sub-County Eye Unit

Old Kimbimbi Eye Unit



Newly renovated Kimbimbi Sub-County Eye Unit



12.8 Annex 8: Kianyaga Sub-County Eye Unit

Newly ~~renovated~~ constructed Kianyaga Sub-County Eye Unit



12.9 Annex 9: Eye health resources at Kerugoya County Referral Hospital

AUDIT OF KIRINYAGA HBCEHP FACILITIES AND SERVICES				
Audit of Kirinyaga HBCEHP facilities and services				
Name of the health eye unit			Kerugoya	
Location of the facility (Sub-Country)		Kerugoya Central		
1. STAFF				
Cadre	Number	Comments		
Ophthalmologists	1			
OCO Cataract surgeons	1			
Ophthalmic Clinical Officers (OCS)				
Ophthalmic Nurses (ON)	2			
General Nurses	0±			
Opticians	0			
Refractionists	0			
Low Vision Therapists	0			
Counsellors	0			
Project manager (OEU)	1			
Instrument technician	0			
Driver for outreach	0			
Community health workers (list)	280			
Other staff list)	1	casual worker		
2. EQUIPMENT				
Diagnostic	Total number	Functional/good working condition	Non-functional	Comment
Visual acuity charts	3	Good		
Slit lamps	2	1 good	1	1 needing repairs
Applanation tonometers	2	1	1	
Non-contact tonometers	0			
Schiotz tonometers	0			
Indirect Ophthalmoscopes	1	Good		
Direct Ophthalmoscopes	1	Good		
20 diopres lenses	0			
78 diopres lenses	0			
90 diopres lenses	0			
Gonioscopy lenses	0			
Retinoscopes	1	Good		
Keratometers	1	Good, manual		
Trial lens sets	2	Good		
Paediatric trial frames	1			
Autorefractors	0			
Lensometers	1	Manual		
Ultrasounds	1	Ascan		

Biometry equipment	0			
Fundus cameras	0			
Others (provide separate list)	0			
<i>Surgical</i>	<i>Total number</i>	<i>Functional</i>	<i>Non-functional</i>	<i>Comment</i>
Operating microscopes	1	new		
Cataract sets	3	good		
Enucleation sets	1	good		
Vitreotomy machines	0			
Retinal lasers	0			
Yag lasers	0			
Cryo machines	0			
Paediatric anaesthetic sets	0			
Others (provide separate list)				
<i>Optical and LV</i>				
Frames	0			
Lenses	0			
Contact lenses	0			
Low vision devises	0			
Others (list)	0			
CONSUMABLES				
Do you receive adequate supply of medicines and other consumables throughout the year?				Yes
Who pays for them (Government, donors, patients etc)?				Donor/county
PHYSICAL FACILITIES				
<i>Type</i>	<i>Adequate</i>	<i>Inadequate</i>	<i>Needs renovation</i>	<i>Not available</i>
Eye clinic	Yes			
Eye ward	No			
Eye theatre	Yes			
Vehicle for outreach	Yes			
SERVICES				
<i>Which of the following services are offered at this facility?</i>			<i>Tick</i>	
1. Prevention of blindness at community level			yes	
2. Treatment of minor eye illnesses and referral of complex ones			yes	
3. Diagnosis and treatment; referral of sight threatening conditions			yes	
4. Refraction			yes	
6. Training of health workers in prevention of blindness			yes	
7. Provision of low vision services			No	
8. Research			No	

