Scientific Research Publishing

Open Journal of Ophthalmology, 2026, 16(4), 389-402
https://www.scirp.org/journal/ojoph
ISSN Online: 2165-7416
ISSN Print: 2165-7408

Awareness of Cataract, Barriers to Cataract Surgery and Cataract Surgical Coverage among Patients Aged 50 Years and above in Bhutan

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How to cite this paper: Wangdi, L., Bajgai, T.M., Wangmo, D., Deki, Gyeltshen, K., Jamtsho, T., Tshering, S.C., Dema, G. and Wangmo, K.Y. (2026) Awareness of Cataract, Barriers to Cataract Surgery and Cataract Surgical Coverage among Patients Aged 50 Years and above in Bhutan. *Open Journal of Ophthalmology*, **16**, 389-402.
https://doi.org/10.4236/ojoph.2026.164032

Received: August 25, 2026
Accepted: November 2, 2026
Published: November 5, 2026

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Abstract

Introduction: Cataract continues to be one of the leading causes of blindness in Bhutan. Although regular cataract surgeries are being provided free of cost, there is still a backlog of untreated cataract in the country. Sub-optimal cataract surgical coverage could be due to unwillingness of patients to come forward, lack of awareness about cataract or due to the difficulties faced by the patients while receiving the cataract surgery. We do not know how well our people are informed about the cataract eye disorder and their challenges in availing cataract surgical services in the country. *Objectives*: This study was intended to assess the level of cataract awareness, challenges to cataract surgery and surgical coverage among patients aged 50 years and above. *Method*: Multicenter cross-sectional survey was conducted in five regional hospitals in Bhutan. Patients aged 50 years and older were enrolled in the study by a simple random sampling method. Data was collected using semi-structured questionnaires for cataract awareness and barriers to cataract surgery. Status of the visual acuity was based on the presenting visual acuity (PVA). Thorough slit lamp examination was done to assess the types of cataracts. Proportion of pseudophakic eyes were used for calculating the cataract surgical coverage. The descriptive statistics were used for describing the demographic profile and clinical characteristics of the participants. *Result*: A total of 380 patients were enrolled in this study, out of which 55% (n = 209) were females with mean age

of 66.83 years (SD = 10.77). Although 60.79% of them had heard about cataract, the overall cataract awareness was 48.05%. An age adjusted cataract surgical coverage (CSC) was 48.61% and the effective cataract surgical coverage (eCSC) calculated as a proportion of pseudophakic eyes with PVA better than 6/12 was 41.73%. The three top most barriers to the cataract surgery were: fear of surgery 79.5% (n = 159), personal escort problems; 72.5% (n = 145) and not aware of treatment facility; 59.5% (n = 119). *Conclusion*: Awareness of cataract and cataract surgical coverage among cataract-prone patients was inadequate. The majority of the participants had personal escort problems, fear of eye surgery and lack of cataract treatment awareness as the biggest challenges. There is a need to scale up cataract surgical coverage in the country by addressing some of the challenges faced by the patients.

Keywords

Cataract, Blindness, Cataract Awareness, Visual Impairment, Cataract Surgical Coverage

1. Introduction

Cataract is the leading cause of blindness among the adult population accounting for up to 45% worldwide [1]-[4]. About 15.2 million people are blinded due to cataract globally, an estimated prevalence of cataract in the adult population is as high as 17.2% [1] [5]. In Asia, 43.6% of blindness is caused by cataract followed by uncorrected refractive error and Glaucoma [6]. In Bhutan, as per the latest rapid assessment of avoidable blindness (RAAB) survey in 2018, cataract accounts for 53.8% of blindness [7].

Vision loss related to cataract is curable by a timely surgical intervention; however, the cataract surgical coverage still remains inadequate in many parts of the world despite availability of high-end treatment facilities [8]. Inadequate surgical coverage of cataract could be due to poor patient turnover, lack of awareness about the cataract eye disease especially in rural settings and due to prevailing challenges faced by the patients. Some of the barriers for cataract surgeries are the cost of surgery, long distance to the hospital, cultural and social barriers, and the lack of trust in the outcome of surgeries [8]. The lack of awareness about the cataract eye disease was reported to be one of the main barriers to cataract surgery [9]-[11]. The concept of blindness is interpreted differently among gender, many don't know the symptoms of cataract and some didn't feel the need for an eye checkup [8] [12].

