Original article

# Prevalence of Cataract Blindness in Rural Ethiopia

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**Abstract**

**Background: Over three-quarter** of all blindness worldwide are preventable and usually caused by cataract and trachoma.

**Objective**: To assess the prevalence of cataract blindness in rural Ethiopia in order to facilitate further health care planning.

**Methods**: A Cross-sectional, community-based study of inhabitants over 40 years of age from villages in the Abeshge and Kebena Districts, south of Addis Ababa. A total of 1100 eligible participants were identified in the study. Visual acuity (VA) was measured using a Snellen's E chart at 6 metres and eye examinations were performed using torch light, 2.5 X magnifying glasses and an ophthalmoscope. Cataract was defined as lens opacity identified as the cause of blindness and low vision after ruling out other causes. Unfortunately, there was no access to a refraction set and slit lamp to conduct thorough examinations.

**Results**: The adjusted prevalence of bilateral cataract blindness (VA<3/60) was 2.4%, 95% confidence interval [CI], 1.8%–3.0%. Cataract is the major cause of bilateral blindness (66.7%) among the participants. The cataract surgical coverage was 28.9% for men and 18.1% for women. The adjusted prevalence of bilateral cataract and VA<6/60 was 3.6% (95% CI, 1.4%–5.8%). In this last group, the surgical coverage was 41.2% (persons) and 38.5% (eyes). Of all operated eyes, 30% could not see at 6/60. Inability to afford the procedure (64.5%) and poor knowledge of cataract (29.8%) were the reasons why surgery had not been performed.

**Conclusions**: Cataract blindness is a major health problem in the study area with low surgical uptake. There is backlog of cataract blindness in the study area that will increase with ageing. This backlog was also reflected in other developing countries. Awareness campaigns, reducing cost, and expansion of surgical services may help to increase the cataract surgical rate, and women should be offered more cataract surgery. These results will enable health managers to plan effective interventions in line with Vision 2020. [*Ethiop. J. Health Dev.* 2011;25(2):156-160]

## Introduction

According to the WHO, over 37 million people are blind and 124 million people have low vision worldwide. Ninety percent of these people live in developing countries like Ethiopia. About 75% of all blindness worldwide is believed to be avoidable and is mainly caused by cataract and trachoma (1).

In most countries, age-related cataract is the leading cause of low vision and blindness. An increasing life expectancy has resulted in a rise in the frequency of cataract among people aged 40 years or older. In many countries, this has caused an increase in the prevalence of cataract blindness and a greater demand for adequate cataract surgical services (1-4). Similar study conducted in the Gurage Zone of rural Ethiopia showed the prevalence of blindness to be 7.9% and half of the blindness was due to cataract (5).

In developing countries, the use of cataract surgical services among women is considerably lower than among men (6). The results of this study provide an insight into the magnitude of blindness and cataract and will enable health managers to plan effective interventions in this area in line with Vision 2020. Periodic assessment of the magnitude of the cataract problem is important to evaluate the effectiveness of intervention programs.

In Abeshge and Kebena districts, more than 90% of the population earn less than 25 birr per day as reported. The total population of the survey area is 116,151. The people are generally less educated, poor, and involved dedicated by agriculture.

At present, eye care services in the survey area are provided by a government hospital and private clinics. There is no permanently residing ophthalmologist in the area. Ophthalmologists from other areas conduct cataract operations once or twice each year during campaigns. The cataract surgical rate (i.e., the number of cataract operations per 1 million population per year in a specified area) in the survey area is therefore expected to be low.

## Methods

The study was a population-based, cross-sectional ophthalmic survey of the inhabitants of the rural villages in the Abeshge and Kebena districts of central Ethiopia. The aim of this study was to assess the prevalence of cataract blindness and rate of surgeries.

Abeshge and Kebena districts are located 150-160 km southwest of the capital city Addis Ababa, in the Gurage Zone of the Southern Nations, Nationalities, and Peoples Region (SNNPR). These districts have a population of 52,989 and 63,162, respectively, with those above 40 years making up about 20,907 (18.0%) of the total population. Abeshge district has 26 Kebena 23 kebeles served by two centrally located health centres providing primary eye care services. Each kebele is further divided into villages.

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Sample size was calculated based on the following assumptions: prevalence of blindness (Visual Acuity < 3/60) for adults aged 40 years and above is estimated to be 7.9%, a confidence interval of 95%, 80% power of the study, and 5% type I error. The odds of being blind among women was assumed to be 1.8 times higher than men. The calculated sample size was 1066 persons (533 for each sex).

