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Peer Reviewer of *World Journal of Methodology*, Cristina Andreea Adam, MD, Assistant Professor, Medical I Department, Discipline of Medical Semiology, "Grigore T. Popa" University of Medicine and Pharmacy Iasi, 16 University Street, Iași 700115, Romania. adam.cristina93@gmail.com

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Seeing the unseen: The low treatment rate of eye emergencies in Africa

Babatunde Ismail Bale, Marco Zeppieri, Obehi Suzan Idogen, Clinton Ifeanyi Okechukwu, Onakhe Emmanuel Ojo, Daniel Ayodele Femi, Abiola Afeez Lawal, Shalom Jesufunminiye Adedeji, Pirakalai Manikavasagar, Adewunmi Akingbola, Abdullahi Tunde Aborode, Mutali Musa

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Babatunde Ismail Bale, Obehi Suzan Idogen, Clinton Ifeanyi Okechukwu, Onakhe Emmanuel Ojo, Daniel Ayodele Femi, Mutali Musa, Department of Optometry, University of Benin, Benin 300283, Nigeria

Marco Zeppieri, Department of Ophthalmology, University Hospital of Udine, Udine 33100, Italy

Abiola Afeez Lawal, Faculty of Pharmacy, University of Benin, Benin 300283, Nigeria

Shalom Jesufunminiye Adedeji, Department of Nursing, Isolo General Hospital, Lagos 300283, Nigeria

Pirakalai Manikavasagar, Public Health for Eye Care, London School for Hygiene and Tropical Medicine, London CB21TN, United Kingdom

Adewunmi Akingbola, Department of Public Health, University of Cambridge, Cambridge CB2 1TN, Cambridgeshire, United Kingdom

Abdullahi Tunde Aborode, Department of Research and Development, Healthy Africans Platform, Ibadan, Nigeria

Corresponding author: Marco Zeppieri, MD, PhD, Department of Ophthalmology, University Hospital of Udine, p.le S. Maria della Misericordia 15, Udine 33100, Italy.

mark.zeppieri@asufc.sanita.fvg.it

Abstract

BACKGROUND

Emergency medical care is essential in preventing morbidity and mortality, especially when interventions are time-sensitive and require immediate access to supplies and trained personnel.

AIM

To assess the treatment rates of eye emergencies in Africa. Ocular emergencies are particularly delicate due to the eye's intricate structure and the necessity for its refractive components to remain transparent.

METHODS

This review examines the low treatment rates of eye emergencies in Africa, drawing on 96 records extracted from the PubMed database using predetermined search criteria.

RESULTS

The epidemiology of ocular injuries, as detailed in the studies, reveals significant relationships between the incidence and prevalence of eye injuries and factors such as age, gender, and occupation. The causes of eye emergencies range from accidents to gender-based violence and insect or animal attacks. Management approaches reported in the review include both surgical and non-surgical interventions, from medication to evisceration or enucleation of the eye. Preventive measures emphasize eye health education and the use of protective eyewear and facial protection. However, inadequate healthcare infrastructure and personnel, cultural and geographical barriers, and socioeconomic and behavioral factors hinder the effective prevention, service uptake, and management of eye emergencies.

CONCLUSION

The authors recommend developing eye health policies, enhancing community engagement, improving healthcare personnel training and retention, and increasing funding for eye care programs as solutions to address the low treatment rate of eye emergencies in Africa.

Key Words: Eye emergency; Ocular injury; Epidemiology; Treatment; Africa

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Core Tip: Eye emergencies in Africa are severely under-treated due to a combination of factors including inadequate healthcare infrastructure, shortage of trained personnel, and socio-economic and cultural barriers. This results in a high prevalence of preventable blindness. This study emphasizes the need for urgent policy reforms, increased funding, and community engagement to improve access to timely and effective eye care across the continent.

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INTRODUCTION

Eye emergencies encompass a wide range of conditions that require immediate medical attention to prevent severe consequences, such as permanent vision loss[1]. These include acute infections like endophthalmitis and corneal ulcers, traumatic injuries such as open globe injuries and chemical burns, and sudden exacerbations of conditions like acute angle-closure glaucoma[1,2]. Timely and effective medical response is critical for these conditions, as they can rapidly worsen if not treated promptly. While eye emergencies are a global public health issue, their impact is particularly pronounced in low-resource settings, such as many regions in Africa[1].

In Africa, socio-economic barriers further exacerbate the challenge, making it difficult for many individuals, especially in rural areas, to access facilities capable of handling ocular emergencies[3]. The shortage of trained ophthalmologists and emergency eye care services worsens the situation, leading to low treatment rates for these critical conditions[4]. This inadequate response infrastructure contributes to a high prevalence of preventable blindness and underscores significant disparities in healthcare access and quality across the continent[5].

Addressing these challenges requires urgent investment in healthcare infrastructure, enhanced training for eye care professionals, and the establishment of surveillance systems to monitor the health situation[7,8]. Public health initiatives to raise awareness about the importance of eye care are also essential[9]. Therefore, this paper critically examines the current state of eye emergencies in Africa, exploring the causes, consequences, challenges, and potential solutions to improve outcomes in this critical area of health.

MATERIALS AND METHODS

This scoping review was conducted to investigate the epidemiology, causes, and management strategies for eye emergencies in Africa, while also identifying barriers to effective treatment. The methodology was carefully designed to ensure a thorough and systematic approach to the selection of literature, extraction of data, and synthesis of findings.

Search strategy

A comprehensive search was performed using the PubMed database to identify studies relevant to ocular emergencies in Africa. The search strategy, summarized in [Table 1](#) below involved using a combination of keywords, including “ocular emergency”, “eye injury”, “Africa” and related terms. The search method utilized Boolean operators and a variety of keywords, including 'ocular emergency', 'eye damage', 'Africa' and associated terms. Search phrases were amalgamated utilizing Boolean operators (*e.g.*, 'AND', 'OR') to optimize the retrieval of pertinent articles. The search was confined to papers published between January 2014 and August 2024 in English, with full-text access. Inclusion criteria specifically targeted research that addressed the epidemiology, etiology, management approaches, and obstacles to the treatment of ocular emergencies in Africa. The search was deliberately limited to studies published between January 2014 and August 2024, ensuring that only the most recent and pertinent literature was considered for inclusion.

