Survey of Blindness in Saki East, Oyo State, Nigeria

Abstract

Background: This survey was undertaken in a rural local government area (LGA) where eye care services recently commenced, with no known previous data on blindness or visual impairment. Aim and Objectives: The aim was to generate evidence for further planning and monitoring of the on-going eye care program. The objectives included determination of the prevalence of blindness and visual impairment, causes of blindness and visual impairment, and assessment of cataract services and barriers to cataract surgery uptake. Materials and Methods: This was a cross-sectional observational study. A population-based rapid assessment of avoidable blindness (RAAB) was undertaken among eligible individuals, aged 50 years and above, who were residents of Saki East LGA. A three-stage cluster sampling technique with probability proportional to size was employed to recruit 1100 respondents. Field data were analysed using the RAAB 5 computer software package. Results: The age- and sex-adjusted prevalence of blindness was 1.7% (95% confidence interval: 0.1–3.3). Cataract was the commonest cause of blindness (37.8%) and severe visual impairment (56.3%), whereas refractive error was the leading cause of moderate visual impairment (68.3%). The prevalence of blindness significantly increased with age ($\chi^2 = 38.01, P = 0.000$). Avoidable conditions were responsible for 94.6% of the blindness. Conclusion: The burden of blindness and visual impairment in the survey area is significant, with more than 90% due to avoidable causes. Cataract, glaucoma, and uncorrected refractive error were important causes needing urgent attention.

Keywords: Barriers, blindness, cataract surgical coverage, prevalence, Saki East

Introduction

Good vision is required for almost every human endeavour. However, in spite of worldwide efforts, the magnitude of blindness and visual impairment keeps increasing globally.\cite{4,5} Four of every five blind or visually impaired persons in the world are aged 50 years and above.\cite{5} With increasing longevity, worldwide occurrence of age-related vision impairment rises as well. This is more so in developing countries in which equitable access to health services tends to be a challenge.\cite{4} Similarly, the prevalence of distance visual impairment is four times higher in low- to middle-income countries, compared with high-income countries.\cite{5} It has been shown that, at least, 80% of all global vision losses could be prevented or cured from cost-effective public health measures, surgical intervention, or early medical therapy.\cite{3}

The World Health Organization (WHO), through the Global Action Plan for Eye Health (2014–2019), proposed district level planning of services towards achieving universal access to eye care, especially in developing countries such as Nigeria.\cite{6} Population-based surveys were advocated as a district level tool for generating important eye health indices by which eye care programs can be planned and/or monitored objectively.\cite{6}

To this end, the Ophthalmology Department of the University College Hospital (UCH), Ibadan, Nigeria established a rural secondary eye facility in Sepeteri, a town located within Saki East Local Government Area (LGA), Oyo State, Nigeria, with the aim of improving access to eye care by ensuring proximity of services to the people of this vast region and by increasing their eye health awareness. It was hoped that possible barriers to the uptake of eye health services such as distance of travel, with its attendant direct and indirect cost implications, would be eliminated as well. General eye care services started from December 2016, whereas on-site cataract surgical services began in July 2018.

This survey was undertaken to determine the extent to which eye care services being rendered were addressing the specific needs of this area and provide data on the prevalence
and causes of vision impairment, crucial for monitoring/planning on-going services and for advocacy.

Saki East LGA is located within the mainly rural, northern zone of Oke-Ogun in Oyo State, Nigeria. Oyo State has 33 LGAs. The Oke-Ogun zone (03°35′–04°13′ N, 008° 05′–009° 08′ E) is a major food-crop-producing area, constituted by 10 different LGAs of Oyo State. Saki East LGA had an estimated population of 153,100 according to the updated 2016 population figures. The LGA is located in the savanna vegetation belt of the northernmost part of Oyo State.

**Materials and Methods**

**Study design**

This was a population-based, cross-sectional blindness prevalence survey.

