Cataract burden and uptake of cataract surgical services: Results from a population-based survey.

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Abstract

Background: Global estimates suggest that approximately two thirds of the blind population are females. Cataract accounts for over half of all blindness worldwide**.** Surgery is curative. However, in many parts of Sub-Saharan Africa, people have limited access to services. We estimated the burden of "operable cataract" and assessed for any gender inequality in the uptake of cataract surgical services.

Method: Using a multi-staged stratified random sampling with probability proportional to size, three local government areas in Plateau state were selected. The study instrument was the Rapid Assessment of Cataract Surgical Services (RACSS) Proforma.

Results: 4115 persons were examined (coverage: 98%). Prevalence of "operable cataract" (VA <6/60 in the better eye) was 3.3%, more among females 78 (3.6%) than males 57 (2.9%). Prevalence of unilateral "operable cataract" was 7.2%. The Cataract surgical coverage (persons) was 43.8%, among males it was 49.1% and for females 39.1% (p>0.05.) The burden of cataract would have been reduced by 28.1% if the CSC was equal for both genders.

Conclusion: The burden of cataract is high; uptake of services is low especially among females.

Keywords: Epidemiology, Africa, Surgery, Gender, Ocular

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Introduction

Global estimates suggest that approximately two thirds of the global blind population are females.[1] In the year 2010;there were an estimated 285 million visually impaired persons worldwide. Of these, 39 million were blind.[2]Majority (82%) of the world's blind population are aged 50 years or more.[2]Up to 75% of visual impairment is avoidable[3].About 90% of visually impaired persons live in developing countries. Majority are in rural areas of poor countries where blindness is associated with severe disability, mortality, and huge socio-economic consequences.[4]Cataract, the leading cause of blindness worldwide, accounts for 51% of all blindness**.**[2] Cataract surgery is curative and it is one of the most cost effective, frequently conducted ambulatory elective surgical interventions. However, in many parts of Sub-Saharan Africa, people have limited access to services. Cataract Surgical Coverage (CSC) is a community-based parameter which compares the proportion of people (or eyes) who have received surgery (aphakic/pseudophakic) to the total, who still need or have had surgery (aphakic/pseudophakic + operable cataract) in a certain area. It is an output indicator which assesses the extent services have covered needs and may be calculated at different visual acuity levels.[5]

As part of a population-based survey aimed at assessing the burden of cataract and impact of services being rendered, we also assessed the extent to which these services are being accessed by the different genders in the study population.

Materials and Methods

This was a cross-sectional population-based survey conducted in January, March and November 2007. Plateau state is in the North-central geopolitical zone of Nigeria and is administratively divided into three senatorial districts with seventeen Local Government Areas (LGAs) and has a population of 3.2 million. Two senatorial districts have six LGAs each while one has five LGAs. Geographical, cultural, ethnic and dietary links exist within each senatorial district. Approximately 15% of the population are aged ≥ 50years[6]. Access to eye care services is relatively similar within each senatorial district.

Sample size calculation

An electronic copy of census data for the state was obtained. Estimated target population was 627,206. With an assumed prevalence of blindness at 4%,[7]precision of ±10% in relative terms, 95% confidence interval and design effect of 1.7, a minimum sample size of 4148 was obtained using the Rapid Assessment of Cataract Surgical Services (RACSS) software. Seventy clusters of sixty persons were to be examined.

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Selection of clusters
One LGA was randomly selected from each senatorial district by balloting. All settlements therein constituted the sampling frame from which clusters were selected with probability proportional to size. We were confident that one LGA is representative of each senatorial district because of the similarities that exist within each senatorial district as outlined above. The selected LGAs included were Langtang South, Bokkos and Bassa LGAs.