Interviewers were recruited and trained in how to complete the questionnaire. Data were collected in January 2007. A pilot test was undertaken in 10 houses of each village and supervision was given to ensure the completeness of the questionnaires. Participants were selected using a multi-stage cluster sampling. Five kebeles were randomly selected from each district and three villages were randomly selected from each kebele. All adults aged 40 years and above living in the selected villages (for at least the preceding 2 months) were considered eligible for the study. We collected proportional samples from all villages.

The study employed a house-to-house survey. Repeated visits were made in the early morning and late afternoons. Absentees were replaced by neighbouring inhabitants. Age, sex, occupation, marital status, and the educational level of each participant were recorded. A single survey team conducted the entire study. Trained clerks obtained a medical and ophthalmic history from each patient in their own language. Each participant then received a vision and eye examination, including presenting visual acuity using a well-illuminated illiterate Snellen's E chart at 6 metres, corrected visual acuity using a pinhole, ocular surface, anterior segment, lens examination and ophthalmoscopy examination. The principal cause of vision less than 6/18, and the reasons why cataract operation had not been performed or details of any cataract operation were noted.

After measuring the VA, the examinee was taken into a shaded or dark area inside their home. There, the lens status was assessed by hand light, binocular loupe, and distant direct ophthalmoscope at 20 to 30 cm under semi-dark conditions, without dilatation of the pupil. The lens in each eye was examined and graded as a normal lens, obvious lens opacity present, lens absent (Aphakia), intraocular lens (IOL) implanted without posterior capsule opacification, or IOL implanted and posterior capsule opacification present. If the lens could not be seen because of corneal scarring, phthisis bulbi, or other causes, no view of the lens was indicated. In case of presenting VA of less than 6/18, the cause of this visual impairment was indicated for the affected eye(s) as well as for the person. The major cause had to be marked as a cataract, refractive error, uncorrected aphakia, surgical complication, phthisis, trachomatous corneal opacity, other corneal opacity, glaucoma, diabetic retinopathy, age-related macula degeneration, or other posterior segment or central nervous system disorders.

Blindness was defined as presenting Visual Acuity (VA) <3/60 in the better eye and low vision was defined as presenting VA <6/18 but ≥3/60 in the better eye. Cataract was defined as any lens opacity that causes visual impairment. Examinations were performed by the principal investigator familiar with cataract diagnosis.

Some patients may have two eyes disorder causing visual impairment. The accepted World Health Organization convention is to assign the main cause to the primary disorder that apparently contributes most to the visual loss. When several causes contribute equally, the cause that is easiest to treat or can be prevented, is taken as the main cause.

Data entry and analysis were carried out using Epi-Info version 6.0 statistical software. The proportion with 95% CI for the main results and chi square test for trend to explain the relationship between gender and cataract blindness were used in the analysis. Odds ratios (OR) and 95% confidence intervals (CI) for the predictors were calculated. All P values were 2 sided and were considered statistically significant when the values were <0.05.

The Gender and Blindness Study in Central Ethiopia was approved by the regional health bureau and the Department of Ophthalmology, Addis Ababa University Research and Publication Committee. Verbal informed consent in the participants' own language was obtained from all participants. Treatment of minor ailments was provided free of charge at the examination sites, and cataract-blind participants and those requiring essential treatment were offered referral to the nearby eye hospital.

**Results**

A total of 1100 persons aged 40 years or older were examined physically: 550 men and 550 women. Of the 1100 39 (3.5%) (95% CI, 3.0%–4.2%), were bilaterally blind (VA<3/60) as a result of all causes. Of these, 26 (66.7%) were bilaterally blind because of cataract, a prevalence of 2.4% (95% CI, 1.8%–3.0%), in the sample population aged 40 years and older. The prevalence of blindness and low vision was consistently higher in women. This gender difference is statistically significant in low vision but not in blindness. ($p<0.05$) (Tables 1 and 2). The prevalence of blindness (resulting from cataract as well as other causes) increased with age and was usually higher in females (Table 3).

Table 1: **Prevalence for bilateral blindness and cataract blindness among adults > 40 yrs in Abeshge and Kebena districts, central Ethiopia January 2007**

| Visual acuity | Gender | | Total (N, %) |
|---|---|---|---|
| | M (n %) | F (n %) | |
| ≥ 6/18 | 498 (90.5 %) | 443 (80.5 %) | 941 (85.5 %) |
| < 6/18 ≥ 6/60 All | 28 (5.1 %) | 69 (12.5 %) | 97 (8.8 %) |
| Cataract | 17 (3.1 %) | 49 (8.9 %) (47+2)* | 66 (6.0 %) |

| | | | | |
|---|---|---|---|---|
| < 6/60 ≥ 3/60 | All | 8 (1.5 %) | 15 (2.7 %) | 23 (2.1 %) |
| | Cataract | 4 (0.7 %) | 10 (1.8 %) (9+1)* | 14 (1.3 %) |
| < 3/60 | All | 16 (2.9 %) | 23 (4.2 %) | 39 (3.5 %) |
| | Cataract | 14 (2.6 %) (11+3)* | 12 (2.2 %) | 26 (2.4 %) |
| **Total** | | **550 (100.0 %)** | **550 (100.0 %)** | **1100 (100.0 %)** |