**Inclusion criteria**

The criteria included inhabitants of the LGA who were 50 years or older and had been resident for, at least, 6 months prior to the survey.

**Exclusion criteria**

Inhabitants of the LGA who were <50 years of age and inhabitants who were 50 years of age or older but had been living in the survey area for <6 months as at the time of the survey were excluded.

**Sample size**

The sample size for the survey was calculated with the RAAB5 software. A minimum sample size of 1054 participants was obtained using the following parameters: a blindness prevalence of 6.3% in persons 50 years old and above, a precision of 30%, and a design effect of 1.5 at 95% confidence interval (CI) with a cluster size of 50.

**Survey teams**

There were two survey teams, each headed by a senior ophthalmology resident. Both teams were trained by a certified RAAB trainer (CDM). Inter-observer variability tests were done to assess the level of agreement between both teams in visual acuity (VA) estimation, lens assessment, and determination of the main cause of visual impairment or blindness. Kappa scores of 0.9, 0.9, 0.8, and 0.7 were achieved for presenting VA, pinhole VA, lens assessment, and main cause of visual impairment, respectively. A pilot field survey in two full clusters was subsequently conducted under the supervision of a trainer.

**Sampling technique**

A three-stage cluster sampling technique was employed to recruit 1100 respondents. In the first stage, 22 clusters were randomly selected from a sampling frame of all villages across Saki East LGA, using probability proportional to size. In the second stage, the compact segment sampling technique was employed. Each cluster was divided into equal segments to contain at least 50 persons, 50 years and above. Landmarks such as prominent structures and roads were used to denote boundaries between the segments and sketched on paper, numbering each segment appropriately. The segment to begin recruitment from was determined by simple balloting. In the third stage, respondents 50 years of age and above and residents in households [see Table 1] within the selected segments were examined through house-to-house visits until 50 participants had been enrolled/examined. Survey teams returned on the same day to examine persons not at home at first visit and

| Term                      | Definition                                                                 |
|---------------------------|-----------------------------------------------------------------------------|
| Household                 | One or more people who live under the same roof, eating from the same kitchen |
| Resident                  | An individual who had lived in the study area for the preceding six or more months |
| Presenting Visual Acuity (PVA) | Distance visual acuity in each eye (with available refractive correction where applicable) |
| Blindness                 | Presenting VA of <3/60 in the better eye                                    |
| Severe Visual Impairment  | Presenting VA of <6/60 to ≥3/60 in the better eye                           |
| Moderate Visual Impairment| Presenting VA of <6/18 to ≥6/60 in the better eye                           |
| Cataract                   | Presence of visually significant lens opacity                               |
| Trachomatous Corneal Opacity| The presence of corneal opacification in an eye with evidence of corrected or uncorrected entropion and/or trichiasis |
| Non-Trachomatous Corneal Opacity| The presence of corneal opacity not attributable to trachoma              |
| Glaucoma                  | The presence of a pale and cupped disc with a vertical cup-to-disc ratio ≥0.8, with/without relative afferent pupillary defect and/or stony hard eye on digital palpation |
| Aphakia                   | Absence of the crystalline lens in the pupillary axis                       |
| Uncorrected Aphakia       | An aphakic eye whose vision improves with +10D lens or pinhole             |
| Surgical Complication     | The finding of a blind or visually impaired eye that had undergone cataract surgery or couching, in the absence of other causes of blindness or visual impairment |
| Cataract Surgical Coverage(CSC)| A measure of the number of people (or eyes) in a defined population with operated cataract as a proportion of those (or eyes) having operable cataract plus operated cataract |
thereafter were listed as absentees. Subjects who declined examination were marked as refusals.

**Clinical examination**

At the household level, individual consent was obtained from each participant before proceeding with examination. Demographic data of each eligible respondent were entered into the RAAB5 survey form. VA estimation was done with a simplified tumbling E chart, and lens examination was done according to the RAAB survey protocol.[11] The main cause of visual impairment (presenting VA worse than 6/18) was determined on the basis of the coding instructions for WHO/PBL eye examination record.[9] All examination findings were marked in the corresponding sections of the survey form.

