African Journal of
Medicine, Surgery and Public Health Research

ISSN: 1595-8000

Index: Harvard, Boston, Sydney University, Dimensions, Lens, ResearchGet Scilit, Semantic, Google Scholar, Base etc

https://doi.org/10.58578/AJMSPHR.v3i1.9087

Evaluating Public Awareness of Glaucoma and Their Associated Risk Factors in Obio/Akpor Local Government Area, Rivers State

Onwunali Juliet Chinwendu, Imarenezor Edobor Peter Kenneth, Efere Y. Samson
Federal University Otuoke, Bayelsa State, Nigeria
imarenezorep@fuotuoke.edu.ng

Article Info:

Submitted:	Revised:	Accepted:	Published:
Dec 27, 2025	Jan 20, 2026	Feb 2, 2026	Feb 7, 2026

Abstract

Glaucoma is a progressive eye disease and a leading cause of irreversible blindness worldwide, often developing without early symptoms, which makes timely detection and treatment crucial for reducing vision loss. This study assessed the level of glaucoma awareness and knowledge of its risk factors among adults in Obio/Akpor Local Government Area, Rivers State, Nigeria, and explored barriers to accessing eye care. A cross-sectional survey was conducted among 440 consenting adults aged 18 years and above using a standardized questionnaire to collect socio-demographic characteristics, awareness of glaucoma, knowledge of its severity and risk factors, and willingness to seek eye care. The sample comprised 60.9% females and 39.1% males with diverse employment and educational backgrounds. While 85.7% of respondents had heard of glaucoma and many recognized it as a cause of blindness, only 26.6% knew it could be asymptomatic, and detailed knowledge of its severity profile and risk factors was limited; the main sources of information were health workers (34%), schools/lectures (24.5%), and

AJMSPHR Journal is licensed under a Creative Commons Attribution-NonCommercial-ShareAlike 4.0 International License

radio/television (18.9%). A large proportion expressed willingness to undergo free eye screening, yet lack of health insurance emerged as a notable barrier to accessing timely care. These findings indicate that general awareness of glaucoma in the community is not matched by adequate understanding of its silent progression and risk factors, potentially delaying care-seeking behavior. The study concludes that awareness campaigns alone are insufficient and that comprehensive public health education, stronger collaboration between healthcare providers and community organizations, and improved access to routine vision screening are essential to promote early detection and effective management of glaucoma, particularly among high-risk populations in Obio/Akpor and similar settings.

Keywords: Glaucoma Awareness; Vision Impairment; Risk Factors; Eye Care Utilization; Community Health.

INTRODUCTION

Glaucoma is a case for universal health because it demands lifelong treatment and financial protection. According to the WHO (2023), fighting glaucoma supports Sustainable Development Goal 3 (good health and well-being) and avoids unnecessary blindness. Countries with good health insurance systems, such as the UK (NHS) and Canada, have shown improved detection and higher compliance due to subsidized care. Nigeria's weak health insurance coverage, however, results in massive health expenditures for patients with chronic eye diseases (Ezinne et al., 2021). Thus, strengthening of UHC in Nigeria would not only improve glaucoma outcomes but also reduce the overall socioeconomic cost of blindness on families.

Glaucoma is a lifetime condition, and smooth referral and feedback from one level of the health system to another is required. Efficient referrals from PHC to Secondary and Tertiary Care can reduce late presentation of glaucoma patients and ensure they receive appropriate attention (Obasuyi et al., 2024). In facilities in Nigeria, where ophthalmologists are few in number, an efficient primary health care (PHC) system, sufficient optometry personnel, and good referral systems are important for controlling the glaucoma burden (Ovenseri-Ogbomo et al., 2017).

The Alma-Ata Declaration (1978) and Astana Declaration (2018) promoted PHC to be the base for universal health coverage (UHC). PHC personnel can act as first contact for patients, and can play crucial roles in early glaucoma detection. Educating them to

recognize risk factors such as family history, age, African origin, diabetes, and hypertension can encourage early referral for a complete eye examination. They can also participate in Community-based screening through simple eye examinations, such as visual acuity, simple torchlight examination, and IOP testing, where feasible. PHC clinics are well-positioned within communities and can offer regular health education and awareness messages, helping to correct myths about glaucoma. Pilot activity in Ghana demonstrated that community health nurses with basic training in eye care could recognize suspected glaucoma and refer appropriately, improving detection rates (Lartey et al., 2018). In Nigeria, PHC facilities often lack eye care capacity. The Ghana Glaucoma Detection Program established that optometrists trained in gonioscopy and visual field examination significantly enhanced early detection rates (Buys et al., 2018). The International Agency for the Prevention of Blindness (IAPB) suggests glaucoma screening in PHC through task-shifting and community mobilization. Nigeria's National Eye Health Committee (2021) has included glaucoma as a priority in its 10-year plan, but this has weak implementation at the LGA levels. However, the National Eye Health Policy (2022–2026) advocated for the integration of primary eye care (PEC) into PHC according to WHO's "Integrated People-Centered Eye Care" (IPEC) strategy (WHO, 2019).

Within Obio/Akpor Local Government Area, the primary health care centers are often understaffed and underequipped with eye care equipment. While this challenge is reduced in private optometry practices available in the community, a great number of those who seek eye care services often wait until a severe level of visual impairment occurs. Upgrading the staff composition of primary health care centers with skilled nurses and optometry staff will help in promoting early presentations for vision screening.

Despite years of evidence, the literature provides evidence that knowledge and awareness of glaucoma in Nigeria are still low, especially in rural communities. There are limited studies at the community level, and few studies examine how cultural beliefs and perceptions drive health-seeking behavior in glaucoma. There are also gaps in the study of the capacity of primary health care facilities, referral systems, and culturally tailored health education programs, resulting in late presentation and loss of vision. On a local level, few studies have assessed perceptions and knowledge of glaucoma among patients at the community level in Obio/Akpor. This study bridges this gap in generating evidences for informing public health interventions.

METHODOLOGY

The methods and designs used in this study, Evaluating Public Awareness of Glaucoma and Its Associated Risk Factors in Obio/ Akpor, Local Government Area, Rivers State, are outlined below;

Study Area

The research will take place in Obio/Akpor Local Government Area (LGA) of Rivers State, Nigeria. Obio/Akpor is among the 23 LGAs of Rivers State and an urban LGA that shares boundaries with Port Harcourt City LGA. The tertiary health care facilities within the communities are poorly covered and are accessible mostly to the population that is wealthy enough to pay for such. Eye care facilities are few, and most of the inhabitants depend on private clinics, pharmacists, and patent medicine shops for primary level care. The LGA is inhabited by different sects of people. Although Ikwerre people are the natives of the region, there is a massive migration involving other minority ethnic groups. There are also socioeconomic differences. Some are middle-class middle-aged professionals working in the petroleum and gas sector or civil service, while others live in semi-urban areas whose access to health is limited.

