

GLAUCOMA KNOWLEDGE OF PATIENTS IN ABUJA, NIGERIA

C. Onunkwor, MPH graduate
University of South Africa
Department of Health Studies

L.V. Monareng, D Litt et Phil
University of South Africa
Department of Health Studies
Corresponding author: monarlv@unisa.ac.za

ABSTRACT

Glaucoma is a major public health problem and is one of the leading causes of blindness worldwide. Many patients present late for medical attention when the eye condition is already advanced, possibly due to lack of knowledge about glaucoma (Cook, 2009:126). The purpose of the study was to assess the level of knowledge about glaucoma amongst patients attending the Central Bank of Nigeria's (CBN) staff eye clinic in Abuja. A descriptive and cross-sectional study was conducted on adult CBN staff members and their eligible dependants. Purposive sampling was used to recruit 145 respondents. Data on demographics and knowledge about glaucoma were collected using a pre-tested structured questionnaire. Validity was assured by using questions from various instruments used in similar studies to formulate the multiple choice questions. Test re-test reliability was done to assess the stability and consistency of the tool. Data were analysed with a statistician's help using descriptive and inferential statistics. Chi-square analysis was used to test for relationships between knowledge of glaucoma and demographic factors. A two-tailed *p*-value of less than 0.05 was considered statistically significant. Of 145 respondents, 74.5% (*n* = 108) claimed they had heard about glaucoma but only 14.5% (*n* = 21) had knowledge of glaucoma. Glaucoma knowledge was inadequate and independent of age, gender, ethnicity and educational level. Recommendations include that enhanced health education about glaucoma should be provided to all CBN staff members. More knowledge about glaucoma should enable CBN staff members to obtain timely treatment for glaucoma, thus preventing blindness. Based on the research findings, an information pamphlet was developed.

KEYWORDS: eye care, eye clinic, eye disease, glaucoma knowledge, glaucoma in Nigeria

INTRODUCTION AND BACKGROUND INFORMATION

Glaucoma is a significant public health problem. It is the second leading cause of blindness globally (Quigley & Broman, 2006:266). As most cases of glaucoma are

asymptomatic, many affected individuals are unaware that they have this devastating eye disease that is a leading cause of irreversible blindness. It has been described to be a human tragedy and has a negative impact on the quality of life of those affected (Egbert, 2002:131).

More than 20 adult types are sub-divided into primary and secondary glaucoma (Merck Manual, 2006:903). Primary open-angle glaucoma is a syndrome of optic nerve damage associated with an open anterior chamber angle and an elevated or sometimes average intra-ocular pressure (IOP) (Merck Manual, 2006:906). Worldwide, most people with glaucoma have primary open-angle glaucoma (Quigley & Broman, 2006). However, many glaucoma patients present with significant visual loss (Cook, 2009:126). According to Abdul et al. (2009:4114), one third of patients who went blind from glaucoma had done so before they sought medical attention. It has been estimated that an African-Caribbean patient is four and a half times more likely to present with advanced visual loss than a white patient of the same gender, age and intraocular pressure (Cook, 2009:126).

Patients suffering from glaucoma require some knowledge to help them make decisions and to seek medical help early. This study was therefore conducted to generate essential knowledge in order to enhance the implementation of effective health education and health promotion programmes to help prevent blindness (Burns & Grove, 2007:18).

STATEMENT OF THE PROBLEM

Most patients diagnosed with glaucoma at the CBN eye clinic since the beginning of 2009, suffered from advanced glaucoma. Approximately 8.9% of the CBN staff members' eye clinic attendances are due to glaucoma. This is significant because the long-term consequence is that many of these patients will go blind, unless effective preventive measures are taken. In some parts of Africa, people with glaucoma present late, with up to 50% of cases already blind in one eye (Cook, 2009:126). Having knowledge about the causes, signs and symptoms of glaucoma, as well as its risk factors, including blindness, might enable people to present themselves for screening and treatment before the condition progresses to an advanced stage.

