

Original Research Article

Health system determinants of vision protection practices among monocular patients attending a referral eye hospital in Kenya

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ABSTRACT

Background: Monocular patients are at increased risk of bilateral blindness as soon as they lose their remaining eye. Despite the importance of protective eye-care behaviors in preserving residual vision, evidence on health system factors influencing vision protection among monocular patients in low- and middle-income countries remains limited. The study assessed health system determinants of vision-protection practices among monocular patients attending the Thika Level Five Hospital Eye Clinic, Kenya.

Methods: The study used a cross-sectional, analytical design. A well-structured questionnaire was used to survey 125 monocular patients. Data were analyzed using SPSS version 25 using descriptive statistics, chi-square tests, and binary logistic regression at a 95% confidence interval, with $p < 0.05$ considered statistically significant.

Results: Response rate was 95.2% (119/125). Overall, 58.6% of respondents demonstrated poor vision protection practices. Binary logistic regression analysis demonstrated that respondents residing far from the health facility were significantly more likely to exhibit poor protection practices (OR=12.604, 95% CI: 2.441-65.083, $p=0.003$). Similarly, respondents who had not received health education on vision protection were significantly more likely to demonstrate poor practices (OR=5.386, 95% CI: 1.697-17.097, $p=0.004$). Inaccessible ophthalmic services and poor caregivers' communication were also significantly associated with poor protection behaviors ($p < 0.05$).

Conclusions: Poor vision protection practices remain highly prevalent. Long distances to hospitals, inadequate health education, and inaccessible eye services significantly influence the adoption of vision protective practices. Decentralizing services through mobile eye clinics, strengthening patient-centered education, and improving the accessibility of ophthalmic services may improve preventive behaviors and reduce avoidable blindness among monocular patients.

Keywords: Blindness prevention, Eye-care practices, Health system determinants, Kenya, Monocular vision, Vision protection

INTRODUCTION

Blindness and visual impairment remain major global public health concerns, contributing substantially to disability, reduced productivity, diminished quality of life, and socioeconomic burden. Globally, an estimated 43 million individuals are blind, while hundreds of millions live with moderate or severe visual impairment.

The burden is disproportionately higher in low- and middle-income countries where access to preventive and specialized eye-care services remains inadequate. Although many causes of blindness are preventable or treatable through early diagnosis and timely intervention, the prevalence of visual impairment continues to increase globally due to population growth, aging populations,

delayed health-seeking behavior, and inequitable access to eye-care services.^{1,2}

Monocular vision refers to vision in only one functional eye, with the affected individual relying entirely on the remaining eye for visual functioning. Patients with monocular vision constitute a highly vulnerable population because injury or disease affecting the remaining functional eye may result in irreversible bilateral blindness. In addition to increased risk of total blindness, monocular vision is associated with impaired depth perception, restricted peripheral visual fields, psychosocial distress, reduced occupational performance, and increased risk of accidents during daily activities.^{3,4} Consequently, protective eye-care practices such as regular ophthalmic reviews, use of protective eyewear, adherence to prescribed treatment, and prompt treatment-seeking behavior are essential in preserving residual vision among monocular patients.⁵

Despite the importance of preventive eye-care practices, evidence from several studies demonstrates poor adoption of protective eye-care behaviors among populations at risk of visual impairment. Previous studies have reported low utilization of protective eyewear, delayed presentation to health facilities, self-medication, and reliance on traditional remedies among individuals with eye conditions.^{6,7} In Kenya, occupational eye injuries remain common among informal sector workers, with poor utilization of personal protective equipment contributing significantly to preventable ocular trauma and vision loss.⁸

Health system-related barriers have been identified as important determinants of eye-care utilization and preventive health behavior. These include long distances to health facilities, inadequate health education, limited availability of eye-care specialists, poor accessibility to ophthalmic services, high treatment costs, and inadequate patient counselling.^{9,10} In many low-resource settings, eye-care services remain concentrated in urban referral centers, limiting access to routine ophthalmic care for vulnerable populations.¹¹ These barriers are likely to disproportionately affect monocular patients who require regular monitoring and consistent vision protection practices to prevent avoidable blindness.