Examination Protocol
Participants were recruited by the random walk method after an informed verbal consent. The standardized RACSS pro-forma was used to obtain information on demographic data, visual acuity (VA), lens status, principal cause of visual impairment for eyes with VA <6/18, barriers to uptake of cataract services and details about cataract surgery where applicable. Visual acuity testing was by an ophthalmic nurse with an un-illuminated Snellen "E" chart in daylight. Ocular examination was conducted by an ophthalmologist. In the absence of ocular pathology, persons with VA ≥6/18 were discharged. The anterior segment of the eye was examined with pen-torch.The status of the lens was graded as normal, obvious lens opacity, aphakia, pseudophakia without posterior capsule opacification (PCO) or pseudophakia with PCO, and no view if the lens could not be examined due to other ocular pathology e.g. dense leucoma. The posterior segment was examined with a direct ophthalmoscope. When indicated, mydriasis was induced with one drop of Guttae Phenylephrine (2.5%) and Guttae Tropicamide (1%) for a dilated fundoscopy. The principal cause of visual loss for each eye and for the person was documented in accordance with WHO guidelines.[8] The major cause was attributed to the primary disorder. When two primary disorders exists, the preventable or treatable cause of visual loss was selected.[8] Those with VA <6/60 due to cataract were asked why they have not had cataract surgery. If an eligible person was absent, the team returned to the house the same day and if after repeated visits the individual is not met, demographic and visual status information about the person was obtained from relatives or neighbours. The closest settlement was visited if the expected number of persons could not be obtained in a selected cluster.

Reliability study to measure the level of agreement between examiners in the assessment of VA and lens status was conducted. The kappa value indicated very good agreement (κ>0.61).

Study definitions
Operable Cataract: Defined as presenting visual acuity of <6/60 attributed to cataract.

Cataract burden
To assess the cataract burden, we assumed participants who had bilateral pseudo(aphakia) had bilateral "operable cataract" at first surgery. Those who had unilateral pseudo(aphakia) and "operable cataract" in the second eye were also assumed to have had an "operable cataract" in the operated eye. Burden of cataract was thus the sum of the never operated bilateral cases plus those cataract operated subjects presumed to have bilateral "operable cataract" at initial cataract surgery.

Cataract Surgical Coverage(CSC)
In this paper we focused on the CSC for people and eyes with "operable cataract".

The (CSC persons) was calculated using the formula: $(x + y)/(x + y + z) \times 100$ where x represents persons with unilateral pseudo(aphakia); y represents persons with bilateral pseudo(aphakia), and z are persons with VA <6/60 attributed to unilateral or bilateral cataract.[9] For CSC (eyes), the formula: $(a/a + b) \times 100$ was used, where a represents pseudo(aphakic) eyes, and b is for eyes with "operable cataract".[9]The number of additional females who would have been operated on, if CSC for females and male were equal was calculated by the formula: Number of additional females ≥ (male CSC x (number of operated females + number of cataract blind females) – number of operated females).[10]The proportion of cases of "operable cataract" that would have benefited from surgery if female CSC and male CSC were equal was calculated using the formula: Number of additional operated females / (number of cataract blind females + number of cataract blind males) x 100.[10] The odd ratio (OR) for the proportion of females who are likely to benefit from cataract surgical services in the study population was calculated with the formula: OR≥ CSCm x (100-CSCf)/ (100-CSCm) x CSC_f.

Data was collected for 4200 persons and entered into the RACSS software (based on Epi-info version 6.04d, WHO, Geneva, Switzerland). Data entry validation was by duplicate entry. Frequencies and percentages, means and standard deviation (SD) were calculated for quantitative variables and chi square was used to compare values. P values (significant at the P<0.05 level) were calculated.

The Human Research Ethics Committee of Jos University Teaching Hospital, Jos-Nigeria provided the ethical approval.

Results
Survey coverage was 98% (4115/4200),with more females (52.9%) than males (Figure 1). A total of 55 (1.3%) persons were unavailable and 30 (0.7%) refused examination.

Prevalence of operable cataract
There were 135 persons with bilateral "operable cataract" (VA<6/60) with prevalence at 3.3%, more among females 78 (3.6%) than males 57 (2.9%), p>0.05.

The prevalence of "operable cataract" increased significantly with age from 0.3% at 50-54 years to 16.7% at the age ≥ 80years, χ^2 ≥257.7, p<0.001 (Figure 2). Another 298 (7.2%) persons had "operable cataract" in one eye, slightly more among males (7.5%) than females (7.0%), p>0.05. The prevalence of unilateral operable cataract also increased significantly with age (χ^2 ≥164.3, p<0.001).