In order to reverse this trend, there was a need to determine the extent of the CBN employees' glaucoma knowledge. The question therefore arose as to the level of knowledge about glaucoma that the people who attend the CBN staff eye clinic have. Based on the CBN employees' identified glaucoma knowledge, guidance could be provided about glaucoma to enable people to seek timely eye treatment.

PURPOSE, OBJECTIVES AND ASSUMPTIONS OF THE STUDY

The purpose of the study was to improve the CBN staff members' ability to seek timely treatment for potential cases of glaucoma.

The research objectives of the study were to assess and describe the level of glaucoma knowledge amongst people who attended the CBN's staff eye clinic in Abuja during June 2010. The study also aimed to recommend ways in which eye care service providers could educate people who come to the eye clinic with relevant knowledge about the signs, symptoms and risk factors of glaucoma.

Definitions of key concepts

An **assessment** refers to an opinion or a judgment about somebody or something that has been thought about very carefully, such as an assessment of the level of knowledge that eye patients had about glaucoma (Oxford Advanced Learners Dictionary, 2006:75).

A **clinic** is a building or part of a hospital or medical facility where people can go for special medical treatment or advice, or a building shared by a group of eye specialists and nurses who care for patients with eye-related problems (Oxford Advanced Learners Dictionary, 2006:264).

Glaucoma is a progressive optic neuropathy with characteristic changes in the optic nerve and corresponding loss of visual field. It represents a final common pathway for a number of conditions, for most of which raised intraocular pressure is the most important risk factor (Denniston & Murray, 2006:270).

Knowledge refers to information, understanding and skills that a person gains through education or experience. It refers to the facts, feelings, or experiences known by a person or group of people. It is the state of knowing or specific knowledge about a subject such as glaucoma (Collins English Dictionary, 2007:900). In the current study, knowledge refers to the respondents' ability to demonstrate a reasonable understanding or knowledge of the common symptoms, risk factors, intra-ocular pressure, diagnosis and treatment of glaucoma. A respondent was said to have knowledge about glaucoma if he/she obtained a score of 50% or more in section B of the questionnaire.

A **patient** refers to a person who is receiving medical treatment, especially in a hospital or a clinic, or a person who receives treatment from a particular doctor (Oxford Advanced Learners Dictionary, 2006:106). In this study, a patient refers to an adult CBN staff member and his/her eligible dependants who attended the eye clinic during the time of research.

SIGNIFICANCE OF THE STUDY

Knowledge about the CBN staff members' levels of glaucoma knowledge will enable recommendations to be made about appropriate health education and health promotion strategies to enable patients to seek timely treatment for eye problems.

Information from the findings communicated through health talks or media will influence patients, especially those with risk factors for the disease, to seek regular and periodic ophthalmic care, thus ensuring early detection and treatment of glaucoma. This could help to reduce the incidence of blindness among the CBN staff members.

LITERATURE REVIEW

Several studies have examined awareness and/or knowledge about glaucoma in general clinic or population-based samples (Altangerel et al., 2009:66; Dandona et al., 2001:96; Krishnaiah et al., 2005:205; Sathyamangalam et al., 2009:355). Studies conducted in developed societies, such as Canada, the United States (US) and China, indicated high levels (> 70%) of awareness about glaucoma (Altangerel et al., 2009:66; Gasch, Wang & Pasquale, 2000:303) and low levels of glaucoma knowledge ranging from 8% to 30% (Altangerel et al., 2009:66; Lau et al., 2002:1080; Pfeiffer, Krieglstein & Wellek, 2002:458).

Few studies have addressed glaucoma awareness in Africa. In their Ethiopian study, Tenkir, Solomon and Deribew (2010:17) reported a glaucoma awareness level of 2.4%. A study carried out by Adegbehingbe and Bisiriyu (2008:240) among hospital workers in Nigeria indicated moderately low levels of knowledge and understanding of glaucoma even among hospital workers. In general, most of these studies have concluded that further education and screening are necessary to promote early diagnosis and treatment of glaucoma.