Static clinic				
1. Please provide outpatient HIMS data on for the conditions diagnosed during the project period				
2. Please provide in patient HIMS data for patients admitted during the project period				
3. How many days/week is eye clinic open?	5			
3. How many days/week is operating theatre operational?	5			
Outreach				
1. Please provide HIMS data for outreach				
2. Is the static clinic closed when your team go on outreach?	no			
COORDINATION				
Structure				
1. Do you a County focal person for Eye Health?	Yes			
1. Do you have a Sub-County focal person for Eye Health?	no			
1. Does your County have a functional Eye Health coordination structure?	Yes			
2. Does your Eye Project have a functional management structure?	Yes			
3. Do you have an effective referral system for patients in need of specialised services?	Yes			
4. Please provide sketch of the coordination and management structures				
Integration of services				
How are your Eye Health services integrated into the following services:				
1. Primary Health Care/Community health strategy?	Yes , through CHEWS			
2. New born health (breast feeding, TEO for ophthalmia neonatorum etc)	yes , through MCH			
3. Children under 5 (immunisation, Vitamin A etc)	MCH			
4. School health (refractive errors, low vision etc)	Outreaches			
Human Resource Development: How many workers were trained during the project period				
Cadre of staff trained	Men	Women	Total	Comment
Ophthalmologists	0			
OCO Cataract surgeons	1	1	2	
OCO				
Nurses	2	1		
optometrist/Refractionists	0			
Community health workers	<u>15</u>	<u>13</u>	<u>28</u>	
Others (specify)PHOs	<u>2</u>	<u>3</u>	<u>5</u>	
Health Records Officers	<u>1</u>	<u>1</u>	<u>2</u>	
Cost of services (US\$)				
1. Please provide list of user fees/charges for your eye services				
2. What proportion of patients have Hospital Insurance cards?				40
3. Does your facility exempt children under 5 years from paying hospital charges?				yes
4. Are there other category of patients or services which are exempted?				Outreach surgeries
5. Please provide a list of your theatre charges?				
6. Are there patients exempted from paying theatre charges?				Under 5s, outreach patients

7. Are Eye Care services affordable to the majority of the patients?				
8. Do you have special provision for the poor patients (good Samaritan fund)?				no
9. If yes, who pays for the poor patients?				waiver system
10. What are the community's contributions to the Eye Health? For example, cost sharing, volunteers, County insurance scheme etc			National Hospital Insurance Fund (NHIF), cost sharing	
11. List the 3 major successes achieved by your facility during the project period - increase in No patients seen in clinic,				
increase in outreaches				
Increase in surgeries performed				
12. List the 3 major challenge you are facing after the project ended				
staff shortages OCOS, and ONOS				
Consumables stock outs/expiry				
Outreach challenges				
13. List 3 strategies you plan to use to overcome these challenges?				
Liase with county to support outreaches				
Liase with county to support consumables				
Liase with county other donors to support training of staff				

12.10 Annex 10: Eye health resources at Kimbimbi Sub-County Hospital

AUDIT OF KIRINYAGA HBCEHP FACILITIES AND SERVICES			
Name of the health eye unit		Kimbimbi	
Location of the facility (Sub-Country)	Mwea East		
1. STAFF			
Cadre	Number	Comments	
Ophthalmologists	0		
OCO Cataract surgeons	0		
Ophthalmic Clinical Officers	1		
Ophthalmic Nurses (ON)	0		
General Nurses	0		
Opticians	0		
Refractionists	0		
Low Vision Therapists	0		
Counsellors	0		
Project manager (OEU)	1		
Instrument technician	0		
Driver for outreach	0		
Community health workers (list)	109		
Other staff list)	1	casual worker	
2. EQUIPMENT			
Diagnostic	Total number	Functional/good working condition	Non-functional
Visual acuity charts	1	good	
Slit lamps	1	1 good	
Applanation tonometers	1		
Non-contact tonometers	0		
Schiotz tonometers	0		
Indirect Ophthalmoscopes	1	good	
Direct Ophthalmoscopes	1	good	
20 diopres lenses	0		
78 diopres lenses	0		
90 diopres lenses	0		
Gonioscopy lenses	0		
Retinoscopes	1	good	
Keratometers	0		
Trial lens sets	0		
Paediatric trial frames	04		
Autorefractors	0		
Lensometers	0		
Ultrasounds	0		

Biometry equipment	0			
Fundus cameras	0			
Others (provide separate list)	0			
<i>Surgical</i>	<i>Total number</i>	<i>Functional/good working condition</i>	<i>Non-functional</i>	<i>Comment</i>
Operating microscopes	1	good		
Cataract sets	2	good		
Enucleation sets	0	good		
Vitreotomy machines	0			
Retinal lasers	0			
Yag lasers	0			
Cryo machines	0			
Paediatric anaesthetic sets	0			
Others (provide separate list)				
<i>Optical and LV</i>				
Frames	0			
Lenses	0			
Contact lenses	0			
Low vision devises	0			
Others (list)	0			
CONSUMABLES				
Do you receive adequate supply of medicines and other consumables throughout the year?				Yes
Who pays for them (Government, donors, patients etc)?				Donor/county
PHYSICAL FACILITIES				
<i>Type</i>	<i>Adequate</i>	<i>Inadequate</i>	<i>Needs renovation</i>	<i>Not available</i>
Eye clinic	yes			
Eye ward	no			
Eye theatre	no			
Vehicle for outreach	shared			
SERVICES				
<i>Which of the following services are offered at this facility?</i>			<i>Tick</i>	
1. Prevention of blindness at community level			yes	
2. Treatment of minor eye illnesses and referral of complex ones			yes	
3. Diagnosis and treatment; referral of sight threatening conditions			yes	
4. Refraction			yes	
6. Training of health workers in prevention of blindness			yes	
7. Provision of low vision services			No	
8. Research			No	

