Rapid Assessment of Avoidable Blindness

Report of findings from Pakistan, Matiari (2019)

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Contents

Sample representation

Table 1

Table 1: Eligible persons, coverage, absentees and refusals

Exam status	Female		Male		Total	
	n	%	*n*	%	*n*	%
Examined*	1 411	93.2	1 340	90.2	2 751	91.7
Refused	8	0.5	1	0.1	9	0.3
Incapable	63	4.2	74	5.0	137	4.6
Unavailable	32	2.1	70	4.7	102	3.4
Total	1 514	100.0	1 485	100.0	2 999	100.0

* The response rate is the percent examined

The response rate indicates the proportion of eligible, enumerated people who were examined. The RAAB sample size calculator includes the expected non-response rate in the sample and increases the sample size accordingly. This ensures that the sample size is powerful enough to estimate the prevalence of blindness with the desired precision.

If the response rate is lower than 80-90%, there is a concern that the conditions under review in the 10-20% who were not examined may be different to those that were examined (non-response bias). For example, non-responders in a RAAB may be younger than responders (e.g., working age vs retired) and may, on average, be less likely to be vision impaired.

If the response rate is over 95%, this might be an indication that eligible participants who were absent or refused to participate were not enumerated but rather replaced by eligible participants in the next household, which would introduce selection bias and mean that results are not representative of the population. For example, people with impaired vision may be more likely to be at home and people with good vision may be more likely to be away and unavailable. In certain settings (e.g., rural or remote) a response rate over 95% is not uncommon – participants may be more compliant with requests to stay home on the day of data collection, or more likely to work in the environment close to their home.

It is important to review this information in relation to the tables on representativeness of the sample below to identify whether a high response rate is valid.

Table 2, table 3

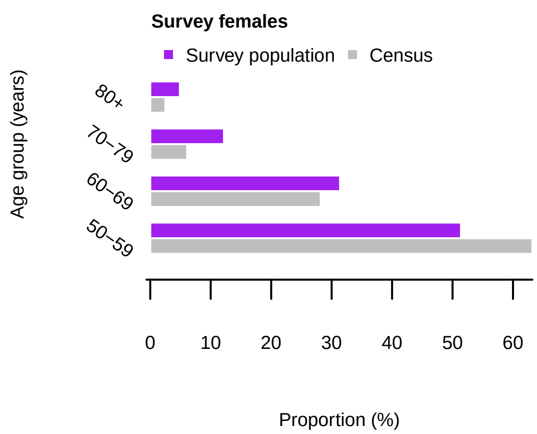
Table 2: Age and sex distribution of people examined in the sample

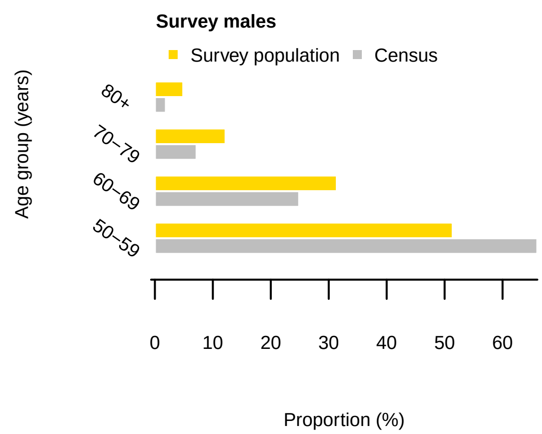
Age group	Female		Male		Total	
Years	*n*	%	*n*	%	*n*	%
50-59	892	63.2	884	66.0	1 776	64.6
60-69	398	28.2	334	24.9	732	26.6
70-79	86	6.1	96	7.2	182	6.6
80+	35	2.5	26	1.9	61	2.2
Total	1 411	100.0	1 340	100.0	2 751	100.0

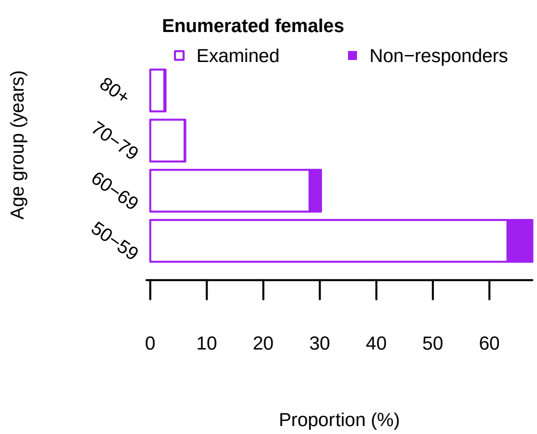
Table 3: Total number of people aged 50+ in survey area