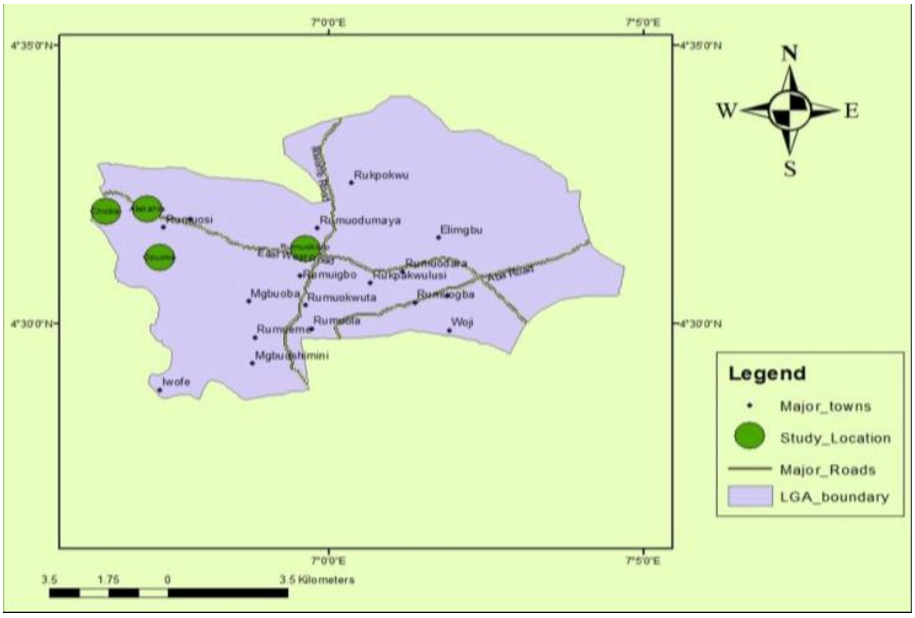


Figure I: Map of Obio/ Akpor LGA (Ehule et al., 2022)

Study Design

A community-based descriptive cross-sectional research design was used in this study. This study design was chosen because it allows for the evaluation of public

awareness about glaucoma and associated risk factors within a short time frame and without follow-up.

Study Population

The study population consists of adults, 18 years and above, randomly selected from communities in Obio/Akpor Local Government Area (LGA), Rivers State, Nigeria. These individuals were selected because they represent the population responsible for making decisions concerning their health and that of their dependents. They are also one of the most vulnerable populations to glaucoma.

Inclusion Criteria

Respondents in this study were:

Adults aged 18 years and above, living in Obio/Akpor LGA. Participants who have lived in the LGA for six months or more and have provided informed consent to take part in the study.

Exclusion Criteria

The following were excluded from being interviewed:

Minors under 18 years.

Those who do not reside there (guests, temporary staff, or students who stay somewhere other than the LGA).

Individuals with communication disability and those who were hospitalized.

Those who do not consent.

Sample Size Determination

The Cochran formula was applied to calculate the minimum required sample size.

The formula is as follows:

$$n_0 = \frac{Z^2.p(1-p)}{d^2}$$

Where:

n_0 = the minimum required sample size (before adjustments)

Z^2 = 1.96 (the standard normal deviate corresponding to the desired confidence level for 95% confidence)

p = 0.15 (15% prevalence level of glaucoma in Nigeria by Yimam et al., 2024)

d = 0.05 (5%) precision level (margin of error).

Substitution in Cochran's formula

$$n_0 = \frac{(1.96)^2 \times 0.15 \times (1 - 0.15)}{(0.05)^2}$$

$$n_0 = \frac{3.8416 \times 0.1275}{0.0025}$$

$$n_0 = \frac{0.4898}{0.0025}$$

n_0=196

Adjusting for cluster sampling using design effect (DEFF) of 2.0 and non-response of 10%

$n_1 = n_0 \times$ DEFF= 196 × 2.0= 392

$n_{final} = \frac{n_1}{1-0.10} = \frac{392}{0.9} = 436 \approx 440$

The final minimum sample size for this study is therefore **440 respondents.**

Sampling Technique

A multi-stage sampling design involved 440 study respondents who were selected from six communities chosen randomly in the Obio/Akpor Local Government Area. Respondents were selected from two sites in each community: those in their residences and other public assembly points such as markets, churches, and schools. This design took into consideration that a purely residential site sampling may end up with a biased population. As such, sampling sites included public points.

Instrument of Data Collection

Data were gathered through a standardized questionnaire created by the researcher. The questionnaire was written in plain but simple language to facilitate quick comprehension by study participants. The instrument was divided into five sections:

Section A – Socio-demographic information: Age, sex, marital status, education, occupation, and other demographics.

Section B – Glaucoma awareness: Asks if the respondents know about glaucoma and from where they have gained knowledge of glaucoma.

Section C – Knowledge of severity of Glaucoma and its risk factors: Questions evaluating knowledge regarding etiology, risk factors, symptoms, prevention, and treatment.

Section D – Sources of Information: where information was obtained, for example, newspapers, radio, and flyers.

Section E – Eye care-seeking behavior

Validity and Reliability

To enable the tool to measure what it was designed to measure, several procedures were followed to determine its validity and reliability. Validity was ensured by having the draft questionnaire reviewed by public health and optometry professionals. Their remarks and suggestions were incorporated to improve clarity, suitability of wording, and comprehensiveness in all areas of relevance.

Instrument Reliability

A pretest reliability was also administered in a subgroup of the respondents by administering the instrument to some participants who were not involved in the final study. The results were compared to ascertain the stability of the results over time. Inconsistencies were addressed by rewording faulty questions. Through these processes, the tool was established to be reliable and valid for assessing awareness and knowledge of glaucoma among the study sample.

Data Analysis

A guided questionnaire was employed in carrying out data collection. The researcher personally distributed the questionnaires to respondents in the study area. Field data collection was carried out for a period of one month. The researcher met with the head of the communities and estate executives to discuss the subject and set up an appointment to hand out the questionnaires to the respondents.

To analyze the collected data, simple descriptive statistics were used. Frequencies and percentages were calculated to describe the socio-demographic profile of the respondents, awareness, and knowledge about glaucoma. The results were presented in the form of tables and charts for ease of understanding.

Ethical Approval

Letter of introduction was given to the researcher by the National Open University of Nigeria. Participants were fully informed of the study's purpose and nature, and they were not mandated to participate. Before the questionnaires were distributed, participants' consent was obtained. The respondents were assured that their responses would be used only for research purposes and their identities would not be disclosed.

RESULTS

This chapter presents the results from the survey collected through questionnaires administered on adults in communities in Obio/Akpor on the topic, "Evaluating Public Awareness of Glaucoma and Its Associated Risk Factors in Obio Akpor Local Government Area, Rivers State. There were four hundred and forty respondents (n=440), and the data are presented below.

Socio-Demographic DATA

Table 1 below shows the socio-demographic data based on age, sex, level of education, employment status, and health insurance coverage of the respondents.

The data reveals that a majority of the respondents were between the ages of 18-29 years; 39.1% were males while 60.9% were females; 47.7% had tertiary education; and 36.2% were employed. Only about 18.4% have health insurance coverage.