Some people still believe that blindness in old age is the part of aging and there is no cure for it. These misconceptions about the cataract among the elderly population could be attributed due to their poor knowledge about it. Delay in timely management of cataract poses the risk of cataract related complications which can possibly lead to irreversible blindness. Phacomorphic glaucoma, lens induced

uveitis and dropped nucleus are some of the known late complications of hypermature cataract where the vision restorative surgery becomes a challenge [13]. Not many patients are keen to come forward to the hospital for eye check-up unless one is advised, referred for eye checkup or their sight becomes nonfunctional. As per the RAAB survey of Bhutan, 37.5% of blinded people due to cataract were levelled as "need not felt" meaning a significant number of blinded people didn't feel the importance of eye checkup or had ignored their deteriorating vision [7].

In Bhutan, long travel distance to the hospital and difficult geographic terrain are the biggest challenges. Although the road connectivity is good in the country, remoteness of the places makes it difficult to reach the eye care services. Enhancement of cataract awareness and improvement of challenges faced by the patients in availing the surgical services are the important measures to improve patient turn over for the cataract surgery. There is no previous literature regarding the level of knowledge about the cataract eye disease among the elderly patients in Bhutan. Since cataract is more prevalent among patients aged 50 years and above, this study was aimed at assessing the cataract awareness, barriers to cataract surgery and cataract surgical coverage among the patients who presented to the hospitals where the ophthalmologist were present.

2. Methodology

This study was designed as a multicenter cross-sectional survey of awareness related to the cataract disease and barriers to the cataract surgery in five regional hospitals in Bhutan where the cataract surgical services were provided. During the time of this study, only five hospitals in the country had ophthalmologists to provide the cataract surgical services, hence the five hospitals were chosen for the study. The hospitals included Jigme Dorji Wangchuck National Referral Hospital (JDWNRH) in Thimphu, Eastern Regional Referral Hospital (ERRH) in Mongar, Central Regional Referral Hospital (CRRH) in Gelephu, Phuntsholing General Hospital, and Samtse General Hospital. The cross-sectional survey was conducted from 1st September to 30 October 2025. Patients aged 50 years and above who were physically and mentally healthy and also willing to participate in the study were enrolled. Overall sample size for this study was calculated based on the assumption that 50% of patients aged ≥ 50 years are aware about cataract blindness, with level of significance (α) 5%, precision (E) of 5% and confidence limit of 95%, the sample size for the study was 347. Considering 10% nonresponse and drop out, the minimal sample size for the study was 380. An equal number of 76 participants were recruited from each five regional hospitals.

Prior to the study, ethical clearance was obtained from the research ethic board of health (REBH), Ministry of Health and the study site clearance was taken from hospital administration. Participants were explained about the purpose and their voluntary participation were ensured. After the explanation, written informed consent was taken from all the participants. To reduce the assessor's bias, an ophthalmic nurse and an ophthalmic technician were assigned for assessing cataract

awareness and barriers to cataract surgery using pre-validated questionnaires throughout the study. To reduce the examiner bias, one ophthalmologist was assigned to examine the participant's eye using slit lamp bio microscopy. Each participant followed three stages of awareness questionnaire and cataract screening procedure.

2.1. Enrollment and Awareness Assessment

This phase of the study involved participant's selection and enrollment for the study followed by assessment of cataract blindness awareness. Patient aged 50 years and above who were healthy and willing to participate in the study were selected. Patients who were critically ill, hard of hearing and nonverbal were excluded. Recruitment of participants commenced from the reception desk of outpatient department (OPD) in each hospital. To reduce the sample selection bias based on participants' educational or occupational status, simple random sampling methods were used whereby, on a typical working day 5 participants were randomly selected using a computer lottery program from the token numbers issued at reception desk.

