

Availability, Accessibility, and Barriers to Low Vision Devices in Edo State, Nigeria: A Cross-Sectional Study of Low Vision Care Providers

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ABSTRACT

Low vision (LV) rehabilitation improves functional vision and quality of life among people living with irreversible visual loss. However, effective rehabilitation depends largely on the availability and accessibility of appropriate low vision devices (LVDs). This study evaluated factors influencing availability and accessibility of LVDs among low vision care providers in Edo State, Nigeria. We carried out descriptive cross-sectional survey among 22 optometrists providing LV care across the three senatorial districts of Edo State. Participants were purposively selected using predefined eligibility criteria. Participants completed a structured questionnaire independently, which was developed from National Eye Institute Visual Function Questionnaire and modified for low vision service delivery. We processed and evaluated all information using SPSS version 23. On average, the participants were 38.18 ± 6.41 years old, and 63.6% were females. Nearly all providers (95.5%) reported poor availability of low vision devices, while 45.5% reported poor accessibility and 50.0% reported moderate accessibility. Most respondents indicated inadequate availability of electronic LVDs, poor access through local suppliers, limited institutional support, and high importation costs as major barriers. Despite these systemic challenges, most providers perceived relatively low barriers to prescribing devices, suggesting adaptation to longstanding resource limitations. Low vision rehabilitation services in Edo State are constrained primarily by inadequate availability and accessibility of LVDs, insufficient institutional support, and financial barriers. Strengthening procurement systems, improving government investment, expanding local distribution networks, and integrating low vision services into national eye health programmes are essential to improve equitable access to vision rehabilitation.

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INTRODUCTION

Low vision is a chronic visual loss that persists despite appropriate medical treatment, surgery, or conventional refractive correction and significantly restricts a person's ability to carry out everyday tasks (National Eye Institute 2025). As reported by World Health Organization (WHO), an individual with low vision retains usable residual vision that can be enhanced through rehabilitation interventions, including optical and non-optical assistive devices and environmental modifications (WHO 2026b). Globally, hundreds of millions of people live with vision impairment, with the greatest burden occurring in developing countries where access to rehabilitation services remains limited (Moyegbone *et al.* 2025; WHO 2026a).

Low vision rehabilitation empowers individuals with irreversible visual loss to optimize usage of their remaining vision in performing everyday tasks independently. The successful delivery of rehabilitation services depends on the availability of trained personnel, functional rehabilitation clinics, and appropriate low vision devices (LVDs), including optical magnifiers, telescopes, electronic magnifiers, closed-circuit television (CCTV) systems, smartphone-based assistive technologies, glare-control devices, and non-optical aids. Appropriate prescription and timely access to these devices substantially improve reading performance, mobility,

social participation, and psychological well-being among individuals living with irreversible visual loss (Virgili *et al.* 2018; Oikonomidis *et al.* 2023).

Availability refers to the physical presence of LVDs and rehabilitation services within healthcare facilities, whereas accessibility encompasses patients' ability to obtain and utilize these services considering affordability, geographical location, distribution systems, awareness, and acceptability. Although these concepts are closely related, healthcare facilities may possess some rehabilitation equipment without patients being able to access or afford them. Consequently, both availability and accessibility are critical determinants of effective low vision rehabilitation (Alsaqr 2021; Kyeremeh and Mashige 2021).

Evidence from sub-Saharan Africa consistently demonstrates that low vision services remain inadequate. A recent study by Akuffo *et al.* (2026) reported that rehabilitation services are concentrated mainly in urban tertiary hospitals, with substantial shortages of trained personnel, rehabilitation equipment, and electronic assistive technologies across the region. Conventional optical magnifiers were generally available, whereas advanced electronic devices were scarce because of their high procurement costs and limited governmental investment.

In Ghana, Kyeremeh and Mashige (2021) reported that only one-third of facilities managing patients with low vision actually provided dedicated rehabilitation services. The study further identified inadequate equipment, lack of LVDs, poor public awareness, and high device costs as major barriers to service delivery. Similar findings have been reported in Ethiopia, where inadequate training, shortages of rehabilitation devices, and limited institutional support significantly reduced providers' ability to deliver comprehensive low vision care (Dendea *et al.* 2023).