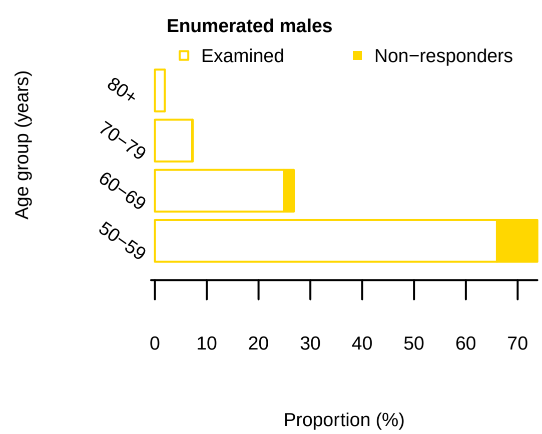
Age group	**Female**		**Male**		**Total**	
Years	*n*	%	*n*	%	*n*	%
50-59	7 461	51.4	9 889	51.4	17 350	51.4
60-69	4 563	31.4	6 047	31.4	10 610	31.4
70-79	1 777	12.2	2 354	12.2	4 131	12.2
80+	718	4.9	950	4.9	1 668	4.9
Total	14 519	100.0	19 240	100.0	33 759	100.0

Plot 1, plot 2









For your results to be useful for planning, your sample needs to be representative of the population 50 years and older. After completing the survey, we can assess representativeness by comparing the age-sex composition of the sample to the age-sex composition of the population 50 years and older.

We can also use the age-sex composition of the population 50 years and older to weight (post-stratify) crude estimates and provide age-sex adjusted (ASA) estimates for the population. We apply an 'inflation factor' – derived from sample vs population comparisons – to the counts of our conditions of interest in each sample age-sex group to generate extrapolated values in the population.

Often, there are more older females than younger males in the sample, and less younger males in the sample than in the population, because men are more likely to be away at work when the survey teams visit. If this is the case, use the age-sex adjusted estimates.

Important: if your sample differs from the population because one group was more likely to be unavailable (e.g., younger men, or other seasonal labourers) then you would expect to see this reflected in the response rate (i.e., more people enumerated but unavailable). If the difference between the sample and the population is high, but the proportion of people unavailable is low (e.g., response rate is still above 95%) this might be an indication that eligible participants who were absent or refused were replaced by others, which introduces bias and may mean that results are not accurate.

Prevalence and causes of distance vision impairment

We report the prevalence of distance vision impairment (VI) in the population 50 years and older using presenting visual acuity (PVA) in the better eye. PVA is visual acuity measured with correction, if available.

Distance vision impairment categories are defined according to the VA thresholds used in the World Health Organization's International Classification of Diseases (ICD-11).

Blindness: PVA less than 3/60 in the better eye

Severe VI: PVA less than 6/60 to 3/60 in the better eye

Moderate VI: PVA less than 6/18 to 6/60 in the better eye

Mild VI: PVA less than 6/12 to 6/18 in the better eye

Table 4, table 5

Table 4: Crude prevalence of blindness, severe, moderate and mild vision impairment

VI level	Female			Male			Total		
	n	*%*	*95% CI*	*n*	*%*	*95% CI*	*n*	*%*	*95% CI*
Blind	35	2.5	1.6 - 3.3	17	1.3	0.6 - 1.9	52	1.9	1.3 - 2.5
Severe	26	1.8	1.0 - 2.7	20	1.5	0.9 - 2.1	46	1.7	1.2 - 2.2
Moderate	159	11.3	9.1 - 13.4	142	10.6	8.3 - 12.9	301	10.9	9.2 - 12.7
Mild	303	21.5	16.8 - 26.1	338	25.2	19.8 - 30.6	641	23.3	18.6 - 28.0