In Kenya, limited evidence exists regarding health system determinants influencing vision protection practices among monocular patients. Most available studies have focused on causes and prevalence of blindness rather than factors influencing adoption of protective eye-care behaviors among high-risk populations. Understanding health system determinants associated with vision protection practices is essential for the development of targeted interventions aimed at improving preventive ophthalmic care and reducing avoidable blindness among monocular patients.

This study therefore assessed health system determinants of vision-protection practices among monocular patients attending the Thika Level Five Hospital Eye Clinic in Kenya.

METHODS

Study design

A hospital-based analytical cross-sectional study was conducted at Thika Level Five Hospital Eye Clinic in Kiambu County, Kenya.

Study site

The study was conducted at Thika Level Five Hospital Eye Clinic in Kiambu County, Kenya. Thika Level Five Hospital is a referral and teaching hospital serving patients from Kiambu County and neighboring counties including Murang'a, Machakos, Kirinyaga, and Nairobi. The eye clinic attends approximately 60 patients daily, with an estimated 8 monocular patients seen per day. The facility was selected because of its strategic location, serving as a referral and teaching center offering eye diagnostics, medical treatment, and surgical intervention. The Eye Unit also serves as a disability assessment Centre for people living with visual impairment and blindness within Kiambu County and as a referral centre for other surrounding counties.

Study period

The study was conducted for a period of one month starting from 1st October 2023 and concluding on 31st October 2023.

Study population

The study population comprised monocular patients aged 18 years and above attending Thika Level Five Hospital Eye Clinic during the study period. Monocular vision was defined as vision worse than 3/60 in the poorer eye according to the World Health Organization classification. Patients with severe illness or communication difficulties that limited their ability to provide reliable responses were excluded from the study.

Sample size determination

The targeted population for the study comprised all 119 of a total target population of 160 monocular vision patients attending TL5H during the month of the study. The target population was small and easily accessible; a census approach was used. This, therefore, explains why no sampling frame or sample size calculation was carried out. The entire population of 119 participants was targeted for data collection, ensuring maximum data correctness and so eliminated errors, with total representation of the group achieved.

Sampling procedure

A census sampling approach was adopted since the estimated number of monocular patients attending the clinic during the study period was approximately 160 patients. All eligible monocular patients attending the eye clinic during the study period were consecutively recruited until the required sample size was achieved.

Data collection

Data were collected using a structured interviewer-administered questionnaire adapted from previous studies on eye-care practices and visual health behavior. The questionnaire captured socio-demographic characteristics, vision protection practices, and health system factors influencing protective eye-care behaviors, including distance to health facility, accessibility of ophthalmic services, health education, healthcare worker communication, cost of care, and availability of eye-care specialists and equipment.

Data were collected electronically using Open Data Kit (ODK) Collect by trained research assistants. Eligible participants were identified after visual acuity assessment and referred for study participation. A pilot study involving 15 participants was conducted at Kenneth Matiba Eye Hospital, Murang'a County, to assess the clarity, reliability, and validity of the study instrument.

Study variables

The dependent variable was vision protection practices among monocular patients. Independent variables included health system determinants such as distance to healthcare facilities, accessibility of eye-care services, health education, healthcare worker attitude, cost of services, and availability of eye-care specialists and equipment.

Data analysis

Data were cleaned, coded, and analyzed using the Statistical Package for the Social Sciences (SPSS) version 25. Descriptive statistics, including frequencies and percentages, were used to summarize study variables. Associations between health system factors and vision protection practices were assessed using chi-square tests. Binary logistic regression analysis was performed to identify factors independently associated with poor vision protection practices. Odds ratios (ORs) and 95% confidence intervals (CIs) were computed, with $p < 0.05$ considered statistically significant.