Nigeria faces comparable challenges. Monye *et al.* (2020) found that functional low vision services existed in only a few tertiary hospitals in Southeast Nigeria, with poor availability of assistive devices and inadequate funding limiting service provision. Other Nigerian studies have similarly identified inadequate awareness, insufficient professional training, weak referral systems, and the high cost of imported assistive technologies as major obstacles to effective rehabilitation (Okoye *et al.*, 2018; Okwudishu *et al.* 2023). Since most low vision devices are imported, fluctuations in exchange rates and import duties further increase costs, making these technologies unaffordable for many patients.

Despite growing recognition of the importance of vision rehabilitation within universal eye health, evidence regarding the availability and accessibility of LVDs in Edo State remains scarce. Understanding the perspectives of low vision care providers is essential for identifying system-level barriers that influence service delivery and informing policies aimed at improving equitable access to rehabilitation services. Therefore, our study evaluated factors influencing availability and accessibility of LVDs among low vision care providers in Edo State, Nigeria. We hypothesized that limited training in low vision care, high cost of LVDs, poor awareness of low vision services, and inadequate institutional support significantly influence the availability and accessibility of low vision devices.

MATERIALS AND METHODS

Study Design

This research utilized a descriptive, cross-sectional framework to evaluate factors influencing availability and accessibility of low vision devices (LVDs) among low vision care providers in Edo State, Nigeria. The methodology was well-suited because it allowed us to obtain information on providers' perceptions and current practice at a single point in time.

Study Area

The research was carried out within Edo State, situated in the South-South geopolitical zone of Nigeria. Edo State has an approximated population of over 3.6 million people, and comprises of 18 Local Government Areas distributed across three senatorial districts: Edo South, Edo Central, and Edo North (NPC 2023). The state capital, Benin City, serves as the major commercial and healthcare hub, housing most tertiary eye care facilities. Eye care services are provided through government-owned teaching hospitals, specialist hospitals, private eye clinics, and mission hospitals, with low vision services predominantly concentrated in urban centres. Data were collected from Optometrists practicing low vision care in various facilities across the state's three senatorial districts. The participating facilities were Edo Specialist Hospital, Benin City; Faculty of Optometry Teaching Clinic, University of Benin, Benin City; Glovera Foundation, Benin City (Edo South Senatorial District); General Hospital, Ekpoma; Irrua Specialist Teaching Hospital, Irrua (Edo

Central Senatorial District); and Edo State University Teaching Hospital, Auchi (Edo North Senatorial District).

Study Population

The study population comprised optometrists providing low vision care services in public and private eye care facilities across Edo State. The participating facilities were Edo Specialist Hospital, Benin City; Faculty of Optometry Teaching Clinic, University of Benin, Benin City; Glovera Foundation, Benin City; General Hospital, Ekpoma; Irrua Specialist Teaching Hospital, Irrua; and Edo State University Teaching Hospital, Auchi. Only practitioners actively involved in low vision assessment, rehabilitation, and prescription of low vision devices were eligible to participate.

Eligibility Criteria

Registered optometrists practicing in Edo State, and actively involved in providing low vision rehabilitation services, as well as provided written informed consent were included in the study. Furthermore, Optometrists not involved in low vision care, those that were not available during the study period, those who declined participation or submitted incomplete questionnaires were excluded from the study.

Sample Size and Sampling Technique

The researchers used purposive sampling method because relatively few practitioners provide dedicated low vision services in Edo State. A total of 22 optometrists that provide low vision services and gave consent to participate were enrolled into the study from the three senatorial districts (Edo South, Edo Central and Edo North).

Data Collection

Participants completed a structured questionnaire independently, which was developed from National Eye Institute Visual Function Questionnaire (NEI VFQ-25) and modified to suit objectives of the study (National Eye Institute 2000). The questionnaire consisted of four sections:

Section A: Socio-demographic and professional characteristics of respondents.

Section B: Availability and accessibility of LVDs within participants' practice settings.

Section C: Factors influencing the prescription and utilization of LVDs.

Section D: Perceived barriers affecting low vision service delivery.

The questionnaire included both demographic questions and five-point Likert scale items ranging from Strongly Agree (5) to Strongly Disagree (1).

