



# Summary of Report Rapid Assessment of Avoidable Blindness Bhutan- 2018



## **Conducted by:**

Primary Eye Care Programme (PECP)  
Ministry of Health

## **In collaboration with:**

Department of Ophthalmology JDWNRH  
Thimpu, Bhutan

## **Technical Support:**

International Agency for Prevention of Blindness  
(IAPB)

## **Financial Support:**

Lions Clubs International Foundation (LCIF)

# Summary of Findings:

## Backgrounds:

Bhutan is one of the country where nationwide blindness survey has been carried out in regular intervals. The Rapid Assessment of Avoidable Blindness (RAAB) Survey 2018 in Bhutan is follow-up population based blindness survey in the country. The survey sampling frame included population aged 50 years and older across all 20 districts of the kingdom. The RAAB is designed to look at the risk of blindness in the population aged 50 and over, since 80 to 90% of blindness is known to occur in this age group.

The first RAAB survey in Bhutan was conducted in 2009. In this survey a total of 4,100 people 50 years or older were enrolled in 82 clusters randomly selected in probability proportionate to size. The survey revealed age sex adjusted prevalence of blindness as 1.5%. Cataract was the leading cause of blindness (67.1%) and severe visual impairment 74.1 %. Cataract surgical coverage was 72.7% among bilateral cataract blind. Good visual outcome 56.8% (presenting visual acuity 6/18 or better) and poor outcome was found in 23.6% of cataract operated eyes.

The follow-up survey was carried out after 9 years in December 2017 to February 2018. The survey was conducted by Primary eye care programme, Ministry of Health, Bhutan with financial support from Lion Clubs International Foundation and technical support from International Agency for Prevention of Blindness (IAPB)-South East Asia Region.

## Methodology:

In this survey a total of 5,100 participants aged 50 years and older were enrolled in 101 randomly selected clusters (50 from each cluster) with population proportionate to size in all 20 districts. Among the selected clusters 70 were in rural area and 31 were urban area (the census shows population distribution is in the ratio 70:30). RAAB six survey protocol with peek mRAAB smartphone was used in collection of data. Three teams each lead by ophthalmologist were mobilized for data collection after three days of training and two days of IOV test and pilot study. House to house visit in selected study clusters were made by study team to enrol the eligible survey participants for clinical examination and data collection. A written consent was obtained with each survey participant before enrolling them; the survey protocol was approved by Research Ethical Approval Committee, Ministry of Health, Royal Government of Bhutan.

# Results

The survey achieved 98.4% response rate, a total of 4970, underwent eye examination and data collection out of 5,100 enrolled participants.

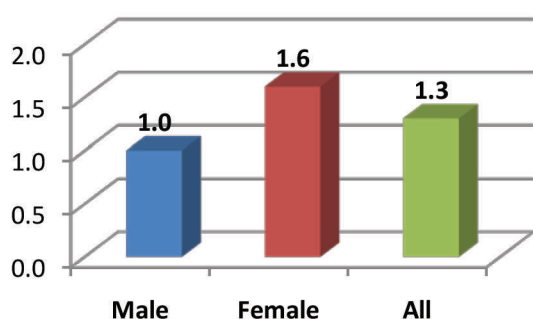
## Prevalence of Blindness and Visual Impairment

In this survey, overall prevalence of blindness based on presenting visual acuity (<3/60) in the sample population was found to be 1.3% (95% CI 0.9 to 1.7). Prevalence of blindness in male was 1.0% (95% CI 0.5 to 1.5) and 1.6 (95%CI 0.9 to 2.3) in female.

