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Evaluating the access and utilization of eyecare services after the adoption of eyecare PBF and its financial sustainability: the case of Rwanda

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Abstract

Introduction Sustainable improvements in eye care outcomes has been a concern for policy makers in low- and middle-income countries (LMICs). We examined the changes in access and utilization of eye care service at primary care level and explored financial sustainability options, after adoption of eye Performance Based Financing (PBF) in Rwanda in 2019.

Methods This study uses case study approach. We conducted desk review to obtain utilization and financial data to assess trends in eye care utilization levels after the introduction of eye PBF and explored financial sustainability options for the eye PBF. We further conducted key informant interviews with different actors' groups at the health centers, district hospitals, and national level. Thirty-eight participants ($n=38$) including eye care providers, health management personnel, health policy makers, and eye care stakeholders at central level selected purposively participated in the study. A framework analysis was employed to analyse data based on the aims of the study.

Results Our findings suggest that incorporating PBF within the eyecare services contributed to access and utilization of eye care services at primary care level. Before the adoption of eye PBF (FY 2018–2019), the number of patients consulting for eye care showed a decreasing trend. After the adoption of eye care PBF (between FY 2018–2019 and FY 2021–2022), the number of patients who consulted for eye needing surgery increased from 228,302 to 1,029,299. During the same period, the share of eye care patients to total patients in outpatient department increased from 1.4% (2017) to 5.4% (2022). Furthermore, before the introduction of eye care PBF, the coverage of patients with cataract operations showed a slow trend from 36.1% (FY 2016–2017) to 37.8% (FY 2018–2019). After introducing eyecare PBF, a sustained increase in cataract operations was noted from 37.8% (FY 2018–2019) to 45.6% (FY 2021–2022). However, due to shortage in providers, more than half of people with identified operable cataracts still needed cataract surgery. Stakeholders across actors' groups supported the narrative that eye care PBF contributed to increase in access and

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utilization of eye care services, enhanced capacity building of eye care staff, improved essential eye care supplies, and strengthened primary care and district hospitals linkages. While the donors have historically predominantly funded the eye care sector (64.2%), including 100% for eye PBF, the study found that the government of Rwanda recently increased its resource allocation (from 28% in 2017 to 35.8% in 2022) to support 100% eye care providers' salaries and maintaining eye infrastructure.

Conclusion The study reveals contributions of eye PBF to the eye care performance as well as health system challenges, including financial sustainability issues, that calls for policy makers and development partners to act.

Keywords Performance-based financing, Evaluation, Rwanda, Eyecare, Sustainability, Effectiveness

Introduction

The World Health Organization (WHO) reports that around 2.2 billion people worldwide experience vision impairment, with the potential for half of these cases to be preventable if appropriate investments in preventive measures are implemented [30]. Data also show that only 17% of individuals with cataract-related impairment and 36% with refractive vision issues receive the necessary interventions [8, 30]. The vision impairment leads to a global productivity cost of US$411 billion [30]. This includes direct healthcare expenses and indirect costs arising from reduced productivity and increased support and care needs [30]. The cataract-related vision loss alone accounted for over 35 million quality adjusted life years (QALYs) lost globally in year 2020 [30]. For instance, Sub-Saharan Africa has only 3% of the world's health workers but carries 25% of the global disease burden, including eye diseases [3, 10].

Sustainable financing mechanisms have been pivotal in driving successful global health interventions, including those of the eye, such as expanding investments in capacity building for eyecare personnel, infrastructure, decentralizing the eyecare service delivery, context-relevant financing models to stimulate demand and supply for eye care [23, 27]. Whereas some interventions have led to access and utilization of eye care services [14, 23], there are still significant barriers to the users, such as physical access, cost incurred by users, waiting time, poor referral system for advanced eye care services, and shortage of eye work force [7, 14, 20, 23]. While the majority of LIMCs have supported eye care through public funding, external financing remains predominant [7, 21], signaling concerns over financial sustainability.

Although current research highlights specific eye care interventions and funding strategies, there are considerable knowledge deficiencies concerning financing models tailored to particular contexts. These deficiencies encompass information that could inform eye care policymakers and practitioners in various environments. Evidence regarding the documentation of intervention and financing strategies aimed at enhancing access to and utilization of eye care services, especially at the primary care level, remains scarce [10, 21, 23, 27, 30].

The WHO report for Sub-Saharan Africa (SSA) reveals several challenges in healthcare financing, particularly the eyecare. Nearly 40% of the total healthcare expenditure in many countries is from out-of-pocket payments, exceeding the recommended 20%, leading to catastrophic health expenditures and poverty [5, 9, 18]. Many countries fall short of the Abuja Declaration's target of allocating 15% of the government budget to health, resulting in inadequate healthcare spending to expand service delivery systems [1, 9, 30]. Only about 10% of the population is covered by health insurance, exacerbating financial burdens [12], with some countries providing less eye care services [29].

In SSA, despite significant investments in eyecare, the rural–urban disparities persist, with rural areas underserved due to a disproportionate distribution of healthcare resources [2, 5]. Sustained and equitable financing is essential to address challenges related to rural–urban disparities and improving primary health eyecare and attain Universal Eye Coverage [23]. While community-based health approaches have proven largely effective in delivering primary care across most LMICs setting, they require increased funding and designing relevant financing models to enhance access and utilization of eye services. Furthermore, although the eyecare financing approaches has been studied in LMICs, the evidence is still limited on which eyecare financing approaches works under different contexts [5, 13]. This signals more studies to shed more light on eyecare financing approaches and share best practices to possible adoption by countries in similar contexts.