Static clinic				
1. Please provide outpatient HIMS data on for the conditions diagnosed during the project period				
2. Please provide in patient HIMS data for patients admitted during the project period				
3. How many days/week is eye clinic open?	5			
3. How many days/week is operating theatre operational?	n/a			
Outreach				
1. Please provide HIMS data for outreach				
2. Is the static clinic closed when your team go on outreach?	no			
COORDINATION				
Structure				
1. Do you a County focal person for Eye Health?	Yes			
1. Do you have a Sub-County focal person for Eye Health?	yes			
1. Does your County have a functional Eye Health coordination structure?	Yes			
2. Does your Eye Project have a functional management structure?	Yes			
3. Do you have an effective referral system for patients in need of specialised services?	Yes			
4. Please provide sketch of the coordination and management structures				
Integration of services				
How are your Eye Health services integrated into the following services:				
1. Primary Health Care/Community health strategy?	Yes , through CHEWS			
2. New born health (breast feeding, TEO for ophthalmia neonatorum etc)	yes , through MCH			
3. Children under 5 (immunisation, Vitamin A etc)	MCH			
4. School health (refractive errors, low vision etc)	Outreaches			
Human Resource Development: How many workers were trained during the project period				
Cadre of staff trained	Men	Women	Total	Comment
Ophthalmologists	0			
OCO Cataract surgeons	0	0	0	
OCO				
Nurses	0	0		
optometrist/Refractionists	0			
Community health workers	<u>27</u>	<u>3</u>	<u>10</u>	
<u>Public Health Officers</u>	<u>1</u>	<u>1</u>	<u>2</u>	
Others (specify) <u>Records Officers</u>	<u>1</u>	<u>0</u>	<u>1</u>	
Cost of services (US\$)				
1. Please provide list of user fees/charges for your eye services				
2. What proportion of patients have Hospital Insurance cards?				40
3. Does your facility exempt children under 5 years from paying hospital charges?				yes
4. Are there other category of patients or services which are exempted?				Outreach surgeries
5. Please provide a list of your theatre charges?				

6. Are there patients exempted from paying theatre charges?		Under 5s, outreach patients
7. Are Eye Care services affordable to the majority of the patients?		
8. Do you have special provision for the poor patients (good Samaritan fund)?		waiver system
9. If yes, who pays for the poor patients?		waiver system
10. What are the community's contributions to the Eye Health? For example, cost sharing, volunteers, County insurance scheme etc		National Hospital Insurance Fund (NHIF), cost sharing
11. List the 3 major successes achieved by your facility during the project period- increase in No patients seen in clinic,		
increase in outreaches		
Increase in surgeries performed		

12.11 Annex 11: Eye health resources at Kianyaga Sub-County Hospital

AUDIT OF KIRINYAGA HBCEHP FACILITIES AND SERVICES				
Name of the health eye unit			Kianyaga	
Location of the facility (Sub-Country)		Kianyaga		
1. STAFF				
Cadre	Number	Comments		
Ophthalmologists	0			
OCO Cataract surgeons	0			
Ophthalmic Clinical Officers (OCS)	0			
Ophthalmic Nurses (ON)	1			
General Nurses	0			
Opticians	0			
Refractionists	0			
Low Vision Therapists	0			
Counsellors	0			
Project manager (OEU)	1			
Instrument technician	0			
Driver for outreach	0			
Community health workers (list)	80			
Other staff list)	1	casual worker		
2. EQUIPMENT				
Diagnostic	Total number	Functional/good working condition	Non-functional	Comment
Visual acuity charts	1	good		
Slit lamps	1	1 good		
Applanation tonometers	1	1		
Non-contact tonometers	0			
Schiotz tonometers	0			
Indirect Ophthalmoscopes	1	good		
Direct Ophthalmoscopes	1	good		
20 diopres lenses	0			
78 diopres lenses	0			
90 diopres lenses	0			
Gonioscopy lenses	0			
Retinoscopes	1	good		
Keratometers	0			
Trial lens sets	0			
Paediatric trial frames	0			
Autorefractors	0			