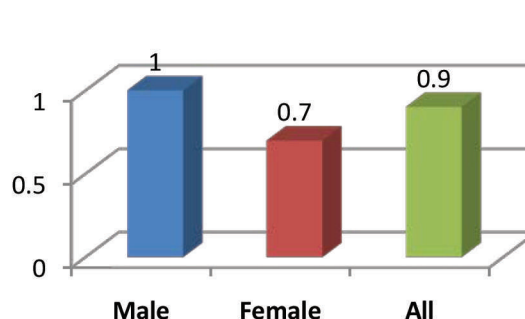
### Prevalence of visual impairment in sample population

| Vision Category                             | Male, % (95% CI)  | Female, % (95% CI) | All, % (95% CI)   |
|---|-------------------|--------------------|-------------------|
| Blindness, PVA<3/60                         | 1.0 (0.5 to 1.5)  | 1.6 (0.9 to 2.3)   | 1.3 (0.9 to 1.7)  |
| Severe visual impairment PVA<6/60 to 3/60   | 1.0 (0.6 to 1.4)  | 0.7 (0.3 to 1.0)   | 0.9 (0.6 to 1.1)  |
| Moderate Visual Impairment PVA<6/18 to 6/60 | 6.8 (5.8 to 7.8)  | 6.9 (5.8 to 8.0)   | 6.8 (6.1 to 7.6)  |
| Early visual impairment PVA <6/12 to 6/18   | 9.2 (8.0 to 10.3) | 9.3 (7.8 to 10.7)  | 9.2 (8.2 to 10.2) |