Rwanda, like many other developing countries, faces a growing burden of eye health issues [15, 22]. According to Rwanda Health Management Information System (RHMIS) data, eye problems ranked among the top ten causes of morbidity in healthcare facilities with burden of disease of eye health mainly represented by cataract, refractive error, glaucoma, allergic conjunctivitis and diabetic retinopathy [22]. Evidence from studies shows that eye conditions are the fourth leading cause of morbidity among children under the age of five in Rwandan healthcare facilities, and fifth leading cause among individuals aged five and above, resulting in nearly 776,198

consultations [15, 22]. Also, eye problems were the primary reason for seeking medical consultation in relation to non-communicable diseases [15].

Analysing the top ten causes of morbidity in Rwandan hospitals in 2022 the eye diseases accounted for 11.8% of cases, making it the second most prevalent cause of morbidity in these healthcare institutions [15]. The Community Based Health Insurance (CBHI) scheme has achieved significant coverage, reaching 90% of the population; however, challenges in healthcare financing continue to exist. Notably, out-of-pocket expenses for patients remain elevated, particularly due to indirect non-medical costs associated with referrals.

There are several strategies and interventions aimed at reducing visual impairment in Rwanda [15, 22], with major focus on expanding cataract surgery, enhancing ophthalmic services for conditions such as glaucoma and diabetic retinopathy, increasing rehabilitation, optical services, and promote primary eye care [22], equitable distribution of high-quality equipment and suitable infrastructure for eye care [22], training and retaining a skilled workforce to deliver comprehensive eye care services throughout the healthcare system [15, 17], expansion of preventive and curative eye care facilities services at primary, secondary, and tertiary levels and private sector. Engaging NGOs and DPs is important for strengthening coordination, governance, monitoring, and evaluation of eye health programs and interventions [15] and to ensure effective implementation, but ensuring also financial and technical sustainability must be considered [17]. The implementation of school-based eye screening and treatment program, as well as the provision of affordable eyeglasses, to further address visual impairment in the country has been ongoing for some time [15, 17]. While Rwanda has prioritized eye health across Non-communicable Diseases (NCDs), financial sustainability for both prevention and management is still an issue as donors still play central role of financing eye care.

In 2019, the Ministry of Health (MoH) adopted the integration of the eyecare into the PBF scheme [27, 28]. This PBF initiative has been introduced in Rwanda to enhance the organizational budgets of health institutions and/or the remuneration of the staff, contingent upon their performance. The primary objective of the PBF has been to elevate both the quality and quantity of health services while optimizing the use of scarce resources. In the context of eyecare, the PBF has been executed to enhance healthcare through various means, such as incentivizing staff, upgrading facility standards, boosting productivity, and increasing the utilization of health services. Under national PBF scheme, various Development Partners (DPs) invested resources to improve eyecare services delivery in Rwanda. In this scheme, the Fred Hollows Foundation (FHF) supported payment of six indicators that aimed at improving eyecare service outputs [27, 28]. The indicators focused on eye health consultations, client follow-up and referrals, identification of operable cataracts, cataract surgeries, mentorship sessions, and identification of diabetic retinopathy cases [26, 28]. The success of the FHF model assumed that PBF strategy can enhance staff retention, equip human resources to meet client demands, minimise stockouts of key eye supplies, boost quantity and quality of eye services, improve data accuracy to guide policy and operational decisions.

PBF approach has been an effective financing model for various interventions such as: Community Health Workers (CHWs) strategy [16, 24], Antenatal care (ANC) and Family planning (FP) [4, 24]. In 2019, the Rwandan ministry of health integrated eye care indicators into the national PBF system, with major financial support from FHF, in which each health center, district and provincial hospital signed a PBF agreement with FHF to pay for eye care indicators [28]. The MoH and partners ensured consumables to districts to perform cataract surgeries, conducted routine mentorship visits, organize pre-service and in-service training to enhance human resources capacity for eye health care in Rwanda; specifically, MoH provides 100% of remuneration to all eye care workers; while the development partners still play critical role in the financial and technical support to the eye care in Rwanda: For PBF, Fred Hollows Foundation (FHF) contributed larger shares, while Fondazione contributed remainder. For upgrading and provision of eye equipment, Fondazione Leonardo Del Vecchio funds more shares with OneSight contributed the rest.

Previous research has examined the influence of the PBF on general healthcare services; however, there is a paucity of evidence regarding its specific implications for eyecare services and their financial viability in low-income countries, including Rwanda. The role of PBF in enhancing access to and utilization of eyecare services in Rwanda remains underexplored. There are still gaps in the research concerning the impact of Performance-Based Financing (PBF) on access to and utilization of eye care services in Rwanda. Additionally, there is a limited documented data regarding the factors that facilitate or hinder the use of these services, as well as the exploration of potential strategies for ensuring their financial sustainability.

As a result, this study aimed to assess the effectiveness, efficiency, relevance, equity, and sustainability of eyecare PBF since its implementation in Rwanda's eyecare sector. The goal was to document best practices and identify potential trade-offs that could impact the sustainability of this innovative financing model, thereby facilitating the development of strategies to improve its effectiveness and efficiency. This study also aimed at reviewing the

implementation of the PBF model in eye care to generate evidence that would inform policy makers and implementation partners to further strengthen the eye care service delivery in Rwanda. To respond to these aims, this study sought to the following research questions: (1) How did the adoption of PBF in eye care affect eye service utilization in Rwanda? (2) Based on current PBF financing model, what are the financially sustainable options? (3) What facilitating factors and barriers are associated with eyecare PBF implementation and (4) What are policy implications for strengthening eye care PFB in Rwanda?

