



## Glaucoma Patients' Perceptions and Factors Influencing Encouragement of Relatives for Glaucoma Screening at a Specialist Eye Clinic in Anambra State, Nigeria

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### Abstract

**Context:** Targeted screening of high-risk relatives of glaucoma patients is a key strategy of mitigating the menace of late presentation and glaucoma-related blindness in resource-limited and middle-income countries.

**Aim:** To assess glaucoma patients' perceptions of familial glaucoma and identify factors associated with encouraging relatives to undergo glaucoma screening.

**Materials and Methods:** This was an analytical cross-sectional study conducted (January-June 2025) among 181 adult patients in a specialist eye clinic in southeastern Nigeria. A pretested interviewer-administered questionnaire was used to obtain data on demographic and clinical characteristics of respondents, knowledge and perceptions of familial glaucoma, and familial screening practices. The variables were summarised descriptively, and bivariate and multivariate analyses were used to examine associations between dependent and independent variables;  $p$ -values  $< 0.05$  were considered statistically significant.

**Results:** The mean age of respondents was  $63.79 \pm 13.32$  years, 51.4% were females. The majority ( $n=81.8\%$ ) believed relatives should be screened for glaucoma; however, only (43.6%) did so. There were significant associations between encouragement by relatives for screening, family history of glaucoma, perception of glaucoma as a familial disease, and perception that screening is necessary for relatives ( $<0.001$ ). Perception that screening is necessary was the strongest independent predictor of encouragement (aOR = 16.44; 95% CI: 3.54–76.34;  $p < 0.001$ ). Middle-aged (aOR = 8.64; 95% CI: 1.11–67.18;  $p = 0.039$ ) and older patients (aOR = 13.41; 95% CI: 1.75–102.72;  $p = 0.012$ ) had higher odds of encouraging relatives than younger patients.

**Conclusion:** Fewer than half of respondents encouraged their relatives to undergo screening, despite high awareness of its importance. This reiterates the need for improved family-centred glaucoma education through counselling to enhance screening uptake among high-risk relatives for earlier detection of glaucoma.

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### 1.0 Introduction

Glaucoma is an important worldwide public health issue because it causes or leads to irreversible blindness. Simply put, the disease is problematic

because it shows no early signs, often progresses silently until significant vision loss has occurred, and requires lifelong management. According to estimates, more than 76 million people are currently glaucoma patients. Because of the world population's increased average age, researchers expect that number to surpass 110 million by 2040.<sup>1,2</sup> The continual burden analysis reaffirms that, especially in the developing world, glaucoma is still a leading cause of blindness. Recent burden analyses continue to show glaucoma as an ongoing cause of vision loss, especially in low- and middle-income countries.<sup>3,4</sup>

Detecting glaucoma early is crucial, but delays in diagnosis currently hinder this. Due to the considerable optic nerve damage that is possible before symptoms show, a large number of patients come in with advanced stages of the disease and suffer from visual loss that cannot be restored.<sup>5,6</sup> While the early identification of cases and timely intervention in the treatment process decreases the possibility of blindness, population-based glaucoma screening is often not practical or economically efficient in several contexts, especially in areas with limited resources.<sup>7,8</sup> Therefore, focused screening of high-risk populations is often considered a reasonable approach.

Significant familial aggregation is observed in primary open-angle glaucoma. It was noted that first-degree relatives of affected individuals have glaucoma considerably more often than the population average.<sup>9,10</sup> This observation reiterates the need for relatives of diagnosed patients to be prioritized for screening. The success of this approach is entirely dependent on the quality of its implementation. Although diagnosed patients are typically the first link in the chain of communicating familial risk and encouraging screening of at-risk relatives, evidence shows that a diagnosis does not guarantee that family risk communication or preventive response will occur.<sup>11-13</sup> Delayed presentation and restricted access to systematic care worsen blindness from glaucoma in sub-Saharan Africa. This area is particularly affected by blindness due to glaucoma because a large proportion of patients visit the clinic only when the condition is very advanced.<sup>14,15</sup>