$X^2$ = 4423.93, p<0.001

* cataract and operated cases written as A+B

Table 2: **Presenting visual acuity (by eye) of > 40 yrs in Abeshge and Kebena districts, central Ethiopia January 2007**

| Visual acuity | | OD = right eye | | OS = left eye | |
|---|---|---|---|---|---|
| | | M (n %) | F (n %) | M | F |
| ≥ 6/18 | | 475 (86.4 %) | 426 (77.5 %) | 475 (86.4 %) | 412 (74.9 %) |
| < 6/18 ≥ 6/60 | All | 42 (7.6 %) | 68 (12.4 %) | 31 (5.6 %) | 73 (13.3 %) |
| | Cataract | 19 (3.5 %) | 40 (7.2 %) | 15 2.7 %) | 42 (7.6%) |
| < 6/60 ≥ 3/60 | All | 9 (1.6 %) | 18 (3.3 %) | 13 (2.4 %) | 15 (2.7 %) |
| | Cataract | 4 (0.7 %) | 8 (1.5 %) | 7 (1.3 %) | 11 (2.0 %) |
| < 3/60 | All | 24 (4.4 %) | 38 (6.9 %) | 31 (5.6 %) | 50 (9.1 %) |
| | Cataract | 15 (2.7 %) | 12 (2.2 %) | 14 (2.6 %) | 23 (4.2 %) |
| **Total** | | **550 (100.0 %)** | **550 (100.0 %)** | **550 (100.0%)** | **550 (100.0 %)** |

$X^2$ = 4423.93, p<0.001

Table 3: **Age Specific Prevalence of Bilateral Visual Loss (VA<6/18) Because of cataract and other causes among adults >40 yrs in**

| Age group in years | AV ≥ 6/18 | | Cataract, %, VA < 6/18 | | Other causes VA < 6/19 | | Total |
|---|---|---|---|---|---|---|---|
| | Male | Female | Male | Female | Male | Female | |
| 40 – 40 | 228 (45.8) | 234 (52..8) | 1 (3.1) | 3 (4.4) | 9 (45.0) | 11 (28.2) | 486 (44.2) |
| 50 – 59 | 153 (30.7) | 132 (29.8) | 10 (31.3) | 19 (27.9) | 4 (20.0) | 15 (38.5) | 333 (30.3) |
| 60 - 69 | 68 (13.7) | 53 (12.0) | 5 (15.5) | 25 (36.8) | 2 (10.0) | 4 (10.2) | 157 (14.3) |
| ≥ 70 | 49 (9.8) | 24 (5.4) | 16 (50.0) | 21 (30.9) | 5 (25.0) | 9 (23.1) | 124 (11.3) |
| **Total** | 498 (100) | 443 (100) | 32 (100) | 68 (100) | 20 (100) | 39 (100) | 1100 (100) |

Assuming that cataract blindness before the age of 40 years is negligible; the prevalence of bilateral cataract blindness in the entire population (116151) would be 1.3%, or 13,000 people per 1 million persons. For presenting VA < 6/60, the age- and gender-adjusted prevalence rates in people aged 40 years or older were higher: 5.6% (95% CI, 4.9%– 6.7%) for all causes and 3.6% (95% CI, 2.9%– 4.4%) for bilateral cataract.

For VA<3/60, one out of every two bilateral cataract-blind persons had undergone surgery in one or both eyes. The coverage rates were lower for VA<6/60 and VA<6/18, which suggests that cataract surgery is performed at low VA levels. The coverage is consistently higher in men, and the difference is significant.

People who are visually impaired (VA<6/18) because of cataract were asked why they had not had cataract surgery. Inability to may for the procedure (64.5%) was the bif barrier to cataract surgery, followed by poor knowledge about cataract and its_management (29.7%). There was no significant difference in the barriers between men and women. The distribution of barriers was similar for bilateral cataract and VA<6/60 (Table 4).

Visual acuity was measured in all aphakic and pseudophakic eyes in the sample. This gives an impression of the visual outcome after cataract surgery. Patients may or may not have the correct postoperative refraction and good results from recent surgeries may be overshadowed by poorer results of operations conducted decades earlier (Table 5).