Methodology

Study design

The research utilized a case study design which used a cross-sectional multi-method strategy to gather and analyze both quantitative and qualitative data to answer the research questions set for this study. A desk review was first carried out to obtain secondary data to provide evidence regarding access and utilization of eyecare services before and after implementing eyecare PBF. Quantitative trends in service utilization were evaluated and in addition qualitative perspectives from stakeholders regarding the impact of the introduction of performance-based financing (PBF) in enhancing the effectiveness, efficiency, relevance, equity, sustainability of eye care services in Rwanda, and service delivery services were collected to complement quantitative data.

Study setting

The research was carried out across four district hospitals, each located in a different administrative province of Rwanda: one in the Southern Province, one in the Northern Province, one in the Eastern Province, and one in the Western Province. A maximum variation purposive sampling was employed to select these hospitals, along with eight health centers—two affiliated with each district hospital, comprising one rural and one urban health center. Given the influence of management styles on health outcomes, two health centers that are church-managed were included in this study. Rwanda's relatively small size, coupled with a singular local language and minimal cultural diversity, resulted in limited variation concerning the topics of interest. The rural–urban contrast offered insights into the equity and inclusiveness of eye care services, as well as challenges related to supply systems, human resources for health, and capital investments. Additionally, the population served by each health center, recognizing that staffing levels are standardized irrespective of the population size were other factors that were considered in selecting the study settings. Furthermore, perspectives from the central level, including the Ministry of Health, as well as development partners such as associations and non-governmental organizations focused on eye care services based in Kigali were included in the study (see Table 1 for details).

Study population and sampling

The study involved a diverse group of stakeholders, including policymakers, healthcare providers, and development partners, ensuring a comprehensive representation to gather extensive data on the implementation of performance-based financing (PBF) for eyecare in Rwanda. This varied population consisted of officials such as managers from district hospitals and health centers situated in remote areas, non-governmental organizations (NGOs) dedicated to eyecare, development partners with a focus on eyecare, and representatives from eye care associations. At the Ministry of Health level, participants included the Director of Planning, Health Financing, and Health Management Information Systems (HMIS), as well as the Clinical Services Directorate. At the district level, the participants comprised hospital Director Generals, monitoring and evaluation (M&E) staff, ophthalmic officers, and members of the PBF Steering Committee. Within health centers, the participants included health center heads and the accountant responsible for PBF. Development partners represented in the study included professional eye associations, officials from eyecare-focused development partners, NGO representatives, and participants from private eyecare clinics.

Table 1 shows detailed information about the number of participants selected per institution and health care system levels to participate in the key informant interviews. The study involved 38 participants.

Data collection

Data collection for this study took place between 2nd December 2022 and 15th February 2023. A checklist derived from the PBF enumerated eyecare health indicators (refer to Table 2) was employed during the review of documents. This checklist also included components that addressed financing and budget-related information. The primary documents examined encompassed PBF strategic and operational plans, annual and quarterly reports, budgets, and additional Ministry of Health reports, including mid-term reviews and annual reports, as well as published peer-reviewed studies concerning eyecare PBF.

As for qualitative data collection, a semi-structured interview guide developed by the authors based on the key evaluation questions that guided this study was used to moderate key informant interviews. An expert team in eyecare provision from the Fred Hollows Foundation and the Ministry of Health reviewed this interview guide. Additionally, a workshop was conducted with all authors and the expert team from both organizations to validate the developed interview guide and found it

Table 1 Number of participants selected per each level

Level	Name of organization	Roles	Total respondents
	Central level		
MoH and RBC		(1) HoD directorate of Planning, Health Financing, and Information Systems, (2) HoD Clinical services (3) RBC (NCDs Division) (4) Eye PBF M&E (HMIS unit)	4
Eye care Associations	Rwanda Ophthalmology Society (ROS)	Head of ROS (they provide oversight support to eye care system)	2
	Rwanda Ophthalmic Clinical Officers and Cataract Surgeons Society (ROCOCS)	Head of ROCOCS (they provide oversight cataract surgical officers	1
	Rwanda International Institute of Ophthalmology (RIIO)	Health of RIIO (they provide international policy orientation for RIISO)	1
FHF officials	FHF Rwanda (head office)	Head of FHF (oversee policy, plans and integration of PBF for eye care)	1
	FHF Country Support (CSN)	MoH policy and plans and integration of PBF for eye care	2
	Decentralized level		
	4 districts (one district hospital per province)	Cataract surgeries	(1) Hospital director, (2) M&E, (3) one PBF member of steering committee (total 12)
	One provincial hospital	Cataract surgery and advanced care	1 interview
	8 HCs (2 per districts: one rural, one urban)	Eye consultations and referrals	8 KII (one KII per HC) 6 FGD with beneficiaries
Development partners in the Eye care		DPs supporting eye care: (1) Christoffel Blind Mission, (2) One Sight (3) National Union of Disability Organizations of Rwanda (NUDOR), (4) Delveccio	One KII per DP (4 KII)

Table 2 PBF remunerated eye care health indicators

No	Eye PBF Indicator	PBF Indicator description
1	Eye care consultations in a health facility	the number of eye care (ophthalmological) consultations taking place in a public health facility every month
2	Total number of cataract surgeries	The number of people received the cataract surgeries in Hospitals especially in the district and Provincial Hospitals after being identified having operable cataract
3	Total number of mentorships conducted in Health Centers	The number of hospitals conducted the visit in the Health Centers under their catchment area
4	Number of people received for Diabetic retinopathy check up	The number of patients received the diabetic retinopathy at Hospital level especially through internal transfer between the Eye Clinics and the internal medicine
5	Operable cataract identified	The number of patients consulted at Hospital level in need of cataract surgeries
6	Total number of eye cases referred at Hospital	The number of cases consulted at Health centers from eye care referred to hospitals for advanced management. We also estimated eye care financing indications using data HRTT system

comprehensible and relevant for data collection regarding the effectiveness, efficiency, relevance, gender equity, and sustainability of eyecare PBF as illustrated in Supplementary information 1.