The data extraction form comprised fields for study characteristics (author, year, country, design), sample characteristics (size, demographics), types of ocular emergencies, causes, management options, and outcomes. Discrepancies among reviewers during research selection and data extraction were reconciled through consensus or by consulting a third reviewer. This method guaranteed impartiality and uniformity during the evaluation process. The authors have read the PRISMA 2009 Checklist, and the manuscript was prepared and revised according to the PRISMA 2009 Checklist.

Inclusion and exclusion criteria

The selection of studies was guided by clearly defined inclusion and exclusion criteria:

Inclusion criteria: (1) Studies that specifically focus on ocular emergencies within African countries; (2) Articles published in the English language; (3) Studies that report on the epidemiology, causes, management strategies, and barriers to the treatment of eye emergencies; and (4) Studies with full-text availability.

Exclusion criteria: (1) Studies published prior to 2014; (2) Articles that are not directly relevant to the topic, including those not conducted within the African context; (3) Non-English language studies and studies without accessible full texts; and (4) Editorials, commentaries, and letters were excluded to maintain a focus on original research contributions.

Study selection

The initial search of the PubMed database yielded 136 records, encompassing a broad range of studies related to ocular emergencies across various African countries. Following this, a multi-stage filtering process was applied to ensure that only the most relevant and high-quality studies were included in the final review.

First, the records were filtered according to the predefined inclusion and exclusion criteria, which resulted in the exclusion of studies published before 2014, non-English language articles, and those that did not focus on the African context or eye emergencies. This initial filtering narrowed the list down to 96 records.

The remaining 96 studies were subjected to a rigorous screening process conducted independently by two reviewers. During this phase, the titles and abstracts of each study were meticulously reviewed to assess their relevance to the research objectives. Studies that appeared to meet the inclusion criteria were retained for full-text review. In cases where there was uncertainty or disagreement between the two reviewers regarding the inclusion of a study, the issue was discussed, and a third reviewer was consulted to reach a consensus. This collaborative approach ensured that the selection process was thorough and unbiased, ultimately leading to a final selection of studies that were deemed highly relevant and aligned with the research objectives. Although full-text availability was a criterion for inclusion to guarantee thorough data extraction, this requirement may have omitted significant studies accessible solely in abstract form.

Data extraction and synthesis

Data from the selected studies were extracted using a standardized data extraction form. The form captured details such as study characteristics (author, year of publication, country, study design), population characteristics (sample size, demographics), types of eye emergencies reported, causes, management approaches, outcomes, and barriers to treatment. Two reviewers (Bale BI and Idogen OS) independently performed data extraction to ensure accuracy and consistency. Disagreements were resolved by consensus or with the involvement of a third reviewer (Musa M). Given the heterogeneity in study designs, populations, and outcomes reported, a narrative synthesis was conducted. The synthesis focused on summarizing the prevalence and types of eye emergencies, the causes identified, management approaches, and barriers to effective treatment. Findings were grouped by themes related to epidemiology, causes, management strategies, and factors contributing to low treatment rates.

RESULTS

A total of 136 records were extracted using the search algorithm from the PubMed database as shown in [Figure 1](#) below. After limiting the publication spread to 10 years spanning 2014 to 2024, a total of 96 records were obtained. Two authors then rigorously examined each record for relevance, language and completeness. Two records were excluded as they were an erratum to published studies which were also not included while another four were excluded because they were not in the English language. A further 53 records were out of the scope of this paper, and so they were also excluded. The references in 37 studies obtained were examined for relevant records; and a total of 21 relevant studies were further obtained, amounting to the usage of a total of 58 studies in this review.

Table 1 Summary of search strategy including search component and keywords used

Search component	Keywords/terms used
Ocular	"ocular"[All Fields] OR "oculars"[All Fields]
Emergency	"emerge"[All Fields] OR "emerged"[All Fields] OR "emergence"[All Fields] OR "emergences"[All Fields] OR "emergencies"[MeSH Terms] OR "emergencies"[All Fields] OR "emergency"[All Fields] OR "emergent"[All Fields] OR "emergently"[All Fields] OR "emergents"[All Fields] OR "emerges"[All Fields] OR "emerging"[All Fields]
Africa	"africa"[MeSH Terms] OR "africa"[All Fields] OR "africa s"[All Fields] OR "africas"[All Fields]
Date range	2014: 2024[mdat]
Language, full text, relevance	Records filtered to exclude non-English language, no full text, and non-relevant articles.