Ethical considerations

Ethical approval to conduct the study was obtained from Mount Kenya University Ethics Review Committee (REF: MKU/ISERC/2988), and permission was granted by Thika Level Five Hospital administration (REF:

MOH/TKA/24226666). A research license was issued by the National Commission for Science and Technology (REF:690902) in Kenya. Written informed consent was obtained from all participants before enrollment into the study. Confidentiality and anonymity of participant information were maintained throughout the study.

RESULTS

Response rate

A total of 119 monocular patients participated in the study out of the targeted sample size of 125 respondents, yielding a response rate of 95.2%.

Table 1: Socio-demographic and socio-economic characteristics of respondents.

Variables	Category	Frequency	Percent
Age group (years)	18-35	29	24.4
	36-59	38	31.9
	≥60	52	43.7
Sex	Male	53	44.5
	Female	66	55.5
County of residence	Kiambu	83	69.7
	Murang'a	22	18.5
	Machakos	12	10.1
	Nyandarua	1	0.8
	Others	1	0.8
Marital status	Married	65	54.6
	Unmarried	54	45.4
Education level	No formal education	14	11.8
	Primary education	24	20.2
	Secondary education	32	26.9
	Tertiary education	49	41.2
Occupation	Business	38	31.9
	Farmer	15	12.6
	Casual labourer	19	16.0
	Employed	21	17.6
	Unemployed	26	21.8
Monthly income (Ksh)	≤20,000	52	43.7
	20,001-50,000	39	32.8
	>50,000	28	23.5

Socio-demographic and socio-economic characteristics of respondents

The socio-demographic and socio-economic characteristics of respondents are presented in Table 1. The majority of respondents, 52 (43.7%), were aged 60 years and above, while 38 (31.9%) were aged between 36 and 59 years. Female respondents constituted 66 (55.5%) of the study population. Most respondents, 83 (69.7%),

resided in Kiambu County, while 65 (54.6%) were married. Regarding education level, 49 (41.2%) respondents had tertiary education, whereas 14 (11.8%) had no formal education. Majority of respondents were business persons, 38 (31.9%), while 52 (43.7%) reported a monthly income of Ksh $\leq$ 20,000.

Vision protection practices among respondents

Overall, 58.6% of respondents demonstrated poor vision protection practices, while 41.4% demonstrated appropriate protective practices, as shown in Figure 1. Majority of respondents reported not routinely protecting their vision (80.7%), not wearing personal protective equipment at work (61.4%), and not wearing prescribed spectacles (73.9%). Additionally, 95.8% of respondents reported not consuming a healthy diet for vision protection, while 89.2% did not maintain recommended facial hygiene practices.

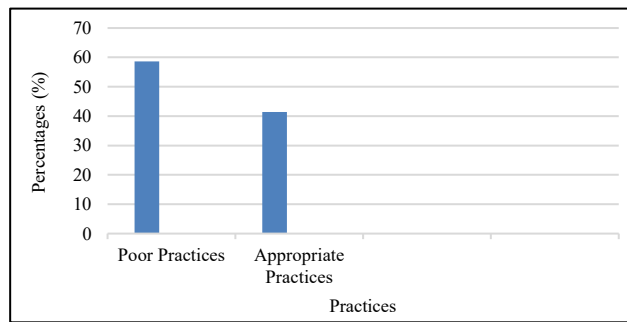


Figure 1: Overall vision protection practices among monocular patients.

Unsafe eye-care practices were also common among respondents. Use of traditional herbal medicine for eye treatment was reported by 63.9% of respondents, while 50.4% reported use of leftover ophthalmic drugs without medical advice. Furthermore, 80.8% reported washing their eyes with soap, and 72.3% admitted to breaking sticks in front of their eyes.

Table 2: Vision protection practices among respondents (n=119).