Using a structured questionnaire, participant's name, age, sex, occupation, education, ethnicity and address were recorded. All the participants were enquired for cataract related awareness using a questionnaire. In the cataract awareness questionnaire, there were total of 5 basic questions related to cataract with 19 multiple choices of right and wrong answers which were explained in simplified local language. The 5 main stems of cataract awareness questions were: 1) Whether they have heard about cataract; 2) Knew about what is cataract; 3) Knew about the worse effect of cataract; 4) Knew cataract is treatable; 5) Knew how cataract is treated. A score of 1 was given for the right answer and 0 for the wrong answer. The overall level of awareness regarding the cataract eye was based on their correct score. The percentage of awareness for the study population was calculated using formula; (A ÷ B)/100 where; A = is the correct scores of all the participants and B = is the overall total score. The overall total score (B), was calculated as; (nQ × TP) where; nQ = total questions, TP = total participant. Based on the scoring, it was interpreted as: score < 50%—inadequate (Poor), score (50 - 75)%—moderately adequate (fair) and score > 76%—adequate (Good/Excellent). Scoring interpretations of cataract awareness questionnaires were adapted based on previous similar published studies [14].

2.2. Assessment of Cataract

In this phase, all the participants underwent routine visual acuity assessment, refraction followed by history and examination under slit lamp bio-microscope. Cataract related conditions were sub-classified as: 1) Nuclear sclerosis; 2) Cortical cataract; 3) Posterior sub-capsular cataract (PSC); 4) Mixed type; 5) Mature cataract; 6) Hyper-mature; 7) Complicated cataract; 8) Pseudophakia; 9) Aphakia. The status of visual acuity among the participants were based on the presenting visual

acuity (PVA) in their better seeing eye which were interpreted as: 6/6 to 6/12—normal, 6/18 to 6/60—mild-moderated visual impairment, 6/60 to 3/60—severe visual impairment and PVA worse than 3/60 as blindness.

2.3. Cataract Surgical Coverage Calculation

The overall cataract surgical coverage (CSC_{person}) adjusted for person, was calculated as proportion of individuals out of operable cataract using formula a/(a + b) where; a = individuals who received cataract surgery in at least one eye or both, b = total individuals with operable cataract (either unilateral or bilateral) with PVA worse than 6/12. The effective cataract surgical coverage (eCSC) was calculated as a proportion of pseudophakic eyes with PVA better than 6/12, using formula c/(c + b) were; c = pseudophakic eye with PVA better than 6/12. CSC and eCSC were also calculated for cataract blind eye and cataract visual impairment.

2.4. Assessment of Barriers to Cataract Surgery

After thorough examination, those patients diagnosed as having cataract related conditions were assessed for the barrier to cataract surgery using a pre-validated questionnaire based on the previous similar study (17). The cataract related conditions included individuals with both unoperated cataracts and operated cataracts (pseudophakia and surgical aphakia). Barriers to cataract surgery included: 1) Hospital distance; 2) Logistic problems; 3) Not being aware of treatment service; 4) Fear of cataract surgery; 5) Personal escort problem; 6) Perceived lack of need for surgery. All the data was compiled and stored in Microsoft Excel and then it was transferred to SPSS software for statistical analysis.

2.5. Statistical Analysis

Statistical Package for Social Sciences (SPSS) Program for Windows (SPSS Inc, Chicago, IL, USA), (version 26) was employed for the analysis. Descriptive statistics were used to describe the demographic and clinical characteristics of the patients. Categorical variables are presented using frequency and percentage. The ordinal and continuous variables were checked for normality and inspected for outliers using the Shapiro-Wilk test at the 0.05 significance level, which indicated a non-normal distribution. Therefore, Spearman correlation at 99% confidence interval was employed to explore the relationship between variables. Cross tabulation and Chi-square test of independence were performed when applicable to find the association between two nominal values at a 0.05 significance level.