**Data handling**

At the end of daily field data collection, data in the survey forms from each cluster were independently entered into the RAAB5 software database by two research assistants. A consistency check was then run by the Principal Investigator, and inconsistencies flagged by the software were corrected by referring to the corresponding survey form(s). After covering all clusters, data were cleaned, and generation of reports was done via the RAAB5 software package. Additional statistical analysis was undertaken using Statistical Package for the Social Sciences (SPSS Inc., Chicago, IL, USA) software version 22.

**Ethical considerations**

Ethical approval was obtained from the Ethics Committee of the UCH/University of Ibadan, as well as the Oyo State Ethical Review Committee, Ministry of Health, Oyo State, Nigeria. Written informed consent was obtained from all respondents, and information obtained from all respondents was treated with utmost confidentiality. Data safety was ensured by storing in a password-secured laptop handled by the Principal Investigator. Respondents seen with ocular complaints benefitted from free medications for the treatment of minor conditions and/or referral to the UCH as necessary. Relatives of respondents who were not necessarily enumerated but brought forward with ocular complaints also benefitted from free medications and/or referrals. Free reading spectacles were given to all respondents diagnosed with presbyopia. Persons diagnosed with cataract requiring surgery were offered the same at subsidized rates at a hospital in Sepeteri.

**Results**

A total of 1095 respondents were examined out of 1100 enrolled. A coverage of 99.5% was thus achieved. Overall, there were more female participants (52.5%) than males (47.5%) [Table 2].

The modal age bracket was 50–59 years. Male participants were more in this age group, unlike females in all older age groups. The mean age was 66 years (SD = ±12.85 years) [Table 3].

Based on the presenting visual acuity (PVA), the overall age- and sex-adjusted blindness prevalence was 1.7% (95% CI: 0.1–3.3). The prevalence of blindness significantly increased with age ($\chi^2 = 38.005, P = 0.000$) [Table 4].

Cataract and glaucoma were the leading causes of blindness and visual impairment [Table 5].

Cataract surgical coverage, analysis of cataract surgical outcome, and barriers to the uptake of cataract surgery are presented in Tables 6-8 respectively.

Further analysis of respondents who had borderline-to-poor outcomes after cataract surgery [Table 6] revealed refractive error (41.9%), surgical sequelae (25.8%), surgical complications (12.9%), and poor patient selection (19.4%) as the reasons.

**Discussion**

The coverage of 99.5% attained in this survey could be attributed to pre-visits done to engage the various community

### Table 2: Summary of enrollees

| Examined | Not available | Refused | Not capable | Total |
|----------|---------------|---------|-------------|-------|
| n        | %             | n       | %           | n     | %     |
| Males    |               |         |             |       |       |
| 518      | 47.0          | 1       | 0.1         | 1     | 0.1   |
| Females  |               |         |             |       |       |
| 577      | 52.5          | 0       | 0.0         | 2     | 0.2   |
| Total    | 1,095         | 1       | 0.1         | 3     | 0.3   |

### Table 3: Age and sex distribution of survey respondents

| Age class | Male | %    | Female | %    | Total | %    |
|-----------|------|------|--------|------|-------|------|
| 50–59     | 210  | 40.5 | 200    | 34.7 | 410   | 37.5 |
| 60–69     | 104  | 20.1 | 144    | 25.0 | 248   | 22.7 |
| 70–79     | 113  | 21.8 | 124    | 21.5 | 237   | 21.7 |
| 80–99     | 91   | 17.6 | 109    | 18.8 | 200   | 18.2 |
| Total     | 518  | 100.0| 577    | 100.0| 1095  | 100.0|
Table 6: Cataract surgical coverage (persons)

|                | Males | Females | Total |
|----------------|-------|---------|-------|
| VA <3/60       | 100.0 | 56.0    | 76.1% |
| VA <6/60       | 100.0 | 48.3    | 70.0% |
| VA <6/18       | 75.0  | 37.8    | 55.1% |
| Overall CSC    | 67.0% |