In developing countries, very low levels of glaucoma awareness and knowledge have been reported and most of these studies have been conducted in India (Dandona et al., 2001; Krishnaiah et al., 2005; Sathyamangalam et al., 2009). Population-based studies on awareness of glaucoma among people from rural areas and urban areas of India (Dandona et al., 2001) have shown that awareness is poor among rural communities. Many of the studies on glaucoma awareness carried out in developing countries did not show clear evidence of definitions of 'awareness' and 'knowledge' (Adegbehingbe & Bisiriyu, 2008:240; Dandona et al., 2001:96; Krishnaiah et al., 2005:205; Sathyamangalam et al., 2009:355). Awareness was defined as 'having heard of glaucoma', while knowledge was defined as 'when the participant had some understanding of glaucoma', for instance, 'it is high pressure in the eye, it is a disease where the nerve of the eye becomes weak, or it is damage to the nerve of the eye due to high pressure'.

In similar studies carried out in the US (Altangerel et al., 2009:67; Gasch et al., 2000:305), glaucoma awareness was also defined as ‘having heard about glaucoma’. However, definitions for glaucoma knowledge varied, with some studies restricting it to only an accurate definition of glaucoma (Altangerel et al., 2009:67), while others included knowledge of signs and symptoms, patho-physiology and treatment (Lau et al., 2009:1082). Direct comparison of these studies may be difficult because they used different definitions.

RESEARCH METHODOLOGY

The research methods will be described in terms of the research context, research design, study population, sample and sampling techniques, and sample size.

Research context

The research was conducted at the CBN staff eye clinic in Abuja, Nigeria, catering for all staff members as well as their eligible dependants. The eye clinic has a consulting room, a mini theatre and a patients’ waiting room. An ophthalmologist runs the clinic in conjunction with a staff nurse and a clinic attendant, but they also provide other health services. The eye clinic offers out-patient consultations, refractions, screening for chronic eye diseases as well as minor out-patient surgical procedures. Patients who have complicated eye conditions and those who require advanced surgical procedures are referred to the National Hospital in Abuja. During 2010, approximately 25 patients were seen daily.

Research design

The quantitative research design used for this study was descriptive and cross-sectional. Multiple choice questions were asked in order to determine patients’ glaucoma knowledge levels.

Study population

According to Burns and Grove (2007:746), a population constitutes all the individuals that meet the sample criteria for inclusion in a study. The research population for this study comprised all the CBN members of staff as well as their dependants. The target population consisted of all adult patients (18–60 years) who attended the eye clinic.

Sample and sampling technique

Purposive sampling was used (Burns & Grove, 2007:344–345). Respondents were recruited and included in the study because they happened to be at the eye clinic when data were gathered during the eye clinic days until the desired sample size of 145 had been obtained. Only volunteers participated in the study.

Ethical considerations

Ethical considerations refer to protecting the rights of the respondents and the institution where the research was conducted, as well as maintaining scientific integrity, based on the Declaration of Helsinki (Burns & Grove, 2007:181–206). Written permission was also granted by the CBN management.

The Research and Ethics Committee of the University of South Africa, Department of Health Studies, granted ethical clearance before data collection commenced. Respondents' rights were respected by obtaining informed consent, maintaining confidentiality, anonymity and privacy, as well as showing respect for the dignity of respondents. Respondents were also informed about their rights to withdraw at any time from the study without incurring any penalty or victimisation at the clinic.

The respondents gave written informed consent to participate in the study. Coercion, covert data collection and deception were avoided. The opinions, health records and other private information of respondents were protected. Questionnaires were completed in a private room.

The respondents' anonymity was ensured as no identification was entered onto any questionnaire. The researchers treated respondents' information confidentially, as this was not shared with any other person. Only the researcher and the statistician had access to the completed questionnaires.

A benefit-risk ratio was determined on the basis of the maximised benefits and the minimised risks. Benefits of the study included increased awareness of glaucoma and its risk factors, early diagnosis and treatment, and in the long run, a reduction in blindness resulting from glaucoma.

Data collection

A structured questionnaire was used to collect data from the respondents who attended the clinic during the time of data collection. A total of 145 respondents, who attended the CBN's staff eye clinic over a two-week period in June 2010, completed questionnaires.