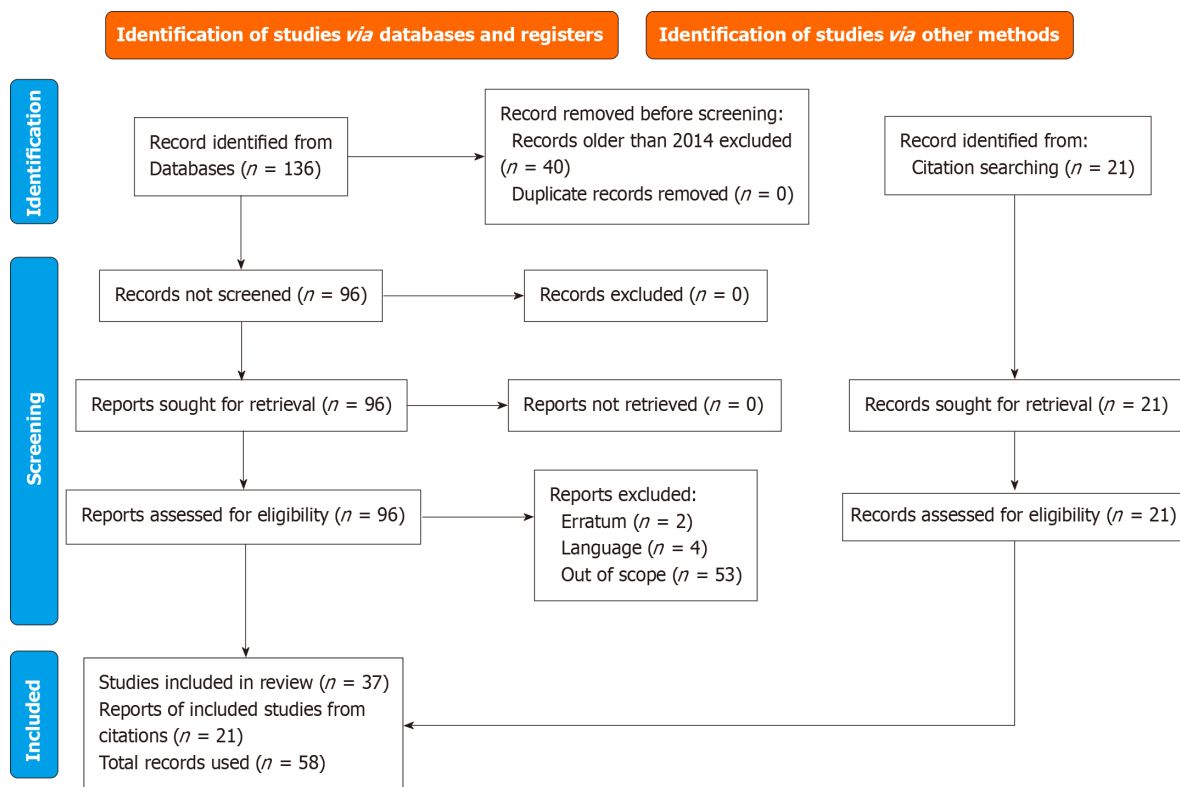


Figure 1 A PRISMA diagram showing the search stratification used in this study.

DISCUSSION

The factors affecting treatment rates for disease emergencies, such as maternal health and infectious diseases, and those for eye emergencies share common barriers but also exhibit unique challenges. Both categories are significantly hindered by inadequate healthcare infrastructure and a shortage of trained personnel. For instance, in Africa, maternal health and eye emergencies alike are often delayed due to insufficient emergency care services, limited availability of supplies, and long travel times to healthcare facilities in rural areas[10-12]. Additionally, socio-economic factors, such as poverty and cultural norms, play a pivotal role in reducing treatment uptake for both[13]. Gender-specific barriers, including women needing permission from male family members to seek care, exacerbate delays for maternal health emergencies and eye injuries in women[14].

Epidemiological characteristics of eye emergencies in Africa

Untreated ocular emergencies pose a significant threat to vision, with global estimates indicating that approximately 2.5 million people are affected by ocular injuries annually[13]. In affluent nations, ocular emergencies are generally addressed *via* robust healthcare systems featuring sufficient infrastructure, a high concentration of trained professionals, and readily available emergency services. In contrast, resource-constrained environments in Africa encounter substantial obstacles, such as insufficient healthcare facilities, restricted staff capacity, and socio-economic limitations. This significant differential highlights the necessity of resolving these gaps to enhance outcomes for ocular emergencies in

Africa.

Men and young individuals represent a significant proportion of those experiencing eye injuries, with one-fifth of adults reported to be affected[14]. In Nigeria, ocular injuries are a significant concern, particularly in Southeastern regions where there is a 3.5% incidence rate of ocular trauma, primarily involving closed globe injuries (76%) caused by blunt objects (57%), affecting mainly young people aged 10 to 19 years[15]. Children are often affected by eye emergencies, with a prevalence rate of 7.93% for eye injuries, commonly presenting as eyelid scars (5.34%), eyebrow scars (2.10%), and canthal scars (0.32%)[16].

Certain professions also face higher risks of eye emergencies due to occupational hazards. For instance, a study by Douglas and Koroye-Egbe[17] found a high prevalence of ocular injuries among welders, with 43.4% experiencing injuries such as burns, foreign bodies, and cuts. Similarly, among carpenters, work-related eye injuries and complaints were reported at rates of 30.7% and 32.5%, respectively, often due to inadequate use of protective eyewear, highlighting a significant occupational health issue[18].

In other parts of West Africa, such as Ghana, the occurrence of ocular injury among cocoa farmers was found to be 11.3 per 1000 worker-years, with lost work time at a rate of 37.3 per 1000 worker-years, indicating a substantial occupational risk for this group[19]. In Côte d'Ivoire, epidemiological data indicates that ocular burns, a form of ocular trauma, constitute 11% of ocular injury cases, with chemical agents being the primary cause in 54% of these incidents[20]. This highlights significant regional risks associated with chemical exposures.

In Southern Africa, particularly in Zimbabwe, there was a high prevalence of open-globe injuries (71.2%) in Zimbabwe with blunt trauma (90%) being the most significant cause[21]. In Northern Cape South Africa, it was reported that 3.2% of acute ocular trauma in which mechanical trauma (blunt, sharp and extraocular foreign body) accounted for over 90% that primarily affect young men (86.3%), with injuries mostly occurring at home (47.9%)[22].

In Ethiopia, ocular trauma predominantly affects males (71.0%) and children (62.87%), with nearly equal prevalence of open globe injuries (47.07%) and closed globe injuries (47.74%). Corneal tears are the most frequent type of injury, accounting for 39.33% of cases[23]. Similarly, in Uganda, eye emergencies are most common among males aged 10 to 20 years, with open globe injuries comprising 72% of cases. The most frequent specific incident is the presence of corneal foreign bodies, occurring in 42% of cases[24].

Other significant eye emergencies in the region include retinal detachment and retinal vessel occlusion. A 2023 prospective study across multiple centers in Nigeria found 237 cases of retinal detachment, with tractional retinal detachment accounting for 25.7% of these cases[25]. Additionally, retinal vascular occlusion was identified in 0.9% of patients in Nigeria[26]. The prevalence of other eye emergencies is listed in Table 2[27-34].

The epidemiology of ocular emergencies in Africa indicates a significant prevalence among males, younger populations, and individuals employed in hazardous professions. Principal findings reveal considerable disparities in prevalence rates among areas

Causes of eye emergencies in Africa

Accidents are a significant cause of eye emergencies in the African population, often occurring during social activities. Male children, in particular, are at higher risk of ocular trauma during play, with most incidents happening at home and commonly involving closed globe injuries from impacts with various objects such as canes, stones, broomsticks, wood, and fists[35]. A study in Cameroon identified fights as the most frequent cause of ocular trauma, accounting for nearly one-third of all cases, with punches being the predominant mechanism in 21.39% of these cases[36]. In Senegal, physical violence against women also contributes to ocular injuries[37]. Additionally, accidental events such as car crashes and gunshot wounds lead to ocular conditions requiring immediate medical attention[38].

