Editorial - Glaucoma: Management and diagnostic challenges in Africa

Glaucoma remains one of the leading causes of irreversible blindness globally[1] and poses a significant public health challenge in Africa[2], with a reported prevalence of 4.4%[3]. The disease disproportionately affects populations of African ancestry, who are known to have higher prevalence, earlier onset, more aggressive disease progression, and poorer visual outcomes compared with other ethnic groups[3-5]. Despite advances in ophthalmic screening, diagnostic technology and therapeutic interventions worldwide, significant barriers continue to impede accessible, quality and cost-effective glaucoma services across the African continent. Common barriers include health system strengthening capacity, infrastructure and equipment gaps, direct and indirect costs, shortage of human resources for eye health, poor physical access and distance to services, diagnostic accuracy bias, lack of local guidelines, gender and socioeconomic inequities [6, 7]. These bottlenecks contribute to suboptimal glaucoma detection and management throughout the continent.

Primary Open-Angle Glaucoma (POAG) is the most common form of glaucoma in Africa[5, 8-10] and frequently presents at advanced stages[11]. Many patients remain asymptomatic and undiagnosed until substantial optic nerve damage and visual field loss have already occurred[10, 12]. The asymptomatic nature of early glaucoma, combined with limited public awareness and inadequate health promotion and screening programs, and poor socioeconomic status contributes to delayed presentation and irreversible blindness[13]. In many African communities, eye diseases are often only recognized when central vision and quality of life become severely impaired, by which time treatment options become less effective.

Diagnostic challenges remain profound. Comprehensive glaucoma evaluation requires specialized equipment such as slit lamps, gonioscopy and indirect lenses, pachymeters, Optical Coherence Tomography (OCT), and automated perimetry. However, many healthcare facilities in low-resource African settings lack access to such technologies[14]. Many studies have identified elevated IOP as a strong risk factor for POAG[15, 16]. In rural areas especially, diagnosis may rely largely on intraocular pressure measurements and direct ophthalmoscopy, both of which have limited sensitivity for early disease detection. Furthermore, normal-tension glaucoma cases may easily be missed when excessive emphasis is placed on elevated IOP[17]. In addition, fluctuations in Intraocular Pressure (IOP) may play an important role in the management and progression of glaucoma[18].

Visual field and Optical Coherence Tomography (OCT) testing, which are central to functional and structural glaucoma assessment, respectively, presents additional difficulties. This is because the diagnosis of glaucoma may have clinically significant depressive symptoms[19]. As a result, qualitative assessments of glaucoma visual field-testing challenges maybe related to sustained concentration, test-related anxiety, doubts about the testing process, and physical discomfort. Addressing patient concerns and anxiety related to visual field testing is essential, with particular emphasis on allowing patient-initiated breaks to mitigate concentration difficulties and physical discomfort during the procedure[20].

Moreover, OCT normative databases are predominantly derived from European, Asian, or North American populations, raising concerns about their applicability in African patients where neuroretina ring, retinal nerve fibre and ganglion cell inner retina layers characteristics may differ[21,22]. Monitoring structural and functional glaucoma progression is important for timely treatment in early disease[23].

Human resource for eye health limitations also contribute significantly to diagnostic delays. While the number of ophthalmologists has grown[24, 25], glaucoma subspecialists continue to be largely based in urban healthcare facilities, creating disparities in access to advanced glaucoma care for patients in rural and underserved areas[7, 26]. Despite carrying a substantial burden of eye disease, sub-Saharan Africa has three ophthalmologists per million population, highlighting a significant human resource gap[25]. In addition, the distribution of eye care personnel across sub-Saharan Africa remains inadequate for the growing burden of visual impairement[14,24]. Consequently, tertiary eye centres are often overwhelmed, while rural populations remain underserved.

Management of glaucoma in Africa is equally challenging. Medical therapy is frequently limited by poor affordability and accessibility, frequent drug stock outs, and inadequate insurance coverage. Prostaglandin analogues, although highly effective, are often too expensive for long-term use in low-income populations. In addition, Rho kinase (ROCK) inhibitors may not be readily available in many health facilities on the continent, necessitating alternative management. Poor adherence to therapy is common and may result from medication side effects, limited understanding of the chronic nature of glaucoma, and socioeconomic constraints[27-29]. Although laser therapy is available in certain centres, its adoption and utilization remain limited[30]. Furthermore, patients

may discontinue treatment once symptoms improve or when financial resources become strained. Given the high prevalence of glaucoma and the predominantly low-income populations across sub-Saharan Africa, optimal management strategies should emphasize early screening and timely detection, coupled with reliable, long-term treatment options that are minimally dependent on patient adherence and compliance[2].