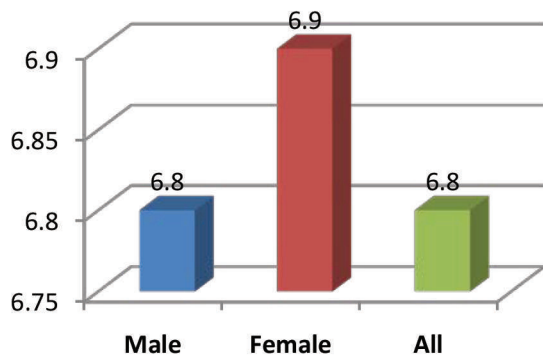
Prevalence of Blindness %



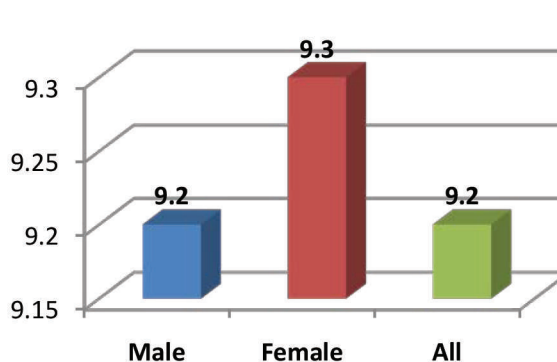
Prevalence of SVI %



Prevalence of MVI %



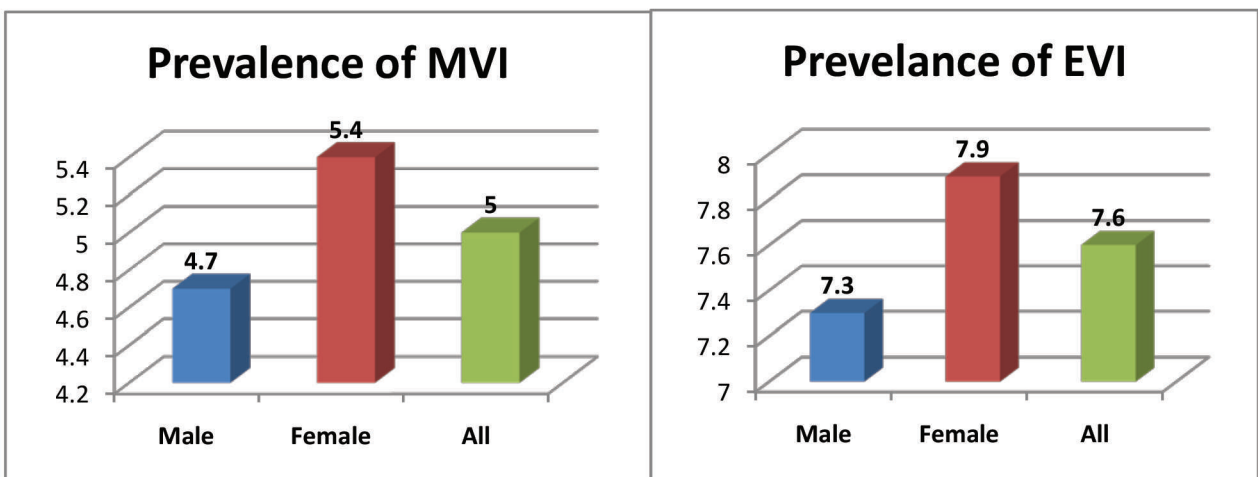
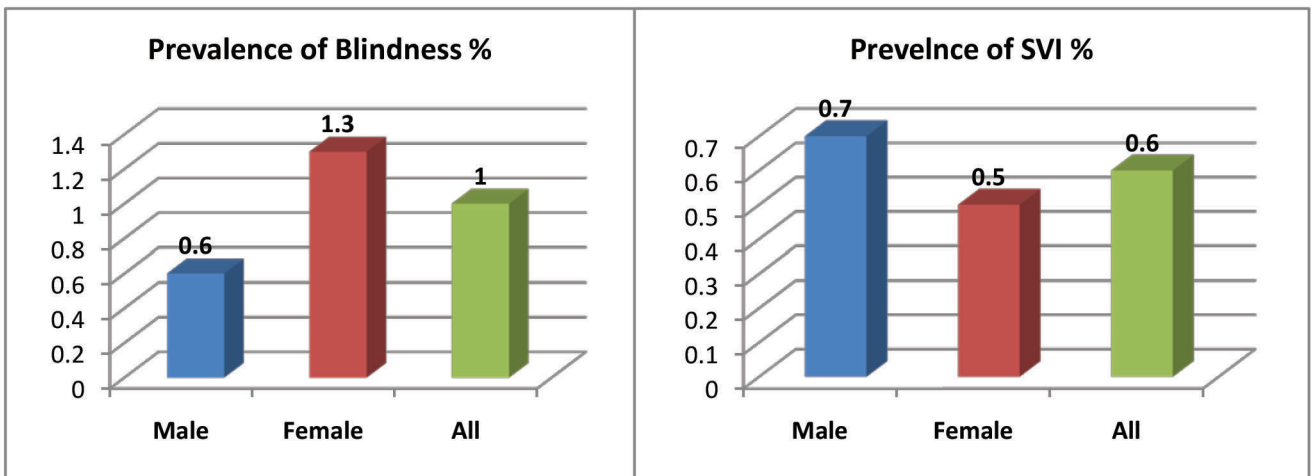
Prevalence of EVI %



**Bhutan Blindness Data: Crude Prevalence 1.3% (Male 1.0, Female 1.6)**

The age sex adjusted prevalence of blindness based on presenting visual acuity of <3/60 was 1.0% (95% CI 0.6 to 1.4), in male 0.6% (95% CI 0.2 to 1.1) and 1.3% (95% CI 0.6 to 2.0) in female.

| Vision Category   | Male % (95% CI)   | Female % (95% CI)   | Total % (95% CI)    |
|---|-------------------|---------------------|---------------------|
| <b>Blindness</b><br>(PVA<3/60)                                | 0.6 (0.2 to 1.1)  | 1.3 (0.6 to 2.0)    | 1.0 (0.5 to 1.4)    |
| <b>Severe Visual Impairment (SVI)</b><br>(PVA<6/60 to 3/60)   | 0.7 (0.3 to 1.1)  | 0.5 (0.2 to 0.9)    | 0.6 (0.4 to 0.9)    |
| <b>Moderate Visual Impairment (MVI)</b><br>(PVA<6/18 to 6/60) | 4.7 (3.7 to 5.7)  | 5.4 (4.3 to 6.5)    | 5.0 (4.2 to 5.8)    |
| <b>Early visual impairment (EVI)</b><br>(PVA <6/12 to 6/18)   | 7.3 (6.1 to 8.4)  | 7.9 (6.4 to 9.4)    | 7.6 (6.6 to 8.5)    |
| <b>All VI (PVA&lt; 6/12)</b>                                  | 13.3 (11.6 to 15) | 15.1 (13.1 to 17.1) | 14.2 (12.7 to 15.6) |