Magnitude of operable cataract

Using the state population of 3.2 million, with 15% of the population aged ≥ 50years, the estimated population of persons aged ≥50years was 480,000. Of these, 52.9% (253,920) were females while 47.1% (226,080) were males (Figure 1). With a prevalence of bilateral operable cataract of 3.3%, an estimated 16 000 persons aged ≥ 50years had bilateral operable cataract in the state. Of these, 9000 were females (prevalence of bilateral operable cataract among women was 3.6%) while 7000 were males (prevalence of bilateral operable cataract among men was 2.9%).

Another 35000 persons had unilateral operable cataract; 17000 females and 18000 males (prevalence of unilateral operable cataract was 7.2%, more among males 7.5% than females 7.0%).

Table 1: Distribution of Cataract Surgical Burden and Cataract Surgical Coverage (Persons) by Age Group and Gender

Age Group	Cataract Blindness Burden				Cataract Surgical Coverage (Persons)			
	Male		Female		Male		Female	
	No	%	No	%	No	%	No	%
50-54	2	0.4	5	0.8	2	100	2	40
55-59	4	1.2	7	1.7	2	50.0	2	28.6
60-64	13	3.6	18	4.4	8	61.5	7	38.9
65-69	12	5.2	18	8.1	8	66.7	8	44.4
70-74	18	6.8	20	9.3	9	50.0	10	50
75-79	22	17.9	14	11.8	10	35.7	5	35.7
80+	41	26.8	46	26.1	16	34.8	16	34.8
Total	112	5.8	128	5.9	55	49.1	50	39.1

Cataract blindness burden

Up to 68 females aged <75years were cataract blind (Table 1), there were 1881 women aged <75years in the study population (Figure 1). The cataract blindness burden among women aged < 75years was 3.6% (68/1881). There were 49 males aged < 75years who were cataract blind (Table 1) and 1663 males were aged <75 years in the study population. The cataract blindness burden among men aged <75years was 2.9% (49/1663). Though the cataract blindness burden was higher among females aged <75 years, on the whole, there was no statistically significant difference between genders, χ^2 ≥ 2.16, p > 0.05 (Table 1).

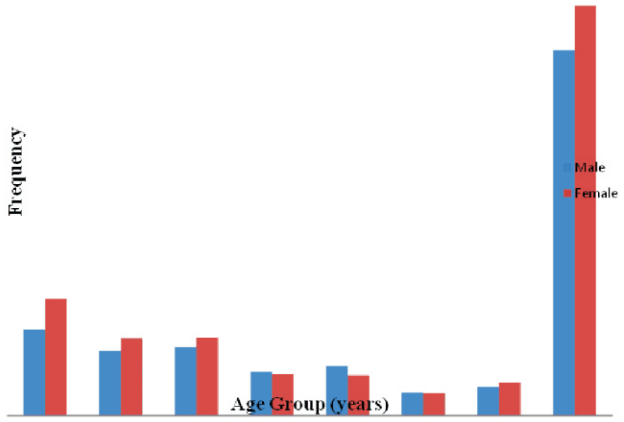

Figure 1: Age-Sex distribution of the study population

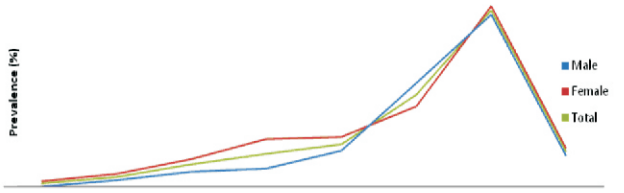

Figure 2: Prevalence of bilateral operable cataract (VA<6/60) by age group

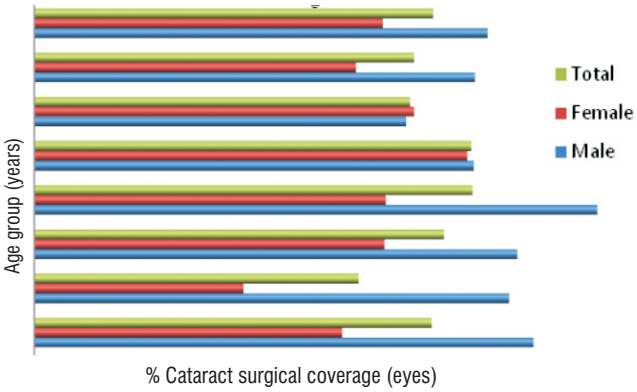

Figure 3: Distribution of cataract surgical coverage (eyes) by age group and gender