Interviews at the central level involved discussions with policymakers from the Ministry of Health and eye care implementing partners, concentrating on several key areas. These included policy formulation and strategic planning, prospective directions for eye care policy, the collection and analysis of clinical data related to eye health, allocation of domestic resources, the development of performance-based financing (PBF) indicators, and the management of procurement and supply chain systems. At the health facility level, participants were solicited for their perspectives on the impact of eye care PBF on multiple dimensions, such as access to and utilization of eye care services, the availability of necessary supplies and instances of stockouts, the efficacy of governance and leadership in resolving staffing issues, the advancement of gender equity, challenges associated with patient referrals for cataract surgery and other eye care services, the mechanisms for patient referral and counter-referral, the reporting processes, data verification, and the procedures for payment.

All data and interview notes were captured using a voice recorder on the same day as the data collection.

These recordings were subsequently sent to senior evaluators via email on a daily basis and/or uploaded to a Google Docs format that permitted access only to authorized users. The duration of the interviews ranged from 45 min to 1 h and 20 min, with data collection was conducted at times that were convenient for the participants in private settings to ensure their confidentiality and privacy. The data collection team maintained all data collection sheets securely in plastic containers and promptly submitted them to the supervisor upon returning from the field.

Data analysis

An Excel spreadsheet facilitated the analysis of utilization and financial data obtained from the document review. A descriptive analysis was conducted to illustrate trends in the utilization of eyecare services among the general population both prior to and following the implementation of eyecare performance-based financing (PBF), as well as to examine the sources of funding for equipment and medications. Additionally, thematic analysis was employed to evaluate qualitative data, focusing on the effectiveness, equity, and sustainability of eyecare services as influenced by the eye PBF. Where feasible, data triangulation was applied to enhance the quality of the collected data and to provide a more comprehensive understanding of the quantitative findings.

On the other hand, the qualitative data was analyzed using Dedoose 9.08 software. This involved transcribing all the interviews and readings in English, and carefully reviewing them multiple times to gain a deep understanding. Two researchers independently coded the transcripts, and discrepancies were resolved through discussion to ensure reliability. This process allowed for the identification of themes and interpretation, with a particular focus on analyzing the observations in relation to the aim of the study. A framework analysis approach was employed to analysis the emerging themes and draw conclusions from the interviews. Finally, a comparison between the Eye input-based approach (before eyecare PBF) and the PBF approach (after PBF introduction in 2019) was conducted based on the findings from both the qualitative and the desk review to have an integrated finding responding to the research questions.

Ethical considerations

The current study is the first round of the project titled 'Integrating Eye Health into Rwanda Performance-Based Financing (PBF): A mid-term Review'. Research conducted on humans and/or human data, or material must be in compliance with the Helsinki Declaration. Therefore, the current study adhered to the Declaration of Helsinki regarding research carried out on humans. This project received approval from the University of Rwanda, College of Medicine and Health Sciences, Institutional Review Board (Approval Notice: No 119/CMHS IRB/2025). This evaluative study posed no risk to the participants involved. The first round of this project whose manuscript is covering focused on assessing the existing eyecare performance-based financing (PBF) program, which operates under the oversight of the Ministry of Health (MoH) with the support of development partners and other eyecare stakeholders. The next round of the project which is yet to be implemented will be gathering data from eyecare service users to examine if the introduction of eyecare PBF has impacted on their access and utilization of Eyecare Services in Primary Health Facilities**.**

Consequently, the Ministry of Health granted permission to conduct this evaluative study. The Ministry's approval letter allowed access to the Health Management Information System (HMIS) and Health Resource Tracking Tool (HRTT) data, as well as the facilitation of Key Informant Interviews (KII) with relevant development partners, stakeholders, and health facilities. The study protocol was in full alignment with the policies and strategies of the MoH. Participants expressed their consent to engage in the research by signing an informed consent form, which was provided after they received comprehensive information about the study through the Participant Information Sheet. This document outlined the objectives of the evaluative study, the types of data required, the expectations regarding their involvement in the implementation of eyecare PBF within their organizations and reassured them that their contributions would not pose any risk to their well-being. This research engaged officials from the Ministry of Health and various stakeholders involved in the implementation of eye care performance-based financing (PBF). Recognizing the significance of sharing the study's findings to enhance the ownership of eye care service provision, improve the effectiveness of service delivery, and develop strategies for the sustainability of eye care PBF within Rwandan health facilities, participants in the interviews provided their consent for their contributions to be cited in this paper.

Results

Contribution of eye PBF on eye service access and utilization

Data from Ministry of health HMIS shows that: Years before adoption of eye care PBF (between FY 2016–2017 and FY 2018–2019), the number of patients consulting for eye care showed a decreasing trend.

Figure 1 above shows that, after the adoption of eye care PBF (between FY 2018–2019 and FY 2021–2022), the number of patients who consulted for eye surgery increased from 228,302 to 1,029,299; nearly three times

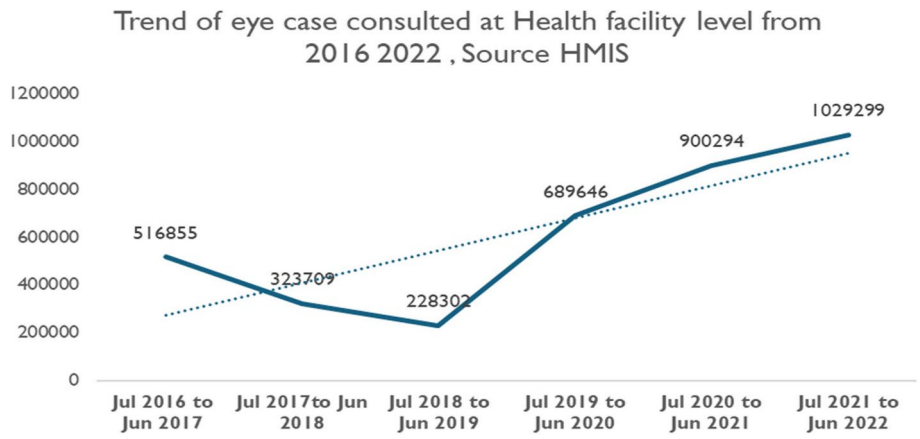

Fig. 1 Trends in eye care consulted at the health facility level (2017–2022)