Eligible participants were approached at their respective practice locations. Following explanation of the study objectives, written informed consent was obtained. Participants completed the questionnaires independently, and completed questionnaires were retrieved immediately or at an agreed time to maximize response rates and minimize missing data.

Validity and Reliability

The adapted questionnaire was reviewed by experts in low vision rehabilitation to establish face and content validity. Necessary modifications were made to improve clarity, relevance, and comprehensiveness. A pilot test was conducted among a small group of optometrists outside the study population to assess comprehensibility and consistency before commencement of data collection.

Data Analysis

We processed and evaluated all information using SPSS version 23. Descriptive metrics such as frequencies, percentages, averages, and standard deviations were used in summarizing respondents' characteristics and research variables. Composite Likert scores were calculated to classify respondents' perceptions regarding availability, accessibility, and barriers into poor, moderate, and good categories.

Ethical Considerations

Ethical approval was initially obtained from the Edo State Ministry of Health Research Ethics Committee (Protocol No. HA/737/25/C/12151037), which was accepted by all participating facilities except the Edo State University Teaching Hospital (ESUTH). However, ESUTH has an institutional policy requiring that all research involving its staff, patients, or facilities must also receive approval from the Edo State University Teaching Hospital Health Research Ethics Committee (ESUTH-HREC), irrespective of prior approval from another ethics committee. Consequently, an additional ethical approval was obtained from ESUTH-HREC (Protocol No. EDSUTH/HREC/2025/041) to comply with the institution's research governance requirements before data

collection commenced at the facility. Permission was obtained from participating facilities before data collection. All subjects participated willingly and provided written informed consent prior to data collection. To safeguard individual identities, strict anonymity and confidentiality protocols were enforced throughout the research period.

RESULTS AND DISCUSSION

Results

Overall, 22 optometrists providing low vision services participated in the research. The average age was 38.18 ± 6.41 years (range: 28–48 years). More than half of the respondents (54.5%) practiced in Edo South Senatorial District, while 72.7% were located in urban practice settings. Females constituted 63.6% of participants. All respondents were optometrists, with 68.2% holding Bachelor of Science/Doctor of Optometry (BSc/OD) degrees, 18.2% possessing master's degrees, 9.1% holding PhD qualifications, and 4.5% being fellowship trained. The predominance of urban-based providers suggests a possible disparity in access to low vision rehabilitation services between urban and rural communities (Table 1).

Table 1: Socio-demographic Characteristics of Respondents

Variable	Options	Frequency (n)	Percentage (%)
Senatorial District	Edo South	12	54.5
	Edo Central	6	27.3
	Edo North	4	18.2
Practice Location	Rural	3	13.6
	Semi-Urban	3	13.6
	Urban	16	72.7
Age Groups (in years)	20-30	4	18.2
	31 -40	9	40.9
	41 -50	9	40.9
Gender	Male	8	36.4
	Female	14	63.6
Profession	Optometrist	22	100.0
	Others	0	0
Highest Qualification	BSC/OD	15	68.2
	MSc	4	18.2
	Fellowship	1	4.5
	PhD	2	9.1

Most respondents reported inadequate availability of low vision devices within their clinics (Table 2). Approximately 72.7% disagreed that their clinics possessed a wide range of devices for patient demonstration and trial, indicating limited opportunities for patients to evaluate assistive devices before prescription. Similarly, 77.3% reported that electronic LVDs, including closed-circuit television (CCTV) systems, electronic magnifiers, and mobile applications, were not readily available. More than half (54.6%) also indicated that optical devices such as telescopes, magnifiers, and high-add lenses were inadequately stocked. Affordability represented another major challenge. Only 4.5% of respondents agreed that most patients could afford the available LVDs, while the majority expressed concerns regarding patients' financial capacity.

Accessibility was similarly limited. Nearly 63.7% of providers reported difficulty obtaining LVDs through local distributors, suggesting dependence on external procurement channels. Furthermore, 63.7% identified import restrictions and the high cost of imported devices as major constraints to accessing advanced assistive technologies. Most respondents (77.3%) also reported inadequate institutional or government support for low vision service provision, while 59.1% agreed that the absence of repair and maintenance services reduced the long-term usability of prescribed devices.