In similar surveys done elsewhere in Nigeria, a higher overall blindness prevalence of 4.5%, 4.2%, and 5.4% was reported in Birnin-Kebbi,[12] Plateau,[13] and Katsina,[14] respectively. In other regions of Sub-Saharan Africa, blindness prevalence from similar population-based surveys varied from 3.3% in Southern Malawi[15] to 1.8% in Western Rwanda.[16] The prevalence from our survey of 1.7% is similar to the prevalence from Western Rwanda.

From recent population-based surveys among individuals aged 50 years and above in other developing countries, Isipradit et al.[17] reported a blindness prevalence of 0.6% in Thailand, whereas Thoufeeq et al.[18] found a prevalence of 2.0% in the Maldives. In the Pune region of Western India, an overall blindness prevalence of 1.3% was observed.[19] The lower prevalence of blindness observed in regions of these countries could be due to better developed and longstanding eye care programmes.

The overall age–sex-adjusted prevalence of bilateral severe visual impairment (SVI) was found to be much lower at 2.3% compared with 6.7% reported in Plateau State, North Central Nigeria.[13] This can be attributed to the higher poverty index in Plateau State,[20] as there is an established causal relationship between low socio-economic status and visual impairment/blindness.[21,22] The age–sex-adjusted prevalence of SVI found in northern Burundi was also much less at 0.6%.[23] Also contrary to our findings, lower age–sex-adjusted prevalence of SVI was reported from Northern Burundi (0.6%), Thailand (1.3%), and the Maldives (1.9%).[17,18,23]

Females had a higher burden of blindness compared with males in this survey. This finding is similar to reports from previous surveys.[12,13,16,24-26] Such gender gap could be due to cultural factors such as the need for permission from the male head of the home before females can seek care and the fact that resources are controlled by the men in most households. In line with the target of the sustainable development goals to...
eliminate gender inequity.\textsuperscript{[27]} It is important to use this evidence to advocate, through collaboration with relevant stakeholders, for increased awareness and commitment to gender equity in access to eye health care in Saki East LGA.

Untreated cataract, followed by glaucoma and uncorrected aphakia, were the commonest causes of blindness in this survey, as was also observed in Plateau State.\textsuperscript{[13]} Likewise, cataract, followed by glaucoma, was the leading cause of blindness in Egbedore LGA of neighbouring Osun State, followed by posterior segment disorders.\textsuperscript{[10]}

The main causes of SVI in this survey were untreated cataract and glaucoma, which is similar to findings in Plateau State where cataract, glaucoma, and uncorrected aphakia were the leading causes of SVI.\textsuperscript{[13]}

Moderate visual impairment (MVI) was mostly due to uncorrected refractive errors and untreated cataract in this survey. This compares with findings in Plateau State, which also showed untreated cataract and refractive error as the two leading causes of MVI. Trachoma, which was also an important cause of vision impairment and blindness reported in Plateau State, was not found in this survey. This is likely due to the fact that Saki East LGA does not lie within the trachoma belt of Nigeria, whereas Plateau state lies within the fringes of the trachoma belt of West Africa.\textsuperscript{[28]}

Over 90% of all blindness in this survey were avoidable, so also were the causes of all SVI and MVI. Similarly, over 80% of all blindness, SVI, and MVI seen in Plateau State, were from avoidable causes.\textsuperscript{[13]} This pattern closely mirrors observations from the Nigerian National Blindness and Low Vision Survey\textsuperscript{[20]} which reported that 84% of all blindness, 84.3% of SVI, and 91.6% of MVI were due to avoidable causes, respectively.

