



Organization and Delivery of Refractive Error Services in Francophone Sub-Saharan Africa: A Multicountry Cross-Sectional Study

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Abstract

Background: The effective organization and delivery of refractive error services are essential for reducing avoidable visual impairment. Limited evidence exists regarding how refractive services are structured and implemented within Francophone Sub-Saharan Africa (FSSA). This study assessed the organization and delivery of refractive error services across FSSA countries. **Methods:** A multicountry descriptive cross-sectional survey was conducted between March and August 2020 among eye health stakeholders across 21 FSSA countries. A structured questionnaire derived from the World Health Organization (WHO) health system building blocks framework evaluated governance, financing, human resources, service delivery models, health information systems, and infrastructure. Descriptive statistical analyses were performed using SPSS version 20. **Results:** Of 500 distributed questionnaires, 151 were completed (30.2%), representing 18 participating countries. Seventy percent reported the existence of national eye health policies; however, 65% indicated absence of refractive-specific operational guidelines. Strategic workforce planning was absent or unknown in 66.2% of cases. Refractive services were predominantly concentrated in urban areas (67.6%), with limited primary-level integration. Only 24.1% reported computerized health information systems. Equipment shortages included retinoscopes (33.3%) and phoropters (66.7%). Spectacle affordability and availability were inadequate in 58.8% and 69.7% of settings, respectively. **Conclusion:** Substantial structural and operational gaps limit the effective organization and delivery of refractive error services in FSSA. Strengthening governance, workforce planning, infrastructure, and service decentralization is essential to enhance equitable access to refractive care.

Subject Areas

Ophthalmology

Keywords

Refractive Error, Service Delivery, Optometry, Eye Health Systems, Sub-Saharan Africa

1. Introduction

Uncorrected refractive errors remain one of the leading causes of avoidable visual impairment worldwide [1] [2]. Recent global estimates indicate that hundreds of millions of people are affected by vision impairment due to uncorrected refractive errors [3] [4]. The World Health Organization (WHO) has emphasized refractive error correction as a cost-effective and essential component of universal eye health [5]-[7].

Although refractive correction is recognized as a cost-effective intervention, its impact depends largely on how services are organized and delivered within national health systems [6] [8].

In Francophone Sub-Saharan Africa (FSSA), refractive services face structural and operational challenges including fragmented governance frameworks, insufficient workforce planning, weak financing mechanisms, limited primary care integration, and inadequate infrastructure [9] [10]. These systemic challenges have also been discussed in the context of the Vision 2020 initiative in Africa [9]-[11].

While national eye health policies have been adopted in several countries, the extent to which refractive error services are effectively organized and delivered remains insufficiently documented. Monitoring health system performance through the WHO health system building blocks framework provides a structured approach to evaluating service organization [12].

This study aimed to evaluate the organization and delivery of refractive error services across FSSA through a structured multicountry cross-sectional assessment.

2. Methods

2.1. Study Design and Setting

This study was conducted across countries in Francophone Sub-Saharan Africa (FSSA) where French is widely used as an official or administrative language. These countries share similar health system structures largely inherited from the former French colonial administration and exhibit comparable health strategies and indicators.

Despite ongoing efforts, these countries face significant challenges in reducing the prevalence of uncorrected refractive errors (URE). None of the countries in

this region meet the recommended minimum ratio of human resources for eye health. In addition, optometry remains insufficiently integrated into national eye care delivery systems in most countries. Until 2020, only two optometry training institutions existed in the region, located in Mali and Cameroon.

Eye care services in FSSA countries are generally delivered through a combination of government services, non-governmental organizations (NGOs), and the private sector. Health systems are typically organized in a three-tier pyramidal structure. The **primary level**, located at the health district level, provides basic eye care services and community education on hygiene and prevention. The **secondary level** is responsible for coordination, supervision, and management of regional health facilities and provides treatment for most eye diseases, including surgical interventions. The **tertiary level**, usually located in national or university hospitals, offers specialized care and serves as the main center for training and research.

2.2. Participants

Participants were selected through a two-stage process involving primary and secondary targets. Primary targets consisted of the national coordinators or managers of eye health programs in each of the 21 countries included in the study. Contact with these coordinators was facilitated by the national eye health coordinator. When coordinators or their deputies could not be reached, information was obtained through the network of alumni from the CHU-IOTA, including ophthalmologists, nurses, and optometrists. Primary targets were responsible for providing lists and contact information for key eye health actors and partners in their respective countries, including ophthalmologists, optometrists, opticians, ophthalmic technicians, and NGOs.