Studies conducted in Nigeria have also documented a lag in care-seeking and declines in preventive practices.<sup>16-18</sup> Documentation from a tertiary eye care

centre in South-Eastern Nigeria shows that most patients with primary open-angle glaucoma present after an extended period with advanced visual field loss at first diagnosis.<sup>19</sup>

Knowledge-practice gaps still exist within families impacted by glaucoma. In South-Eastern Nigeria, first-degree relatives of glaucoma patients know of glaucoma and know screening is important, but screening uptake is still low. Barriers include perceived lack of need, time, money, and distance.<sup>20</sup>

The study concludes that family-based opportunistic screening is limited by both service factors and socio-demographic and behavioural factors that influence preventive health behaviour.

Besides these structural and behavioural barriers, psychosocial factors may further affect engagement with screening and risk communication. Anxiety and depressive symptoms associated with the fear of blindness and related socioeconomic concerns are noted in patients with eye diseases such as glaucoma.<sup>21</sup>

Furthermore, the psychological impact of having eye pathology can begin at diagnosis, which, in turn, can negatively affect coping, adherence, and proactive positive health behaviors.<sup>22</sup> The negative life satisfaction with the diagnosis of eye pathology hints at the psychological burden of such a diagnosis. Diagnosis of eye pathology is associated with negative life satisfaction and an increased psychological burden. Such psychosocial impacts may reduce patients' initiative to adopt and sustain preventive measures for their families' eye health. When community trust and social structures influence health decisions, moving glaucoma prevention beyond clinic-based messages may be advantageous. As observed, faith-based leaders in South-Eastern Nigeria are quite willing to support glaucoma prevention and see churches as potential sites for teaching eye health.<sup>23</sup>

This adheres to the WHO Integrated People-Centred Eye Care (IPEC) framework, which emphasizes the role of communities and shared responsibilities for eye health (World Health Organization [WHO]).<sup>24</sup> Considering the above background, the study will analyse the association between socio-demographic variables and the likelihood of diagnosed glaucoma patients encouraging their family members to have glaucoma screening at a tertiary health facility.

This study assessed glaucoma patients' perceptions of familial glaucoma and identified factors

associated with encouraging relatives to undergo glaucoma screening. To achieve this, we explored the sociodemographic and clinical characteristics, knowledge, and perception of familial glaucoma, the proportion of glaucoma patients who encouraged their relatives to undergo glaucoma screening, and the predictors.

## 2.0 Materials and Method

### 2.1 Study Design

This research took the form of an analytical cross-sectional study of patients with glaucoma undergoing follow-up care. The methodology and reporting were based on the cross-sectional STROBE statement.<sup>25</sup>

### 2.2 Study Setting

The research was conducted at a City of Refuge Specialist Eye Clinic in Onitsha, Anambra State, Nigeria, a specialist eye centre that offers outpatient glaucoma services, including clinical assessments, intraocular pressure evaluation, optic nerve evaluation, and chronic medication management and surgery. Data collection was done from January to June 2025.

### 2.3 Study population

The patients who composed the study population were diagnosed with glaucoma and visited the study period follow-up clinics. Patients were eligible if they had been receiving glaucoma treatment for at least 6 months. This criterion was established to capture continuity of care and exposure to glaucoma counselling.

### 2.4 Eligibility criteria

#### Inclusion criteria

- Adults with glaucoma ( $\geq 18$  years).
- There is a confirmed clinical diagnosis of glaucoma in the medical records.
- Patient has been on anti-glaucoma treatment and in clinic follow-up for at least six months.
- Patient granted written informed consent.

#### Exclusion criteria

- Patients who are critically ill or who are unable to complete the interview due to severe cognitive/communication impairment.

### 2.6 Sample size determination

The minimal sample size for the study was calculated employing a standard formula for estimating a single proportion for cross-sectional studies.<sup>26</sup>

$$N = Z^2 (PQ) / d^2$$

Where  $n$  = minimum sample size,  $Z$  = standard normal deviate for 95% confidence (1.96),  $p$  = proportion of glaucoma patients from the literature or pilot  $p$  who spur their relatives to get screened, and  $d$  = margin of error (typically 0.05). A non-response cushion (e.g., 10%) was factored into the calculated sample size.