There was an overall cataract surgical coverage of 67% in the survey area, with particularly poor coverage in the female gender. This might be partly due to gender-related inequity already discussed earlier. The observed barriers of ‘unawareness of availability of treatment’ among other barriers to cataract surgery may also contribute to this inadequate coverage. In addition, all routine eye outreaches that had been done as at the time of the survey were to major and fairly easily accessible settlements of the survey area. Coverage of the most remote villages could be guaranteed by training and equipping, at least a community health extension worker or any suitable volunteer in each village on VA estimation to identify cases of visual impairment and refer to the base hospital.

Concerning cataract surgical outcomes, the WHO recommends that district cataract programs should aim for good outcomes (VA \textgreater{} 6/18) in at least 80%, whereas poor outcomes should not exceed 5%.\textsuperscript{[30]} Our finding is such that outcomes of cataract surgeries in the survey area so far fell short of this recommendation, and the majority of poor outcomes observed were due to refractive error and other surgical sequelae. This means going forward, adequate attention must be paid to ensuring long-term follow-up of individuals who have undergone cataract surgery in order to attend to all medium- to long-term sequelae of cataract surgery that may contribute to visual impairment. Even though post-operative follow-up rates are reportedly poor in developing countries due to several factors,\textsuperscript{[31]} its role in achieving better visual outcomes of surgery is crucial to improving effective cataract surgical coverage.\textsuperscript{[32]}

The barriers to cataract surgery observed in this survey are mostly surmountable by an intensive awareness campaign, across the survey area, on the causes of visual impairment observed in this survey, what can be done to treat, and the importance of follow-up clinic visits. This can be achieved through the existing eye outreach team. The use of audio-visual aids and pseudophakic motivators during health talks at routine outreaches as well as periodic information dissemination via the local radio station could help to reinforce the message and reverse the trend of ignorance, poor attitude to eye health, and fear of surgery. Interestingly,

| Table 7: Cataract surgical outcome with available correction (eyes) [n = 74] |
|------------------|------------------|------------------|
|                   | Males            | Females          | Total            |
|                   | n    | %   | n    | %   | n    | %   |
| Good: can see ≥ 6/18 | 24   | 57.1| 19   | 59.4| 43   | 58.1|
| Borderline: can see ≥ 6/60 | 2    | 4.8 | 5    | 15.6| 7    | 9.5 |
| Poor: cannot see 6/60  | 16   | 38.1| 8    | 25.0| 24   | 32.4|
| Total              | 42   | 100.0| 32   | 100.0| 74   | 100.0|

| Table 8: Barriers to cataract surgery |
|------------------|------------------|------------------|
|                   | Males            | Females          | Total            |
|                   | n    | %   | n    | %   | n    | %   |
| Unaware treatment is possible | 16   | 39.0| 28   | 46.7| 44   | 43.6|
| Cost              | 16   | 39.0| 13   | 21.7| 29   | 28.7|
| Need not felt     | 6    | 14.6| 13   | 21.7| 19   | 18.8|
| Cannot access treatment | 2    | 4.9 | 2    | 3.3 | 4    | 4.0 |
| Fear              | 1    | 2.5 | 4    | 6.6 | 5    | 4.9 |
| Total             | 41   | 100.0| 60   | 100.0| 101  | 100.0|
over half of all the individuals identified with visually significant cataracts during this survey did not show up to take up the highly subsidized cataract surgery they were offered in the immediate week following the field work. Follow-up revealed fear of surgery and cost as the main reasons for this. We saw that highly subsidized cost of surgery does not necessarily mean that the local populace will utilize surgical services if the aforementioned barriers are not addressed first. It will be informative if further studies can reveal what participants who are blind or visually impaired with cataract, identified in the survey area, are willing to pay for cataract surgery. This could provide information to address the issue of affordability of cataract surgery among the people of this community.