Self-administered questionnaires and a list of 25 multiple choice questions were distributed to 145 eye clinic attendees. The multiple choice questions had the main key statement and three options from which the answer had to be chosen. The questions reflected the patients' demographic data and glaucoma knowledge levels. Two trained research assistants and one researcher were available to assist the respondents where needed and to collect completed questionnaires. All the distributed questionnaires (100%; n = 145) were returned.

Research instrument

Section A of the questionnaire consisted of 11 questions that elicited general information including the respondents' gender, age, ethnic background, clinic attendance, marital status and education level. Also included in this section were questions about whether the respondents had ever heard of glaucoma or received any eye examinations.

Section B contained 25 close-ended multiple choice items which were developed specifically for this study with questions covering various aspects of glaucoma knowledge. The answer categories were mutually exclusive, and special instructions were provided on how to choose correct options (Araoye, 2003:134). In view of the fact that most of the respondents were literate, the instrument was developed as a simplified assessment tool with clearly indicated options.

Validity was enhanced by using an instrument which actually measured the concept it was supposed to measure (Stommel & Wills, 2004:222). Content validity was therefore assured by using questions from various instruments that had been used in other similar studies to formulate the multiple choice questions. The instruments were also evaluated and approved by academics, knowledgeable about multiple choice evaluation tools. Ophthalmologists who were colleagues of the first author also assessed the questionnaire's face validity to confirm whether the questions addressed the phenomenon of glaucoma.

Reliability of a measurement tool denotes the consistency of measures obtained in the use of a particular instrument (Burns & Grove, 2007:310). Most of the questions were adapted from a tool that was previously tested for reliability and whose internal consistency was established with a Chronbach's alpha score of 0.89.

Pre-testing the questionnaire

A pre-test was conducted in order to modify or refine the instrument (Burns & Grove, 2007:746). Patients with similar characteristics to the study sample were included in the pre-test to determine the clarity of the items and questions, and the consistency of responses. Some questions about glaucoma diagnostic tests were difficult because of medical terms, and these were simplified.

Data analysis

Data analysis refers to ‘techniques used to reduce, organise and give meaning to data’ (Burns & Grove, 2007:43). The Epi-Info computer program was used for data entry and the Statistical Package for Social Sciences (SPSS) version 13.0, was used for analysis. Descriptive and inferential statistics, frequency tables and percentages were used in the data analysis and interpretation. Chi-square analysis was used to test for relationships between knowledge of glaucoma and demographic factors. A two-tailed p-value of less than 0.05 was considered to be statistically significant.

RESULTS

Socio-demographic characteristics of respondents

A total of 145 respondents completed questionnaires during the two-week research period. More females (59.3%; n = 86) than males made up the sample; respondents were mostly between 25 and 54 years of age (76.6%; n = 111) and 66.2% (n = 96) were from the major Nigerian ethnic groups (Hausa, Igbo and Yoruba); the majority had visited the clinic at least once (75.9%; n = 110). Of the respondents, the majority were married (75.2%; n = 109) and had a secondary school education (93.8%; n = 136) as reflected in table 1.

Table 1: Respondents’ socio-demographic characteristics (N = 145)

Socio-demographic characteristics	Frequency	%
Age group (years)		
< 25	25	17.2
25–34	24	16.6
35–44	39	26.9
45–54	48	33.1
55–64	8	5.5
> 65	1	0.7
Gender		
Female	86	59.3
Male	59	40.7
Marital status		
Single	32	22.1
Married	109	75.2
Widow	2	1.4
Non-response	2	1.4
Education		
No schooling	2	1.4
Primary education	2	1.4
Secondary education	15	10.3

College diploma	16	11.0
University, first degree	56	38.6
Post-graduate qualification	47	32.4
Non-response	4	2.75

Knowledge about glaucoma

Of the respondents, only 14.5% (n = 21) had knowledge about glaucoma (see table 2). Knowledge included glaucoma's common symptoms, risk factors, intra-ocular pressure, diagnosis and treatment. Glaucoma knowledge was independent of age, gender, ethnicity and education level. Respondents who had previously had an eye examination, were more likely to know about glaucoma than those who had never had any eye examination ($p = 0.04$).