3. Result

A total of 380 patients participated in the study from the five regional hospitals, of which 55% (N = 209) were females, mean age of participants was 66.83 years (SD = 10.77) and range = 50 - 94 years. Concerning ethnicity, Lhotshampa (41.3%) represented the highest, followed by Sharchop (34.5%) and Ngalop (15.8%). More than half of the participants were farmers (55.8%, N = 212) (**Figure 1**). The majority of

the participants did not receive formal education (68.9%, N = 262), only 0.8% had postgraduate education (Figure 2).

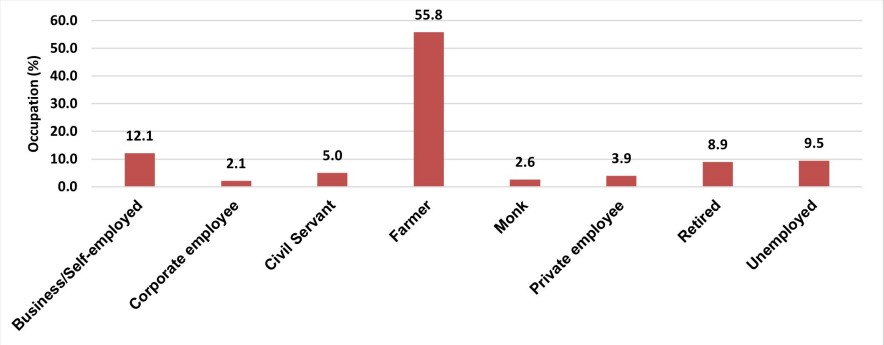


Figure 1. Participants based on occupation.

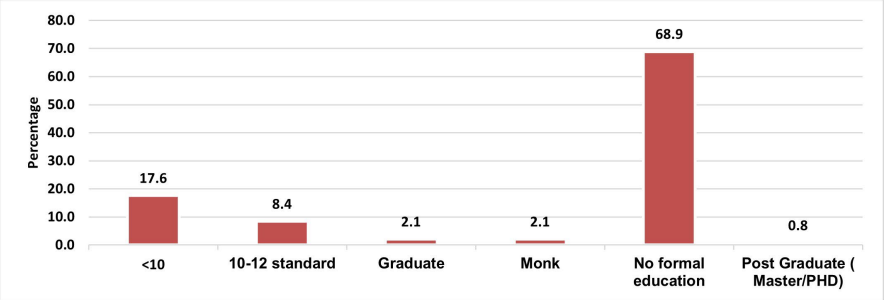


Figure 2. Participants based on educational status.

3.1. Awareness of Cataract

There were 5 main stems of cataract awareness questions and a total of 380 participants, therefore the total score was 5 × 380 = 1900. Out of 1900 total score, the participants had a total of 913 right score therefore, based on the scoring, the overall level of cataract awareness was 48.05%. Out of 380 participants, 60.79% of them had heard about cataract however, 58.16% (n = 221) didn't know what is cataract, 45.53% didn't know the worse effects of cataract, 53.95% don't know whether cataract is treatable or not and 62.89% of them didn't know how cataract is being treated as in Table 1. The majority of participants had the wrong score (Table 1).

Table 1. The overall score of awareness questions amongst the participants. N: Number of participants.

Cataract Awareness Questions	Right Score N (%)	Wrong Score N (%)
1) Heard about cataract	231(60.79)	149 (39.21)
2) Knew about cataract	159 (41.84)	221(58.16)
3) Knew about worse effects of cataract	207 (54.47)	173 (45.53)
4) Knew cataract is treatable	175 (46.05)	205(53.95)
5) Knew how cataract is treated	141 (37.11)	239 (62.89)
Total score: (5 × 380) = 1900	**913 (48.05%)**	**987 (51.95%)**

Among 231 patients who heard about the cataract, cross tabulation followed by Chi-square test were done to assess the difference of basic idea of cataract between gender, age range, educational status, occupation and ethnicity. There was no significant difference of basic idea of cataract between all the categories as shown in Table 2.