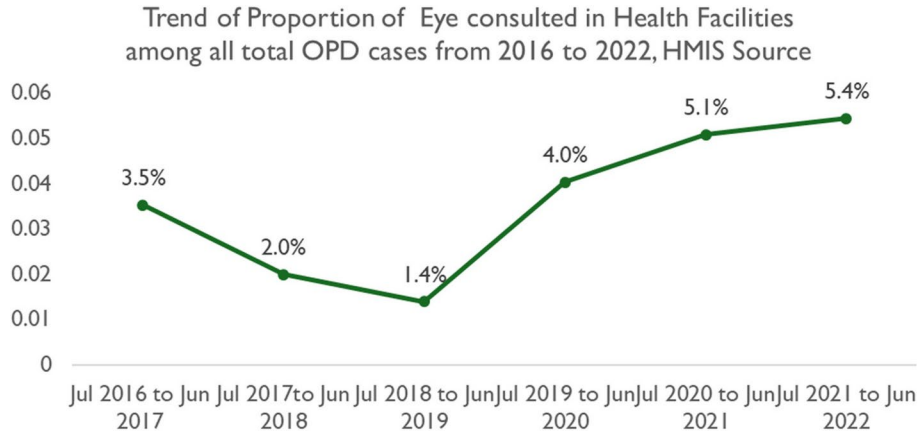

Fig. 2 Trends in proportion of eye consulted in health facilities as share of total OPD cases from 2016–2017 to 2021–2022

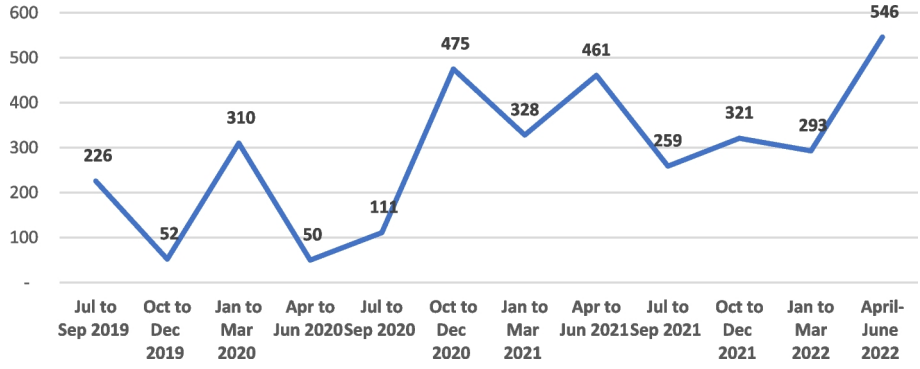

Fig. 3 Trends of cataract surgeries performed since the implementation of eye PBF

higher than the number before the introduction of eye care PBF.

Figure 2 above, shows that between FY 2016–2017 and FY 2018–2019, the proportion of eye care patients to the total patients who consulted in outpatient department, showed a decreasing trend from 3.5% to 1.4%. After adoption of PBF (between FY 2018–2019 and FY 2021–2022), this proportion increased from 1.4% to 5.4%, nearly four time the number before PBF was introduced.

As shown in Fig. 3, patients who went for a cataract surgery increased since the starting of the of Eye PBF project with the quarter of April to June 2022 recording the highest number of cases (546). The cumulative number for the whole fiscal year corresponds to 1,419 that were operated by the hospitals under PBF program and there is a huge number that were referred to other hospitals that are not in the Eye PBF project. Despite the observed increase of cataract surgeries operated, the national target (4,000) of

the hospitals under PBF project for this indicator was not attained since the achievement of cataract surgery was only 35.5% of the annual target. Participants generally observed that the introduction of eye Performance-Based Financing (PBF) enhanced both access to and utilization of eye care services when compared to the three-year period prior to its implementation (2017–2019). Specifically, a significant majority of respondents noted the following contributions of eye care PBF: many participants from district hospitals and health centers recognized that it played a crucial role in enhancing the capabilities of eye care providers, increasing the availability of eye care supplies, despite ongoing challenges related to inefficiencies, improving access to primary eye health services at health centers, and reinforcing the connection between health centers and hospitals.

> *"Services have been improved since the introduction of eye PBF, especially at the health center level where screening is conducted". DHP 2.*

Same positive feedback was also backed by health care providers.

> *"Eye service had immensely improved when you compare how the service provision three years back before initiation of the eye PBF". OCO 1*

Furthermore, all providers said eye PBF has improved the access to cataract treatment across the country.

> *"The cataract surgery was performed only at Kabgayi hospital for all the patients in whole country but currently there are other hospitals and even the district hospitals that organize those surgeries in period of month or twice a year or three time based on the number of patients they have..." DH Manager 3*

Financing for eye care and eye PBF

Figure 4 shows that before eye PBF, the external funding to has been declining gradually, until 2019, when PBF was introduced which increased slightly. The trends indicate that overall, donor funding has dropped from nearly 70% in 2017–2018 to nearly 64% in 2020–2021. During the same period, the government funding increased from nearly 30% in FY 2017–2018 to nearly 36% in FY 2020–2021.