Vision protection practice	Yes (%)	No (%)
Routinely protects vision	23 (19.3)	96 (80.7)
Uses personal protective equipment at work	46 (38.6)	73 (61.4)
Wears prescribed spectacles	31 (26.1)	88 (73.9)
Consumes healthy diet for vision protection	5 (4.2)	114 (95.8)
Maintains recommended facial hygiene	13 (10.8)	106 (89.2)
Uses traditional herbal medicine for eye treatment	76 (63.9)	43 (36.1)
Uses leftover ophthalmic drugs without prescription	60 (50.4)	59 (49.6)
Washes eyes with soap	96 (80.8)	23 (19.2)
Breaks sticks in front of the eyes	86 (72.3)	33 (27.7)

Health system determinants associated with vision protection practices

Associations between health system determinants and vision protection practices are presented in Table 3. Chi-square analysis demonstrated statistically significant associations between distance to health facility ($\chi^2=10.432$, $p=0.001$), accessibility of eye-care services ($\chi^2=8.761$, $p=0.003$), health education ($\chi^2=11.529$, $p=0.001$), healthcare worker communication ($\chi^2=7.944$, $p=0.005$), cost of eye-care services ($\chi^2=4.883$, $p=0.027$), and vision protection practices among respondents.

Respondents reporting poor accessibility to eye-care services and dissatisfaction with healthcare worker communication were significantly more likely to demonstrate poor vision protection practices compared to respondents reporting better accessibility and communication.

Table 3: Association between health system determinants and vision protection practices among respondents.

Variables	Poor practices (%)	Appropriate practices (%)	χ^2	P value
Long distance to health facility	52 (74.3)	18 (25.7)	10.432	0.001
Poor accessibility to eye-care services	49 (71.0)	20 (29.0)	8.761	0.003
Lack of health education	45 (76.3)	14 (23.7)	11.529	0.001
Poor healthcare worker communication	41 (69.5)	18 (30.5)	7.944	0.005
High cost of eye-care services	38 (66.7)	19 (33.3)	4.883	0.027
Limited availability of eye specialists	43 (71.7)	17 (28.3)	6.318	0.012

Binary logistic regression analysis of health system determinants

Binary logistic regression analysis was performed to determine independent health system factors associated

with poor vision protection practices among monocular patients as shown in Table 4. Respondents residing far from the health facility were significantly more likely to exhibit poor vision protection practices compared to respondents residing nearer the facility (OR=12.604, 95%

CI: 2.441-65.083, $p=0.003$). Similarly, respondents who had not received health education on vision protection were significantly more likely to demonstrate poor protective practices compared to respondents who had received health education (OR=5.386, 95% CI: 1.697-17.097, $p=0.004$).

Poor accessibility to eye-care services (OR=3.942, 95% CI: 1.284-12.094, $p=0.016$), poor healthcare worker communication (OR=2.871, 95% CI: 1.103-7.475, $p=0.031$), and limited availability of eye specialists (OR=2.544, 95% CI: 1.011-6.401, $p=0.047$) were also independently associated with poor vision protection practices among respondents.

Table 4: Binary logistic regression analysis of health system determinants associated with poor vision protection practices.

Variables	OR	95% CI	P value
Long distance to Health facility	12.604	2.441-65.083	0.003
Lack of health education	5.386	1.697-17.097	0.004
Poor accessibility to eye-care services	3.942	1.284-12.094	0.016
Poor healthcare worker communication	2.871	1.103-7.475	0.031
High cost of eye-care services	2.116	0.864-5.182	0.101
Limited availability of eye specialists	2.544	1.011-6.401	0.047

DISCUSSION

This study assessed health system determinants of vision protection practices among monocular patients attending Thika Level Five Hospital Eye Clinic in Kenya. The findings demonstrated a high prevalence of poor vision protection practices among monocular patients, with 58.6% of respondents exhibiting inadequate protective eye-care behaviors. The study further established that health system factors, including distance to healthcare facilities, health education, accessibility of ophthalmic services, and healthcare worker communication, significantly influenced the adoption of protective eye-care practices.