Table 1: Demographic Characteristics of Respondents (N=440)

Characteristics	Number	Percentage
Age		
18-29 years	180	41
30-39 years	145	33
40-49 years	70	16
50-59 years	25	6
60 years and above	18	4
Total	440	100%
Sex		
Male	172	39.1
Female	268	60.9
Total	440	100%
Level of Education		
No Formal Education	18	4.1
Primary Education	80	18.2
Secondary Education	132	30
Tertiary Education	210	47.7
Total	440	100%
Employment Status		
Employed	160	36.2
Unemployed	99	22.5
Students	122	27.5
Retired	59	13.5
Total	440	100%

Characteristics	Number	Percentage
Health Insurance		
Have Insurance	81	18.4
No Insurance	359	81.6
Total	440	100%

Awareness of Glaucoma

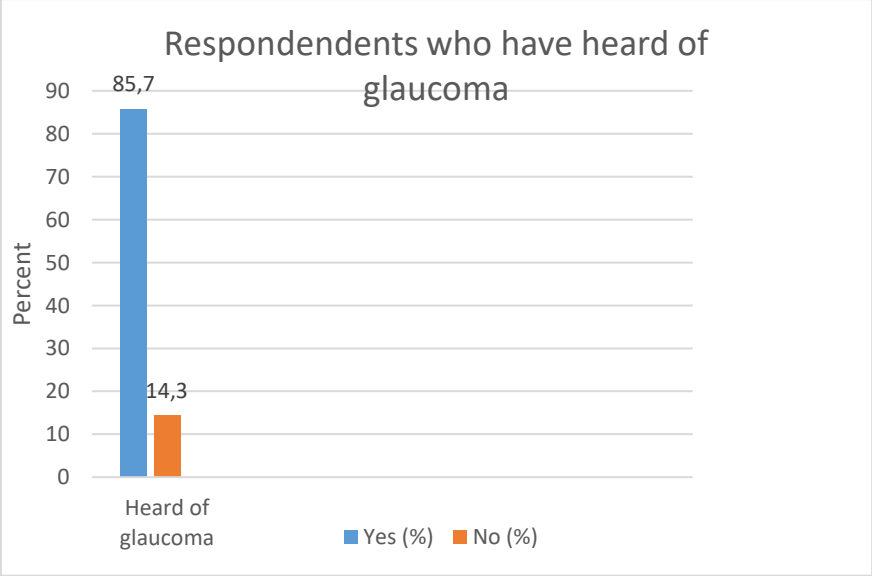


Figure II: Percentage of respondents who have heard of glaucoma

In Figure II, 14.3% of respondents (63) had not heard of glaucoma, while 85.7% respondents (377) stated that they had heard of glaucoma. This indicates a high level of awareness.

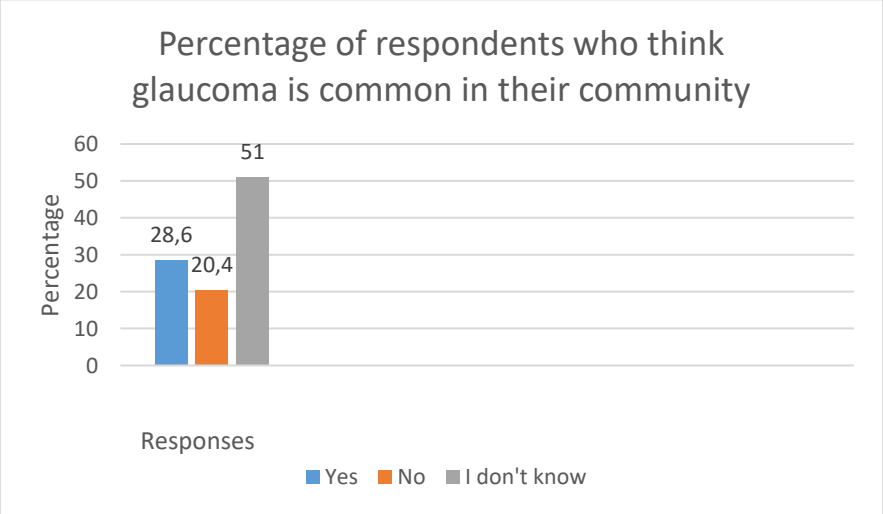


Figure III: Percentage of respondents who think glaucoma is common in their community

In Figure III, 126 respondents (28.6%) perceived glaucoma to be common in their community, 90 respondents (20.4) stated that it was not common, while a greater number, 224 respondents (51%) were not sure if glaucoma was common in Obio/Akpor community.

3. Do have a family member who has glaucoma?

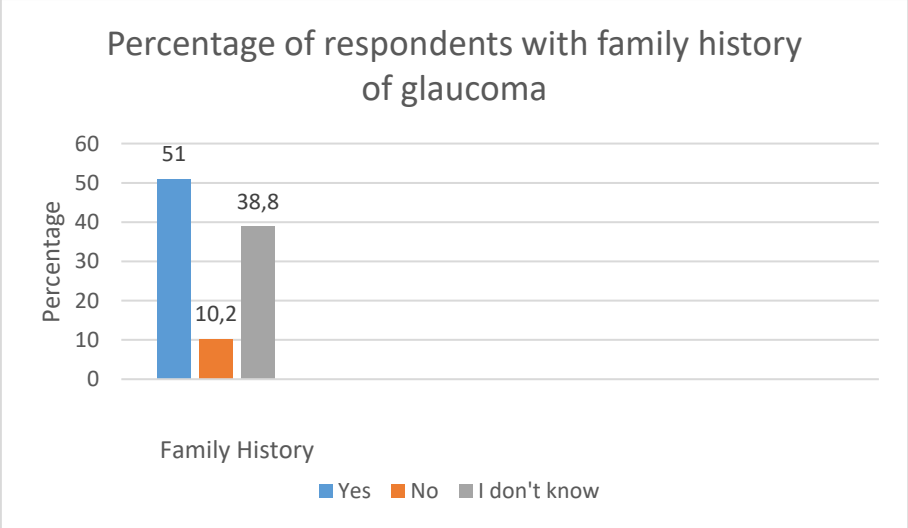


Figure IV: Percentage of respondents with family history of glaucoma

According to the responses, 51% (224) had family members with glaucoma, 10.2% (45) did not have family members with glaucoma, and 38.8% (171) were not sure if they had family members with glaucoma.