Cataract surgical coverage (CSC)

The CSC (persons) was 43.8%, males 49.1% and females 39.1% (χ^2 ≥2.4, p>0.05). Among both gender, surgical coverage was less among more elderly persons (Table 1). The CSC (eyes) was 29.4%. More male eyes (33.4%) were operated, p>0.05, (Figure 3).

An estimated additional 38 females in the sample would have benefitted from services if the CSC was equal for both genders. This would have resulted in a further 28.1% reduction in the burden of cataract. The cataract surgery odd ratio was 1.5, for males and 0.7 for females (p > 0.05).

Barriers to uptake of cataract surgical services

Being unaware of cataract as a cause of visual loss was the main barrier reported by majority (38.9%) of the respondents. Cost of surgery was the second most important (36.3%). A higher proportion of females reported "being unaware of cataract" (39.8%), "Non-availability of services" (11.5%) and "Old age: no need for surgery" (10.6%) compared to 37.5%, 6.3% and 7.5% of males respectively. More males (43.8%) reported cost as a barrier compared to females (31.0%), $\chi^2 \geq 2.6$, $p<0.05$.

Discussion

This study revealed a higher prevalence of operable cataract among females. In our setting, gender defined roles, cultural factors and socio-economic differences between the genders are often prohibitive for women to access services. Women do not have freedom of movement and are usually inundated with child care and other domestic responsibilities. Women have less disposable income, little control over finances and often do not have decision-making power.[1] Lower literacy level among females limits exposure to information and their health care needs are accorded a lower priority. It is also known that globally, women have a higher incidence of cataract due to longer life expectancy and hormonal changes.[10] These are factors that could have contributed to our finding which is consistent with global estimates and observations from other parts of the developing world.[10-16]

The CSC (persons) observed is low and also similar to results from other parts of the developing world,[5,17-18] though lower than findings from Botswana and Nepal where there are probably better intervention strategies.[13,19] Our observation is also consistent with findings from other parts of the developing world.[11,13,17,20-24] Women access cataract surgery at two-thirds the rate of men globally and should make up about 60–70% of all cataract surgeries if the CSC is to be equal.[10] If service uptake was similar between both gender, the burden of cataract would have been reduced by 28.1% similar to what has been observed in other part of the developing world.[10] Discrepancy in cataract surgical coverage is a cause of gender inequality. The need for equal access to eye health by both men and women was the theme of 2009 World Sight Day.[25] Attaining this in our setting will require advocacy at all levels of government.

The very low CSC (eyes) found, translates to a large unmet need which seems to stem more from lack of demand. It is estimated that the number of persons needing cataract surgery in Nigeria will increase by 43% in the next 12 years if the prevalence of operable cataract and CSC remains unchanged[23]. In Plateau state, this translates to an increase from about 51,000 to 73,000 persons by the year 2020.

The barriers to uptake of services observed are similar to results from other parts of Nigeria.[7,26] Lack of awareness of cataract especially among women may be a result of lack of enlightenment and unfamiliarity with the health system. Community-based education about cataract in the local language has to be widely undertaken in the state. Health careworkers who are members of the community can be very useful in this regard. Satisfied cataract operated patients in the community could serve as excellent motivators for others to have surgery. Thus, it is very essential that outcome of cataract surgery is made increasingly better. Cost as a barrier may be associated with some deeper, more complex reasons that patients may not wish to express. These findings provide a baseline against which achievements may be measured in the near future.

A limitation of this study is the fact that we could not calculate the age-sex adjusted prevalence rate for cataract blindness due to the non-availability of appropriate census information for the state.

Conclusion

The burden of cataract is high being more in women; and the uptake of services is also low. A special approach to increase uptake of cataract surgical service is needed as closing the gap could significantly decrease the magnitude of cataract in the community

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Competing interest: Nil

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