The prevalence of poor vision protection practices observed in the present study is consistent with findings reported in several low- and middle-income countries where preventive eye-care behaviors remain suboptimal among populations at risk of visual impairment. Abdulwahab et al reported low uptake of protective eye-care practices among individuals with ocular conditions in Saudi Arabia despite moderate awareness regarding eye injuries and prevention.⁶ Similarly, Ofosu et al found delayed health-seeking behavior and poor utilization of preventive ophthalmic services among rural populations in Ghana.⁷ The consistency of these findings across different settings suggests that preventive eye-care behaviors are influenced not only by individual awareness but also by systemic barriers affecting accessibility and utilization of eye-care services.

The present study identified several unsafe eye-care practices among monocular patients, including use of traditional herbal medicine, self-medication with leftover ophthalmic drugs, washing eyes with soap, and failure to use prescribed spectacles. Similar harmful practices have been documented in studies conducted in Nepal and Nigeria, where patients frequently relied on home

remedies or delayed seeking professional ophthalmic care.^{17,18} Such practices expose monocular patients to avoidable ocular infections, chemical injuries, delayed treatment, and irreversible vision loss affecting the only functional eye. The findings therefore underscore the need for intensified patient counselling and targeted preventive eye-care education among monocular patients.

Distance to healthcare facilities emerged as one of the strongest determinants of poor vision protection practices in this study. Respondents residing far from ophthalmic services were significantly more likely to demonstrate poor protective eye-care behaviors. This finding is comparable to studies conducted in Kenya and other sub-Saharan African settings, which identified geographical inaccessibility as a major barrier to utilization of eye-care services.^{9,10} In many low-resource settings, specialized ophthalmic services remain concentrated in urban referral facilities, forcing patients from rural and peri-urban regions to travel long distances for routine ophthalmic review and treatment. Similar observations were reported by Burton et al who highlighted inequitable distribution of eye-care services as a major contributor to preventable blindness globally.¹¹

Health education was also significantly associated with vision protection practices among respondents. Participants who had not received health education regarding vision protection were more likely to exhibit poor protective practices compared to respondents who had received counselling on eye-care practices. Similar observations have been reported in studies conducted in China and Ethiopia, where individuals receiving health education demonstrated improved eye-care seeking behavior and better adherence to preventive ophthalmic recommendations.^{13,16} These findings support the role of structured patient education in promoting behavior change and improving long-term adherence to vision protection measures among high-risk populations.

The study additionally demonstrated that healthcare worker communication and accessibility of ophthalmic services significantly influenced vision protection practices among monocular patients. Respondents dissatisfied with communication and counselling provided by healthcare workers were more likely to demonstrate poor protective eye-care behaviors. Similar findings have been reported in studies evaluating utilization of eye-care services in low-resource settings where poor patient-provider communication negatively affected uptake of preventive ophthalmic services.^{10,21} Effective communication between healthcare providers and patients is essential in improving patient understanding of disease risk, treatment adherence, and adoption of preventive eye-care behaviors.

The findings of the current study are also consistent with the health belief model, which suggests that adoption of preventive health behaviors is influenced by perceived susceptibility, perceived severity, perceived benefits, and perceived barriers to healthcare utilization.¹⁵ Monocular patients may understand their vulnerability to blindness but remain unable to adopt appropriate protective practices due to systemic barriers such as poor accessibility, limited health education, cost of care, and inadequate healthcare support systems.

Comparatively, the prevalence of poor eye-care practices observed in this study appears higher than rates reported in some Asian and European settings where structured ophthalmic counselling and community-based eye-care programs are more established. Mirza et al reported relatively improved utilization of preventive ophthalmic services among monocular patients in Turkey, while studies in China demonstrated better adherence to routine eye-care practices among populations exposed to continuous health education interventions.^{3,16} The differences observed may reflect disparities in healthcare infrastructure, accessibility of ophthalmic services, literacy levels, and integration of preventive eye-care interventions within primary healthcare systems.