Table 5: Adjusted prevalence and extrapolated magnitude of blindness, severe, moderate and mild vision impairment

VI level	Female			Male			Total		
	%	*95% CI*	*Extraplotated magnitude*	*%*	*95% CI*	*Extrapolated magnitude*	*%*	*95% CI*	*Extrapolated magnitude*
Blind	4.1	3.1 - 5.1	596	2.0	1.3 - 2.7	382	2.9	2.2 - 3.5	977
Severe	2.5	1.6 - 3.3	362	2.2	1.5 - 2.8	422	2.3	1.8 - 2.8	784
Moderate	13.6	11.3 - 15.9	1 976	13.4	11.0 - 15.8	2 577	13.5	11.6 - 15.4	4 553
Mild	22.4	17.7 - 27.1	3 249	25.4	19.9 - 30.8	4 879	24.1	19.4 - 28.7	8 129

These tables show the crude and adjusted prevalence of vision impairment by impairment level and gender. The sample size for RAAB is calculated to provide an acceptable level of precision for the total prevalence of blindness. The accuracy of prevalence estimates for population subgroups is lower and caution should be taken in the interpretation of these data. Table 5 shows the estimated magnitude of vision impairment in the study area by gender, calculated by multiplying the crude prevalence by the population count (e.g., census data). Throughout, the 95% confidence intervals are calculated to account for RAAB's cluster sampling design.

Table 6, table 7

Table 6: Crude cumulative prevalence of blindness (any PVA <3/60), severe (any PVA <6/60), moderate (any PVA <6/18) and mild (any PVA <6/12) vision impairment

VI level	**Female**			**Male**			**Total**		
	n	*%*	*95% CI*	*n*	*%*	*95% CI*	*n*	*%*	*95% CI*
Blind	35	2.5	1.6 - 3.3	17	1.3	0.6 - 1.9	52	1.9	1.3 - 2.5
Severe or worse	61	4.3	3.0 - 5.7	37	2.8	1.9 - 3.6	98	3.6	2.7 - 4.4
Moderate or worse	220	15.6	12.8 - 18.4	179	13.4	11.0 - 15.7	399	14.5	12.4 - 16.6
Mild or worse	523	37.1	31.0 - 43.1	517	38.6	31.9 - 45.2	1040	37.8	31.8 - 43.8

Table 7: Adjusted cumulative prevalence of blindness (any PVA <3/60), severe (any PVA <6/60), moderate (any PVA <6/18) and mild (any PVA <6/12) vision impairment

VI level	**Female**			**Male**			**Total**		
	%	*95% CI*	*Extrapolated magnitude*	*%*	*95% CI*	*Extrapolated magnitude*	*%*	*95% CI*	*Extrapolated magnitude*
Blind	4.1	3.1 - 5.1	596	2.0	1.3 - 2.7	382	2.9	2.2 - 3.5	977
Severe or worse	6.6	5.1 - 8.1	957	4.2	3.3 - 5.1	804	5.2	4.3 - 6.2	1 761
Moderate or worse	20.2	17.1 - 23.3	2 933	17.6	15.0 - 20.2	3 381	18.7	16.3 - 21.1	6 314
Mild or worse	42.6	36.2 - 49.0	6 183	42.9	36.2 - 49.7	8 260	42.8	36.6 - 48.9	14 443

Table 8, table 9

Table 8: Principal cause of blindness, severe, moderate and mild vision impairment

Principal cause	**Blind**		**Severe**		**Moderate**		**Mild**	
	n	*%*	*n*	*%*	*n*	*%*	*n*	*%*
1. Uncorrected refractive error	0	0.0	0	0.0	15	5.0	515	80.3
2. Uncorrected aphakia	0	0.0	0	0.0	0	0.0	0	0.0
3. Untreated cataract	34	65.4	39	84.8	245	81.4	87	13.6
4. Cataract surgical complications	4	7.7	3	6.5	33	11.0	22	3.4
5. Trachomatous corneal opacity	0	0.0	0	0.0	0	0.0	1	0.2
6. Other corneal opacity	10	19.2	2	4.3	2	0.7	1	0.2
7. Phthisis	0	0.0	0	0.0	0	0.0	0	0.0
8. Onchocerciasis	0	0.0	0	0.0	0	0.0	0	0.0
9. Glaucoma	0	0.0	1	2.2	1	0.3	5	0.8
10. Diabetic retinopathy	0	0.0	0	0.0	0	0.0	0	0.0
11. Age-related macular degeneration	2	3.8	0	0.0	2	0.7	4	0.6
12. Other posterior segment disease	2	3.8	1	2.2	3	1.0	6	0.9
13. Myopic degeneration	0	0.0	0	0.0	0	0.0	0	0.0
14. Other globe or CNS abnomalities	0	0.0	0	0.0	0	0.0	0	0.0
Total	52	100.0	46	100.0	301	100.0	641	100.0