**Bhutan Blindness Data: Age sex adjusted Prevalence 1.0%  
(Male 0.6, Female 1.3)**

## Causes of Blindness and Visual Impairment

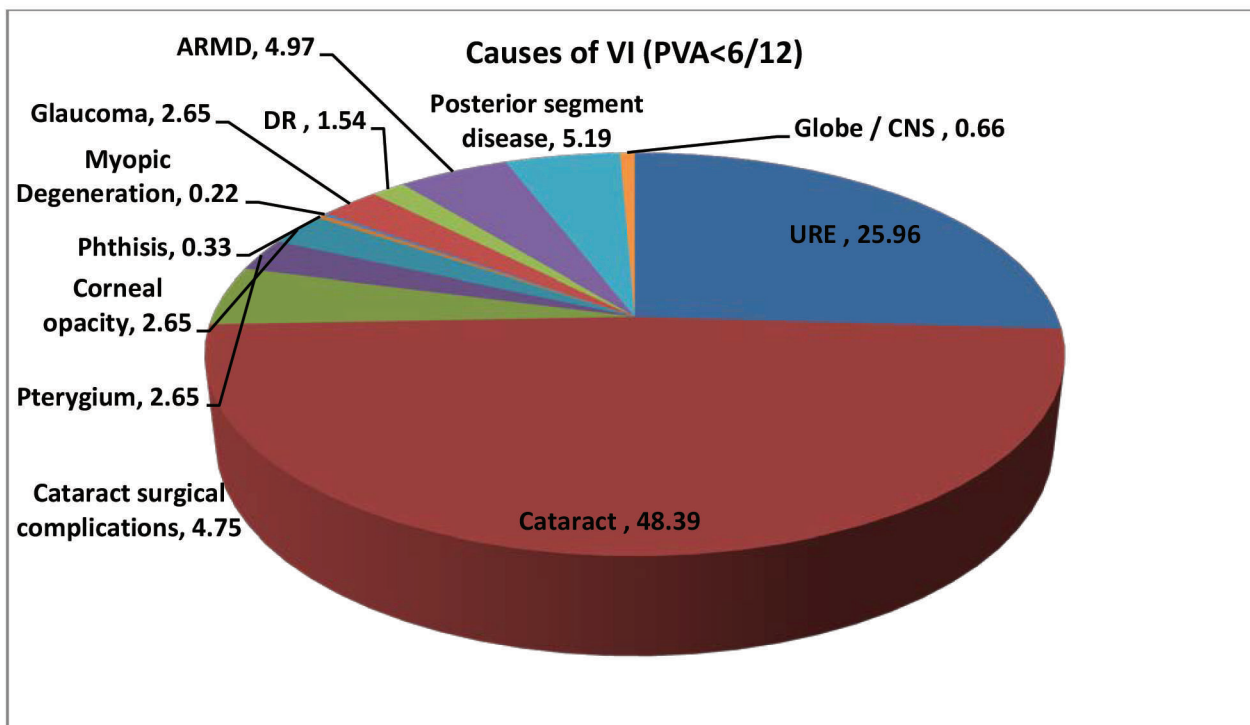
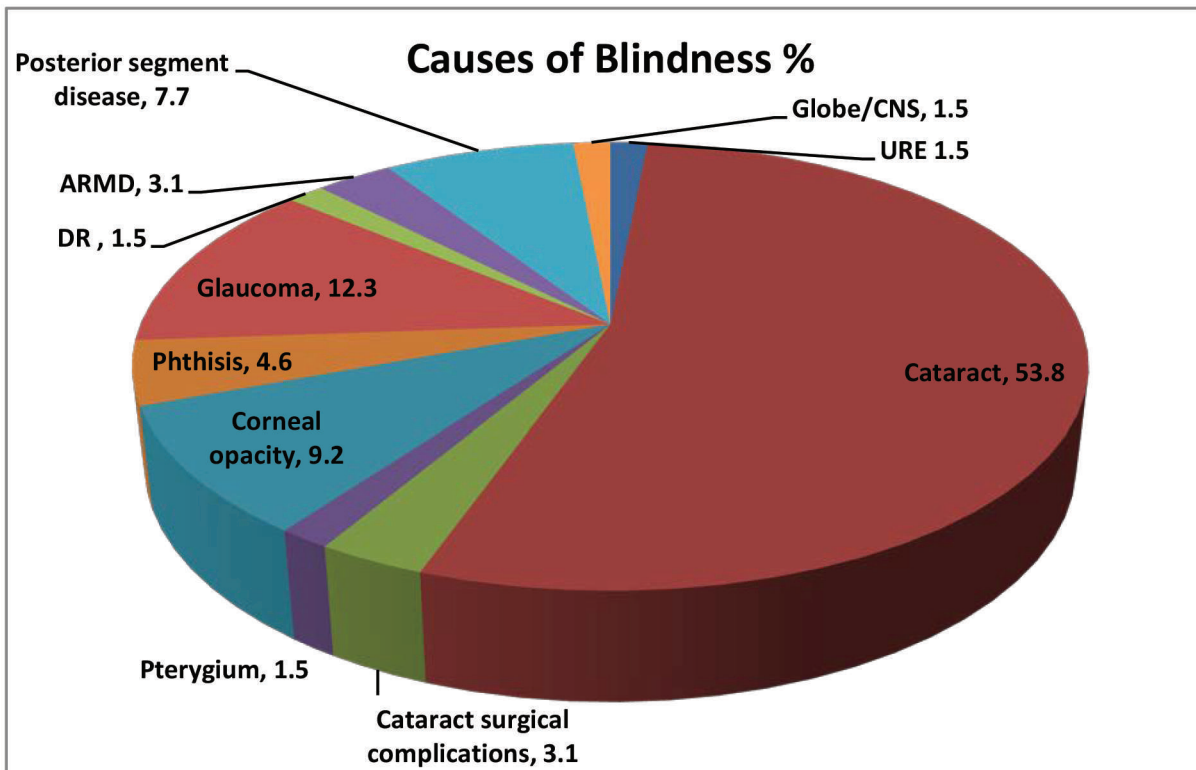
The major cause of bilateral blindness PVA <3/60 was cataract (53.8%), followed by Glaucoma (12.3%), non-trachomatous corneal opacity (9.2%) and posterior segment disorder (7.7%).