The findings of this study have important public health implications. Monocular patients represent a highly vulnerable population requiring continuous ophthalmic monitoring and preventive eye-care interventions to reduce the risk of avoidable blindness. Strengthening decentralized ophthalmic services, enhancing patient education, improving accessibility to routine eye-care services, and integrating preventive eye-care counselling into routine clinical practice may improve protective eye-care behaviors among monocular patients in Kenya and similar low-resource settings. Expansion of outreach ophthalmic clinics, community-based health education programs, and teleophthalmology services may further improve accessibility to preventive eye-care services among vulnerable populations.^{22,23}

This study had several strengths, including focus on a highly vulnerable and under-researched population, use of

standardized data collection tools, and assessment of multiple health system determinants influencing vision protection practices. However, the study was limited by its hospital-based cross-sectional design, which limits causal inference and generalizability of findings beyond the study setting. Additionally, some responses were self-reported and may have been affected by recall bias and social desirability bias.

There are some limitations of the study. The study utilized a hospital-based cross-sectional design, which limited the ability to establish causal relationships between health system factors and vision protection practices among monocular patients.

The study was conducted at a single referral eye hospital, which may limit the generalizability of the findings to monocular patients in other healthcare settings and regions within Kenya.

Some study variables were based on self-reported responses, which may have been affected by recall bias and social desirability bias among respondents.

The study focused primarily on health system determinants and did not extensively assess clinical factors that may influence vision protection practices among monocular patients.

The relatively small sample size may have limited the strength of some statistical associations observed in the study.

CONCLUSION

Generally, vision protection practices among monocular patients attending Thika Level Five Hospital Eye Clinic in Kenya were found to be poor. Despite the higher risk of total blindness if the remaining functional eye is injured or develops disease, a bigger percentage of monocular patients did not adequately protect their vision. The study established that health system factors, including distance to healthcare facilities, inadequate health education, poor accessibility to ophthalmic services, and poor communication by eyecare providers, significantly influenced vision protection practices among monocular patients. Respondents residing far from health facilities and those who had not received health education were significantly more likely to exhibit poor protective eye-care behaviors. Therefore, it is essential to integrate structured patient-centred health education into routine ophthalmic care for monocular patients, improving accessibility to ophthalmic services and strengthening healthcare support systems. Decentralizing eye care services through expansion of outreach programs, enhancement of healthcare workers' communication, and continuous counselling may improve vision protection behaviors, which ultimately will lead to a reduction in the risk of avoidable blindness among monocular patients in Kenya and similar low-resource settings.

Recommendations

The Ministry of Health and county governments should strengthen the decentralization of ophthalmic services through the establishment of satellite eye clinics and outreach ophthalmic programs in rural and underserved areas to reduce geographical barriers associated with poor vision protection practices among monocular patients.

Healthcare facilities providing ophthalmic services should integrate structured and continuous health education programs on vision protection into the routine management of monocular patients, since a lack of health education was significantly associated with poor protective eye-care behaviors.

Eye-care healthcare workers should strengthen patient counselling and communication regarding appropriate vision protection practices, including use of personal protective equipment, adherence to prescribed spectacles, routine ophthalmic reviews, and avoidance of unsafe traditional eye-care practices.

Health systems should improve accessibility and availability of ophthalmic services, eye-care specialists, and treatment equipment to enhance utilization of preventive eye-care services among monocular patients.

Community-based eye health promotion interventions should be implemented to increase awareness regarding monocular vision risks and promote positive preventive eye-care practices within the community.

Future studies should adopt multicentre and longitudinal study designs to further evaluate long-term health system determinants and the effectiveness of preventive ophthalmic interventions among monocular patients in Kenya.

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