Recognizing the huge magnitude of global blindness from cataract and refractive errors alone, the WHO Global Action Plan for Eye Health (2014–2019) suggested that provision of effective cataract and refraction services alone could reduce the burden of visual impairment by up to two-thirds in any world district.[9] More recently, the 74th World Health Assembly took a step further by recommending new global targets for States towards stemming the tide of avoidable vision loss.[6] The 74th World Health Assembly further emphasized that the world needs to double the number of people treated for visual impairment and blindness in every country. Similar targets for vision were endorsed at the 75th World Health Assembly in May 2022.[6]

There is a need to re-plan on-going services in Saki East LGA to further reduce the burden of blindness from avoidable causes identified in this survey. Service delivery through the Sepeteri eye facility is currently being tailored towards addressing these issues, the impact of which will be assessed in the near future. These include provision of high quality, affordable cataract surgery, optical services as well as on-going community engagement via advocacy for general eye health promotion/ utilization in Saki East LGA and environs. Furthermore, the data provided by this survey could help to streamline district eye care service planning in South-Western Nigeria at large.

Limitations

Limited posterior segment examination, by design of the RAAB methodology, implied that we could have underestimated some posterior segment causes of avoidable blindness such as early glaucoma.

Acknowledgement

The authors gratefully acknowledge the input of Professor Charles Bekibele, the Research Assistants Mr. Samson Ogunbami and Ms. Ronke Ajayi as well as Mr. Olusegun Fashina, who donated his vehicle to the survey teams.

Financial support and sponsorship

This research is funded in-part by the Bruce E. Spivey Trust Fund and the University College Hospital, Ibadan, Nigeria.

Conflicts of interest

The authors declare no conflicts of interest whatsoever in this work.