Another form of environmental accident, though rare, is ocular Hymenoptera stings, which are considered an eye emergency due to the severe ocular complications they can cause when the eye is stung or comes into contact with venom from insects of the Hymenoptera order, such as bees, wasps, and ants[39]. Similarly, although rare, snake envenomation, a common public health concern in the savanna regions of West Africa, can cause immediate severe eye damage, inflammation, necrosis, and vision loss if not treated promptly, with potential systemic toxicity and infections necessitating emergency care[40].

Furthermore, ocular infections are a significant cause of eye emergencies, demanding immediate medical intervention to avert severe complications and potential vision loss. Bacteria are one of the causes of most ocular infections such as keratitis, corneal ulcer and endophthalmitis that are ocular emergencies[41]. Several significant factors have been identified as being associated with the prevalence of bacterial ocular infections. These factors include age, farming activities, a history of previous eye surgeries, and poor facial hygiene habits[42]. Similarly, open-globe injuries have been found to potentially result in endophthalmitis[44]. Corneal ulcers also often result from ocular trauma and lead to severe pain, potential corneal scarring, and risk of permanent vision loss if not treated promptly[45]. Moreover, fungal keratitis is one of the most challenging forms of infectious keratitis and is considered an eye emergency[46]. Like corneal ulcer, fungal keratitis can also be caused by ocular trauma[47]. A study by Fekih *et al*[48] reported that in 78.8% of fungal keratitis cases in Tunisia, fungal filaments were identified as the cause of infection, with *Fusarium* species being the most frequently isolated, found in 39.4% of the patients, especially those who had experienced ocular trauma. Similarly, parasitic keratitis, particularly caused by *Acanthamoeba* is another serious, though rare, corneal infection that can lead to emergency ocular injury, particularly among contact lens wearers in rural areas with low hygiene practices[49].

Occupational risks: Occupational hazards constitute a primary source of ocular emergencies, especially among welders, carpenters, and farmers, where insufficient utilization of protective eyewear intensifies the risk

Table 2 Summary of the prevalence and incidence rates of eye emergencies across various countries in Africa

Ref.	Type of eye emergency (prevalence)	Study period	Sample size	Data sources	Study design	Country in Africa
Kyei <i>et al</i> [21]	Open globe injuries (71.2%). Blunt trauma causing open-globe injuries (90%). Penetrating Intraocular, and perforating injuries causing open-globe injuries (10%)	January 2017 to December 2021 (4 years)	863	Patients records	Retrospective cross-sectional	Zimbabwe
Bert <i>et al</i> [19]	Ocular trauma (25.7%)	2 days	556	Questionnaire and ocular examination	Cross-sectional survey	Ghana
Douglas and Koroye-Egbe[17]	Ocular burns (42%). Foreign body injury to the eye (32%). Injuries caused by cuts to the eye (4%)	-	212	Ocular examination	Cross-sectional descriptive	Nigeria
Onyekwelu <i>et al</i> [18]	Superficial foreign body to the eye (88.6%). Chemical injury (8.6%). Nail injury to the eye (5.7%)	April 7, 2017 to May 15, 2017 (1 month)	114	Questionnaire, ocular examination and interview	Descriptive cross-sectional	Nigeria
Daoudi <i>et al</i> [27]	Preseptal cellulitis (85%). Orbital cellulitis (15%)	2008 to 2014 (6 years)	28	Patient records	Retrospective cohort	Morocco
Ajayi <i>et al</i> [28]	Neovascular glaucoma (0.05%)	January 2015 to December 2019 (4 years)	566	Patient records	Retrospective cohort	Nigeria
Koki <i>et al</i> [29]	Ocular trauma (16.92%)	January 2008 to December 2014 (6 years)	591	Patient records	Retrospective cohort	Cameroon
Kibret and Bitew [30]	Fungal keratitis (45.1%)	September 2014 to August 2015 (11 months)	153	Clinical examination	Cross-sectional	Ethiopia
Haingomalala <i>et al</i> [31]	Serious ocular trauma (5.75%)	January 1, 2009 to December 31, 2011 (2 years)	1267	Patient records	Retrospective cohort	Madagascar
Damtie and Siraj [32]	Eye injury (7.7%)	2019	300	Questionnaire	Cross-sectional	Ethiopia
Baba <i>et al</i> [33]	Penetrating ocular injury (65.7%)	January 2006 to November 2013 (7 years)	100	Patient records	Retrospective cohort	Tunisia
Bastola <i>et al</i> [34]	Ocular trauma (1.94%)	September to November 2018 (3 months)	280	Clinical examination	Prospective observational	Eritrea

Failure to use protective eyewear and inadequate ocular health and safety training are major contributors to the reported cases of ocular emergencies in Africa[50]. This issue is particularly pronounced among farmers and individuals involved in agricultural activities, who are frequently exposed to hazards such as trauma from farming equipment, contact with vegetable material, eye injuries from animal attacks, and spillage of sand into the eye[50]. While welders in sub-Saharan Africa generally exhibit good ocular protection practices, linked to on-the-job training, work experience, and a history of previous ocular injuries[51], mechanics often suffer from prevalent eye injuries due to not using protective devices, exposing them to hazards such as dust, engine oil, fire sparks, metal crusting, and battery acid[52]. A study in Ethiopia showed that the risk of occupational ocular injuries was seven times higher for workers who did not use protective eyewear and 2.22 times higher for those without health and safety training compared to those who received such training[53]. Furthermore, within work environments involving Africans, the most common ocular injuries included blunt trauma and incidents involving foreign bodies[54].

Obstacles to treatment

Healthcare infrastructure, human resources and policy: Government policies are essential in determining how resources are allocated to healthcare infrastructure, directly influencing the availability and quality of care. In African countries, healthcare is delivered across primary, secondary, and tertiary levels, each offering varying degrees of service. Primary eye care services are particularly important, as they enable trained mid-level personnel to manage common eye emergencies, thereby reducing the burden on secondary and tertiary hospitals, as noted by Patel *et al*[6]. However, these primary services are often underdeveloped in many African nations, leaving gaps in early intervention for eye conditions. The lack of critical supplies, such as surgical instruments and medications, further hampers the effectiveness of treatment, as documented by research[55]. In response to these challenges, the World Health Organization (WHO) has made strides by introducing a “Primary Eye Care Training Manual” aimed at equipping healthcare workers with the skills needed to handle common eye emergencies. Furthermore, collaborative efforts between the International Agency for the Prevention of Blindness and nursing colleges in East and South Africa have led to the expansion of primary eye care services across

12 additional countries, enhancing access to essential eye care at the primary health care level[56,57].