Cataract was still the leading cause among those with severe visual impairment and moderate visual impairment as 57.1% and 65.3 %. Uncorrected refractive error was leading cause of early visual impairment in 46.7%.

| Sl.no | Cause                           | Blindness |      | Severe VI |      | Moderate VI |      | Early VI |      | All VI |              |
|-------|---------------------------------|-----------|------|-----------|------|-------------|------|----------|------|--------|--------------|
|       |                                 | N         | %    | N         | %    | n           | %    | n        | %    | n      | %            |
| 1.    | Uncorrected Refractive error    | 1         | 1.5  | 3         | 7.1  | 17          | 5    | 214      | 46.7 | 235    | <b>25.96</b> |
| 2.    | Cataract untreated              | 35        | 53.8 | 24        | 57.1 | 222         | 65.3 | 157      | 34.3 | 438    | <b>48.39</b> |
| 3.    | Cataract surgical complications | 2         | 3.1  | 3         | 7.1  | 19          | 5.6  | 19       | 4.1  | 43     | <b>4.75</b>  |
| 4.    | Pterygium                       | 1         | 1.5  | 2         | 4.8  | 0           | 0    | 21       | 4.6  | 24     | <b>2.65</b>  |
| 5.    | Corneal opacity (Non Trachoma)  | 6         | 9.2  | 2         | 4.8  | 9           | 2.6  | 7        | 1.5  | 24     | <b>2.65</b>  |
| 6.    | Phthisis                        | 3         | 4.6  | 0         | 0    | 0           | 0    | 0        | 0    | 3      | <b>0.33</b>  |
| 7.    | Myopic Degeneration             | 0         | 0    | 1         | 2.4  | 0           | 0    | 1        | 0.2  | 2      | <b>0.22</b>  |
| 8.    | Glaucoma                        | 8         | 12.3 | 0         | 0    | 12          | 3.5  | 4        | 0.9  | 24     | <b>2.65</b>  |
| 9.    | Diabetic retinopathy            | 1         | 1.5  | 0         | 0    | 10          | 2.9  | 3        | 0.7  | 14     | <b>1.54</b>  |
| 10.   | ARMD                            | 2         | 3.1  | 2         | 4.8  | 20          | 5.9  | 21       | 4.6  | 45     | <b>4.97</b>  |
| 11.   | Other posterior segment disease | 5         | 7.7  | 5         | 11.9 | 27          | 7.9  | 10       | 2.2  | 47     | <b>5.19</b>  |
| 12.   | All globe / CNS abnormalities   | 1         | 1.5  | 0         | 0    | 4           | 1.2  | 1        | 0.2  | 6      | <b>0.66</b>  |
|       | Total                           | 65        | 100  | 42        | 100  | 340         | 100  | 458      | 100  | 905    | 100          |