Overall, 95.5% of respondents classified the availability of low vision devices as poor. Regarding accessibility, 50.0% reported moderate accessibility, 45.5% reported poor accessibility, and only 4.5% considered accessibility to be good (Table 3).

Table 2: Availability and Accessibility of Low Vision Devices

Question	Options	SD	D	N	A	SA
Availability of LVDS						
My clinic has a wide range of LVDs available for demonstration & trial	Count (n)	11	5	6	0	0
	Percent (%)	50.0	22.7	27.3	0	0
Patients in my clinic can afford most of the available LVDs	Count (n)	7	5	9	1	0
	Percent (%)	31.8	22.7	40.9	4.5	0
Electronic LVDs (e.g CCTV, Magnifiers, Apps) are readily available	Count (n)	9	8	5	0	0
	Percent (%)	40.9	36.4	22.7	0	0
Optical aids (magnifiers, telescopes, high-add lenses) are adequately stocked	Count (n)	6	6	10	0	0
	Percent (%)	27.3	27.3	45.5	0	0
Accessibility of LVDS						
LVDs are easily accessible through local distributors or suppliers	Count (n)	10	4	4	3	1
	Percent (%)	45.5	18.2	18.2	13.6	4.5
Import restrictions and high costs limit access to advanced devices	Count (n)	2	2	4	6	8
	Percent (%)	9.1	9.1	18.2	27.3	36.4
There is adequate institutional or government support for LV service provision	Count (n)	10	7	3	1	1
	Percent (%)	45.5	31.8	13.6	4.5	4.5
Lack of repair or maintenance services limits device usability	Count (n)	3	0	6	11	2
	Percent (%)	13.6	0	27.3	50.0	9.1

Table 3: Level of Availability and Accessibility of Low Vision Devices

Variable	Options	Frequency (n)	Percentage (%)
Availability Level of LVDs	Poor Availability	21	95.5
	Moderate Availability	1	4.5
Accessibility Level of LVDs	Poor Accessibility	10	45.5
	Moderate Accessibility	11	50.0
	Good Accessibility	1	4.5

In Table 4, providers generally did not perceive deficiencies in professional training as the principal barrier to prescribing low vision devices. More than half (54.6%) disagreed that limited training significantly affected their prescribing practices. Likewise, 63.7% disagreed that the absence of a dedicated low vision clinic constituted the primary obstacle to effective service delivery. Similarly, respondents generally disagreed that poor patient awareness, cultural beliefs, consultation time, inadequate multidisciplinary collaboration, or the lack of standardized clinical protocols represented major barriers to prescribing low vision devices.

Composite barrier scores showed that 81.8% of respondents perceived an overall low level of barriers to prescribing low vision devices, while 13.6% reported moderate barriers and only 4.5% reported high barriers (Figure 1). Despite this finding, the consistently poor ratings for device availability and accessibility suggest that systemic limitations remain substantial. The discrepancy may indicate that practitioners have adapted to persistent resource shortages or have adjusted their expectations within existing service delivery conditions.

Table 4: Factors Influencing Prescription of Low Vision Devices

Question	Options	SD	D	N	A	SA
Limited training in LVC limits my ability to prescribe LVDs	Count (n)	6	6	5	3	2
	Percent (%)	27.3	27.3	22.7	13.6	9.1
Lack of access to a range of LVDs limits my prescriptions	Count (n)	7	10	4	0	1
	Percent (%)	31.8	45.5	18.2	0	4.5
Patient inability to afford devices affects my prescription decision	Count (n)	3	8	9	0	2
	Percent (%)	13.6	36.4	40.9	0	9.1
Low awareness among patients about LV rehabilitation affects demands	Count (n)	8	8	4	1	1
	Percent (%)	36.4	36.4	18.2	4.5	4.5
Absence of a structured LV clinic setup limits device prescription	Count (n)	8	6	5	2	1
	Percent (%)	36.4	27.3	22.7	9.1	4.5
Time constraints during consultations discourage detailed LV assessments	Count (n)	5	6	7	2	2
	Percent (%)	22.7	27.3	31.8	9.1	9.1
Cultural beliefs or stigma associated with device use discourage prescription	Count (n)	5	6	9	1	1
	Percent (%)	22.7	27.3	40.9	4.5	4.5
Poor collaboration with rehabilitation or occupational therapists affects outcomes	Count (n)	6	10	2	3	1
	Percent (%)	27.3	45.5	9.1	13.6	4.5
Lack of continuing education on low vision care is a major barrier	Count (n)	6	5	7	2	2
	Percent (%)	27.3	22.7	31.8	9.1	9.1
Lack of standardized protocols or guidelines affects consistency in presentation	Count (n)	4	6	11	0	1
	Percent (%)	18.2	27.3	50.0	0	4.5