Surgical intervention, particularly trabeculectomy, remains an important treatment modality in Africa because of poor adherence to chronic medical therapy. Evidence suggests that early surgical management of Primary Congenital Glaucoma, undertaken within the first days to weeks of life, substantially improves prognosis and reduces the risk of irreversible visual impairment[31]. However, surgical outcomes may be compromised by late presentation, aggressive wound healing responses, limited postoperative follow-up, and shortages of antifibrotic agents such as mitomycin-C. Fear of surgery and cultural misconceptions further reduce surgical acceptance in some communities[32]. Furthermore, the increasing introduction of Minimally Invasive Glaucoma Surgery (MIGS) offers promise but remains financially inaccessible in many low-resource environments[33, 34].

Childhood glaucoma poses unique diagnostic and management challenges, particularly in low-resource settings. Delayed presentation, limited access to specialized paediatric ophthalmology services, and the frequent need for examinations under anaesthesia contribute to difficulties in achieving timely diagnosis and effective treatment. Therefore, increasing disease awareness, promoting early diagnosis, and ensuring timely treatment are essential for reducing the risk of long-term visual impairment[35,36]. Furthermore, the lifelong nature of the disease necessitates sustained monitoring and repeated interventions[37,38], yet long-term follow-up is often compromised by healthcare access barriers and socioeconomic constraints. Consequently, affected children are at increased risk of irreversible visual impairment, which can adversely affect educational attainment, psychosocial development, and overall quality of life during critical developmental years[39].

Nevertheless, important opportunities exist to improve glaucoma care in Africa. Strengthening public awareness campaigns, integrating glaucoma screening into primary healthcare systems, and promoting opportunistic screening of people at risk could facilitate earlier diagnosis. Teleophthalmology and artificial intelligence-assisted diagnostics may help bridge gaps in specialist availability, especially in remote regions[40-42]. Furthermore, increasing local training opportunities for ophthalmologists, glaucoma specialists and midlevel cadres, and expanding access to affordable diagnostic technologies are essential steps towards sustainable and high impact glaucoma services.

Research focused specifically on African populations must also be prioritized. There remains a critical need for population-based epidemiological studies, genetic research[3,43], and normative imaging databases relevant to African eyes[21]. Locally generated evidence will be vital in developing context-appropriate diagnostic criteria and treatment strategies.

Glaucoma in Africa is not merely an ophthalmic condition; it is a significant public health challenge with substantial socioeconomic consequences. Blindness from glaucoma affects productivity, independence, and quality of life, often placing additional burdens on already strained healthcare systems and families. Childhood glaucoma represents a significant economic challenge, with costs peaking in the first year after presentation due to the need for comprehensive diagnostic assessments, surgical treatment, and close postoperative monitoring[44]. Reducing the burden of glaucoma blindness across Africa will require coordinated efforts involving governments, civil society, non-governmental organisations, healthcare and academic institutions, professional societies, researchers, and international partners.

Early detection, equitable access to affordable treatment, investment in healthcare infrastructure and equipment, and sustained research initiatives remain central to addressing the growing glaucoma burden in Africa. Without urgent and coordinated action, glaucoma will continue to contribute significantly to preventable irreversible blindness across the continent.

Mwale C, Section Editor, JOECSA and Phil Eye Hospital, Kitwe and Lusaka Apex Medical University, Zambia. Email: consitymwale@gmail.com

REFERENCES

1. Steinmetz JD, Bourne RR, Briant PS, *et al.* Causes of blindness and vision impairment in 2020 and trends over 30 years, and prevalence of avoidable blindness in relation to VISION 2020: the Right to Sight: an analysis for the Global Burden of Disease Study. *Lancet Glob Health.* 2021; **9**(2):e144-e160.
2. Sarfo JO, Mordi P, Aggrey EK, *et al.* Glaucoma prevalence and treatment in sub-Saharan Africa's elderly population: A scoping review. *BMC Geriatrics.* 2025; **25**(1):255.
3. Kyari F, Abdull MM, Bastawrous A, *et al*. Epidemiology of glaucoma in sub-saharan Africa: prevalence, incidence and risk factors. *Middle East Afr J Ophthalmol.* 2013; **20**(2):111-125.
4. Tham Y-C, Li X, Wong TY, *et al*. Global prevalence of glaucoma and projections of glaucoma burden through 2040: a systematic review and meta-analysis. *Ophthalmol.* 2014; **121**(11):2081-90.