In addition, sub-Saharan Africa faces a shortage of eye health professionals, including ophthalmologists, optometrists, ophthalmic nurses, and allied personnel, with a particularly uneven distribution, leaving rural areas significantly underserved compared to urban areas[58]. Current challenges include inadequate working conditions (structural issues) and a lack of security prompting trained eye care professionals to work in the city or emigrate internationally[59].

In Africa, the density of ophthalmologists is alarmingly low, with roughly 2.5 ophthalmologists per million individuals, in contrast to over 60 per million in high-income nations. Emergency eye care services are equally limited and frequently concentrated in urban regions, hence restricting access for rural communities. This imbalance is reflected in other emerging areas, including South Asia and Latin America. However, the exact figures change due to variations in healthcare infrastructure and personnel capability.

Also, although many African countries have developed national eye health plans and fostered collaborations between non-governmental organizations (NGOs) and the private sector, there remains a significant disconnect at regional and district levels[60,61]. This lack of local engagement and representation results in insufficient healthcare infrastructure and human resources at the grassroots level, undermining the effectiveness of national strategies[62]. Without the active involvement of local entities in decision-making processes, there is a risk of misaligned priorities and inefficient use of resources, ultimately hampering efforts to improve eye health outcomes and address the needs of communities effectively [63].

Geographical and Socio-economic factors

People from poorer backgrounds rely on government services for eye care, and when these are not available, affordable and accessible this delays timely care, leading to long-term vision complications[64]. In remote regions, patients often face long travel times to reach adequately equipped facilities, leading to delays in treatment[65]. Moreover, high costs associated with medical consultations, treatments, and surgeries may prevent many individuals from seeking timely care for eye emergencies[66]. Even when services are subsidized, the cost of transportation to healthcare facilities can be prohibitive for low-income families[67].

Cultural and behavioral factors

Cultural and behavioral factors play a significant role in the low treatment rates of eye emergencies in Africa. One such factor is the additional barriers faced by women. In many African societies, women may lack financial autonomy, limiting their ability to pay for medical services[68]. Furthermore, cultural norms often require women to obtain permission from male family members before seeking medical care, which can delay or prevent access to timely treatment for eye emergencies[69]. These gender-specific barriers compound the overall challenges in accessing healthcare, contributing to the high prevalence of untreated eye conditions and resulting in greater risk of severe vision loss and other complications [70].

Consequences of untreated eye emergencies

Individual impact: A person's ability to carry out daily tasks is significantly impaired by vision loss, which results in a loss of independence[71]. Simple tasks such as reading, driving, and face recognition become challenging, drastically reducing the quality of life[72]. Untreated eye emergencies can have serious consequences on a person's quality of life that can be severe and permanent[73]. Some of these emergencies include acute glaucoma, retinal detachment, severe eye infections, and traumatic eye injuries[74].

In Sub-Saharan Africa, trauma-induced orbito-oculoplastics diseases, if untreated, significantly harm individuals' psycho-social well-being, economic stability, educational achievements, quality of life, and pose a substantial threat to vision[75]. In cases of traumatic cataract it can lead to partial or total loss of vision[76]. Additionally, ocular trauma can result in the development of superficial corneal scars, which significantly impair vision by causing visual blur, glare, and reduced visual acuity, thereby affecting daily activities and overall quality of life[77].

In addition, untreated eye emergencies may result in persistent pain and discomfort. Acute angle-closure glaucoma, an eye emergency, is linked to excruciating eye discomfort and nausea[78]. Moreover, untreated infections can cause chronic inflammation and possibly spread to other body regions[79]. Untreated ocular syphilis, particularly prevalent among HIV-positive individuals, can cause severe eye conditions such as uveitis, retinitis, optic neuritis, and panuveitis, leading to sudden vision loss if not promptly addressed[80]. Psychological discomfort is frequently present alongside these physical symptoms. Anxiety and sadness might result from the pain and discomfort as well as the fear of permanent vision loss[81,82].

Public health and economic impact: On a larger scale, untreated eye emergencies represent a significant public health concern[83]. Ocular injury is a significant public health concern, particularly in low-resource cultures, as it is a primary cause of ocular morbidity and unilateral vision impairment[84]. Vision impairment and blindness substantially burden healthcare systems, increasing the need for specialized care, prolonged treatment, and potential complications, increasing the demand for healthcare professionals and facilities[85,86]. Individuals with untreated eye conditions often require more frequent medical visits and interventions, which puts additional strain on already limited healthcare resources, especially in low-income and underserved areas[87].

Vision impairment reduces workforce participation and productivity, impacting national economies[88]. Individuals who suffer from vision loss may find themselves unemployed or unable to make as much money. Good vision is necessary for many occupations, thus persons who lose their vision might face career limitations[89]. In addition to impacting the individual, this loss of income strains their families financially and makes them more dependent on welfare assistance[90].

Interventions and programs rendered for the management of eye emergencies in Africa

In many regions of Africa, healthcare systems face numerous challenges, including limited resources, infrastructure, and access to specialized medical care. Access to treatment for eye emergencies varies significantly, with some ophthalmological services available, particularly in urban areas.

Over the past decade (2014–2024), trends in eye emergencies have shown significant strides in certain areas alongside persistent challenges. Awareness campaigns, particularly in urban centers, have improved due to enhanced public health initiatives and collaborations with NGOs, leading to greater recognition of eye health issues[91]. Urban areas have seen better access to basic care and advanced treatments, as highlighted by the establishment of primary eye care facilities and integration into primary health care systems in some African regions. However, rural areas still face barriers contributing to delayed treatment and higher rates of preventable blindness.