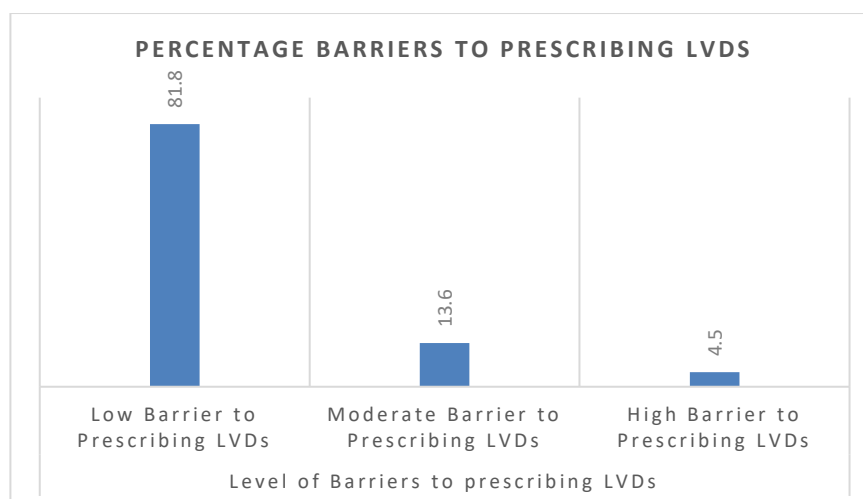


Figure 1: Overall Barriers to Prescribing Low Vision Devices

Discussion

This study evaluated the factors influencing availability and accessibility of low vision devices (LVDs) among low vision care providers in Edo State, Nigeria. The findings demonstrate that inadequate availability of assistive devices, poor accessibility, high acquisition costs, and limited institutional support remain the principal barriers to effective low vision rehabilitation. These findings are consistent with recent evidence from Nigeria and other developing countries (Okoye *et al.* 2018; Monye *et al.* 2020; Kyeremeh and Mashige 2021; Acheampong *et al.* 2025; Garba 2026), indicating that deficiencies within health systems, rather than provider competence, constitute the primary barriers to comprehensive low vision care.

Nearly all respondents (95.5%) reported poor availability of LVDs within their clinics. In particular, electronic LVDs and demonstration units were largely unavailable, limiting opportunities for individualized device selection and patient education. These findings are consistent with reports from Southeast Nigeria, where Monye *et al.* (2020) found that only a minority of tertiary hospitals maintained functional low vision services and that available devices were inadequate for comprehensive rehabilitation. Similar observations have been reported in Ghana, where Kyeremeh and Mashige (2021) identified shortages of essential assessment equipment and assistive devices in most eye care facilities. Likewise, Akuffo *et al.* (2026), in a systematic review of low vision services in sub-Saharan Africa, concluded that advanced rehabilitation technologies remain scarce and are largely confined to urban tertiary centres. Collectively, these findings suggest that inadequate procurement systems, weak supply chains, and insufficient investment continue to limit the availability of LVDs across the region.

Accessibility to available devices was also considerably restricted. Most respondents indicated that obtaining low vision devices through local suppliers was difficult and that importation costs substantially limited access to advanced technologies. Because many optical and electronic low vision devices are imported, fluctuations in foreign exchange rates, import duties, and transportation costs inevitably increase their retail prices, reducing affordability for both healthcare facilities and patients. Similar financial constraints have been documented in Ghana (Kyeremeh and Mashige 2021), Jordan (Okasheh-otoom 2026), and South Africa (Abraham *et al.*, 2025). Improving local procurement systems, encouraging regional manufacturing of assistive technologies, and

reducing import tariffs may therefore enhance accessibility and promote equitable distribution of low vision devices.