5. Kyari F, Entekume G, Rabiu M, *et al.* A population-based survey of the prevalence and types of glaucoma in Nigeria: results from the Nigeria National Blindness and Visual Impairment Survey. *BMC Ophthalmol.* 2015; **15**(1):176.
6. Eze UA, Adepoju ST, Bello SU, *et al.* A review of factors contributing to severe progression of primary open angle glaucoma (POAG) in people of African descent. *Disc Soc Sci Health.* 2026; **6**(1): Article 69.
7. Kyei S. Gaps in glaucoma diagnosis and management in low-resource settings: evidence, challenges, and practical solutions for West Africa. *Integr Health Res J.* 2026; **3**(1):1-7.
8. Cook C, Foster P. Epidemiology of glaucoma: what's new? *Can J Ophthalmol.* 2012; **47**(3):223-226.
9. Quigley HA, Broman AT. The number of people with glaucoma worldwide in 2010 and 2020. *Br J Ophthalmol.* 2006; **90**(3):262-267.
10. Rotchford AP, Kirwan JF, Muller MA, *et al.* Temba glaucoma study: a population-based cross-sectional survey in urban South Africa. *Ophthalmol.* 2003; **110**(2):376-382.
11. Kayange P, Nkume H, Feyi-Waboso A, *et al.* Presentation of primary open angle glaucoma (POAG) at Lions Sight First Eye Hospital in Blantyre, Malawi. *Malawi Med J.* 2014; **26**(3):60-62.
12. Cook C. Glaucoma in Africa: size of the problem and possible solutions. *J Glaucoma.* 2009; **18**(2):124-128.
13. Shen R, Li VS, Wong MO, *et al.* Pediatric glaucoma—from screening, early detection to management. *Children.* 2023; **10**(2):181.
14. WHO; World report on vision 2019.
15. Sommer A, Tielsch JM, Katz J, *et al.* Relationship between intraocular pressure and primary open angle glaucoma among white and black Americans: The Baltimore Eye Survey. *Arch Ophthalmol.* 1991; **109**(8):1090-95.
16. Leske MC, Connell A, Wu S-Y, *et al*. Risk factors for open-angle glaucoma: the Barbados Eye Study. *Arch Ophthalmol.* 1995; **113**(7):918-924.
17. Nemesure B, Honkanen R, Hennis A, *et al*. Incident open-angle glaucoma and intraocular pressure. *Ophthalmol.* 2007; **114**(10):1810-15.
18. Asrani S, Zeimer R, Wilensky J, *et al.* Large diurnal fluctuations in intraocular pressure are an independent risk factor in patients with glaucoma. *J Glaucoma.* 2000; **9**(2):134-142.
19. Rees G, Tee HW, Marella M, *et al.* Vision-specific distress and depressive symptoms in people with vision impairment. *Invest Ophthalmol Vis Sci.* 2010; **51**(6):2891-96.
20. Lu SJ, Girgis S, Shah P, *et al.* Patient experience and barriers to the visual field test for glaucoma. *J Glaucoma.* 2024; **33**(11):835-840.
21. Nelson-Ayifah D, Mashige KP, Munsamy AJ. Normative values for retinal parameters in a Ghanaian clinical population at risk for glaucoma. *Afr Vis Eye Health.* 2024; **83**(1):1-9.
22. Ismail S, Ally N, Alli HD. Retinal nerve fibre layer thickness in a normal black South African population. *Eye.* 2020; **34**(8):1426-31.
23. Salowe RJ, Chen Y, Zenebe-Gete S, *et al.* Risk factors for structural and functional progression of primary open-angle glaucoma in an African ancestry cohort. *BMJ Open Ophthalmol.* 2023; **8**(1): e001120.
24. Resnikoff S, Lansingh VC, Washburn L, *et al*. Estimated number of ophthalmologists worldwide (International Council of Ophthalmology update): will we meet the needs? *Br J Ophthalmol.* 2020; **104**(4):588-592.
25. Resnikoff S, Block SS, Chai S, *et al.* The Global Eye Care Workforce: 2023 Estimates Across Ophthalmologists, Optometrists, and Allied Personnel. *AJO Int.* 2026: 100260.
26. Kilmer G, Bynum L, Balamurugan A. Access to and use of eye care services in rural Arkansas. *J Rural Health.* 2010; **26**(1):30-35.
27. Ocansey S, Kyei S, Diafo A, *et al.* Cost of the medical management and prescription pattern for primary open angle glaucoma (POAG) in Ghana–a retrospective cross-sectional study from three referral facilities. *BMC Health Ser Res.* 2016; **16**(1):282.
28. Olthoff CM, Schouten JS, van de Borne BW, *et al.* Noncompliance with ocular hypotensive treatment in patients with glaucoma or ocular hypertension: an evidence-based review. *Ophthalmol.* 2005; **112**(6):953-961. e7.
29. Obasuyi OC, Yeye-Agba OO, Ofuadarho OJ. Factors limiting glaucoma care among glaucoma patients in Nigeria: A scoping review. *PLOS Glob Public Health.* 2024; **4**(1):e0002488.
30. Olawoye O, Washaya J, Gessesse GW, *et al.* Glaucoma treatment patterns in sub-Saharan Africa. *J Glaucoma.* 2023; **32**(10):815-819.
31. Mandal AK, Gothwal VK, Bagga H, *et al.* Outcome of surgery on infants younger than 1 month with congenital glaucoma. *Ophthalmol* 2003;**110**(10):1909-15.
32. Adekoya BJ, Akinsola FB, Balogun BG, *et al*. Patient refusal of glaucoma surgery and associated