### 2.8 Data Collection and Analysis

Data collection employed a pretested, interviewer-administered, structured questionnaire developed based on the study objectives and related literature on glaucoma screening. The tool covered areas such as socio-demographic details, clinical history and care, awareness of familial glaucoma, practices for motivating relatives to undergo glaucoma screening, and perceived barriers and facilitators. Glaucoma patients excluded from the study were used to pre-test the questionnaire, and interviewers were trained on standardized administration and confidentiality. Questionnaires were reviewed to ensure completeness; data entry was supervised to limit errors. During the study, participants were recruited consecutively, which limits selection bias. Information bias was mitigated through interviewer training, clinical data validation, and instrument pretesting. Possible confounders were dealt with by means of multivariable analysis.

The statistical package used to perform the analyses was IBM SPSS. Descriptive statistics for the categorical variables comprised their respective frequencies and percentages while the mean ( $\pm$ SD) or median (IQR) were used to summarize quantitative data. For inferential statistics, associations between categorical variables were determined using the Chi-square or Fisher's exact tests, and for continuous variables, the t-test (for normally distributed data) and Mann–Whitney U test (for non-normally distributed data) were done. If  $p < 0.05$  were observed in the bivariate analysis or if variables of clinical importance were identified, those variables were retained for a multivariable binary logistic regression analysis. For the purposes

of this study, statistical significance was set at  $p < 0.05$ .

**Table 1: Sociodemographic characteristics of glaucoma patients**

| Variable                 | Frequency(n=181)           | Percentage (%) |
|--------------------------|----------------------------|----------------|
| <b>Age (years)</b>       |                            |                |
| <40                      | 13                         | 7.2            |
| 40–49                    | 14                         | 7.8            |
| 50–59                    | 26                         | 14.4           |
| 60–69                    | 60                         | 33.3           |
| 70–79                    | 54                         | 30.0           |
| ≥80                      | 13                         | 7.2            |
| <b>Mean age ± SD</b>     | <b>63.79 ± 13.32 years</b> |                |
| <b>Gender</b>            |                            |                |
| Male                     | 88                         | 48.6           |
| Female                   | 93                         | 51.4           |
| <b>Educational level</b> |                            |                |
| Primary                  | 83                         | 45.9           |
| Secondary                | 37                         | 20.4           |
| Tertiary                 | 16                         | 8.8            |
| Postgraduate             | 31                         | 17.1           |
| <b>Marital status</b>    |                            |                |
| Single                   | 7                          | 3.9            |
| Married                  | 130                        | 71.8           |
| Widowed                  | 37                         | 20.4           |
| Divorced                 | 1                          | 0.6            |
| <b>Residence</b>         |                            |                |
| Rural                    | 97                         | 53.6%          |
| Urban                    | 84                         | 46.4%          |

### 3.0 Results

The study participants comprised 181 respondents with glaucoma. Majority of the respondents (69.6%) were older adults, with an average age of 63.79 years (SD = 13.32). Most participants were aged ≥60 years (127, 70.2%), while 40 (22.1%) were aged 40–59 years and 13 (7.2%) were younger than 40 years. No numeric age was recorded for 1 respondent. There was a slight female preponderance (51.4%), M: F = 1:1.1.

Regarding education, most had primary schooling (45.9%), followed by secondary education (20.4%). Even fewer had attained tertiary (8.8%) or postgraduate education (17.1%). Most participants

were married (71.8%), with 20.4% widowed, and only few were single or divorced.

Majority of the participants had glaucoma for five years or less (65.2%), while 19.9% had it for 6–10 years and 12.7% for greater than 10 years, indicating that most of them were in the early to mid-stages of the disease. Most of the participants were treated medically, as 84.0% used eye drops as their only form of treatment. Some participants used a combination of medical and surgical therapies (13.3%), while very few only had surgery (2.2%), used eye drops and tablets (0.6%), or had only eye drops. About 40.3% of respondents indicated at least one occurrence of glaucoma in their family. Conversely, 58.6% stated there is no known family occurrence of glaucoma, and 1.1% were unsure. This shows that there is a moderate occurrence of glaucoma in the respondents' families.