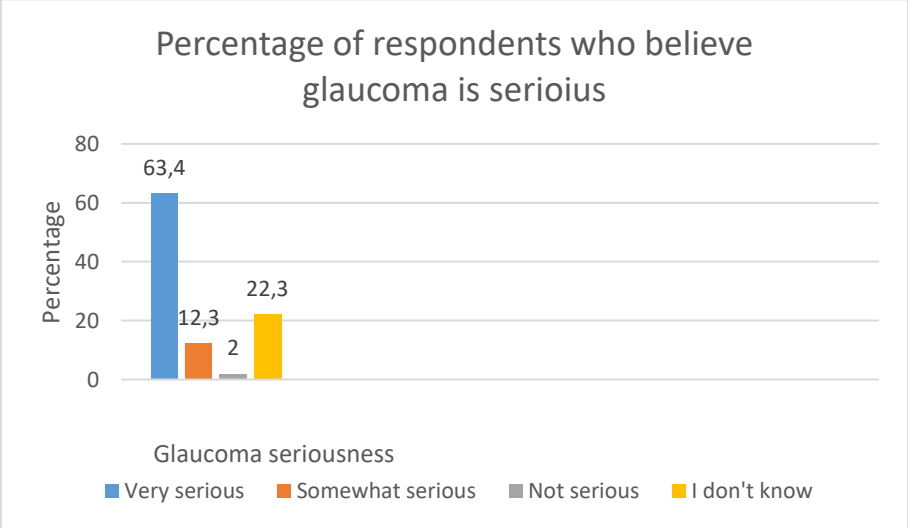


Figure V: Percentage of respondents who believe glaucoma is serious

Most of the respondents, 63.4% (279) perceived glaucoma to be a serious eye condition; 12.3% (54) respondents perceived it to be somewhat serious, 2.0% (9) respondents said the

condition wasn't serious while 22.3% (98) respondents did not know if the condition was a serious eye issue.

Table 2: Knowledge about glaucoma

Variable	Number	Percentage (%)
Knows glaucoma as "Silent thief of Sight"	350	79.6
Yes	90	20.4
No		
Total	440	100%
Knows glaucoma can cause blindness	413	93.9
Yes	0	0
No	27	6.1
I don't know		
Total	440	100%
Believe glaucoma can affect all ages	305	69.4
Yes	45	10.2
No	90	20.4
I don't know		
Total	440	100%
Believe glaucoma has a spiritual or natural cause	9	2.0
Spiritual	377	85.7
Natural	36	8.2
Both	18	4.1
I don't know		
Total	440	100%
Believes glaucoma is contagious		
Yes	126	28.6
No	305	69.4
I don't know	9	2.0
Total	440	100%
Knows glaucoma can occur without symptoms	117	26.6
Yes	173	38.6
No	153	34.8
I don't know		
Total	440	100%

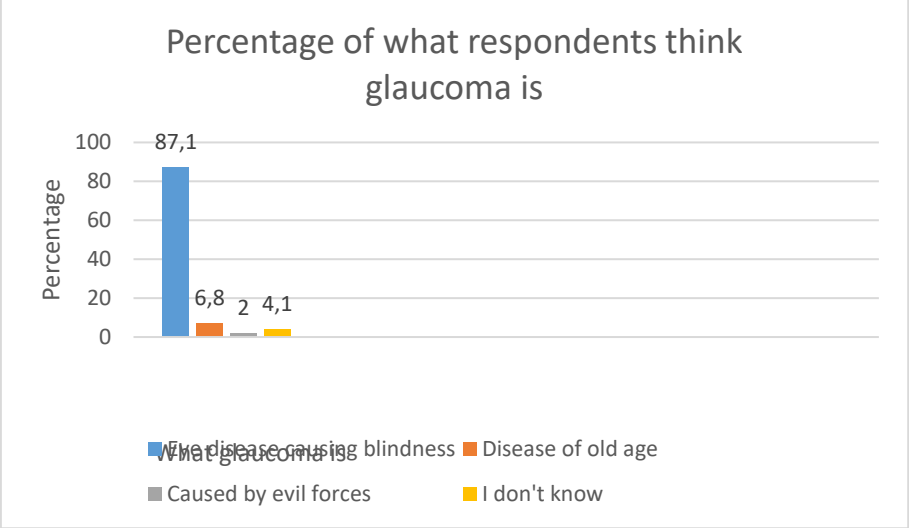


Figure VI: Percentage of what respondents think glaucoma is.

In Figure VI, most of the respondents 383 (87.1%) perceived glaucoma an eye disease that causes blindness; 30 respondents (6.8%) perceived it to be a disease of old age; 9 respondents (2.0%) perceived it to be caused by evil forces; and 18 respondents (4.1%) did not know what glaucoma is.

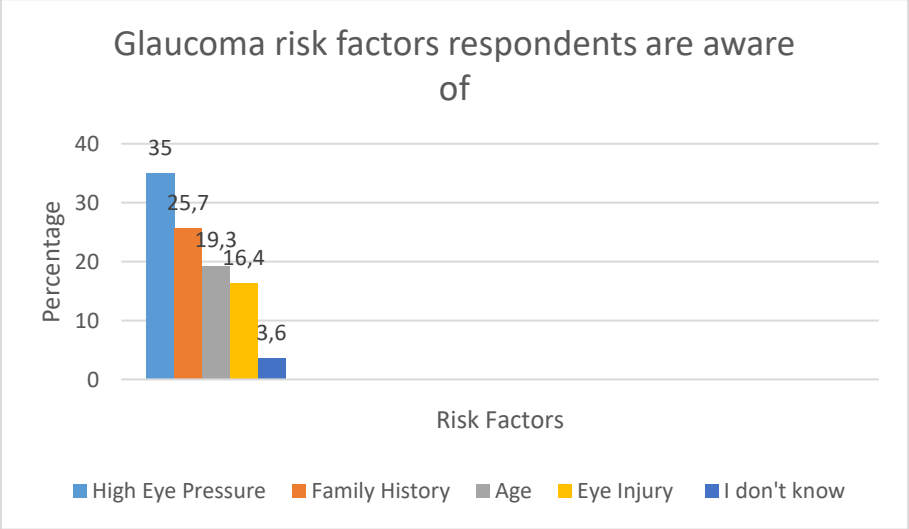


Figure VII: Percentage of glaucoma risk factors respondents are aware of

Respondents are aware of some risk factors like high eye pressure (n=154, 35%); family history (n=113, 25.7%); age (n=85, 19.3%); and eye injuries (n=72, 16.4%). 16 respondents (3.6%) did not know the risk factors of glaucoma disease.

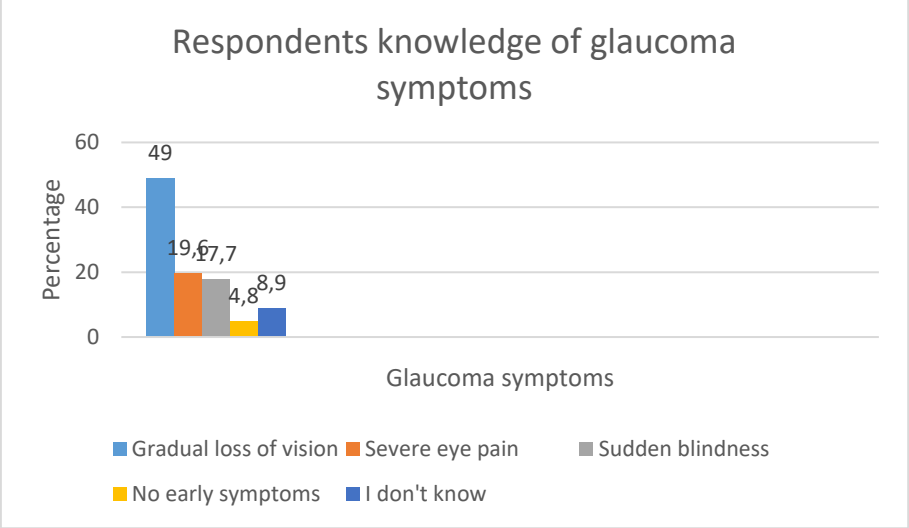


Figure VIII: Percentage of respondents' knowledge of glaucoma symptoms.