Surgical procedures, including corneal transplants and cataract surgeries, are essential in mitigating impaired vision resulting from ocular crises. Enhancing accessibility to these procedures, especially in rural regions, is crucial for alleviating the impact of vision impairment. Corneal transplantation is a surgical procedure that generally yields positive results. Unfortunately, in regions where subspecialty treatments like corneal transplants are not readily available, patients can develop serious complications which may result in blindness. A study in Malawi revealed that while many ocular trauma patients did not require surgical intervention, about one-third needed procedures such as corneal repair and cataract surgery[92]. Also, in Lubumbashi, Democratic Republic of Congo, the management of ocular foreign bodies included either straightforward removal or removal with suturing for deeper foreign bodies, which successfully preserved visual acuity in the majority of patients[93].

In Lagos, Nigeria, a study found that ocular trauma was the most common indication for destructive eye surgeries, with visceration being frequently performed due to trauma or infection, highlighting the significant impact of ocular trauma and the urgent need for advanced surgical options to prevent severe outcomes[94]. For the management of ocular or peri-ocular trauma, the majority of patients requiring urgent surgery to the peri-ocular region, the treatment landscape in South Africa involves a high demand for immediate and multi-disciplinary surgical care, encompassing specialties like ophthalmology, maxillofacial, plastic, otorhinolaryngology, and neurosurgery[95,96]. This underscores the complexity of the injuries, highlights the extensive nature of trauma and the necessity for a coordinated and comprehensive approach to treatment (such as orthopedic operations, laparotomies, and vascular procedures).

Furthermore, due to the unavailability of some technological diagnostic testing in Africa, it may delay access to treatment of eye emergencies that can result in visual impairment or even blindness. A study by Miller *et al*[97] found that African ophthalmologists specialized in ophthalmic trauma adopt a more conservative approach to managing open globe injuries, using computed tomography (CT) imaging selectively for specific indications like suspected intraocular foreign bodies, unlike their counterparts in North and South America who routinely obtain CT imaging for all suspected cases. In Liberia, the lack of magnetic resonance imaging in a resource-limited setting necessitated the use of CT scans (coronal and sagittal cuts with variable window width) to detect intra-orbital wooden foreign bodies, facilitating their surgical removal to relieve pain, treat infection, and prevent complications[98]. This suggests that there may be fewer resources, such as availability of advanced imaging equipment, which can impact the thoroughness and immediacy of the diagnosis and treatment. This can potentially lead to differences in outcomes and quality of care for patients with eye emergencies in Africa. One such occurrence was reported in a case of retrobulbar hematoma reported in Uganda. Retrobulbar hematoma, an uncommon emergency that can cause blindness, requires prompt surgical intervention and may be delayed due to unavailability of radiological evaluation, particularly in rural areas where patients often present late and lack access to radiological services, thereby necessitating emergency surgical decompression of the orbit[99].

Certain ocular infections are considered eye emergencies and require immediate medical attention to prevent complications and preserve vision. In the case of ocular infections like endophthalmitis and bacterial keratitis, prompt and intensive treatment with topical antibiotics is crucial[100]. Despite this, according to some studies conducted in South Africa, there is still inadequate scientific evidence to support the effectiveness and safety of adjunctive steroid use (systemic or topical) compared to antibiotics alone in the treatment of these conditions[101,102]. Unlike fungal keratitis, which commonly occurs among people living in rural communities and often has worse outcomes than bacterial keratitis, its early management with drug-based medical treatments has achieved good outcomes in Egypt despite the shortage of medical resources[103].

Chemical injuries due to toxins and other harmful substances are significant causes of eye emergencies, requiring prompt and effective management to prevent long-term damage and vision loss. Venom ophthalmia, resulting from ocular contact with snake venom from various species of spitting cobras in Africa, is a severe ocular chemical injury that necessitates immediate medical attention, including thorough irrigation, analgesics, antibiotics, antihistamines, and anti-inflammatory topical drugs[104]. Similar to a reported case of venom ophthalmia in South Africa, the initial management involves extensive irrigation, followed by the application of topical cycloplegics and antibiotics to prevent secondary infection, without requiring topical steroids or antivenom (topical or intravenous)[105].

Optic neuritis, however, less commonly documented than other causes, constitutes a significant etiology of ocular emergencies in Africa. The prevalence may be undervalued due to restricted diagnostic skills. Timely diagnosis and intervention are essential to avert permanent vision impairment.

Challenges and barriers to effective interventions

Resource limitations: Despite a strong commitment to managing eye emergencies effectively, African countries frequently encounter significant challenges due to limited financial and technical resources[106,107]. These constraints are a major impediment to the provision of high-quality eye care and the timely treatment of eye emergencies. **Figure 2** summarizes the challenges and most appropriate solutions.