Table 2. Level of cataract related awareness based on age, gender, ethnicity, education and occupation.

Level of awareness	Poor N (%)	Fair N (%)	Good/excellent N (%)	P value
Gender (N)				
Female (114)	35 (30.70%)	20 (17.54%)	59 (51.75%)	0.77
Male (117)	39 (33.33%)	23 (19.66%)	55 (47.00%)	
Age range (N)				
50 - 60 year (109)	34 (31.19%)	36 (33.03%)	39 (35.78%)	
61 - 70 year (91)	29 (31.52%)	30 (32.61%)	32 (34.78%)	0.992
>71 Year (31)	10 (32.26%)	11 (35.48%)	10 (32.26%)	
Education (N)				
<10 (39)	9 (23.08%)	9 (23.08%)	21 (53.85%)	
10 - 12 standard (20)	10 (50.00%)	2 (10.00%)	8 (40.00%)	
Graduate (8)	3 (37.50%)	2 (25.00%)	3 (37.50%)	0.44
Monk (6)	2 (33.33%)	0 (0.00%)	4 (66.67%)	
No formal education (155)	50 (32.26%)	28 (18.06%)	77 (49.68%)	
Postgraduate (Master/PHD) (3)	0 (0.00%)	2 (66.66%)	1 (33.33%)	
Occupation (N)				
Business (32)	3 (9.37%)	11(34.37%)	18 (56.25%)	
Corporate employee (4)	1 (25.00%)	1 (25.00%)	2 (50.00%)	
Civil servant (17)	4 (23.53%)	2 (11.76%)	11 (64.71%)	
Farmer (113)	47 (41.59%)	23 (20.35%)	43 (38.05%)	0.29
Monk (3)	0 (0.00%)	1 (33.33%)	2 (66.67%)	
Private employee (14)	5 (35.71%)	4 (28.57%)	3 (35.71%)	
Retired (23)	2 (8.70%)	3 (13.04%)	18 (78.26%)	
Unemployed (25)	8 (32.00%)	2 (8.00%)	15 (60.00%)	
Ethnicity (N)				
Kheng (8)	0 (0.00%)	2 (25.00%)	3 (62.50%)	
Lhatshampa (85)	23 (27.56%)	16 (18.82%)	46 (54.12%)	
Ngalop (39)	13 (33.33%)	9 (23.08%)	17 (43.59%)	0.43
Sharchops (92)	33 (35.87%)	14 (15.22%)	45 (48.91%)	
Others (7)	5 (71.43%)	1 (14.29%)	1 (14.29%)	

3.2. Diagnosis

Based on the eyes of the person, 200 (52.63%) out of 380 participants had cataract related conditions including operated eyes. Among the cataract related conditions; 65.00% (n = 130) had cataract, 34.00% (n = 68) were pseudophakic and 1.00% (n = 2) were aphakic. The overall prevalence of cataract and pseudophakia were 34.2% (n = 130) and 17.89% (n = 68) respectively. Among the cataracts, the most common presentation was immature cataract 37% (n = 74) which included cortical cataract (CC), nuclear sclerosis (NS), posterior subcapsular cataract (PSC), mixed types as in Figure 3. Out of the cataract patients, 17.00% (n = 34) had mature cataract, 6% (n = 12) had hypermature cataract and 5% (n = 10) had complicated cataract on presentation (Figure 3).

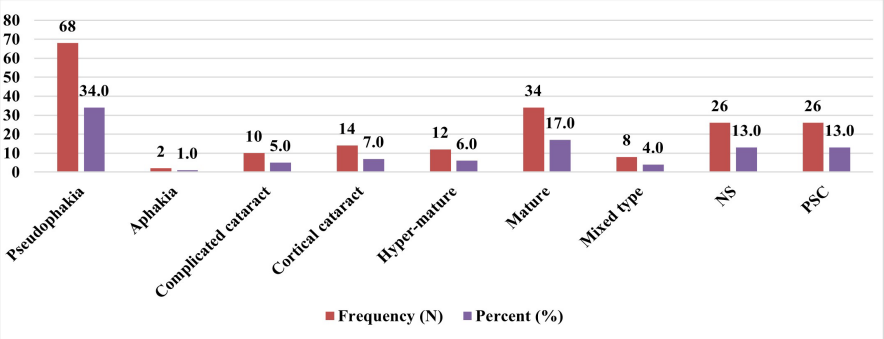


Figure 3. Types of cataract and related conditions among the elderly patients. NS: Nuclear sclerosis, PSC: Posterior Sub-capsular Cataract.