Table 9: Principal cause of blindness, severe, moderate and mild vision impairment, by intervention category

Category	Blind		Severe		Moderate		Mild	
	n	%	n	%	n	%	n	%
A. Treatable (1, 2, 3)	34	65.4	39	84.8	260	86.4	602	93.9
B. Preventable (PHC/PEC services) (5, 6, 7, 8)	10	19.2	2	4.3	2	0.7	2	0.4
C. Preventable (Ophthalmic services) (4, 9, 10)	4	7.7	4	8.7	34	11.3	27	4.2
D. Avoidable (A + B + C)	48	92.3	45	97.8	296	98.4	631	98.5
E. Posterior segment disease (8, 9, 10, 11, 12, 13)	4	7.6	2	4.4	6	2.0	15	2.3

* PHC: Primary Health Care; PEC: Primary Eye Care

Table 8 compares the main cause of blindness, severe vision impairment, moderate vision impairment and mild visual impairment in the person. Table 9 shows what proportion of vision impairment is attributable to treatable, preventable and posterior segment disease. From these tables the priorities for intervention can be determined. The distribution of cases of blindness in the sample are visualised below.

Plot 3

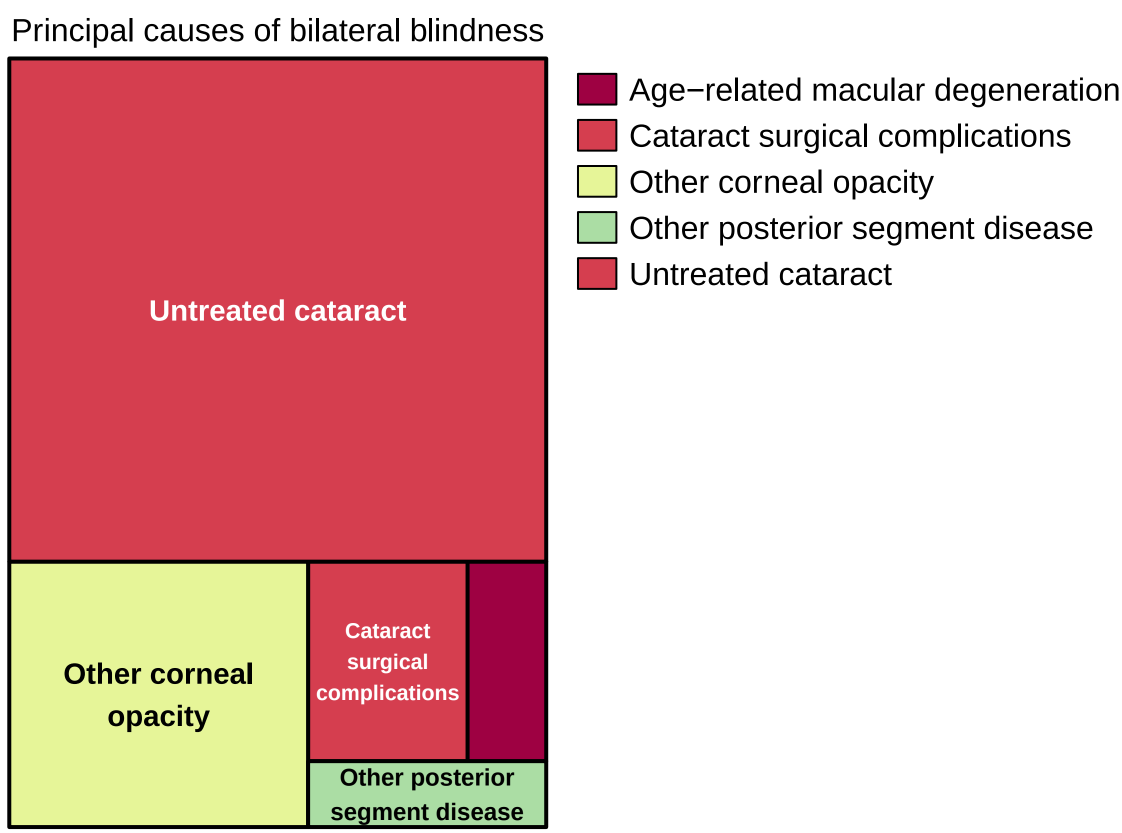


Table 10, table 11

Table 10: Principal cause of blindness in males and females

Principal cause	Female		Male		Total	
	n	%	n	%	n	%
1. Uncorrected refractive error	0	0.0	0	0.0	0	0.0
2. Uncorrected aphakia	0	0.0	0	0.0	0	0.0
3. Untreated cataract	23	65.7	11	64.7	34	65.4
4. Cataract surgical complications	3	8.6	1	5.9	4	7.7
5. Trachomatous corneal opacity	0	0.0	0	0.0	0	0.0
6. Other corneal opacity	7	20.0	3	17.6	10	19.2
7. Phthisis	0	0.0	0	0.0	0	0.0
8. Onchocerciasis	0	0.0	0	0.0	0	0.0
9. Glaucoma	0	0.0	0	0.0	0	0.0
10. Diabetic retinopathy	0	0.0	0	0.0	0	0.0
11. Age-related macular degeneration	1	2.9	1	5.9	2	3.8
12. Other posterior segment disease	1	2.9	1	5.9	2	3.8
13. Myopic degeneration	0	0.0	0	0.0	0	0.0
14. Other globe or CNS abnomalities	0	0.0	0	0.0	0	0.0
Total	35	100.0	17	100.0	52	100.0

This table shows the principal cause of blindness disaggregated by gender.