**Table 3: Knowledge and perception of familial glaucoma among glaucoma patients (n = 181)**

| Variable                                                         | Frequency | Percentage (%) |
|------------------------------------------------------------------|-----------|----------------|
| <b>Perception of glaucoma as a familial disease</b>              |           |                |
| Yes                                                              | 59        | 32.6           |
| No                                                               | 112       | 61.9           |
| I don't know                                                     | 8         | 4.4            |
| Maybe                                                            | 2         | 1.1            |
| <b>Discussion of glaucoma diagnosis with relatives</b>           |           |                |
| Yes                                                              | 109       | 60.2           |
| No                                                               | 72        | 39.8           |
| <b>Perception of need for glaucoma screening among relatives</b> |           |                |
| Yes                                                              | 148       | 81.8           |
| No                                                               | 18        | 9.9            |
| Maybe                                                            | 10        | 5.5            |
| I don't know                                                     | 5         | 2.8            |

Most respondents stated that screening for glaucoma among family members is important, but respondents had low awareness of the family features of the condition. Only 32.6% of the participants considered glaucoma a family disease, while 61.9% did not see it as hereditary, and 5.5% did not know. Even with this limited knowledge of the possibility of family connection, 60.2% of respondents said they had had conversations with family members regarding their glaucoma diagnosis. Additionally, a high number of participants (81.8%) said that family members should be screened for glaucoma; 9.9% said family screening was not important, and 8.3% did not have an opinion.

**Table 2: Clinical characteristics of glaucoma patients (n = 181)**

| Variable                            | Frequency | Percentage (%) |
|-------------------------------------|-----------|----------------|
| <b>Duration of glaucoma (years)</b> |           |                |
| ≤ 5 years                           | 118       | 65.2           |
| 6–10 years                          | 36        | 19.9           |
| > 10 years                          | 23        | 12.7           |
| <b>Treatment received</b>           |           |                |
| Medical therapy (eye drops only)    | 152       | 84.0           |
| Surgical intervention only          | 4         | 2.2            |
| Surgery and eye drops               | 24        | 13.3           |
| Eye drops and tablets               | 1         | 0.6            |
| <b>Noticed change in vision</b>     |           |                |
| Yes                                 | 171       | 94.5           |
| No                                  | 10        | 5.5            |
| <b>Family history of glaucoma</b>   |           |                |
| Yes                                 | 73        | 40.3           |
| No                                  | 106       | 58.6           |
| Maybe                               | 2         | 1.1            |

**Table 4: Practice of encouraging relatives for glaucoma screening among glaucoma patients (n = 181)**

| Variable                                           | Frequency | Percentage (%) |
|----------------------------------------------------|-----------|----------------|
| <b>Encouraged relatives for glaucoma screening</b> |           |                |
| Yes                                                | 79        | 43.6           |
| No                                                 | 102       | 56.4           |

Only 43.6% of respondents said they motivated at least one family member to get a glaucoma screening. In contrast, 56.4% did not attempt to motivate anyone, suggesting that while there is a good understanding of what glaucoma is and the importance of screening among family members, screening-related practices among glaucoma patients that urge family members to get screened remain low.

**Table 5: Factors associated with encouraging relatives for glaucoma screening among glaucoma patients (Chi-square analysis)**

| Variable                                                        | $\chi^2$ | p-value          |
|-----------------------------------------------------------------|----------|------------------|
| Age group                                                       | 4.08     | 0.130            |
| Gender                                                          | 0.33     | 0.567            |
| Educational level                                               | 1.99     | 0.575            |
| Marital status                                                  | 7.70     | 0.261            |
| Family history of glaucoma                                      | 8.82     | <b>0.012</b>     |
| Perception of glaucoma as a familial disease                    | 8.92     | <b>0.030</b>     |
| Perception that glaucoma screening is necessary among relatives | 23.32    | <b>&lt;0.001</b> |