Among the all population with blindness and visual impairment (BVI), cataract still accounts for 48.39% and uncorrected refractive error in 25.96%. Glaucoma, corneal lesions and posterior segment causes were other important blinding and visual impairment conditions found in this survey.

**Bhutan Blindness Data: Cataract leading cause of blindness in 53.8%, followed by Glaucoma 12.3%, Corneal Opacity 9.2 % and Posterior Segment 7.7%**



**Bhutan Blindness Data: Cataract leading cause of visual impairment in 48.39%, followed by URE 25.96%, Posterior Segment 5.19 % and Cataract sequel 4.75%**

## Cataract Surgical Coverage

Cataract surgical Coverage in bilateral cataract blind person was found to be 86.1 % (Male 91.3% and female 82.8%). Among the cataract blind eyes the coverage was 74.7% (Male 76.7% Female 73.1%).

| Cataract Surgical Coverage                               | Males      |          | Females    |          | Total      |          |
|--|------------|----------|------------|----------|------------|----------|
|  | Unadjusted | Adjusted | Unadjusted | Adjusted | Unadjusted | Adjusted |
| <b>Cataract Surgical Coverage (eyes) – percentage</b>    |            |          |            |          |            |          |
| VA < 3/60  | 76.7       | 76.9     | 73.1       | 74.1     | 74.7       | 75.3     |
| VA < 6/60  | 71.3       | 71.5     | 68.1       | 69.1     | 69.5       | 70.1     |
| VA < 6/18  | 45.7       | 46.9     | 47.6       | 47.4     | 46.2       | 47.3     |
| <b>Cataract Surgical Coverage (persons) – percentage</b> |            |          |            |          |            |          |
| VA < 3/60  | 91.3       | 93.2     | 82.8       | 85.7     | 86.1       | 88.7     |
| VA < 6/60  | 86.4       | 89.8     | 81.1       | 84.2     | 83.2       | 86.4     |
| VA < 6/18  | 51.4       | 60.0     | 59.1       | 64.7     | 55.6       | 62.6     |

Among the bilateral severe visual impairment due to cataract the surgical coverage was 83.2% and among the eyes was 69.5%.

| <b>Effective Cataract Surgical Coverage (persons) – percentage</b> |       |         |       |
|--|-------|---------|-------|
|  | Males | Females | Total |
| VA < 3/60  | 68.8  | 66.4    | 67.3  |
| VA < 6/60  | 62.5  | 62.9    | 62.7  |
| VA < 6/18  | 33.9  | 44.2    | 39.5  |