Many respondents (n=216, 49%) recognized gradual vision loss as a symptom of glaucoma. Other symptoms identified include severe eye pain (n=86, 19.6%); sudden blindness (n=78, 17.7%); and no early symptoms 21 (4.8%) Some respondents (n=39, 8.9%) were not aware of symptoms of glaucoma.

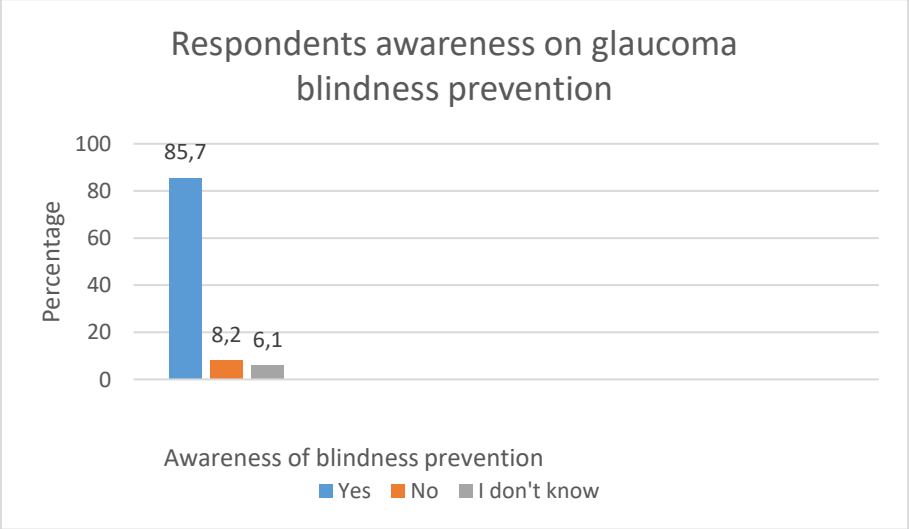


Figure IX: Percentage of responses on prevention of blindness from glaucoma

85.7% of respondents (n=377) think glaucoma blindness can be prevented if diagnosed early, 8.2% (n=36) thought otherwise; while 6.1% (n=27) were indecisive.

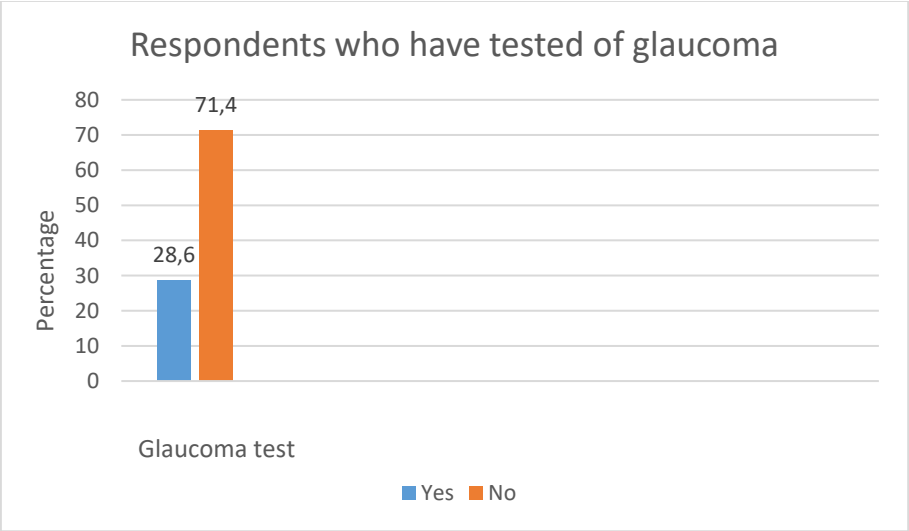


Figure X: Percentage of respondents who have tested for glaucoma

126 respondents (28.6%) had tested for glaucoma while 314 respondents (28.6%) never had a glaucoma test done.

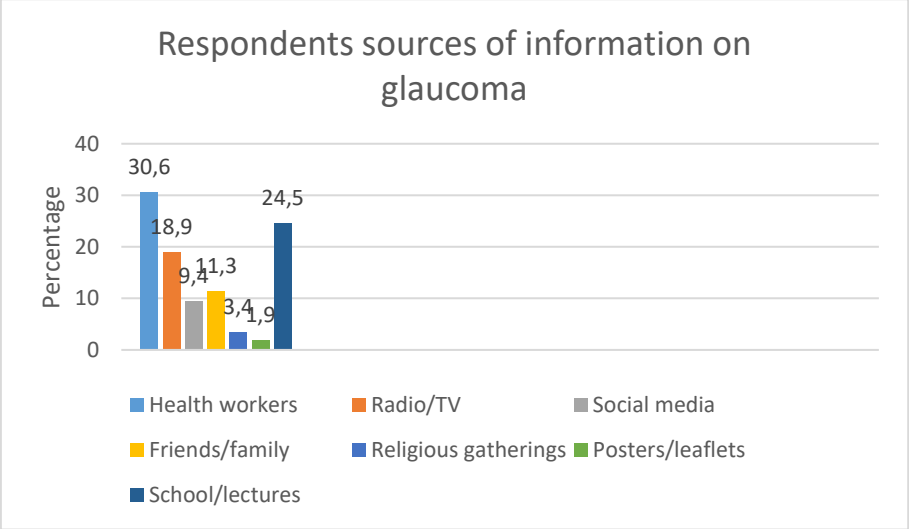


Figure XI: Graph showing respondents sources of Information on glaucoma.

Respondents sourced information on glaucoma from various sources including health workers (n=135, 30.6%); Radio/TV (n=83, 18.9%); social media (n=41, 9.4%); friends/family (n=50, 11.3%); religious gatherings (n=15, 3.4%); posters/leaflets (n=8, 1.9%); and school/lectures (n=108, 24.5%).

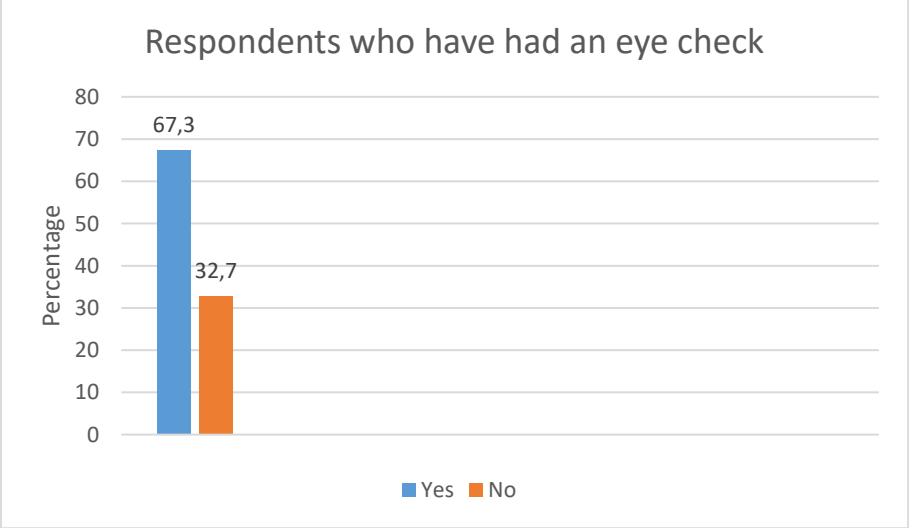


Figure XII: Graph showing respondents who have had an eye check

296 respondents (67.3%) have had an eye check, while 144 respondents (32.7%) have not had an eye check.