The study further demonstrated inadequate institutional and government support for low vision rehabilitation services. Most respondents reported insufficient funding, weak policy implementation, and inadequate maintenance services for assistive devices. Sustainable low vision rehabilitation requires not only trained personnel but also consistent financing, procurement mechanisms, multidisciplinary collaboration, and supportive national policies. The Nigerian National Eye Health Strategic Development Plan (2024–2028) recognizes vision rehabilitation as an essential component of comprehensive eye care. However, translating policy into practice requires increased budgetary allocation, improved infrastructure, and stronger integration of rehabilitation services within routine eye care delivery (Federal Ministry of Health & Social Welfare 2023). Lack of repair and maintenance services identified in this study is also important because damaged assistive devices frequently become unusable, resulting in abandonment of rehabilitation interventions and reduced long-term patient benefit (Oldfrey *et al.* 2024).

An interesting finding was that although respondents reported poor availability and accessibility of devices, most perceived relatively low overall barriers to prescribing low vision devices. This apparent contradiction may reflect adaptation to long-standing resource limitations. Practitioners working in resource-constrained settings may become accustomed to limited device availability and consequently perceive these deficiencies as part of routine clinical practice. Similar observations have been reported among eye care practitioners in Nigeria and other developing countries, where normalization of resource shortages may reduce the perceived impact of systemic barriers on clinical decision-making (Jose *et al.* 2016; Okoye *et al.* 2018). Nevertheless, the objective findings of poor availability and accessibility indicate that these systemic challenges continue to compromise the quality and scope of low vision rehabilitation services.

Overall, our findings highlight the need for coordinated interventions involving government agencies, professional associations, academic institutions, healthcare facilities, and private-sector partners. Expanding procurement of assistive technologies, strengthening local supply chains, improving healthcare financing, enhancing maintenance services, and integrating low vision rehabilitation into universal eye health programmes will be essential for improving access to quality low vision care in Edo State and Nigeria as a whole.

Strengths of the Study

This study provides one of the few empirical assessments on availability and accessibility of LVDs from the perspective of low vision care providers in Edo State, Nigeria. By focusing on practitioners directly involved in low vision rehabilitation, the research provides meaningful perspectives on how daily operations and overall systemic structures impact service delivery. Furthermore, the inclusion of providers from the three senatorial districts enhances the geographical representation of low vision services within the state. The findings also add to the limited body of evidence on low vision rehabilitation in Nigeria, which may impact policy formulation, resource allocation, and future programme development aimed at strengthening vision rehabilitation services.

Limitations of the Study

There are drawbacks in our study. First, the small sample size reflects the limited number of practitioners providing dedicated low vision services in Edo State and may restrict the generalizability of the findings to other regions of Nigeria. Second, because data were obtained at a single point in time, cross-sectional study cannot confirm whether the identified factors directly cause variations in the availability or accessibility of low vision devices. Third, the research depended on self-reported information from respondents, which may be affected by recall bias and tendency to conform to societal norms. Finally, patient perspectives and objective facility assessments were not included; therefore, the findings represent only the experiences of low vision care providers. Future studies should adopt multicentre mixed-methods designs involving larger samples of providers, patients, and healthcare facilities to provide a more comprehensive evaluation of low vision rehabilitation services in Nigeria.

CONCLUSION

Our findings demonstrated that availability and accessibility of LVDs in Edo State remains inadequate despite the presence of trained low vision care providers. Shortages of optical and electronic assistive devices, dependence on imported technologies, poor local distribution systems, inadequate institutional and government support, and limited repair and maintenance services constitute the major barriers to effective low vision rehabilitation. Although many providers perceived relatively few personal barriers to prescribing low vision devices, the findings indicate that systemic deficiencies continue to compromise service delivery and patient access to appropriate rehabilitation.

Addressing these challenges requires coordinated efforts by government, professional bodies, healthcare institutions, educational institutions, and development partners. Strengthening procurement systems, promoting local availability of assistive technologies, subsidizing device costs through health insurance or government support, expanding professional capacity building, and integrating low vision rehabilitation into routine eye care services will improve equitable access to rehabilitation and optimize quality of life of persons living with irreversible visual impairment in Nigeria.

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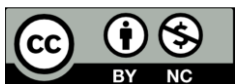
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