All the patients with cataract and related conditions were classified as having normal vision, mild/moderate visual impairment (VI), severe VI and blindness based on their presenting visual acuity (PVA). Among the pseudophakic patients, 53 (77.9%) had normal vision, 14 (20.6%) had mild/moderate visual impairment and 1(1/5%) had severe visual impairment (Figure 4). No patient was blinded due to pseudophakia. Among the cataract patients, 57 (43.8%) had mild-moderate VI, 2 (1.5%) had severe VI, 15 (11.5%) were blinded whereas 56 (43.08%) cataract patients are asymptomatic on presentation (Figure 5).

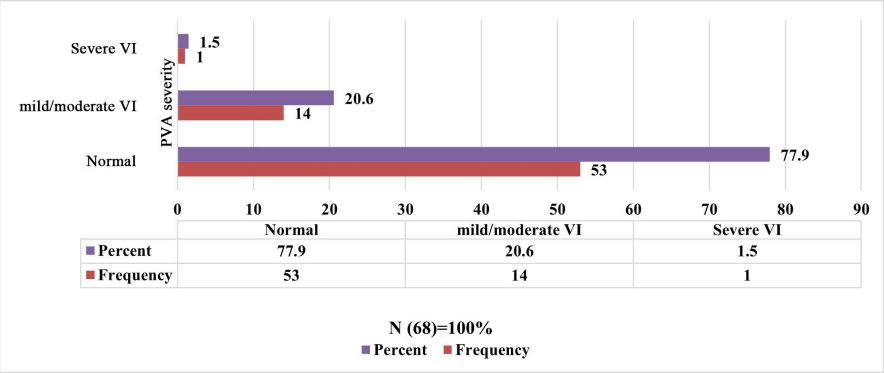


Figure 4. Presenting visual acuity (PVA) among pseudophakic patients.

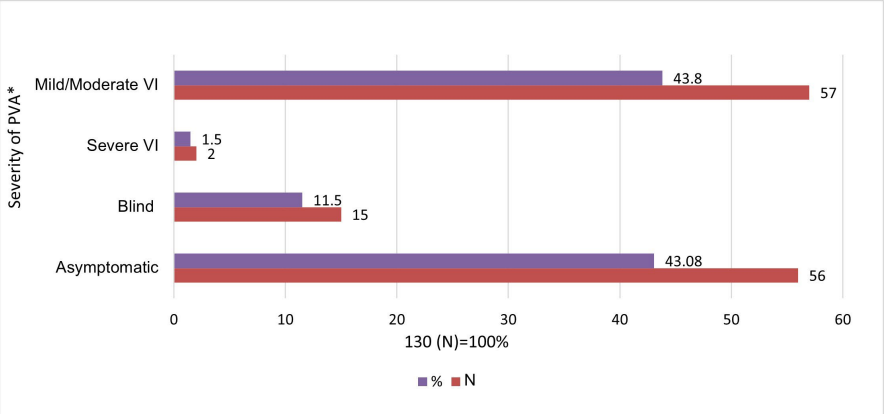


Figure 5. Visual acuity among cataract patients based on PVA. PVA: Presenting Visual Acuity, VI: Visual Impairment.

3.3. Cataract Surgical Coverage Result

The cataract surgical coverage was based on the proportion of operated eyes (n = 70) and operable cataract (n = 74) with PVA worse than 6/12. An age adjusted cataract surgical coverage (CSC) calculated in the eyes of persons was 48.61%. Age adjusted CSC for the blind eye was 81.93%; **Table 3**. The overall effective cataract surgical coverage (eCSC) was 41.73% which was calculated as a proportion of pseudophakic eyes with PVA better than 6/12.