factors in Lagos, Nigeria. *Middle East Afr J Ophthalmol.* 2013; **20**(2):168-173.
33. Andoh AKA, Akuffo KO, Ampong J, *et al*. Glaucoma management therapies and clinical outcomes in an African population: A review of prospective studies. *J Clin Med.* 2026; **15**(5):1837.
34. Adunola O, Godswill N. Is minimally invasive glaucoma surgery a viable option in Africa? *Med Res Arch.* [online]. 2025; **13** (5): doi:10.18103/mra. v13i5.6565.
35. de Silva DJ, Khaw PT, Brookes JL. Long-term outcome of primary congenital glaucoma. *J AAPOS.* 2011; **15**(2):148-152.
36. Zagora SL, Funnell CL, Martin FJ, *et al.* Primary congenital glaucoma outcomes: lessons from 23 years of follow-up. *Am J Ophthalmol.* 2015; **159**(4):788-796. e2.
37. Chang TC, Cavuoto KM. Anesthesia considerations in pediatric glaucoma management. *Curr Opin Ophthalmol.* 2014; **25**(2):118-121.
38. Coviltir V, Marinescu MC, Urse BM, *et al*. Primary congenital and childhood glaucoma—a complex clinical picture and surgical management. *Diagnostics.* 2025; **15**(3):308.
39. Khaw P. Quality of life and functional vision in children with glaucoma. *Ophthalmol.* 2017; **124**(10):1439 – 41.
40. Balakrishnan P, Swain TA, McGwin Jr G, *et al.* Comparison of glaucoma diagnosis by telemedicine, in-person ophthalmologist, and optometrist. *J Glaucoma.* 2024; **33**(9):619- 623.
41. Huang J, Galal G, Mukhin V, *et al.* Prediction and detection of glaucomatous visual field progression using deep learning on macular optical coherence tomography. *J Glaucoma.* 2024; **33**(4):246-253.
42. Brandão-de-Resende C, de Alcântara LdAR, Vasconcelos-Santos DV, *et al*. Glaucoma and telemedicine. *J Glaucoma.* 2023; **32**(5):327-332.
43. Barquet-Pizá V, Siegfried CJ. Understanding racial disparities of glaucoma. *Curr Opin Ophthalmol.* 2024; **35**(2):97-103.
44. Liu D, Huang L, Mukkamala L, *et al.* The economic burden of childhood glaucoma. *J Glaucoma.* 2016; **25**(10):790-797.