Table 2: Respondents' knowledge about glaucoma (N = 145)

Glaucoma knowledge	Frequency	%
Yes	21	14.5
No	124	85.5
Total	145	100.0

Table 2 indicates that only 14.5% (n = 21) of the respondents knew about glaucoma as they obtained an overall knowledge score of 50% and above for the 25 multiple choice questions. The rest of the respondents (85.5%; n = 124) obtained scores of 49% and lower.

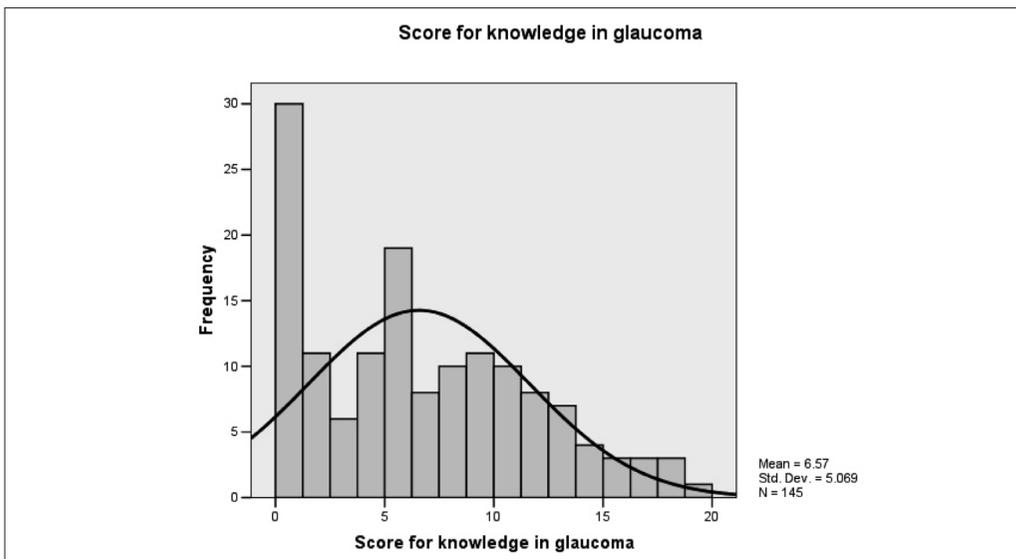


Figure 1: Respondents' glaucoma knowledge scores

A respondent was said to have knowledge about glaucoma if a score of 50% or more in section B of the questionnaire was obtained.

Only 31% (n = 45) of the respondents chose the correct response to the question ‘what is glaucoma’? Only 7.6% (n = 11) of the respondents could correctly identify the normal eye pressure range of 10 to 21 mmHg. Most respondents (66.2%; n = 96) knew that untreated glaucoma leads to loss of vision. As many as 64% (n = 93) of the respondents did not answer questions about diagnostic tests for glaucoma which was also a finding of the pre-test.

DISCUSSION

The results from this cross-sectional study of 145 eye patients were both similar to and different from the findings of other studies about patients’ glaucoma knowledge. Some studies on glaucoma awareness, conducted in developing countries, did not portray distinctions between the definitions of ‘awareness’ and ‘knowledge’ (Adegbehingbe & Bisiriyu, 2008:240; Dandona et al., 2001:96; Krishnaiah et al., 2005:205; Sathyamangalam et al., 2009:355). Awareness was defined as ‘having heard of glaucoma’, while knowledge was defined as ‘when the participant had some understanding of glaucoma’. The items on the questionnaire assessed the respondents’ knowledge about various aspects of glaucoma, including definition, causes, main symptoms, examination findings, relevant diagnostic investigations and treatment.

In the current study, awareness of glaucoma (having heard of glaucoma) was high (74.5%) which does not agree with similar studies carried out in other third world countries, such as India, where levels of awareness were as low as 13.3%, 2.4% and 0.32% respectively (Dandona et al., 2001; Krishnaiah et al., 2005; Sathyamangalam et al., 2009). This result, however, compares with studies carried out in developed societies, such as Canada, the US and China, which indicated high levels (> 70%) of glaucoma awareness (Altangerel et al., 2009:66; Gasch et al., 2000:303; Lau et al., 2002:1080), as indicated in table 3.