Table 3. Comparison of current cataract surgical coverage (CSC) with RAAB survey 2018; Bhutan.

	Category	PVA of operable cataract	Present Study 2026; Total (%)	RAAB 2018; Total (%)
CSC	**Overall CSC**	<6/12	**48.61**	**NA**
	CSC for mild-Moderate VI	6/18 - 6/36	55.12	55.6
	CSC for Severe VI	6/60 - 3/60	97.22	83.2
	CSC for blind eye	<3/60	81.93	86.1
eCSC	**Overall eCSC**	<6/12	**41.73**	**NA**
	eCSC for mild-moderate VI	6/18 - 6/36	40.46	39.9
	eCSC for severe VI	6/60 - 3/60	69.74	62.7
	eCSC for blind eye	<3/60	59.55	67.3

RAAB: Rapid assessment of avoidable blindness, NA: not available.

3.4. Barriers to Cataract Surgery

200 patients who were diagnosed as having cataract and related conditions were assessed for six possible barriers to cataract surgery. According to the score of each question, the three top most barriers to the cataract surgery were: fear of undergoing cataract surgery as main barriers which accounted for 79.5% (n = 159), likewise, 72.5% (n = 145) had personal escort problems and 59.5% (n = 119) did not

know about the treatment services (Figure 6). The majority of the patients didn't have treatment cost as a barrier to the cataract surgery and most of the patients felt the need to seek cataract surgical services (Figure 6).

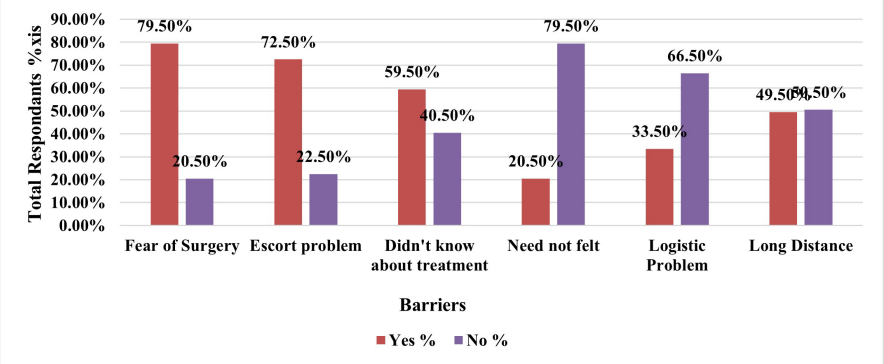


Figure 6. Barriers to cataract surgery among the elderly patients.

4. Discussion

In Bhutan, not every district has an ophthalmologist to provide cataract surgery, thus reaching cataract surgical services in the remote places is one of the biggest challenges. To improve the cataract surgical coverage in the country, operative mobile eye camps (OMEC) are being conducted annually to all districts. In Bhutan phacoemulsification has been introduced as the standard cataract surgical technique at the National Eye Centre, whereas manual small-incision cataract surgery (MSICS) is performed in district hospitals and during OMEC. However, the cataract surgical coverage seems to be inadequate in the country. In this study, the cataract surgical coverage was 48.61% which was relatively low compared to the neighboring countries for example, CSC in Nepal was reported as high as 82.7%, likewise 57.3% in India and 57.2% % in China [15]-[17]. In Bhutan, considering low CSC, there is a need to gear up cataract surgical services to improve CSC. Looking at the effective cataract surgical service (eCSC), this study showed overall eCSC of 41.73%. There was no drastic difference between CSC (48.61%) and eCSC (41.73%) which could imply that the cataract surgical outcome is fairly good in Bhutan. In this study, the CSC for blind eye (81.93%) was less compared to 86.1% in RAAB survey 2018, whereas the CSC for severe VI (97.22%) was better compared 83.2% in RAAB survey [7]. It implies, there is still backlog of cataract blindness among elderly patients in Bhutan. As per the world health assembly in 2021, every country should achieve a 30%-point absolute increase in eCSC by 2030. Therefore, Bhutan should strive to increase eCSC to 71.73% by 2030 [18]. This study was a multicenter hospital-based study among the eye patients presented at the hospital yet the CSC was low which implies the community-based CSC will be even lesser. It could mean that the hospital turnover of the cataract patients is less or cataract surgical services are not adequately reaching in the remote places.