Encouraging relatives to undergo glaucoma screening was highly linked to multiple knowledge and perception domains. Patients whose relatives had glaucoma were more likely to motivate their relatives to get screened ( $\chi^2 = 8.82$ ,  $p = 0.012$ ); similarly, and significant results were found among patients who had glaucoma in their family ( $\chi^2 = 8.92$ ,  $p = 0.030$ ). Patients convincing relatives about the need for glaucoma screening had the highest proportion supporting the need to get screened ( $\chi^2 = 23.32$ ,  $p < 0.001$ ). On the other hand, age, gender, education, and marital status were not linked to convincing relatives to get screened ( $p > 0.05$ ).

Bivariate analysis showed that encouragement of relatives to undergo glaucoma screening was significantly associated with having a family history of glaucoma ( $\chi^2 = 8.82$ ,  $p = 0.012$ ), perceiving glaucoma as a familial disease ( $\chi^2 = 8.92$ ,  $p = 0.030$ ), and perceiving that glaucoma screening is necessary among relatives ( $\chi^2 = 23.32$ ,  $p < 0.001$ ). Nonetheless,

there was no statistically significant association between age group, gender, educational level, or marital status and encouragement of relatives to undergo glaucoma screening at the bivariate level ( $p > 0.05$ ). In multivariable analysis, the belief that screening is necessary for relatives continued to be a strong independent predictor of encouragement (aOR = 16.44; 95% CI: 3.54–76.34;  $p < 0.001$ ). Middle-aged (40–59 years) respondents had higher odds of encouraging their relatives to undergo screening than younger (<40 years) patients (aOR = 8.64, 95% CI: 1.11–67.18;  $p = 0.039$ ), while older ( $\geq 60$  years) patients also had higher odds compared with younger patients (aOR = 13.41, 95% CI: 1.75–102.72;  $p = 0.012$ ).

Binary logistic regression: Adjusted odds ratios (aOR) are given with 95% confidence intervals.

**Table 5b: Multivariable logistic regression analysis of factors associated with encouraging relatives for glaucoma screening**

| Variable                                       | aOR   | 95% CI      | p-value          |
|------------------------------------------------|-------|-------------|------------------|
| <b>Age group</b>                               |       |             |                  |
| Middle-aged (40–59 years) vs Young (<40 years) | 8.64  | 1.11–67.18  | <b>0.039</b>     |
| Older ( $\geq 60$ years) vs Young              | 13.41 | 1.75–102.72 | <b>0.012</b>     |
| <b>Gender</b>                                  |       |             |                  |
| Male vs female                                 | 0.60  | 0.25–1.42   | 0.241            |
| <b>Educational level</b>                       |       |             |                  |
| Primary vs postgraduate                        | 0.81  | 0.28–2.32   | 0.692            |
| Secondary vs postgraduate                      | 0.54  | 0.17–1.78   | 0.313            |
| Tertiary vs postgraduate                       | 0.69  | 0.15–3.22   | 0.635            |
| <b>Family history of glaucoma</b>              |       |             |                  |
| Yes, vs No                                     | 1.08  | 0.34–3.38   | 0.895            |
| <b>Perception of glaucoma as familial</b>      |       |             |                  |
| Yes, vs No                                     | 2.31  | 0.67–7.98   | 0.187            |
| <b>Perception that screening is necessary</b>  |       |             |                  |
| Yes, vs No                                     | 16.44 | 3.54–76.34  | <b>&lt;0.001</b> |

#### 4.0 Discussion

This study demonstrates that despite screening being perceived as highly important, fewer than 50% of diagnosed glaucoma patients encourage their relatives to get screened for glaucoma. This finding highlights the gap between awareness and action regarding family-centred glaucoma control and again raises concern that patient-mediated risk communication is still not used in the day-to-day management of glaucoma. The result of this study aligns with reports from other low- and middle-income countries, where glaucoma awareness does not prompt preventive action among high-risk family members. Family-based screening has been shown

to be low in South Asia and sub-Saharan Africa, even among long-term glaucoma patients.<sup>11-13</sup> These findings indicate that diagnosis alone does not empower patients enough to become active agents of familial risk communication.