References

1. Pascolini D, Mariotti SP. Global estimates of visual impairment: 2010. Br J Ophthalmol 2012;96:614-8.
2. Cieza A, Keel S, Kocur I, McCoy M, Mariotti SP. World report on vision. Switzerland, 2019. Available from: https://www.who.int/publications-detail/world-report-on-vision [last accessed on October 27, 2019].
3. Ackland P, Resnikoff S, Bourne R. World blindness and visual impairment: Despite many successes, the problem is growing. Community Eye Health 2017;30:71-3.
4. Burton MJ, Ramke J, Marques AP, Bourne RRA, Congdon N, Jones I, et al. The Lancet Global Health Commission on Global Eye Health: Vision beyond 2020. Lancet Glob Health 2021;9:e489-551.
5. Adelson JD, Bourne RRA, Briant PS, Flaxman SR, Taylor HRB, Jonas JB, et al. Causes of blindness and vision impairment in 2020 and trends over 30 years, and prevalence of avoidable blindness in relation to VISION 2020: The right to sight: An analysis for the Global Burden of Disease Study. Lancet Glob Health 2021;9:e144-60.
6. World Health Organisation. Universal eye health: A global action plan 2014–2019. In: Universal Eye Health: A Global Action Plan 2014–2019. Geneva: WHO Press; 2013. p. 11.
7. Obed RI, Ademola AK, Vascotto M, Giannini G, Radon measurements by nuclear track detectors in secondary schools in Oke-Ogun region, Nigeria. J Environ Radioact 2011;102:1012-7.
8. National Population Commission of Nigeria NB of S. Saki East (Local Government Area, Nigeria)—Population Statistics, Charts, Map and Location. Saki East Local Gov. 2017. Available from: https://www.citypopulation.de/php/nigeria-admin.php?adm2id=NGA031031 [last accessed on November 11, 2017].
9. Hans L, Meester W. International Centre for Eye Health, London School of Hygiene and Tropical Medicine. UK: RAAB Instruction Manual; 2003.
10. Kolawole OU, Ashaye AO, Adeoti CO, Mahmoud AO. Survey of blindness and low vision in Egbedore, south-western Nigeria. West Afr J Med 2010;29:327-31.
11. Kuper H, Polack S, Limburg H. Rapid assessment of avoidable blindness. Community Eye Health 2006;19:68-9.
12. Rabiu MM, Muhammad N. Rapid assessment of cataract surgical services in Birnin-Kebbi local government area of Kebbi State, Nigeria. Ophthalmic Epidemiol 2008;15:359-65.
13. Mpyet C, Odugbo P, Adenuga O, Lohdip V, Nyonyikes A. Prevalence and causes of blindness and visual impairment in Plateau State, Nigeria. TAF Prev Med Bull 2010;9:401-6.
14. Taryam MO, Rabiu MM, Muhammad N, Oladigbolu K, Abdurrahman H. Prevalence and causes of blindness and visual impairment; and cataract surgical services in Katsina State of Nigeria. Br J Ophthalmol 2020;104:752-6.
15. Kalua K, Lindfield R, Mtumodzi D, Msiska V. Findings from a rapid assessment of avoidable blindness (RAAB) in southern Malawi. PLoS One 2011;6:e19226.
16. Mathenge W, Nkurikiye J, Limburg H, Kuper H. Rapid assessment of avoidable blindness in Western Rwanda: Blindness in a postconflict setting. PLoS Med 2007;4:e217.
17. Isipradit S, Sirimaharaj M, Charukarnmoetkanok P, Thonginnetera O, Wongsawad W, Sathornsumete B, et al. The first rapid assessment of avoidable blindness (RAAB) in Thailand. PLoS One 2014;9:e114245.
18. Thoufeg U, Das T, Limburg H, Maitra M, Panda L, Sil A, et al. First rapid assessment of avoidable blindness survey in the Maldives: Prevalence and causes of blindness and cataract surgery. Asia Pac J Ophthalmol (Phila) 2018;7:316-20.
19. Kulkarni S, Kondalkar S, Mactaggart I, Shamma BR, Lodhi A, Mendke R, et al. Generating evidence for planning eye care service
delivery in an urban underprivileged population setting in Pune, Western India. BMJ Open Ophthalmol 2019;4:e000202.
20. National Multidimensional Poverty Index for Nigeria | MPPN. 2017. Available from: https://mppn.org/nigeria-national-mpi/ [last accessed on November 18, 2019].
21. Dandona R, Dandona L. Socioeconomic status and blindness. Br J Ophthalmol 2001;85:1484-8.
22. Kuper H, Polack S, Eusebio C, Mathenge W, Wadud Z, Foster A. A case–control study to assess the relationship between poverty and visual impairment from cataract in Kenya, the Philippines, and Bangladesh. PLoS Med 2008;5:e244.
23. Kandeke L, Mathenge W, Giramahoro C, Adubang'o F-P, Undendere PR, Habiyakare C, et al. Rapid assessment of avoidable blindness in two Northern provinces of Burundi without eye services. Ophthalmic Epidemiol 2012;19:211-5.
24. Odugbo OP, Mpyet CD, Chiroma MR, Aboje AO. Cataract blindness, surgical coverage, outcome, and barriers to uptake of cataract services in Plateau State, Nigeria. Middle East Afr J Ophthalmol 2012;19:282-8.
25. Correia M, Das T, Magno J, Pereira BM, Andrade V, Limburg H, et al. Prevalence and causes of blindness, visual impairment, and cataract surgery in Timor-Leste. Clin Ophthalmol 2017;11:2125-31.
26. Neena J, Rachel J, Praveen V, Murthy GVS, Group for the RIS. Rapid assessment of avoidable blindness in India. PLoS One 2008;3:e2867.
27. WHO. Integrated people-centred eye care, including preventable vision impairment and blindness. Global targets for 2030. Draft decision. 2021. Available from: https://apps.who.int/gb/ebwha/pdf_files/WHA74/A74_9Add3-en.pdf [last accessed on August 18, 2021].