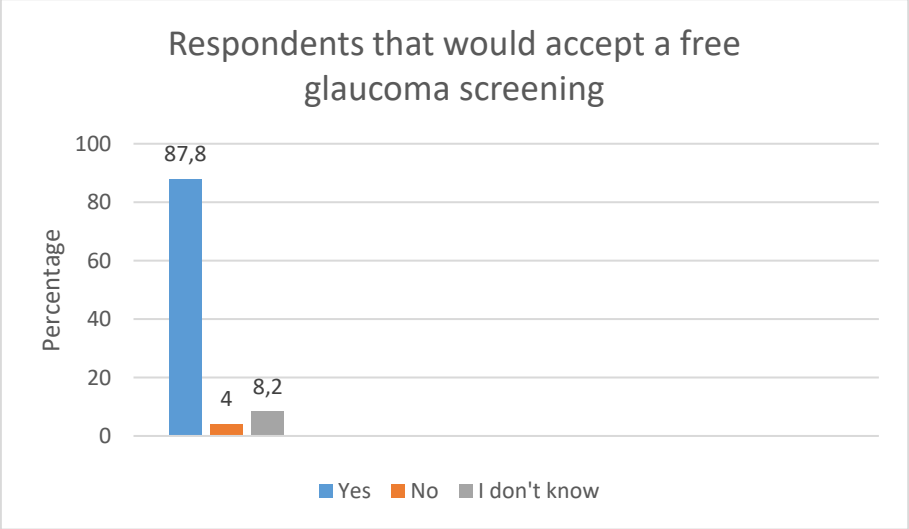


Figure XIII: Graph showing respondents that would accept a free glaucoma screening

386 respondents (87.8%) would accept a free glaucoma screening; 18 respondents (4.0%) would not accept a free screening while 36 respondents (8.2%) were indecisive.

DISCUSSION

This chapter discusses the data from the study evaluating the public awareness of glaucoma and its risk factors among adults resident in Obio/ Akpor Local Government Area, Rivers State. It also provides conclusions and recommendations for public health

practice. The results on Table 1 revealed that most of the respondents were young adults between the ages of 18-29 years (41%), and ages 30-39 years (33%), young adults are more open to health information. Older adults aged 60 years and above made up 4% of the respondents.

Male respondents were 39.1% while 60.9% were females. This is consistent with Ezenwa (2025) study where females also dominated (92.4%). This data suggests that females are more open to health researches. A good number of the respondents (47.7%) had tertiary education and 30% secondary education. This shows that higher education and exposure may bring about greater awareness of glaucoma. In terms of employment, 36.2% were employed, 22.5% unemployed, 27.5% students, and 13.5% retired. Only 18.4% had insurance coverage, this factor also limits access to glaucoma testing. Furthermore, the study revealed a high level of awareness of glaucoma among adults in Obio/Akpor LGA. A good number of the respondents (85.7%) had heard of glaucoma. This is consistent with the findings of Ezenwa et al. (2025) who reported a glaucoma awareness rate of 81.3% among teachers. This high awareness rate could be due to increased availability of health information as most Obio/ Akpor LGA is more urban. However, this study indicated a higher level of awareness when compared to earlier studies. Onyekonwu et al. (2019) revealed that in south-east Nigeria, only 26% had ever heard of glaucoma, while less than 10% knew its risk factors. From the study, it was deduced that 63.4% of respondents perceived that glaucoma was a serious eye condition, while a huge number 22.3% were unsure. This showed that though people may have heard about glaucoma, a lot of people are still uncertain about the condition. Additionally, 51% of the respondents had family members who had glaucoma, indicating the influence of family on glaucoma awareness. From Table 2, majority of the respondents, 93.9%, were aware that glaucoma is an eye condition that causes blindness, and 79.6% identified it as a "silent thief of sight". This shows that the respondents have a good understanding of the severity of the disease. This knowledge indicates an improvement in public awareness of glaucoma. However, only 26.6% of respondents knew that glaucoma can occur without symptoms while 38.6% did not know and 34.8% were unsure. 28.6% believed glaucoma is contagious, 2% thought it had spiritual causes. This lack of correct knowledge is consistent with Ezenwa's (2025) study that only 14.7% demonstrated correct knowledge of glaucoma. A majority 85.7% believed that glaucoma had natural causes, indicating an increase in the awareness.

The knowledge of the risk factors of glaucoma are still low. Only 35% knows glaucoma is caused by increased intraocular pressure; family history (25.7%); Eye injury (16.4%), and Age (19.3%). This may suggest that a good number of people are aware of glaucoma, but not the risk factors.

Overall, the awareness of glaucoma is high but detailed knowledge of risk factors and symptoms remains poor among adults in Obio/ Akpor LGA.

The major sources of information about glaucoma were health workers (30.6%), school/ lectures (24.5%), Radio/TV (18.9%). Others include friends, family, religious gathering, and social media.

This agrees with the study by Adegbehingbe et al. (2022) that awareness efforts like mass media led to some increase in glaucoma knowledge. The quality of information from these various sources differ, but health workers were the most trusted source. Though the information given by social media can be of mixed quality, its role in the dissemination of public health information cannot be overlooked especially for younger adults who were a majority of the respondents.

A total of 67.3% of the respondents reported that they had at least one general eye check-up, only 28.6% of them reported that they had undergone a glaucoma test. That means many people do not go for routine glaucoma testing unless the symptoms show up or because it is included in the general eye check-up.

Moreover, the study revealed that 87.8% respondents displayed interest to participate in free glaucoma screening if made available. Although 4% said they would not accept free screening and 8.2% were indecisive. This suggests that financial constraint could be a factor affecting glaucoma screening as revealed by the low health insurance coverage.

The implications of this study in the control of glaucoma in Obio/ Akpor LGA include;

1. Improving Community Health Education: Though there was a high level of glaucoma awareness, some knowledge gaps were noticed. This indicates a need for continued health education.

2. Promoting Early Glaucoma Screening: The low rate of glaucoma testing despite a high willingness to accept free screening suggest that community –based screening programs would be effective, and should be prioritized.

3. Integrating Eye Care into primary Health Services: Since a large number of the respondents didn't have health insurance coverage, glaucoma screening needs to be adopted as a part of primary health care.
4. Addressing myths: Appropriate communication strategies should be adopted to correct misconceptions like glaucoma is contagious or spiritual.
5. Mass media engagement to dispense accurate information about glaucoma, as a great population of the community are young adults.
6. Targeted Interventions: High percentage of respondents reporting a family history of glaucoma indicates that interventions should be focused on households at risk.
7. Policy relevance: The findings support policies targeting subsidized eye examination, routine community glaucoma screening, and inclusion of eye care in the primary health services.