From the results, the perception of the need for glaucoma screening for relatives emerged as a strong independent predictor, even after controlling for socio-demographic and clinical factors. This observation is in keeping with previous reports, which considers perceived benefit as a key motivator of preventive health behaviour. In glaucoma care research, screening beliefs have been reported to predict screening behaviour more than disease knowledge.<sup>27,28</sup>

Although there was a significant association between family history of glaucoma and the perception of glaucoma as a family disease, this association was not present in multivariate analysis. This suggests that while awareness of the risk can be valuable, it is unlikely to be sufficient to drive such behaviour in the absence of a strong perception of the benefit of screening.

This finding aligns with other studies showing that awareness of genetic or family-related risks will not translate into preventive initiatives unless there are clear steps to take and a time-constraining element is included.<sup>29</sup> Age was independently associated with relatives' encouragement, with middle-aged and older patients significantly more likely to advocate for screening than younger patients. This could be due to the cumulative exposure to disease-related morbidity, the increasing prioritization of health with aging, or more significant position(s) within the family decision-making hierarchy. Equivalent age-related gradients in health care engagement have been documented in the case of glaucoma and other chronic diseases.<sup>14,15</sup> Most critically, this indicates that younger glaucoma patients may require tailored counselling approaches to increase involvement in family-centred preventive activities. Surprisingly, family members' encouragement did not vary by educational level. This strengthens the evidence that disease-specific understanding and experiential factors may be more important than formal education in shaping preventive behaviour.

More educated individuals tend to have higher rates of screening uptake, and this appears to hold true even for glaucoma-specific screening, although this is a function of glaucoma-specific health literacy

rather than general health literacy.<sup>30</sup> This indicates that when designing interventions, it is necessary to be clearer, more relevant, and practically instructive as opposed to simply informing with general informational content.

The results also highlight some important issues for existing models of counselling for glaucoma. Despite the time spent with eye care services and significant self-reported improvements in vision, most patients did not advocate for screening to family members. This suggests that clinic-centred counselling, as a routine, may overlook family risk communication or fail to prepare patients to feel confident raising screening conversations within their families. Incorporating clear, structured family-centred counselling, with referral prompts and easier screening pathways, may improve opportunistic, risk-based screening. The outcomes indicate that targeted screening of first-degree relatives is reasonable, from a public health perspective, for early glaucoma detection, particularly in low-resource settings, where it may be economically justified. Given the pronounced clustering of primary open-angle glaucoma within families, enhancing patient-mediated referral channels may help reduce cases of late presentation and permanent vision loss.<sup>9,10</sup> In line with the World Health Organization's People-Centred Integrated Eye Care framework, these strategies are likely to achieve greater reach with long-term sustainability.

The strength of this study lies in the fact that it highlights an important gap by examining patient-driven advocacy of relatives for glaucoma screening, providing actionable insights beyond awareness alone. The use of the robust statistical analysis, a clinically confirmed sample, and a pretested instrument strengthens the validity and relevance of the findings in a resource-limited setting. However, possible limitations include its cross-sectional design limits the ability to establish causal relationships between the factors identified to determine patients' encouragement of relatives for glaucoma screening. Also, being a single specialist eye clinic, which may limit the generalizability of the findings. In addition, self-reported data obtained may be subject to recall and social desirability bias. Despite the limitations, the insight on the role of patient-mediated glaucoma advocacy obtained from this study cannot be overlooked.

## 5.0 Conclusion

The study demonstrates that encouragement of family members for glaucoma screening is still inadequate for diagnosed glaucoma patients, even with good awareness of screening. Besides socio-demographic factors or awareness of familial risk, patient perception of the importance of screening and increasing age independently impacted participation in family-centred preventive practices. These findings demonstrate the need for models of glaucoma care to go beyond individual disease management and incorporate family-centred approaches to disease prevention. Counselling interventions should focus on building patients' understanding of relatives' early-detection potential and should include concrete screening referral mechanisms. Advancing the patient-mediated risk communication approach is practical and scalable, increasing the number of targeted glaucoma screenings and reducing the number of people who become blind from glaucoma in resource-limited settings.