Table 4: **Reasons for Not Having Cataract Surgery Among adults > 40 yrs of Age in Abeshge and Kebena Districts, central Ethiopia, January 2007.**

| Reasons | Cataract | |
|---|---|---|
| | Male | Female |
| **Financial problems/surgical cost** | 35 (71.4) | 54 (60.7) |
| **Poor knowledge about treatment** | 12 (24.5) | 29 (32.6) |
| **Inability to travel to HC-facility** | 1 (2.0) | 2 (2.2) |
| **Fear of surgical complications** | 0 | 3 (3.4) |
| **Religious belief/misconception** | 0 | 1 (1.1) |

| | | |
|---|---|---|
| **Treatment not easily available** | 1 (2.0) | 0 |
| **Total** | 49 (100) | 89 (100) |

Table 5: **Post-operative Visual acuity with available correction at presentation of adults > 40yrs, Abeshge and Kebena District, central Ethiopia, January 2007**

| V/A | Male | Female | Total |
|---|---|---|---|
| **≥ 6/18** | 7 | 4 | 11 |
| **< 6/18- ≥ 6/60** | 2 | 5 | 7 |
| **< 6/60- ≥ 3/60** | 0 | 3 | 3 |
| **< 3/60** | 4 | 3 | 7 |
| **Aphakia** | 6 | 9 | 15 |
| **Pseudophakia** | 7 | 6 | 13 |
| **Total** | 13 | 15 | 28 |

Of all 40 operated eyes in the sample, 17 could see 6/18 or better and 11 could not see 6/60. Furthermore, of all operated eyes in the sample, 28 had an IOL implanted and 12 had not received an IOL. More patients (11) could see 20/60 after IOL implantation than after an operation without IOL implantation (0) ($P < 0.01$).

**Discussion**

In this assessment, the prevalence of bilateral cataract blindness (VA<3/60) was found to be 2.4 % (95% CI, 1.8%–3.0%) contributing to 66.7% of the blindness, which is similar to other African countries, where bilateral cataract accounts for 60% of blindness. Cataract is the cause of 49.9 % of national and 50% of global blindness (1, 3, 7, 8).

In 2007, one out of every two persons with bilateral cataract blindness in the study area had undergone surgery in one or both eyes, and one out of every three (40/114) cataract-blind eyes had undergone surgery. This means that there is still a considerable backlog of cataract blindness and that the current cataract surgical rate should increase considerably. The coverage for VA<6/60 and VA<6/18 is lower, suggesting that patients undergo surgery in the later stages of cataract.

The cataract surgical coverage is 1.6 times higher in men compared with women, and more men undergo surgery than women, which is comparable with other developing countries (1.2-1.7); (6). However, women accounted for 68% of all cataract cases in the study population, which is similar to other developing countries (63%). (6).

Of all operated patients, 70% received intra-ocular lens (IOL). The proportion of poor visual outcomes (VA<6/18) after cataract surgery was higher (57.5%) than in Paraguay (27%), Peru (26%), and Buenos Aires (10%) (10, 11). The proportion of IOL implantations was lower in the study area than in Peru (82%) and Buenos Aires (94%), but higher than in Paraguay (60%). This study was not designed to analyze the causes of poor visual outcome after cataract surgery (9-11).

Adequate refraction could significantly improve the proportion of borderline and good outcomes, but could only marginally reduce the proportion of eyes with poor outcomes. This survey was done in a rural setting, which limited access to eye care services.

Being unable to afford cataract surgery and the low level of knowledge about cataract were the main barriers to cataract surgery. This suggests that public awareness of cataract is low and that services are not affordable to everyone, which is the case in other developing countries (6). Awareness campaigns about the benefits of cataract surgery and an affordable surgical service could well increase the uptake of services. As mentioned earlier, 1 out of every 4 operated eyes is unable to see at 6/60. That is no cause for great confidence and may explain the barrier of being fearful of the surgery. Routine monitoring of the visual outcome of cataract operations could reveal the cause of poor outcome and help to identify corrective measures (12). Improved outcomes will increase the local people's confidence and should result in more patients coming forward for cataract surgery. Patients who have received successful surgery will provide proof of the benefits to others.

Blindness in the elderly and less productive individuals is not perceived as among the health priorities by poor families. Such families who are not able to spend money on cataract surgery are usually taken care of by their children or relatives.

For most people in the area, cataract surgery is expensive. Cataract surgery in these areas is given by the government hospital, the private ones, and by NGOs through campaigns. None of these can perform all the cataract operations alone. Close cooperation and collaboration between the 3 sectors is necessary to increase the cataract surgical rate.

Awareness campaigns, cost reduction, and improving the outcome of cataract surgery are the main activities to motivate more patients to undergo surgery. Furthermore, extra attention should be given to motivating more women to come forward for it.

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