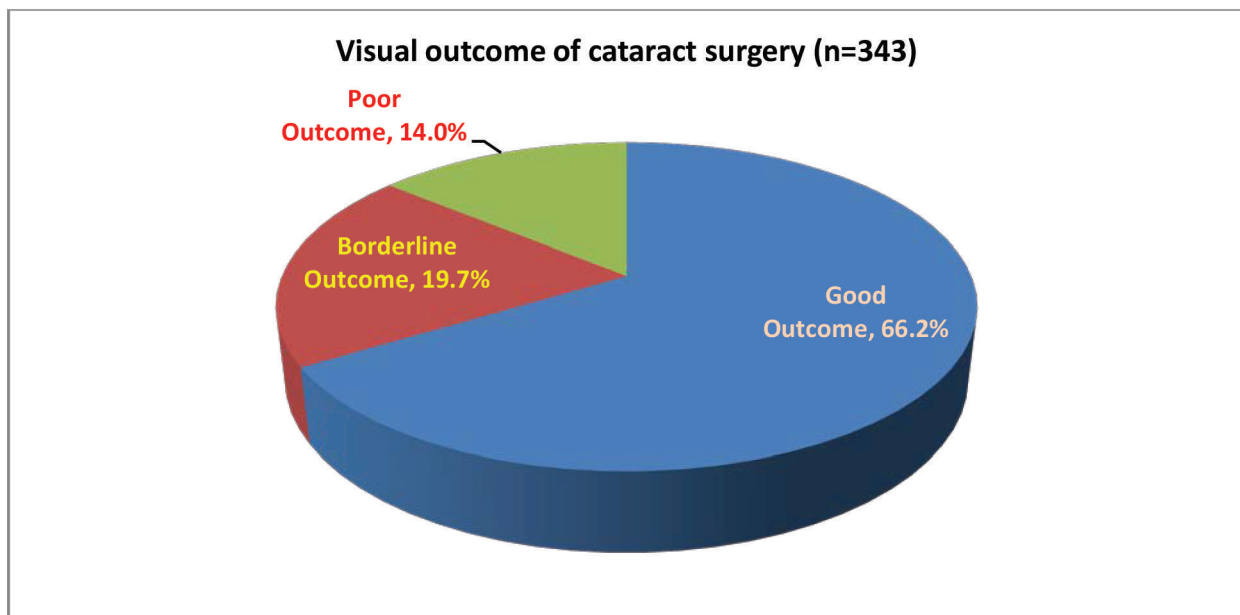
When cataract surgical coverage is combined with good outcome of cataract surgery (VA 6/18 or better) the effective cataract surgical coverage among the bilateral blind was 67.3 % and among those with severe visual impairment was 62.7%.

**Bhutan Blindness Data: Cataract surgical coverage among the bilateral cataract blind VA<3/60, 86.1%, Effective cataract surgical coverage 67.3%.**

## Visual Outcome of Cataract Surgery

Visual outcome of Cataract surgery with good outcome (PVA 6/18 or better), according to WHO standard was found in 66.3% of cataract operated eyes. Poor outcome was recorded as 11.5% of cataract operated eyes. Good visual outcome was found among those operated 4 to 6 years back (71.1%), compared to the eyes which were operated less than 3 years ago was (69.5%). Only 58.2% of the eyes operated 7years ago have good visual outcome.

| VA Category              | Non-IOL |       | IOL   |       | All   |       |
|--------------------------|---------|-------|-------|-------|-------|-------|
|                          | PVA     | BCVA  | PVA   | BCVA  | PVA   | BCVA  |
| Very good: can see 6/12  | 0.0%    | 15.4% | 50.6% | 58.4% | 49.3% | 57.4% |
| Good: can see 6/18       | 7.7%    | 7.7%  | 17.2% | 15.5% | 16.9% | 15.3% |
| Borderline: can see 6/60 | 30.8%   | 15.4% | 19.5% | 15.8% | 19.7% | 15.8% |
| Poor: cannot see 6/60    | 61.5%   | 61.5% | 12.8% | 10.3% | 14.0% | 11.5% |



**Bhutan Blindness Data: Visual outcome of cataract surgery, good outcome 66.2%, borderline, 19.7% and poor outcome 14.0%.**