Figure 5 shows that the proportion of eye PBF as shares of total clinical PBF increased marginally from 2.4% in 2017–18 to 3.1% in 2020–21. Table 3 below provides further data on the contributions made by each organization over the past four years, encompassing two years prior to the implementation of the eyecare Performance-Based Financing (PBF) initiative and two years following its introduction.

From the table above, One Sight and FHF are the two major funders with long term commitments with consistency in financial disbursements year-in year-out. Although eyecare PBF has pooled its resources with the PBF funds from other services, participants expressed concerns over sustaining the PBF package provided to health professionals. Both eye care associations and officials from the MoH noted that sustainability for eye care PBF like PBF for other programs is still challenging as PBF funding is still donor dependent.

From the reviewed financial documents, results showed that the Government of Rwanda (GoR) was responsible for 100% of the remuneration for both clinical and non-clinical personnel across various facilities. In contrast, the FHF accounted for nearly 90% of the overall expenditure on eye care PBF, with Fondazione Leonardo Del Vecchio contributing approximately 10.5% of the remaining funds. Additionally, Fondazione Leonardo Del Vecchio provided 80.5% of the funding for eye care equipment, while One Sight contributed 10.4% in this

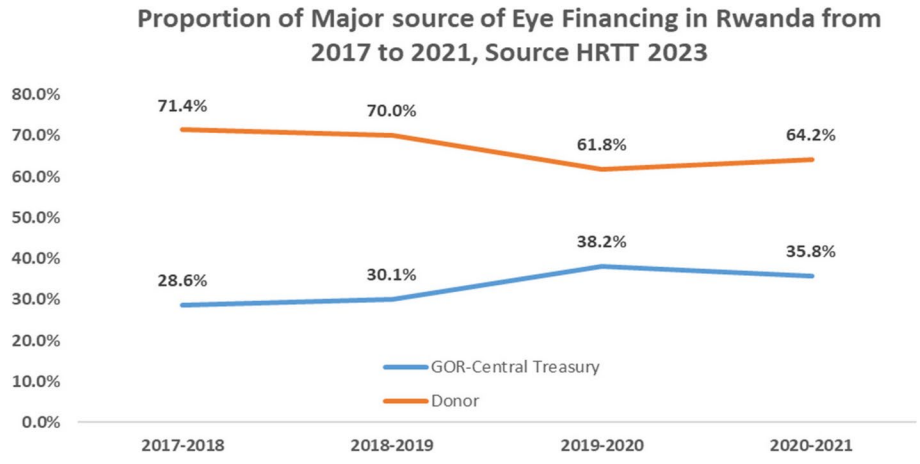

Fig. 4 Proportion of donors versus government: 2017 to 2021

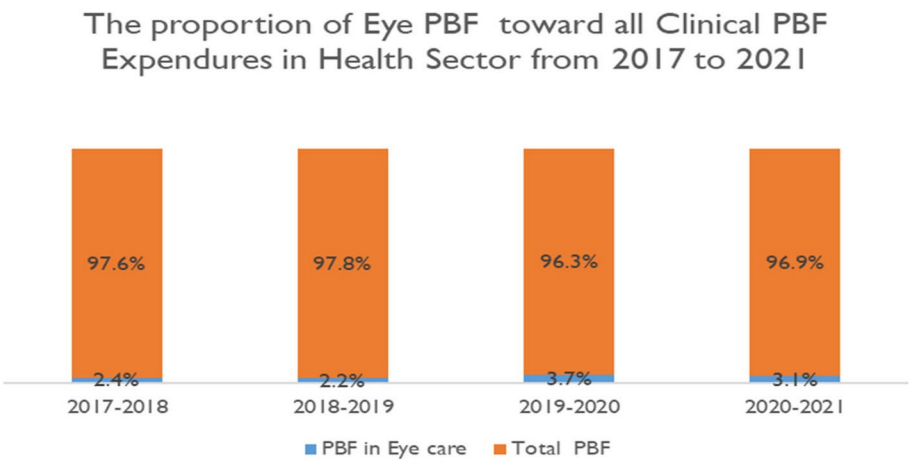

Fig. 5 Total health expenditure vs eye health expenditures

Table 3 Trends in share of external funding versus domestic funding

Main financing sources	2017–2018	2018–2019	2019–2020	2020–2021
Fred Hollows Foundation	26.9%	24.6%	10.8%	12.1%
CBM INTERNATIONAL	4.1%	5.6%	4.3%	1.2%
Cornea help		0.8%	0.0%	
FONDATION HERON		3.1%	1.8%	
FL Del Vecchio			6.1%	26.3%
GOR-Central Treasury	28.6%	30.1%	38.2%	35.8%
ONE SIGHT Headquarters	21.5%	20.5%	35.9%	19.3%
ORBIS		0.4%		1.3%
Philadelphia Eagles Foundation		3.8%		
RIIO	1.2%	10.1%	2.9%	4.0%
SAVE THE CHILDREN		0.0%		
Vision for a Nation Foundation	17.1%			
WDF	0.6%	1.1%		
Grand Total	100.0%	100.0%	100.0%	100.0%

area. CBM International contributed 6.5% to the budget of examining and treating eye patients. Overall, 35.0% of the total expenditure on eye care was allocated to human resources, specifically the remuneration of clinical and non-clinical staff, with PBF representing the second-largest share at 10.7% of eye care financing.

Facilitating factors to the adoption of eye care PBF in Rwanda

Interviews conducted with healthcare providers, directors of health facilities participating in the study, and officials from the Ministry of Health as well as information from the literature review revealed the facilitators that contributed to the adoption of PBF in eyecare services.