Table 3: Comparison of the results of previous studies

Author (year)	Country	Study sample	Glaucoma knowledge
Sathyamangalam et al. (2009)	India	Urban, above 40 years of age	8.7%
Dandona et al. (2001)	India	Urban, above 15 years of age	2%
Krishnaiah et al. (2005)	India	Rural, above 15 years of age	0%
Pfeiffer et al. (2002)	Germany	German population, 14 to 93 years of age	8.4%
Altangerel et al. (2009)	US	Community, 11 to 95 years of age	29%
Lau et al. (2002)	China	Community, above 40 years of age	10.2%

The current study found that only 14.5% of the respondents (n = 21) knew about glaucoma. Although their glaucoma knowledge level was low (14.5%), the respondents seemed to have better glaucoma knowledge levels compared to other published studies with the exception of the US, which was reportedly 29% (see table 3). There was no association between glaucoma knowledge and gender, age, ethnicity or education. This finding is not consistent with similar studies where education played a significant role in the level of glaucoma awareness and knowledge (Altangerel et al., 2009:66; Krishnaiah et al., 2005:207; Sathyamangalam et al., 2009:355). In this study, the respondents were mostly literate as 93.8% (n = 136) had completed at least secondary education. Respondents who reported having had previous eye examinations, were more likely to know about glaucoma than those who had never had eye examinations. This association might be explained because patients' previous eye examinations might have included glaucoma checks and information might have been provided about glaucoma.

CONCLUSION

According to the findings of this study, patients' awareness of glaucoma was high but their knowledge levels were low. Demographic variables, such as level of education, age and gender, did not influence levels of glaucoma knowledge. Patients who had previously had eye examinations demonstrated better knowledge about glaucoma than those who had not. Knowledge about glaucoma amongst patients who attended the CBN staff eye clinic seemed to be inadequate as only 14.5% (n = 21) scored 50.0% or more for the multiple choice questions. Knowledge gaps, such as ignorance about diagnostic tests to identify glaucoma, were identified and require further health education. The CBN staff members lacked glaucoma knowledge which could enable them to seek timely diagnosis and treatment services, and thereby avoid preventable blindness.

RECOMMENDATIONS

Pamphlets containing information about glaucoma are handed to patients who attend the eye clinic. It was found in the study that awareness levels of glaucoma were high (74.5%). However, use of audio visual material would be helpful to educate patients on difficult aspects of knowledge about glaucoma. Early detection through 'opportunistic case detection' could be enhanced by performing comprehensive eye examinations at available opportunities, and commencing treatment or instituting appropriate referrals. Conducting similar studies in other regions and states could provide an overall picture of glaucoma knowledge in Nigeria. Future studies should also assess glaucoma knowledge levels of staff who work in eye clinics as patients might lack information due to staff members' inability to provide essential information about glaucoma.

LIMITATIONS OF THE STUDY

The respondents who participated came mostly from the upper middle class. Therefore, these findings might be relevant only to the population of this clinic and not be generalisable to other populations in other clinics or hospitals in Abuja. The purposive sampling technique used in the study is considered by most quantitative researchers as a weak approach to sampling because it provides little opportunity to control for bias (Burns & Grove, 2007:345). Certain aspects of the questionnaire were considered to be too difficult for the respondents as many respondents ticked the 'I do not know' option of some questions. The objective items were not subjected to item analysis by experts, which could have affected their reliability.

ACKNOWLEDGEMENTS

The authors wish to express their sincere appreciation to the research respondents for their co-operation; the management of CBN, Abuja, for granting permission to conduct the study; and to the Research and Ethics Committee of the Department of Health Studies, Unisa, for approving the proposal.