CONCLUSION

This study was aimed at Evaluating the Public Awareness of Glaucoma and Its Risk Factors in Obio/ Akpor LGA, Rivers State. The results and information from the study indicated a high awareness of 85.7% but a limited knowledge of the symptoms and risk factors. While 93.9% of the respondents knew that glaucoma causes blindness, a quarter of (26.6%) knew that it can occur without symptoms, and less than a third 28.6%) had ever been screened for glaucoma.

Additionally, age, level of education, and employment status were socio-demographic factors affecting awareness and health-seeking behavior. Despite a high willingness to undergo free screening at 87.8%, this study suggested that a lack of health insurance among residents and financial constraints were limitations to routine eye check.

This study, therefore, concludes that awareness campaigns alone are not enough for quality eye care. Hence, there is need for public health education and routine vision screening aimed at early detection and management of glaucoma among high-risk populations.

Recommendations

The following recommendations are made for policy making, eye care management, and hospital management towards increasing glaucoma awareness and improving the quality of life of the community.

1. Intensify Health Education: Firstly, health stakeholders and management are urged to support the development of community-based health education programs about patient health especially eye health, stressing how symptoms of glaucoma are not normally seen, and how early detection is important. In order to ensure effective implementation of health education strategies, monitoring and evaluation of the performance of the programs is important.

2. Primary Health Care Participation: Secondly, it is recommended that glaucoma screening and education should be incorporated into the routine health activities at primary health centers and also at health outreach programs in schools, markets, and churches. Primary health workers and community health workers need trainings on early detection and referral for glaucoma cases.

3. Advocacy for Regular Eye Check: In addition, advocacy for regular eye checks should be targeted at adults above 40 years and people with family medical histories of eye disorders.

4. Mass Media Utilization: Radio, television, and social media should be used to disseminate appropriate information and correct myths about glaucoma. These programs could be done weekly and answers provided for the questions and concerns of the population. Education materials, flyers and posters should be utilized to spread information focusing on glaucoma and blindness prevention.

5. Provision of Free or Subsidized Screening: The government and NGOs should periodically organize free or low-cost glaucoma screening programs in order to ensure early detection.

6. World Glaucoma week awareness: Coordinating and participating in world glaucoma week activities should be encouraged. These activities include public awareness, early detection, and glaucoma screenings in health facilities, government, and community groups, in order to reduce preventable blindness.

REFERENCES

Abdull, M. M., Sivasubramaniam, S., Murthy, G. V. S., Gilbert, C. E., Abubakar, T., Ezelum, C., & Rabiu, M. M. (2009). Causes of blindness and visual impairment in Nigeria: The Nigeria national blindness and visual impairment survey. *Investigative Ophthalmology & Visual Science, 50*(9), 4114–4120. https://doi.org/10.1167/iovs.09-3507

Adegbehingbe, B. O., Akinye, A. M., & Ajayi, B. G. K. (2022). Community-based screening and awareness of glaucoma in South-Western Nigeria: Implications for eye health promotion. *Nigerian Journal of Ophthalmology, 30*(1), 15–22.

Advanced Glaucoma Intervention Study (AGIS) Investigators. (2000). The Advanced Glaucoma Intervention Study (AGIS): 7. The relationship between control of intraocular pressure and visual field deterioration. *American Journal of Ophthalmology, 130*(4), 429–440. https://doi.org/10.1016/S0002-9394(00)00538-9

Agarwal, R., Gupta, S., & Agarwal, P. (2022). Advances in glaucoma management: Current perspectives and future directions. *Indian Journal of Ophthalmology, 70*(5), 1253–1262.

Allison, K., Patel, D., & Alabi, O. (2020). Epidemiology of glaucoma: The past, present, and predictions for the future. *Cureus, 12*(11), e11686. https://doi.org/10.7759/cureus.11686

Aspberg, J., Heijl, A., & Bengtsson, B. (2021). Screening for open-angle glaucoma and its effect on blindness. *American Journal of Ophthalmology, 228*, 106–116. https://doi.org/10.1016/j.ajo.2021.03.030

Buys, E. S., Potter, J. R., Pasquale, L. R., & Ksander, B. R. (2018). Regulation of intraocular pressure by soluble guanylate cyclase in mice. *Investigative Ophthalmology & Visual Science, 59*(3), 1239–1246. https://doi.org/10.1167/iovs.17-23452

Chibueze, L. M. (2015). *Glaucoma in Nigeria: Factors influencing late presentation of the disease* (Master's thesis). Royal Tropical Institute/Vrije Universiteit Amsterdam.

Dandona, L., & Dandona, R. (2019). Blindness in the developing world: The way forward. *Indian Journal of Ophthalmology, 67*(6), 777–780.

Ehrlich, J. R., Burke-Conte, Z., Wittenborn, J. S., et al. (2024). Prevalence of glaucoma among US adults in 2022. *JAMA Ophthalmology, 142*(11), 1046–1053. https://doi.org/10.1001/jamaophthalmol.2024.3884

Ehule, H. W., Davies, O. E., Nwaogburu, L., & Ogele, E. P. (2022). Good governance and rural development in local government areas in Rivers State, Nigeria: A study of Obio/Akpor local government area, 2010–2020. *Journal of Public Administration and Social Welfare Research, 7*(1), 35–49.

Enock, M. E., Adepoju, F. G., & Onwubiko, S. N. (2019). Awareness and knowledge of glaucoma among adults in Ibadan, Nigeria. *Annals of Ibadan Postgraduate Medicine, 17*(2), 106–113.

European Glaucoma Society. (2020). *European Glaucoma Society guidelines* (5th ed.): Terminology and guidelines for glaucoma [PDF]. https://www.oogheelkunde.org/wp-content/uploads/2022/05/EGS_Guidelines_5_English-1.pdf

Ezenwa, A. C., & Nwosu, S. N. (2025). Awareness and knowledge of glaucoma among secondary school teachers in Onitsha, Nigeria. *The Nigerian Health Journal, 25*(1), 380–385. https://doi.org/10.71637/tnhj.v25i1.995

Ezinne, N. E., Ojukwu, C. S., Ekemiri, K. K., Akano, O. F., Ekure, E., & Osuagwu, U. L. (2021). Prevalence and clinical profile of glaucoma patients in rural Nigeria—A hospital-based study. *PLOS ONE, 16*(12), e0260965. https://doi.org/10.1371/journal.pone.0260965

Flaxman, S. R., Bourne, R. R. A., Resnikoff, S., Ackland, P., Braithwaite, T., & Cicinelli, M. V. (2017). Global causes of blindness and distance vision impairment 1990–2020: A systematic review and meta-analysis. *The Lancet Global Health, 5*(12), e1221–e1234. https://doi.org/10.1016/S2214-109X(17)30393-5

Halkiadakis, I., Konstantopoulou, K., Tzimis, V., Papadopoulos, N., Chatzistefanou, K., & Markomichelakis, N. N. (2024). Update on diagnosis and treatment of uveitic glaucoma. *Journal of Clinical Medicine, 13*(5), 1185. https://doi.org/10.3390/jcm13051185

International Agency for the Prevention of Blindness (IAPB). (2020). Vision atlas: Key facts about avoidable blindness. https://www.iapb.org

International Centre for Eye Health. (2014). *The Nigerian national blindness and visual impairment survey*. London School of Hygiene and Tropical Medicine. https://iceh.lshtm.ac.uk/files/2014/04/NigeriaSurvey.pdf

Isawumi, M., & Aina, A. (2024). Awareness and knowledge of glaucoma among workers in a missionary hospital in Nigeria. *Research Journal of Health Sciences, 12*(3), 180–188. https://doi.org/10.4314/rejhs.v12i3.2

Khurana, A. K. (2021). *Comprehensive ophthalmology* (7th ed.). Jaypee Brothers Medical Publishers.