Lensometers	0			
Ultrasounds	0			
Biometry equipment	0			
Fundus cameras	0			
Others (provide separate list)	0			
<i>Surgical</i>	<i>Total number</i>	<i>Functional/good working condition</i>	<i>Non-functional</i>	<i>Comment</i>
Operating microscopes	1	old		
Cataract sets	2	good		
Enucleation sets	0			
Vitreotomy machines	0			
Retinal lasers	0			
Yag lasers	0			
Cryo machines	0			
Paediatric anaesthetic sets	0			
Others (provide separate list)				
<i>Optical and LV</i>				
Frames	0			
Lenses	0			
Contact lenses	0			
Low vision devices	0			
Others (list)	0			
CONSUMABLES				
Do you receive adequate supply of medicines and other consumables throughout the year?				Yes
Who pays for them (Government, donors, patients etc)?				Donor/county
PHYSICAL FACILITIES				
<i>Type</i>	<i>Adequate</i>	<i>Inadequate</i>	<i>Needs renovation</i>	<i>Not available</i>
Eye clinic	Yes			
Eye ward	No			
Eye theatre	No			
Vehicle for outreach	Shared			
SERVICES				
<i>Which of the following services are offered at this facility?</i>			<i>Tick</i>	
1. Prevention of blindness at community level			yes	
2. Treatment of minor eye illnesses and referral of complex ones			yes	
3. Diagnosis and treatment; referral of sight threatening conditions			yes	
4. Refraction			yes	
6. Training of health workers in prevention of blindness			yes	
7. Provision of low vision services			No	
8. Research			No	

Static clinic				
1. Please provide outpatient HIMS data on for the conditions diagnosed during the project period				
2. Please provide in patient HIMS data for patients admitted during the project period				
3. How many days/week is eye clinic open?				5
3. How many days/week is operating theatre operational?				n/a
Outreach				
1. Please provide HIMS data for outreach				
2. Is the static clinic closed when your team go on outreach?				no
COORDINATION				
Structure				
1. Do you a County focal person for Eye Health?				Yes
1. Do you have a Sub-County focal person for Eye Health?				yes
1. Does your County have a functional Eye Health coordination structure?				Yes
2. Does your Eye Project have a functional management structure?				Yes
3. Do you have an effective referral system for patients in need of specialised services?				Yes
4. Please provide sketch of the coordination and management structures				
Integration of services				
How are your Eye Health services integrated into the following services				
1. Primary Health Care/Community health strategy?				Yes, through CHEWS
2. New-born health (breast feeding, TEO for ophthalmia neonatorum etc)				yes, through MCH
3. Children under 5 (immunisation, Vitamin A etc)				MCH
4. School health (refractive errors, low vision etc)				Outreaches
Human Resource Development: How many workers were trained during the project period				
Cadre of staff trained	Men	Women	Total	Comment
Ophthalmologists	0			
OCO Cataract surgeons	0	0	0	
OCO				
Nurses	1	0		
optometrist/Refractionists	0			
Community health workers	2	<u>6</u>	<u>8</u>	
Others (specify) <u>Public Health Officers</u>	<u>1</u>	<u>1</u>	<u>2</u>	
<u>Records Officers</u>	<u>1</u>	<u>0</u>	<u>1</u>	
Cost of services (US\$)				
1. Please provide list of user fees/charges for your eye services				
2. What proportion of patients have Hospital Insurance cards?				40
3. Does your facility exempt children under 5 years from paying hospital charges?				yes
4. Are there other category of patients or services which are exempted?				Outreach surgeries
5. Please provide a list of your theatre charges?				
6. Are there patients exempted from paying theatre charges?				Under 5s, outreach patients

7. Are Eye Care services affordable to the majority of the patients?		
8. Do you have special provision for the poor patients (good Samaritan fund)?		waiver system
9. If yes, who pays for the poor patients?		waiver system
10. What are the community's contributions to the Eye Health? For example, cost sharing, volunteers, County insurance scheme etc	National Hospital Insurance Fund (NHIF), cost sharing	
11. List the 3 major successes achieved by your facility during the project period - increase in No patients seen in clinic,		
increase in outreaches		
Increase in surgeries performed		
12. List the 3 major challenge you are facing after the project ended		
staff shortages OCOS, and ONOS		
Consumables stock outs/expiry		
Outreach challenges		
13. List 3 strategies you plan to use to overcome these challenges?		
Liase with county to support outreaches		
Liase with county to support consumables		
Liase with county other donors to support training of staff		