REFERENCES

- Abdul, M.M., Sivasubramaniam, S., Murthy, G.V., Gilbert, C.E., Abubakar, T., Ezelum, C.C. & Rabiu, M. 2009. Causes of blindness and visual impairment in Nigeria: the Nigeria National Blindness and Visual Impairment Survey. *Investigative Ophthalmology and Visual Science*, 50(9):4114–4120.
- Adegbehingbe, B.O. & Bisiriyu, L.A. 2008. Knowledge, attitudes and self-care practices associated with glaucoma among hospital workers in Ile-Ife, Osun state, Nigeria. *Tanzania Journal of Health Research*, 10(4):240–245.
- Altangerel, U., Nallamshetty, H.S., Uhler, T., Fontanarosa, J., Steinmann, W.C., Almodin, J.M., Chen, B.H. & Henderer, D. 2009. Knowledge about glaucoma and barriers to follow-up care in a community glaucoma screening program. *Canadian Journal of Ophthalmology*, 44:66–69.
- Araoye, M.O. 2004. *Research methodology with statistics for health and social sciences*. Ilorin: Nathadex.
- Burns, N. & Grove, S.K. 2007. *The practice of nursing research: conduct, critique and utilization*. 5th Edition. St Louis: Elsevier Saunders.
- Collins English Dictionary*. 2007. 9th Edition. Glasgow: Harper Collins.
- Cook, C. 2009. Glaucoma in Africa: size of the problem and possible solutions. *Journal of Glaucoma*, 18(2):124–128.
- Dandona, R., Dandona, L., John, R.K., McCarty, C.A. & Rao, G.N. 2001. Awareness of eye diseases in an urban population in southern India. *Bulletin of the World Health Organization*, 79:96–102.
- Denniston, A.K.O. & Murray, P.I. 2006. *Oxford handbook of ophthalmology*. New York: Oxford University Press.
- Egbert, P.R. 2002. Glaucoma in West Africa: a neglected problem. *British Journal of Ophthalmology*, 86:131–132.

- Gasch, A.T., Wang, P. & Pasquale, L.R. 2000. Determinants of glaucoma awareness in a general eye clinic. *Ophthalmology*, 107:303–308.
- Krishnaiah, S., Kovai, V., Srinivas, M., Shamanna, B.R., Rao, G.N. & Thomas, R. 2005. Awareness of glaucoma in the rural population of Southern India. *Indian Journal of Ophthalmology*, 53:205–208.
- Lau, J.T.F., Lee, V., Fan, D., Lau, M. & Michon, J. 2002. Knowledge about cataract, glaucoma, and age related macular degeneration in the Hong Kong Chinese population. *British Journal of Ophthalmology*, 86:1080–1084.
- Merck Manual* – see *The Merck Manual of Diagnosis and Therapy*.
- Oxford Advanced Learners' Dictionary*. 2006. 7th Edition. New York: Oxford University Press.
- Pfeiffer, N., Krieglstein, G.K. & Wellek, S. 2002. Knowledge about glaucoma in the unselected population: a German survey. *Journal of Glaucoma*, 11:458–463.
- Quigley, H.A. & Broman, A.T. 2006. The number of people with glaucoma worldwide in 2010 and 2020. *British Journal of Ophthalmology*, 90:262–267.
- Sathyamangalam, R.V., Paul, P.G., Ronnie, G., Baskaran, M., Hemamalini, A., Raj, V.M., Augustian, J., Prema, R. & Vijaya, L. 2009. Determinants of glaucoma awareness and knowledge in urban Chennai. *Indian Journal of Ophthalmology*, 57:355–360.
- Stommel, M. & Wills, C.E. 2004. *Clinical research: concepts and principles for advanced practice nurses*. Philadelphia: Wolters Kluwer; Lippincott, Williams & Wilkins.
- Tenkir, A., Solomon, B. & Deribew, A. 2010. Glaucoma awareness among people attending ophthalmic outreach services in Southwestern Ethiopia. *BioMed Central Ophthalmology*, 10:17.
- The Merck Manual of Diagnosis and Therapy*. 2006. 18th Edition. Whitehouse Station: Merck Research Laboratories.
- World Health Organization. 2001. *Health research methodology: a guide for training in research methods*. 2nd Edition. Manilla.