Krishnadas, R., & Ramakrishnan, R. (2001). Secondary glaucomas: The tasks ahead. *Community Eye Health, 14*(39), 40–42. https://pmc.ncbi.nlm.nih.gov/articles/PMC1705934/

Kyari, F., Adekoya, B., Abdull, M. M., Mohammed, A. S., & Garba, F. (2018). The current status of glaucoma and glaucoma care in sub-Saharan Africa. *Asia-Pacific Journal of Ophthalmology, 7*(6), 375–386. https://doi.org/10.22608/APO.2018392

Lartey, S. Y., Antwi, O., & Boadi-Kusi, S. B. (2018). Community health nurses as the first point of contact for eye care in Ghana: A pilot study. *African Vision and Eye Health, 77*(1), a438.

Nkumbe, H. E., & Boadi-Kusi, S. B. (2020). Misinformation and barriers to glaucoma surgery and long-term treatment adherence in Ghana and Ethiopia. *Ghana Medical Journal, 54*(2), 79–85. https://doi.org/10.4314/gmj.v54i2.4

Obasuyi, O. C., Yeye-Agba, O. O., & Ofuadarho, O. J. (2024). Factors limiting glaucoma care among glaucoma patients in Nigeria: A scoping review. *PLOS Global Public Health, 4*(1), e0002488. https://doi.org/10.1371/journal.pgph.0002488

Okeke, C. O., Onwubiko, S. N., & Chuka-Okosa, C. M. (2020). Medication adherence among glaucoma patients in southeastern Nigeria. *Journal of Glaucoma, 29*(4), 293–300. https://doi.org/10.1097/IJG.0000000000001462

Okoye, O., & Umeh, R. E. (2020). Barriers to uptake of glaucoma services in Enugu, Nigeria. *Nigerian Journal of Clinical Practice, 23*(5), 626–632.

Oluwatayo, O., & Ashaye, A. O. (2022). Awareness and knowledge of glaucoma among patients attending a tertiary hospital in Ibadan, Nigeria. *Nigerian Postgraduate Medical Journal, 29*(1), 48–54.

Onakoya, A. O., Kolawole, O. U., & Adepoju, F. G. (2015). Glaucoma blindness and visual impairment in an African population: Results of the Nigeria Blindness and Visual Impairment Survey. *Investigative Ophthalmology & Visual Science, 56*(1), 536–543.

Onyekonwu, C. L., Chime, P. E., & Okoye, O. I. (2019). Community awareness and knowledge of glaucoma in Southeast Nigeria. *Nigerian Journal of Ophthalmology, 27*(1), 21–27.

Ovenseri-Ogbomo, G., Amiebenomo, O., & Obahiagbon, A. E. (2017). Pattern of referrals by optometrists in Nigeria in relation to glaucoma and diabetic retinopathy. *Journal of Medical and Biomedical Sciences, 5*, 36–44. https://doi.org/10.4314/jmbs.v5i3.4

Sarfo, J., Mordi, P., Aggrey, E., et al. (2025). Glaucoma prevalence and treatment in sub-Saharan Africa's elderly population: A scoping review. *BMC Geriatrics, 25*, 255. https://doi.org/10.1186/s12877-025-05901-0

Shan, S., Wang, Y., Wu, X., Li, J., Zhang, C., Yang, X., & Zhou, M. (2024). Global incidence and risk factors for glaucoma: A systematic review and meta-analysis of prospective studies. *Journal of Global Health, 14*, 04252. https://doi.org/10.7189/jogh.14.04252

Si, Z., Fan, Y., Shen, H., Wang, M., Zhao, J., & Zheng, Y. (2025). Global, regional, and national burden of low vision and blindness due to glaucoma, 1990–2021, and projections to 2050: A systematic analysis of glaucoma. *International Journal of Surgery*. Advance online publication. https://doi.org/10.1097/JS9.0000000000003723

Soh, Z. D., Thakur, S., Majithia, S., et al. (2021). The global extent of undetected glaucoma in adults: A systematic review and meta-analysis. *Ophthalmology, 128*(10), 1393–1404. https://doi.org/10.1016/j.ophtha.2021.05.008

Sun, Y., Chen, A., Zou, M., Zhang, Y., Jin, L., Li, Y., ... & Wang, N. (2022). Time trends, associations and prevalence of blindness and vision loss due to glaucoma: An analysis of observational data from the Global Burden of Disease Study 2017. *BMJ Open, 12*(1), e053805. https://doi.org/10.1136/bmjopen-2021-053805

Weinreb, R. N., Aung, T., & Medeiros, F. A. (2014). The pathophysiology and treatment of glaucoma. *JAMA, 311*(18), 1901–1911. https://doi.org/10.1001/jama.2014.3192

Wiggs, J. L., & Pasquale, L. R. (2017). Genetics of glaucoma. *Human Molecular Genetics, 26*(R1), R21–R27. https://doi.org/10.1093/hmg/ddx184

World Health Organization. (2023). Blindness and vision impairment: Fact sheet. https://www.who.int/news-room/fact-sheets/detail/blindness-and-visual-impairment

Wubet, G. M., & Assefa, A. A. (2021). Glaucoma and its predictors among adult patients attending ophthalmic outpatient department: A hospital-based study, North West Ethiopia. *BMC Ophthalmology, 21*, 400. https://doi.org/10.1186/s12886-021-02168-y

Yekunoamelak, B. Z., Ayele, F. A., Bogale, Z. M., & Worku, E. M. (2025). Proportion and associated factors of glaucoma among outpatient department at university of Gondar comprehensive specialized hospital tertiary eye care and training center, northwest Ethiopia, 2021. *Frontiers in Ophthalmology, 5*, 1521263. https://doi.org/10.3389/fopht.2025.1521263

Yimam, W., Anbesaw, T., Seid, M., et al. (2024). Knowledge about glaucoma among adults in Africa: A systematic review. *BMC Ophthalmology, 24*, 69. https://doi.org/10.1186/s12886-024-03333-9

Zhang, N., Wang, J., Li, Y., & Jiang, B. (2021). Prevalence of primary open-angle glaucoma in the last 20 years: A meta-analysis and systematic review. *Scientific Reports, 11*, 13762. https://doi.org/10.1038/s41598-021-92971-w