## Barrier to uptake cataract surgical services

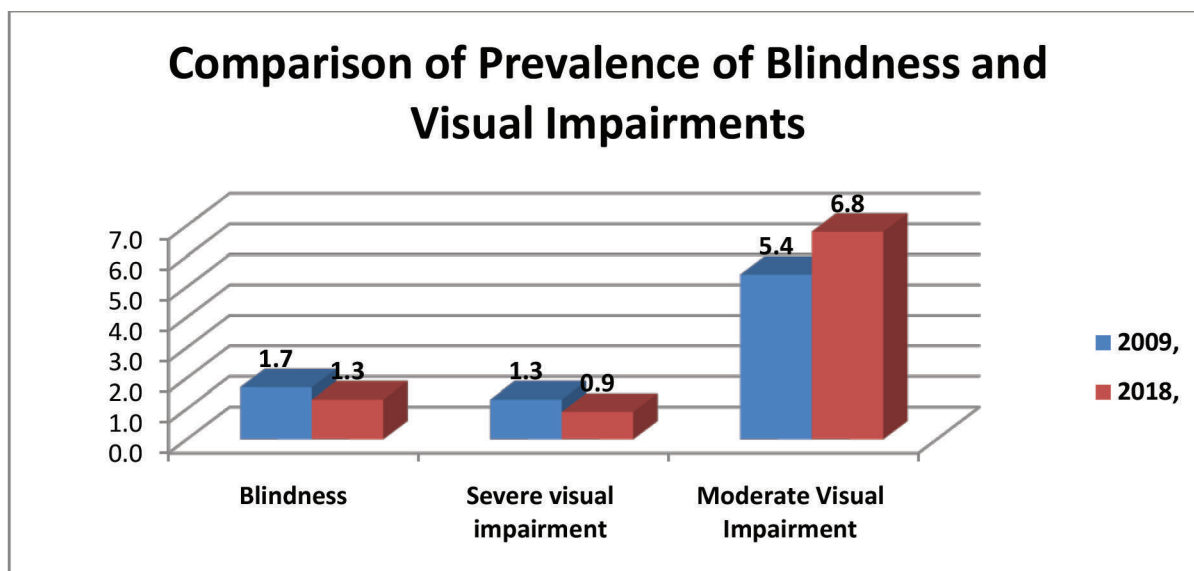
All health services are free of cost in Bhutan. Therefore, no one reported as financial reason as a barrier to undergo cataract surgical services.

Accessibility issues among the cataract blinds (BCVA<6/60) were found to be a prominent barrier to obtain cataract surgical services. Almost 50% of cataract blinds reported distance and lack of accompanying person as barriers to avail the services. This response might have been influenced by factors such as travel, food and loss of wages of accompanying person (indirect cost).

| Causes                        | Male (n=20) | Female (n=36) | Total (n=56) |
|-------------------------------|-------------|---------------|--------------|
| Need not felt                 | 35.00%      | 11.10%        | 19.60%       |
| Fear                          | 10.00%      | 8.30%         | 8.90%        |
| Cost                          | 0.00%       | 0.00%         | 0.00%        |
| Treatment denied by provider  | 0.00%       | 2.80%         | 1.80%        |
| Unaware treatment is possible | 15.00%      | 22.20%        | 19.60%       |
| Cannot access treatment       | 15.00%      | 13.90%        | 14.30%       |
| Non Accompany person          | 25.00%      | 41.70%        | 35.70%       |
| Total                         | 100.00%     | 100.00%       | 100.00%      |

**Bhutan Blindness Data: Accessibility is the prominent barrier to uptake cataract surgical services as 50.1%**

## Comparison of prevalence of blindness 2009 and 2018



### Conclusions:

The nationwide RAAB of 2018 was successfully conducted by government of Bhutan as a follow up of RAAB 2009. The present survey reveals that Bhutan has achieved the target set by WHO Universal Eye Health, Global Action Plan 2014-2019, in the blindness category with a decrease of prevalence of blindness by 33%. This study provides evidence of improvement in eye care services in Bhutan in last 8 years, as shown by a decrease in prevalence of blindness and cataract blindness as well substantial increase in cataract surgical coverage combined with improved visual outcome.

Despite the overall reduction of blindness prevalence of moderate visual impairment has increased. The prevalence of impairment due to cataract and refractive error (avoidable causes) still remains high. The difference in distribution of blindness and surgical coverage based on gender and rural/urban is still prevalent although statistically not significant. The emerging causes of blindness and visual impairment such as glaucoma, corneal lesions, diabetic retinopathy and posterior segment anomalies are significant. Improving of quality of cataract surgery to address issue of visual outcome, expansion of services to rural area are important issues to be addressed identified by survey. Bhutan needs to formulate long-term strategic action plan for eye health focused in strengthening primary eye care and comprehensive eye care service.

**Bhutan eye care service has achieved global targets set by WHO Global Action Plan 2014-2019, however it is recommended to formulate long-term strategic action plan on eye health to obtained further reduction of blindness and visual impairment prevalence.**