Secondary targets were selected from these lists using a purposive sampling approach to ensure representation while avoiding redundancy. Five ophthalmologists and five optometrists per country were selected. When the number of professionals exceeded five, random selection was performed; if fewer than five were available, all were included. For ophthalmic technicians and opticians, six participants per profession were selected in each country, considering geographic distribution to ensure regional representation. When the number of regions exceeded six, random selection was applied, while all available personnel were included if fewer than six were identified. Technical and financial partners involved in eye health, particularly NGOs, were also included. When more than ten partners were identified in a country, a random selection of ten organizations was made.

2.3. Data Collection

Data were collected using an online questionnaire developed based on the World Health Organization Eye Health Systems Assessment Tool (ECSAT) [13]. The questionnaire primarily focused on issues related to refractive error and followed

the health systems framework, including six key components: leadership and governance, human resources, financial resources, eye care service delivery, infrastructure and equipment, and health information systems.

Before dissemination, the questionnaire and related tools were translated into French and pre-tested among trainees undergoing training at CHU-IOTA during the study period. This pre-testing phase allowed refinement of the questionnaire to improve reliability, validity, and clarity of the questions.

Data collection was conducted in two phases. The first phase involved gathering information on eye health resources and identifying NGOs and partners through direct contact with primary targets via email, supplemented in some cases by telephone calls. The second phase consisted of administering the online questionnaire to all selected participants according to a structured framework based on the six components of the eye health systems assessment tool.

Each questionnaire sent by email included an informed consent form that participants had to accept before completing the survey. Several reminders were sent via email and telephone calls to encourage participation and improve response rates.

2.4. Ethical Considerations

Ethical approval was obtained from the Ethics Committee of the Faculty of Medicine and Odontostomatology, Mali (Ref No: 2019/47/CE/FMPOS). Electronic informed consent was obtained from all participants.

2.5. Statistical Analysis

The data collected online were exported and analyzed using SPSS version 20 (IBM Corp., Armonk, NY, USA). Descriptive statistical analyses were performed to characterize eye health resources and the organization of eye care systems in FSSA countries.

Descriptive statistical analyses were performed using SPSS version 20 (IBM Corp., Armonk, NY, USA).

3. Results

A total of 151 respondents completed the survey (30.2% response rate) (See **Figure 1**), representing 18 countries (See **Table 1**).

3.1. Governance

Seventy percent reported the existence of national eye health policies; however, 65% indicated absence of refractive-specific operational guidelines (See **Table 2**).

3.2. Financing

The financial aspects of services related to refractive errors were investigated, both in terms of the specific availability of budgetary resources and the existence of healthcare coverage programs.

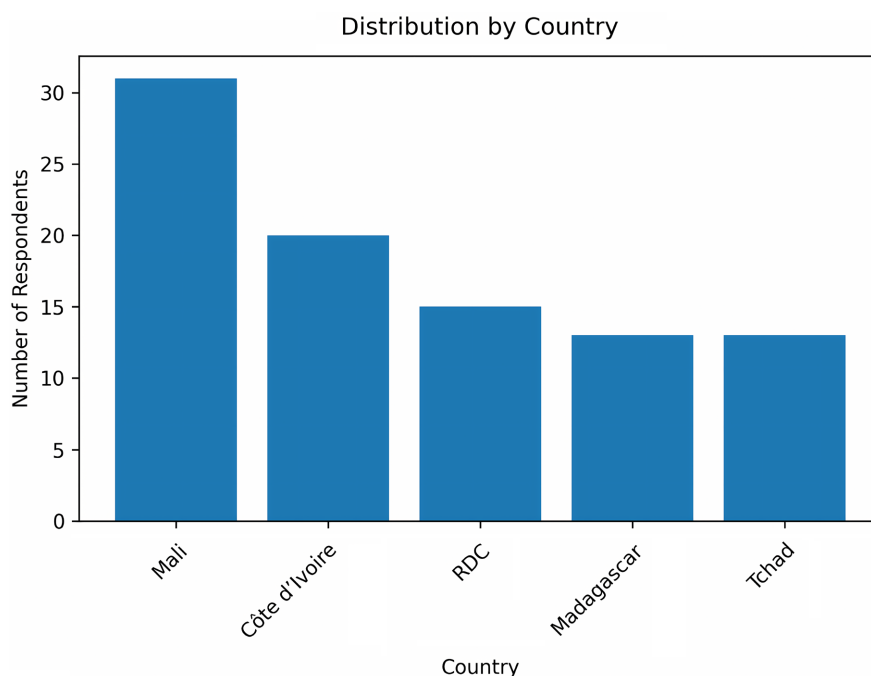


Figure 1. Distribution by country response.

Table 1. Respondent characteristics (N = 151).

Category	n (%)
Ophthalmologist	68 (45.0)
Optometrist	49 (32.5)
Ophthalmic Assistant	16 (10.6)
Other	18 (11.9)

Table 2. Governance indicators.