Future studies should assess the impact of structured family referral interventions and community-linked screening models on early detection initiatives for family members at risk. Evaluating the impact of patient-centred counselling on long-term screening and diagnostic behaviours will require longitudinal study designs.

## References

1. Quigley HA, Broman AT. The number of people with glaucoma worldwide in 2010 and 2020. *British journal of ophthalmology*. 2006 Mar 1;90(3):262-7.
2. Tham YC, Li X, Wong TY, Quigley HA, Aung T, Cheng CY. Global prevalence of glaucoma and projections of glaucoma burden through 2040: a systematic review and meta-analysis. *Ophthalmology*. 2014 Nov 1;121(11):2081-90.
3. Flaxman SR, Bourne RR, Resnikoff S, Ackland P, Braithwaite T, Cicinelli MV, et al. Global causes of blindness and distance vision impairment 1990–2020: a systematic review and meta-analysis. *The Lancet Global Health*. 2017 Dec 1;5(12):e1221-34.
4. Bourne CI, Shingleton BJ. Glaucoma Due to Trauma. In: Chandler and Grant's Glaucoma 2024 Jun 1 (pp. 427-436). CRC Press.
5. Weinreb RN, Aung T, Medeiros FA. The pathophysiology and treatment of glaucoma: a review. *Jama*. 2014 May 14;311(18):1901-11.
6. Qureshi R, Azuara-Blanco A, Michelessi M, Virgili G, Breda JB, Cutolo CA, et al. What do we really know about the effectiveness of glaucoma interventions?: an overview of systematic reviews. *Ophthalmology Glaucoma*. 2021 Sep 1;4(5):454-62.
7. Burr JM, Mowatt G, Hernández RA, Siddiqui MA, Cook JA, Lourenco T, et al. The clinical effectiveness and cost-effectiveness of screening for open angle glaucoma: a systematic review and economic evaluation.
8. Friedlander, A.H., Graves, L.L., Chang, T.I., Kawakami, K.K., Lee, U.K., Grabich, S.C., et al.. Prevalence of primary open-angle glaucoma among patients with obstructive sleep apnea. *Oral surgery, oral medicine, oral pathology and oral radiology*, 2018, 126(3), pp.226-230.
9. Tielsch JM, Katz J, Quigley HA, Javitt JC, Sommer A. Diabetes, intraocular pressure, and primary open-angle glaucoma in the Baltimore Eye Survey. *Ophthalmology*. 1995 Jan 1;102(1):48-53.
10. Wolfs RC, Klaver CC, Ramrattan RS, van Duijn CM, Hofman A, de Jong PT. Genetic risk of primary open-angle glaucoma: population-based familial aggregation study. *Archives of ophthalmology*. 1998 Dec 1;116(12):1640-5.
11. Ichhpujani P, Bhartiya S, Kataria M, Topiwala P. Knowledge, attitudes and self-care practices associated with glaucoma among hospital personnel in a tertiary care center in North India. *Journal of current glaucoma practice*. 2012 Oct 16;6(3):108.
12. Rewri P, Kakkar M. Awareness, knowledge, and practice: a survey of glaucoma in north Indian rural residents. *Indian journal of ophthalmology*. 2014 Apr 1;62(4):482-6.
13. Adegbehingbe SA, Olusanya BA, Ajayi BK, Ashaye AO, Bekibele CO. Central Cornea Thickness in Glaucoma and Non-Glaucoma African Population. *Ophthalmology Research: An International Journal*. 2016 Jan 10;6(4):1-8.
14. Budenz DL, Barton K, Whiteside-de Vos J, Schiffman J, Bandi J, Nolan W, et al. Tema Eye Survey Study Group. Prevalence of glaucoma in an urban West African population: the Tema Eye Survey. *JAMA ophthalmology*. 2013 May