The culture of Results-Based Management (RBM)

Officials from the Ministry of Health indicated that following the Rwandan government's implementation of RBM across all public institutions, where civil servants commit to annual performance contracts linked to specific objectives, any initiative employing a results-oriented methodology aligns seamlessly with this overarching governmental strategy aimed at enhancing performance. They noted that after the extensive expansion of facilities nationwide, various programs have adopted PBF in diverse ways. Consequently, when the proposal to incorporate PBF into eye care was introduced, it was met with greater receptivity, as policymakers were already aware of the potential benefits PBF could bring to the health system.

Culture of PBF among providers

Since the inception of PBF, healthcare providers have largely recognized its pivotal function in improving the performance of essential targeted services and compensating additional performance fees for these services. According to feedback from providers, the launch of eye care PBF was crucial in tackling the access and utilization challenges prevalent in the eye care sector. The execution of eye PBF has bolstered healthcare providers'efforts to connect with community members, with the objective of

increasing awareness regarding eye diseases and the benefits associated with early detection and treatment.

Greater alignment of national policy, strategic and operational plan

Evidence from literature (MoH plans) shows that Rwandan development partners are well aligned to the policies and strategies which makes it easier to implement any new initiative. When eye care PBF was introduced, it was easy to align the eye care PBF along bold policies and strategies that made it easier for rollout.

Presence of PBF at decentralized entities

The presence framework for implementing PBF at decentralized level, including health center and community level enabled quick awareness and mobilizations, especially by health centers staff. The presence of knowledge of PBF ensured that there were not many trainings because these levels were knowledgeable about the PBF process.

Presence of national supply chain system

Presence Rwanda Medical Supplies (RMS), a general supply chain system for health commodities, facilitated process of purchasing basic eye care commodities, especially the essential materials for cataract surgery. Even though the supply system suffers some inefficiencies, its presence offered an avenue for purchasing eye materials as well as other materials that development partners purchased by passing the national procurement system.

The presence of eyecare Technical Working Group

The presence of this platform provided a mechanism to discuss technical and policy issues pertaining the eye service delivery and an avenue for policy dialogue. The introduction and issues of eye care PBF are discussed in TWG where joint recommendations are submitted for action. The presence of this platform enabled the adoption of eye care PBF.

Priorities of eye services at policy level

Eyecare is among the Ministry of Health's priorities covered under the non-communicable disease strategy. Having eye care as a priority in the NCD policy, facilitated the adoption of eye care PBF as the outcome contributes to the overall NCD impact. Prioritizing eye care under the NCD made adoption of eye PBF quicker.

The presence strong M&E and health data infrastructure

There is a monitoring and evaluation desk within the ministry of health (eyecare coordinator) and the district PBF steering committees that oversee the implementation of eyecare PBF ranging from reporting, monitoring, evaluation, and data quality check. Information sharing across all levels, including disseminating of guidelines, treatment protocols and procedure manuals. The presence of eyecare data through national HMIS system and electronic reporting systems of the e-tracker, further enabled quick eye care PBF uptake.

National coordination of health sector stakeholders

The strong coordination of health sector stakeholders at central and decentralized level facilitated the quick adoption of eye PBF because the outcome of coordination meetings are quickly translated into activities and implemented. The PBF coordination activities at the central and district levels ensured that eye PBF was implemented according to the design.

Barriers the hindered smooth implementation of eye care PBF include

Insufficient days and space for eye consultations

Based on views from health center providers, there were limited space for eye care consultation due to increasing demand for eye care patients. The eye care services were less integrated into primary health care system with no specific appointment dates and space for consultation. These barriers compromised the access and utilization of the services.

Weaknesses in referral and counter-referral of patients

Generally, referral and counter-referral pathways still face barriers to use advanced eyecare services; for eye care, this barrier particularly cataract surgery at district level where effective monitoring of cataract surgery outcome is missing.

Mismatch between demand and supply

As eye care patients increased at the health center led to shortage of providers because the increase was probably not anticipated. This mismatch between increasing demand for eye care services and limited supply for providers might have caused a barrier for additional patients who may have wanted to come back for the service.

Inadequate staff at MoH to oversee

The shortage of staff at central level was a barrier to implementing eye PBF as one staff at MoH could not deal with all eye care PBF activities: planning, implementation, monitoring, designing and including eye quality indicators.

Deficiencies of supply of essential eye commodities

Rwanda medical supplies suffer inefficiency in procurement and supply of eye consumables. The development partners intervened to address this barrier by bypassing the public procurement to purchase the needed essential materials, mainly for cataract surgery.

Inadequate ICT equipment

Limited computers and internet supplies to health centers hindered reporting process for the eye care data as well as other clinical data. The providers at the health center, said that they also lack computer skills which hinder the reporting compliance of the eyecare indicators set in the PBF scheme.

Coordination of stakeholders for eye care service delivery

Although the government supported eye care PBF, through policy and implementation, in sharing protocol and other implementation guidelines, there were issues of coordination for stakeholders especially for sharing the schedule for outreach cataract surgery.

Discussion

Our study found that the adoption of eye care PBF significantly contributed to access and use of eye care services, mainly at the primary care level (district hospitals and health centers). This finding corroborates with previous evidence on the effects of PBF on other health service delivery, showed that PBF has improved utilization of health services; for example: PBF improved HIV/AIDS service delivery, in terms of reduction of patient attrition and a reduction in rates of treatment failure [25], improved maternal and child indicators, such as facility delivery and antenatal care [4, 6], as well as community-based health service delivery [6, 11, 24].