Indicator	Percentage
National eye health policy exists	70%
Refractive-specific guidelines absent	65%
Certification system absent	63.6%

According to respondents, 58.80% stated that a specific allocation for eye care does not appear in the Ministry of Health's budget. Additionally, 23% were unaware of the existence of such a specific allocation (See **Figure 2**).

3.3. Human Resources

Regarding the geographical distribution of eye health professionals, 45.95% of respondents stated that the government is not taking steps to ensure that this distri-

bution of professionals meets the country's needs, and 24.32% were unaware of the existence of any policy to this effect (See **Figure 3**).

According to 79.17% of respondents, educational institutions that train eye health professionals are minimally involved in the development of government plans and strategies concerning eye care professionals (See **Figure 3**).

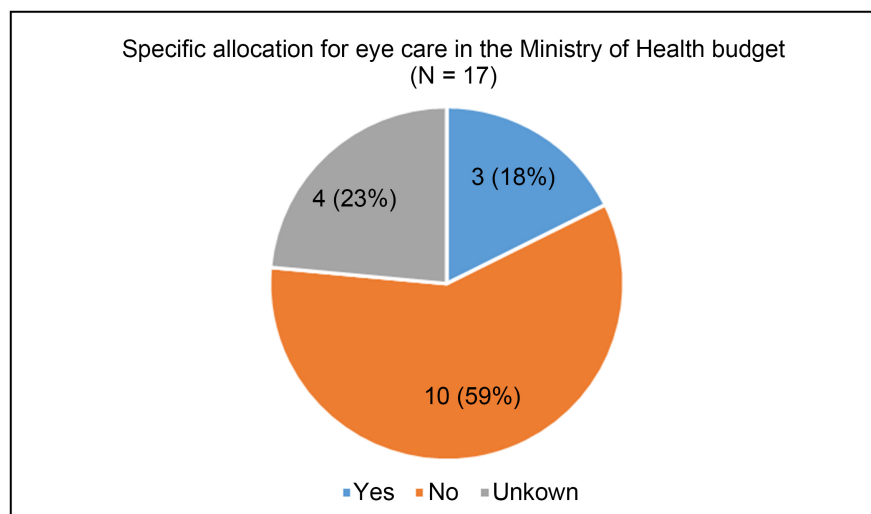


Figure 2. Specific allocation for eye care in the Ministry of Health budget.

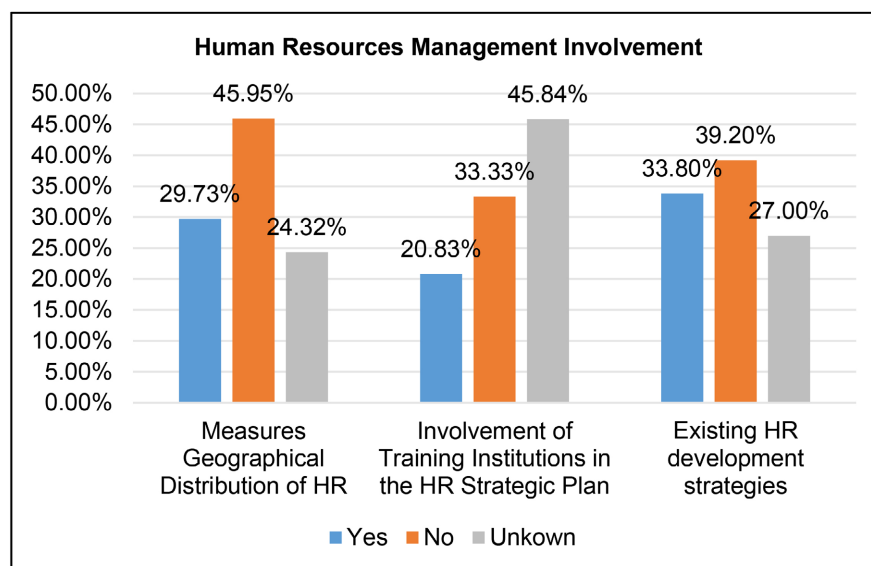


Figure 3. Human resources management involvement.

3.4. Provision of Eye Care Services in Refractive Error

In healthcare facilities, 54.5% of respondents believe that the cost of an eye exam is affordable for the local population. Regarding the treatment of refractive errors with glasses, 58.8% of participants believe that the cost of glasses is unaffordable for the population, and according to 69.7% of respondents, these glasses are simply not available (See **Figure 4**).