Low CSC could be attributed to many factors, out of which lack of adequate knowledge and ideas about the cataract could be one of the most important bar-

riers to the cataract surgery. In this cross-cross sectional survey, the overall level of awareness regarding the cataract was 48.05% which was poor and inadequate. There were no significant differences of basic idea of cataract between genders, age range, educational status, occupation or the place of residence which could infer that the overall knowledge of cataract eye condition is poor among all the categories of patients aged 50 years and above in Bhutan. Although 60.79% of them had heard about cataract, their in-depth knowledge about cataract was not adequate. Overall, the poor awareness about cataract eye disease such as its symptoms, or whether cataract is treatable or not could significantly affect people's willingness to come forward to avail the cataract surgical services. Also, the majority of the elderly participants were farmers 55.8% and 68.9% had no formal education. It could imply that the health seeking behavior among farmers and uneducated people are better compared to the educated lot or the elderly population are mostly farmers, uneducated and not aware about the cataract. Cataracts being the leading cause of blindness in adults, elderly people are at risk of cataract blindness due to the poor cataract awareness. The cataract awareness score in this study was low compared to the neighboring countries which ranges from 52.00% in Bangladesh and as high as 69.8% in India, however it is comparable with Nepal's cataract awareness score of 46.9% [19]-[21].

In addition to poor awareness of cataract, the majority of participants had fear (79.50%) for cataract surgery as one of the major barriers, likewise, the majority had personal escort problems and at least 49.50% of participants had long travel to the hospital as a barrier to the cataract surgery. In Bhutan, phacoemulsification and mSICS are routinely provided free of cost to the people, therefore the treatment cost was not a big issue. However, one of the biggest challenges for the people to avail cataract surgical services are having to travel long distances because not every district hospital has an ophthalmologist. In this study, 59.50% of the participant were not aware of availability of cataract treatment services. In the rural part of Bhutan, some elderly people still dwell in myths about incurable blindness with age. Although, not all the barriers to the cataract surgery are correctable, some of the important barriers like improving cataract awareness, health campaigns and interaction of eye care professionals with communities can alleviate fear of eye surgeries. In this study, the cataract prevalence was 34.2% which was relatively high compared to 17.2% global prevalence of adult cataract. High prevalence of cataract in this study could be due to the hospital-based nature of the study.

This study was a multicenter hospital based where it was conducted among patients who were presented to the hospital with eye conditions. Since it is a hospital-based study, the finding of this research may not be applicable to the general population of the nation. Therefore, a community-based large-scale study is needed to get a clear picture of prevalence of cataract, cataract awareness and people's challenges in receiving cataract surgical services.

5. Conclusion

Although cataract is the leading cause of blindness, the overall level of cataract

awareness among patients aged 50 years and above was relatively poor in this study. In addition to poor awareness, personal escort problems, fear of eye surgery and long hospital travels were the biggest challenges patients had faced while receiving cataract surgical services. There is a need to upscale the cataract surgical coverage in the country by addressing some of the barriers such as a cataract awareness campaign, and health personal interaction and education about the cataract surgery to improve patient's willingness in availing this surgery.

Acknowledgements

We sincerely acknowledge the support of the research funding agency: Cure Blindness Project for their valuable financial and institutional support. We are also grateful to the Department of Ophthalmology, GKCW National Eye Centre for the guidance and support throughout the project. Our sincere thanks go to senior ophthalmologists, collogues and all the support staffs for their assistance and contributions, which were essential to the successful completion of this work.

Author Contributions

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Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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