Table 11: Principal cause of blindness (PVA <3/60), by gender and intervention category

Category	Male		Female		Total	
	n	%	n	%	n	%
A. Treatable (1, 2, 3)	23	65.7	11	64.7	34	65.4
B. Preventable (PHC/PEC services) (5, 6, 7, 8)	7	20.0	3	17.6	10	19.2
C. Preventable (Ophthalmic services) (4, 9, 10)	3	8.6	1	5.9	4	7.7
D. Avoidable (A + B + C)	33	94.3	15	88.2	48	92.3
E. Posterior segment disease (8, 9, 10, 11, 12, 13)	2	5.8	2	11.8	4	7.6

Table 12, table 13

Table 12: Crude prevalence of blind, severe, moderate and mild unilateral vision impairment

VI level	Male			Female			Total		
	n	*%*	*95% CI*	*n*	*%*	*95% CI*	*n*	*%*	*95% CI*
Blind in one eye only	12	0.9	0.3 - 1.4	26	1.9	1.1 - 2.8	38	1.4	0.9 - 1.9
Severe in one eye only	6	0.4	0.0 - 0.8	9	0.7	0.3 - 1.1	15	0.5	0.2 - 0.8
Moderate in one eye only	56	4.0	2.9 - 5.0	43	3.2	2.2 - 4.2	99	3.6	2.9 - 4.3
Mild in one eye only	92	6.5	4.9 - 8.1	74	5.5	3.9 - 7.1	166	6.0	4.8 - 7.3

* Unilateral refers to cases where the other eye has PVA of 6/12

Table 13: Adjusted prevalence and extrapolated magnitude of blind, severe, moderate and mild unilateral vision impairment

VI level	Female			Male			Total		
	%	*95% CI*	*Extrapolated magnitude*	*%*	*95% CI*	*Extrapolated magnitude*	*%*	*95% CI*	*Extrapolated magnitude*
Blind in one eye only	0.8	0.3 - 1.3	122	2.4	1.5 - 3.2	457	1.7	1.2 - 2.2	579
Severe in one eye only	0.4	0.0 - 0.8	63	0.7	0.3 - 1.1	142	0.6	0.3 - 0.9	205
Moderate in one eye only	4.0	2.9 - 5.0	577	3.4	2.4 - 4.4	652	3.6	2.9 - 4.4	1 229
Mild in one eye only	6.2	4.6 - 7.8	896	5.1	3.6 - 6.7	991	5.6	4.3 - 6.9	1 887

* Unilateral refers to cases where the other eye has PVA of 6/12

Cases of unilateral vision impairment acknowledge an additional sight loss burden in the population, not captured in the standard definition of bilateral vision impairment, but with the potential to impact on visual functioning.