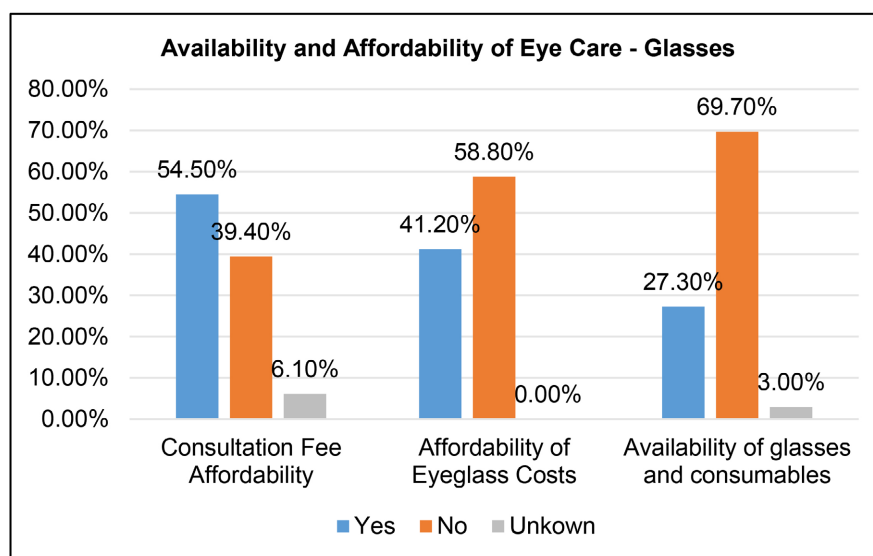


Figure 4. Availability and affordability of eye care-glasses.

3.5. Information Systems

Only 24.1% reported computerized health information systems and Government institutions or structures are the primary sources of information for the eye care health information system, followed by NGOs and private institutions.

3.6. Infrastructure and Equipment

The survey included a section on the equipment and infrastructure needed to provide services related to refractive errors and eyeglass supply facilities.

Retinoscopes were unavailable in 33.3% of facilities, and phoropters were absent in 66.7%. Spectacle production units were available in 43.3% of settings (See **Table 3**).

Table 3. Equipment availability.

Equipment	Percentage
Retinoscope unavailable	33.3%
Phoropter unavailable	66.7%
Spectacle production unit available	43.3%

4. Discussion

This study highlights substantial structural and operational gaps affecting the organization and delivery of refractive services across FSSA. Despite the existence of national policy frameworks, implementation remains limited by insufficient workforce planning, inadequate financing transparency, and equipment shortages, consistent with previous regional assessments [10] [14].

Urban concentration of services contributes to inequitable access, particularly

in rural areas, reflecting broader disparities in eye health systems across sub-Saharan Africa [11] [15]. Strengthening integration of refractive services into primary health care remains a critical priority [10].

The recent adoption of effective refractive error coverage (eREC) as a global indicator reinforces the importance of strengthening governance structures, monitoring systems, and accountability mechanisms [7]. The broader global eye health strategy emphasizes system-level reform and sustainable service models [12] [16] [17].

The findings of this multicountry assessment highlight the urgent need for system-level reforms to strengthen refractive error services across Francophone Sub-Saharan Africa. Despite the existence of national eye health policies in several countries, important operational gaps persist in governance, workforce planning, infrastructure, and service decentralization [18]-[20].

Addressing these gaps will require coordinated policy actions that prioritize the development of refractive-service guidelines, the establishment of reliable workforce planning systems, and the integration of basic refractive services within primary health care platforms [15] [21]-[24].

From a policy perspective, refractive error correction represents a highly cost-effective intervention capable of substantially reducing avoidable vision impairment while advancing broader universal health coverage goals. Embedding refractive services within national health strategies, strengthening monitoring through indicators such as effective refractive error coverage, and expanding equitable access to spectacles could significantly improve population eye health outcomes across the region. These actions provide a feasible pathway for translating global eye health commitments into sustainable service delivery within national health systems [15] [24].

Improving workforce planning, decentralizing services, enhancing infrastructure, and institutionalizing monitoring indicators are essential steps toward achieving equitable refractive care delivery across the region [18].

Limitations

The study relied on self-reported data and may be subject to response bias. The response rate may limit generalizability; however, representation across 18 countries provides meaningful regional insight.

5. Conclusions

Substantial structural and operational deficiencies persist in the organization and delivery of refractive error services in FSSA.

Strengthening refractive error services represents a critical opportunity to reduce avoidable vision impairment and improve population eye health across Francophone Sub-Saharan Africa. The gaps identified in governance, workforce planning, service decentralization, and infrastructure highlight the need for coordinated system-level reforms.

Prioritizing the integration of refractive services into primary health care and national universal health coverage strategies could substantially expand equitable access to vision correction. Advancing these reforms will be essential for translating global eye health commitments into measurable improvements in visual health outcomes across the region.

Conflicts of Interest

The authors declare no conflicts of interest.

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