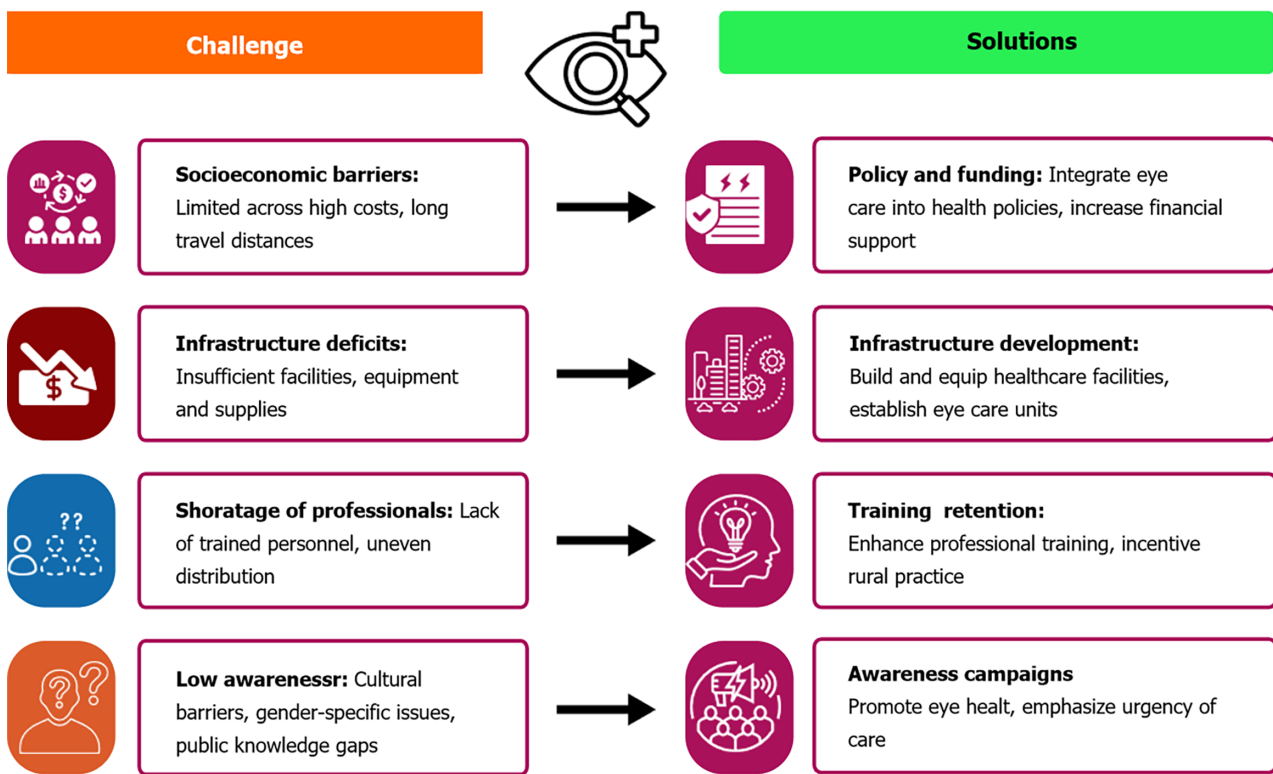


Figure 2 Challenges and solutions to eye emergencies in Africa.

The financial constraints faced by many African countries significantly impact their ability to manage eye emergencies. Health budgets are often limited and must be stretched to cover a wide range of medical needs, leaving insufficient funds for eye care[108,109]. Eye care services, including routine examinations, emergency treatments, and surgical interventions, require substantial investment in infrastructure, equipment, and supplies[110]. Many eye care facilities, especially in rural areas, are poorly equipped to handle complex eye emergencies[111]. Basic diagnostic equipment, surgical tools, and necessary medications are often in short supply. Additionally, the costs associated with consumables like intraocular lenses, medications, and diagnostic tools further strain limited budgets[112].

In addition to financial constraints, African countries face significant technical challenges in managing eye emergencies. There is a critical shortage of trained ophthalmologists, optometrists, and other eye care professionals[113]. For instance, in Nigeria, the availability and regional distribution of oculoplastic surgical services are inadequate, largely due to insufficient training[114]. In addition, the training and retention of these specialists are hampered by inadequate educational facilities and opportunities for professional development[115]. Consequently, the few available specialists are often concentrated in urban centers, leaving rural areas underserved[116].

Logistical challenges

Logistical challenges are a significant barrier to effective interventions for eye emergencies in Africa. One of the primary logistical issues is the scarcity of transportation funds, which can delay or completely hinder patients from accessing medical facilities for necessary interventions[117]. In addition, the distribution of eye care facilities is uneven, with most specialized centers situated in urban areas[118]. This urban-rural disparity contributes to the challenges of accessing eye care services in rural regions and people would often have to travel long distances to reach specialized eye care centers [119]. This can be particularly challenging for elderly patients, those with disabilities, and families with limited financial means.

Awareness and knowledge

Awareness and knowledge regarding eye health issues are essential for the timely treatment of eye emergencies. When individuals are unaware of their conditions, they are less likely to seek appropriate care[120]. Furthermore, the sources from which patients obtain information about their conditions can impact their response to emergency eye cases[121]. This is such that even when individuals actively seek information, they may encounter a lack of reliable sources for accurate details about their eye conditions. For instance, a study in South Africa found that limited education on eye issues and the necessity for regular eye screenings among patients in a diabetic outpatient clinic affected their diagnosis and treatment[122].

Awareness of the importance of adhering to treatment plans is crucial for achieving effective medical outcomes[123]. This is significantly true for eye emergency cases. This lack of awareness can lead to poor compliance[124], as patients who do not perceive the benefits of following recommended care may neglect or discontinue it altogether. Similarly, unawareness of available facilities for managing eye emergencies can cause patients to seek alternative, and often less

effective, treatments[125].

The demographic and geographic traits of the study population may restrict the applicability of the findings to wider populations." Although our results offer significant insights into low treatment rates of eye emergencies in Africa, one must exercise caution when generalizing these findings to communities with differing demographic, socioeconomic, or healthcare circumstances. This study's findings, especially within the African setting, highlight the necessity of customizing interventions to local conditions while evaluating their possible relevance to other worldwide locations.

Recommendations and future directions

Community engagement and education: Effective community engagement and education are essential components in addressing the low treatment rates of eye emergencies in Africa. Preventive strategies should prioritize promoting and teaching the use of eye protective gear, particularly for individuals involved in high-risk activities such as operating machinery, agriculture and participating in certain sports[126]. Educational campaigns can highlight the importance of protective eyewear in preventing eye injuries and related emergencies, thus reducing the incidence of such cases.

Moreover, there is a crucial need to emphasize the importance of seeking prompt medical attention in the event of eye emergencies[127]. Public health initiatives should focus on raising awareness about the symptoms and dangers of delayed treatment for eye injuries and infections[128]. By educating communities about the urgency of timely medical intervention, it is possible to mitigate the risk of severe complications and improve overall eye health outcomes[129].

To address the difficulties of ocular emergencies in Africa, it is imperative to implement people-centered eye care systems. These encompass community-oriented screening initiatives, the incorporation of ocular health into primary healthcare services, and the formation of referral networks to enhance access to specialized care. Furthermore, comprehensive monitoring frameworks, including real-time surveillance systems for ocular crises, can facilitate targeted treatments and resource distribution.

Healthcare infrastructure enhancement

To address the low treatment rate of eye emergencies in Africa, enhancing healthcare infrastructure is paramount. This involves substantial investment in the construction and refurbishment of healthcare facilities for emergency care services [130]. Upgrading existing hospitals and clinics with state-of-the-art ophthalmic equipment and ensuring a steady supply of essential medical materials are crucial steps[131]. Furthermore, establishing specialized eye care units within these facilities can significantly improve the accessibility and quality of emergency eye care[132]. Ensuring that these infrastructures are evenly distributed across rural and urban areas will help bridge the gap in eye care services and provide timely treatment to those in need[133].