The study found that eyecare PBF led to improved training and mentorship of key human resources for eyecare at the district and health centre contributed to availability of more eye care staff and more volume of eye care services. However, our study noted that the growing demand for cataract surgeries presents a significant challenge. and this calls for investments in increasing the number of ophthalmic Clinical Officers (OCOs) and cataract surgeons in district hospitals in Rwanda. The shortage of OCOs did not only affect the surgical capacity but also limited the opportunities for primary eye care nurses to receive consistent and effective supportive supervision and mentorship in the provision of eye care. Consequently, since this may undermine the current eye services utilization, there is a need for the government and their stakeholders to invest in training more ophthalmic Clinical Officers (OCOs) and cataract surgeons in district hospitals in Rwanda to address the growing demand of eye services.

Our research indicated that, although the implementation of PBF for eye care has successfully motivated eye care providers and led to an increase in the utilization of eye services within public health facilities, significant weaknesses remain in the referral and counter-referral systems. These deficiencies could adversely affect the overall effectiveness of advanced eye care services for the general population, especially in the context of monitoring cataract surgeries both prior to and following the procedure.

Our research suggests that the eyecare PBF has played a moderate role in enhancing the availability of eye care supplies and consumables at healthcare facilities, largely due to the assistance of DPs. However, it is noteworthy that a significant portion of these supplies, especially consumables necessary for advanced eye care procedures like cataract surgery, continues to be procured and provided by DPs. This reliance raises concerns about the sustainability of these services in the event that development partners withdraw their support. Consequently, it is imperative for the Ministry of Health to foster greater ownership of cataract surgery and other advanced eye care services by identifying strategies to allocate a portion of the budget for these essential treatments.

While the demand and identification of the operable cataract surgeries improved, we found that the number of cataract surgeries performed each year were limited compared to the national target [23, 27]. Equally, in some LMICs settings, however, disparities in cataract surgeries are often attributable to the shortage of health service providers, equipment, and consumables to perform cataract surgeries as well as the cost of surgical cataract services [19, 23].

Our study showed that there's still limited capacity at the decentralized level to ensure that the eyecare input resources are procured through public procurement system. Despite this limitation, the support from central MoH administration to maintain infrastructures, staff salaries, and oversight in policy guidance is promising as far as strengthening technical and institutional capabilities. If this support is maintained with additional increase in financial resources, eye care services, including services covered under eye care PBF could be sustained.

Our research indicates that the eye care PBF continues to depend heavily on external funding, with over 60% of resources sourced from development partners. In fact, the eye care PBF is nearly entirely financed by donors. Although there has been a slight increase in the proportion of government funding within the overall eye health expenditure—from 29% in 2017/18 to 36% in 2020/21—this contribution remains insufficient when compared to the average donor funding, which stands at approximately 70% during the same period. Consequently, the government needs to implement innovative strategies for domestic resource mobilization to enhance funding for eye care services. This is essential to meet the growing demand for these services, particularly in light of the rising prevalence of NCDs and the increasing public awareness regarding eye care services available at primary healthcare facilities.

Study limitations

Our research employed comprehensive methodologies to gather data from various sources, including document analysis and input from diverse eyecare stakeholders. Nonetheless, the results of this study should be approached with caution due to some limitation because data about the fund invested in the eye PBF could not be separated from other financial resources allocated to eye health services, which hindered our ability to ascertain the exact financial contributions directed towards the eye care PBF.

Conclusion

Following the implementation of the eye care PBF model, there has been a notable increase in consultations across various health facilities, with health centers reporting a substantial rise in eye consultations. This initiative has also fostered greater accountability in the reporting of eye care data. Despite improvements in the identification of cataract cases through outreach efforts, the challenge of providing surgical interventions for all individuals diagnosed with operable cataracts persists. The advancements achieved in eye care in Rwanda since the introduction of the eyecare PBF model are encouraging. Therefore, this study suggests that all stakeholders in eyecare, including government entities need to such as enhance the efficiency of procuring and supplying medical consumables, improve the referral and counter-referral systems, establish quality indicators, and strengthen the coordination and management of cataract surgeries. Addressing these issues can promote a sense of ownership over eye health services within facilities and ensure the sustainability of eye health initiatives. Furthermore, to bolster ownership and financial sustainability in eye care, it is essential for the government to increase its budget allocation for eye care, particularly for the eye care PBF program.

Supplementary Information

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Supplementary Material 1.

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Authors' contributions

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Data availability

The results section of this manuscript contains all the relevant data. If additional datasets and documents, which could not be included in this manuscript due to their extensive nature, are required, they can be requested via email from Dr. Thierry Claudien Uhawenimana and Dr. James Humuza.

Declarations

Ethics approval and consent to participate

Research conducted on humans and/or human data, or material must be in compliance with the Helsinki Declaration. Therefore, the current study adhered to the Declaration of Helsinki regarding research carried out on humans. This project received approval from the University of Rwanda, College of Medicine and Health Sciences, Institutional Review Board (Approval Notice: No 119/CMHS IRB/2025). This evaluative study presented no risk to the participants involved. Its main objective was to evaluate the current eyecare performance-based financing (PBF) program, which is managed by the Ministry of Health (MoH). As a result, the Ministry of Health authorized the conduct of this evaluative study after examining the study protocol and issuing an approval letter. This letter facilitated access to the Health Management Information System (HMIS) and Health Resource Tracking Tool (HRTT) data, as well as the organization of Key Informant Interviews (KII) with pertinent development partners, stakeholders, and health facilities. The study protocol was fully consistent with the policies and strategies of the MoH. Participants provided their consent to participate in the research by signing an informed consent form, which was distributed after they received detailed information about the study through the Participant Information Sheet. This document detailed the aims of the evaluative study, the types of data needed, the expectations regarding their participation in the implementation of eyecare PBF within their organizations and assured them that their involvement would not endanger their well-being.

Consent for publication

N/A.

Competing interests

The authors declare no competing interests.

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