- 1;131(5):651-8.
15. Kyari F, Entekume G, Rabi M, Spry P, Wormald R, Nolan W, et al. .Nigeria National Blindness and Visual Impairment Study Group. A Population-based survey of the prevalence and types of glaucoma in Nigeria: results from the Nigeria National Blindness and Visual Impairment Survey. *BMC ophthalmology*. 2015 Dec 12;15(1):176.
16. Abdull MM, Sivasubramaniam S, Murthy GV, Gilbert C, Abubakar T, Ezelum C, et al. Causes of blindness and visual impairment in Nigeria: the Nigeria national blindness and visual impairment survey. *Investigative ophthalmology & visual science*. 2009 Sep 1;50(9):4114-20.
17. Onakoya AO, Mbadugha CA, Aribaba OT, Ibidapo OO. Quality of life of primary open angle glaucoma patients in Lagos, Nigeria: clinical and sociodemographic correlates. *Journal of glaucoma*. 2012 Jun 1;21(5):287-95.
18. Ashaye A, Ashaolu O, Komolafe O, Ajayi BG, Olawoye O, Olusanya B, Adeoti C. Prevalence and types of glaucoma among an indigenous African population in southwestern Nigeria. *Investigative ophthalmology & visual science*. 2013 Nov 1;54(12):7410-6.
19. Okosa MC, Apakama AI, Onwuegbuna AA, Uozie CC, Amobi MB, Onyekwe LO, et al. Clinical features of Primary Open Angle Glaucoma at initial presentation: Experience at a tertiary eye care center in Nigeria. *Journal of Ophthalmology and Research*. 2021;4:244-53.
20. Onwuegbuna AA, Eze UA, Apakama AI, Ezeude CM , Ochiogu BC, Udejaja AC. Glaucoma screening among relatives of glaucoma patients in Anambra State, Nigeria. *Adv Res*. 2024 Apr 12;25(3):175-85.
21. Okosa MC, Uwakwe R, Apakama AI, Onwuegbuna AA, Uozie CC, Amobi MB, et al. . Psychological effects of eye diseases: A tertiary eye center study. *J Psychiatry Psychiatr Disord*. 2021;5(04):128-39.
22. Omar M, Soffer S, Agbareia R, Bragazzi NL, Apakama DU, Horowitz CR, et al . Socio-demographic biases in medical decision-making by large language models: a large-scale multi-model analysis. *MedRxiv*. 2024 Oct 30:2024-10.
23. Onwuegbuna AA, Eze UA, Apakama AI, Chianakwalam EA, Ezeude CM, Ochiogu BC, et al. Engaging Faith Based Leaders in the Fight against Glaucoma Related Blindness. *Journal of Advances in Medical and Pharmaceutical Sciences*. 2024 Oct 7;26(10):52-61.
24. World Health Organization. Eye care situation analysis tool (ECSAT) [Internet]. Geneva: World Health Organization; 2022 May 12 [cited 2026 Mar 22] . Available from : <https://www.who.int/tools/eye-care-situation-analysis-tool>
25. Von Elm E, Altman DG, Egger M, Pocock SJ, Gøtzsche PC, Vandenbroucke JP. The Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) statement: guidelines for reporting observational studies. *The lancet*. 2007 Oct 20;370(9596):1453-7.
26. Kotrlik JW, Higgins CC. Organizational research: Determining appropriate sample size in survey research appropriate sample size in survey research. *Information technology, learning, and performance journal*. 2001 Jul 12;19(1):43.
27. Lee EJ, Lee KM, Lee SH, Kim TW. OCT angiography of the peripapillary retina in primary open-angle glaucoma. *Investigative ophthalmology & visual science*. 2016 Nov 1;57(14):6265-70.
28. Gibson DM. Use of and disparities in access to adaptive devices among US adults with age-related eye diseases. *Preventive medicine reports*. 2018 Dec 1;12:233-40.
29. Ito YA, Walter MA. Genetics and environmental stress factor contributions to anterior segment malformations and glaucoma. In *Glaucoma-Basic and Clinical Aspects* 2013 Apr 17. IntechOpen.
30. Frick KD. What the comprehensive economics of blindness and visual impairment can help us understand. *Indian journal of ophthalmology*. 2012 Sep 1;60(5):406-10.