Training and retention of eye care professionals

Training and retaining more eye care professionals, such as ophthalmologists, optometrists, and nurses, are also critical for improving the treatment rates of eye emergencies especially in rural areas[134,135]. Investment in professional development and continuing education programs can provide the necessary skills to manage eye emergencies effectively [136]. Furthermore, creating a robust referral system to ensure that patients can access specialized care promptly can significantly enhance the management of eye emergencies[137].

Strengthening local organizations

Partnerships with NGOs and the private sector can also play a crucial role in bridging resource gaps. Ensuring that local organizations are actively involved in planning and resource allocation can help bridge the gap between national strategies and grassroots needs[137]. The Gambia's model exemplifies how effective partnerships and health system frameworks can address vision care challenges and serves as a potential blueprint for other African countries seeking to enhance their vision care systems[138]. Therefore, not only empowering local organizations but also integrating them into the decision-making processes can ensure that resources are used effectively and that services are aligned with community needs[139].

Policy implementation and advocacy

The WHO's data indicating a reduction in vision loss in the African Region is a positive advancement. This trend illustrates the effects of enhanced healthcare delivery, heightened awareness, and focused efforts like the WHO's Vision 2020 campaign[57]. Yet, awareness of eye care is insufficient in numerous areas of the African Region, with misunderstandings regarding the urgency of ocular emergencies leading to procrastination in obtaining treatment. Augmenting financial support for eye care initiatives is warranted due to the considerable burden of avoidable visual impairment and its socioeconomic repercussions. Targeted expenditures in eye care do not exclude financing for other diseases but rather address a significant deficiency in healthcare services.

Comprehensive health policies and advocacy are vital for improving healthcare across Africa[140]. Developing standardized frameworks and guiding principles will help countries better incorporate ocular health into their healthcare systems[141]. Especially in the area of financial integration, these policies should be thorough, including budgets, plans, and guidelines to tackle the issue of inadequate eye care treatment in the region[142]. Integrating comprehensive eye care into Universal Health Coverage (UHC) is also vital for improving public health outcomes and ensuring equitable access to vision care[143]. However, many UHC programs currently lack comprehensive coverage for eye health care, resulting in significant out-of-pocket expenses and limited access to specialized care, such as in eye emergencies[144]. Innovative financing mechanisms, such as health insurance schemes and community health funds, can also be explored as has been done in Ghana and South Africa[145,146]. This approach will promote equitable access to eye care services and improve

overall health outcomes^[137]. Therefore, the challenges and solutions to eye emergencies in Africa are summarized in [Figure 2](#) below.

Limitations

The drawback of this study lies in the possibility of residual confounding, as not all variables that potentially affect the observed relationships may have been evaluated or considered. Lifestyle factors or genetic predispositions, which were outside the purview of this investigation, may have influenced the outcomes. Subsequent study should endeavor to incorporate a broader array of variables to mitigate this constraint.

Also, the dependence on self-reported and secondary data for certain variables creates the potential for recall and misclassification biases. Recall bias may arise if people wrongly recollect past events, whereas misclassification bias could stem from inaccuracies in data entry or categorization. These biases may compromise the validity of the findings. We therefore suggest utilizing objective metrics or primary data acquisition may alleviate these constraints.

While the longitudinal design of this study offers a more robust foundation for inferring temporal relationships than cross-sectional studies, it does not definitively establish causality. Unmeasured variables and other biases intrinsic to observational studies may continue to affect the outcomes. Consequently, prudence is necessary in interpreting the data as causal, and experimental research is required to validate these connections.

CONCLUSION

Summary of key points

This study discusses the critical and under-addressed issue of low treatment rates for eye emergencies in Africa, which significantly contributes to the high prevalence of preventable blindness across the continent. Eye emergencies require immediate medical attention to prevent severe outcomes, such as permanent vision loss. However, the ability to respond effectively to these emergencies is severely constrained by several factors unique to Africa. Socioeconomic barriers, particularly in rural regions, impede access to healthcare facilities equipped to handle ocular emergencies. The continent faces a significant shortage of trained eye care professionals, compounded by the uneven distribution of available specialists between the rural and urban regions, which further limits access to timely care. The epidemiology of eye emergencies in Africa reveals a worrying trend of increasing incidence, with young individuals, men, and those in high-risk occupations disproportionately affected. This study also notes that untreated eye emergencies can have devastating personal consequences, including a drastic reduction in quality of life, loss of independence, and long-term economic impacts. The challenges in managing these emergencies are exacerbated by inadequate healthcare infrastructure, lack of essential supplies, and insufficient training for healthcare workers at the primary care level. Our findings corroborate existing literature that underscores the significant deficiency of eye care experts in Africa and its effect on emergency care provision. This study emphasizes the necessity for policies that promote workforce development, encompassing the training and retention of eye care workers. The results underscore the necessity of incorporating eye care into primary healthcare systems to improve accessibility. These results ought to guide national health programs and international partnerships focused on mitigating preventable eyesight loss.

Call to action

Effective initiatives to enhance eye emergency care in Africa encompass the establishment of mobile eye clinics for remote populations, the incorporation of eye care within existing primary healthcare systems, and the implementation of specialized training programs for primary healthcare practitioners. Public awareness efforts, customized to local contexts, should be executed to inform populations about the significance of prompt medical attention for ocular emergencies. These programs necessitate collaborative efforts among governments, NGOs, and international organizations to guarantee sustainability and efficacy. This study calls for urgent action to address the low treatment rates of eye emergencies in Africa. This includes enhancing healthcare infrastructure, especially in rural areas, and improving the training and retention of eye care professionals. It also advocates for stronger community engagement and education to raise awareness about the importance of eye care and the need for timely medical intervention. Furthermore, the study emphasizes the necessity of policy reforms and increased funding to ensure that eye health is integrated into broader public health strategies and that resources are allocated effectively to prevent avoidable vision loss across the continent.

FOOTNOTES

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Country of origin: Italy

ORCID number: Babatunde Ismail Bale 0000-0003-2028-3960; Marco Zeppieri 0000-0003-0999-5545; Mutali Musa 0000-0001-7486-8361.

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