Cataract

Table 14

Table 14: Crude prevalence of people bilaterally and unilaterally cataract operated

Oerated cataract	Female		Male		Total	
	n	*%*	*n*	*%*	*n*	*%*
Bilateral operated	99	7.0	66	4.9	165	6.0
Unilateral operated	76	5.4	53	4.0	129	4.7
Total operated	175	12.4	119	8.9	294	10.7

This table reports the prevalence of people in the sample with one or both eyes operated, irrespective of post-operative visual acuity or pinhole acuity in the unoperated eye.

Table 15, table 16

Table 15: Crude unmet need for cataract surgery at pinhole VA thresholds <3/60, <6/60, <6/18 and <6/12

Unmet need threshold	Female			Male			Total		
	n	*%*	*95% CI*	*n*	*%*	*95% CI*	*n*	*%*	*95% CI*
PinVA <3/60	16	1.1	0.5 - 1.8	8	0.6	0.1 - 1.1	24	0.9	0.4 - 1.3
PinVA <6/60	28	2.0	1.1 - 2.9	20	1.5	0.9 - 2.1	48	1.7	1.2 - 2.3
PinVA <6/18	99	7.0	5.0 - 9.0	75	5.6	4.1 - 7.0	174	6.3	4.9 - 7.8
PinVA <6/12	204	14.5	11.6 - 17.3	181	13.5	11.2 - 15.8	385	14.0	11.9 - 16.1

Table 16: Extrapolated magnitude of unmet need for cataract surgery at pinhole VA thresholds <3/60, <6/60, <6/18 and <6/12

Unmet need threshold	Female			Male			Total		
	Adj. %	*95% CI*	*Extrapolated magnitude*	*Adj. %*	*95% CI*	*Extrapolated magnitude*	*Adj. %*	*95% CI*	*Extrapolated magnitude*
PinVA <3/60	1.8	1.1 - 2.5	262	0.8	0.3 - 1.4	163	1.3	0.8 - 1.7	425
PinVA <6/60	2.9	2.0 - 3.9	427	2.4	1.7 - 3.0	454	2.6	2.0 - 3.2	881
PinVA <6/18	9.2	7.1 - 11.3	1 338	8.2	6.6 - 9.8	1 575	8.6	7.0 - 10.2	2 913
PinVA <6/12	17.4	14.4 - 20.4	2 527	17.1	14.6 - 19.5	3 286	17.2	15.0 - 19.5	5 814

The number of people at each PinVA threshold in these tables correspond to the unmet need for cataract surgery in the calculation for effective cataract surgical coverage (see notes). People with unmet need for surgery may have cataract in one or both eyes. Those with cataract in one eye and different cause of VI in the other eye would potentially benefit from cataract surgery. Note, this group with unilateral cataract excludes people with previous cataract surgery, refractive error or uncorrected aphakia in the non-cataract eye.

Table 17, table 18

In tables 17 & 18, the unmet need for cataract surgery is broken down by bilateral and unilateral cataract cases at each of the cataract surgical thresholds. Here, cataract cases are defined by the presence of an obvious lens opacity and assignment of cataract as the main cause of vision impairment in both eyes (bilateral) or only one eye (unilateral).

Table 17: Crude prevalence of cataract at surgical thresholds <3/60, <6/60, <6/18 and <6/12

Cataract surgical threshold	Female			Male			Total		
	n	*%*	*95% CI*	*n*	*%*	*95% CI*	*n*	*%*	*95% CI*
Bilateral									
PinVA <3/60	12	0.9	0.4 - 1.3	5	0.4	0.0 - 0.9	17	0.6	0.2 - 1.0
PinVA <6/60	22	1.6	0.8 - 2.3	13	1.0	0.4 - 1.6	35	1.3	0.8 - 1.8
PinVA <6/18	83	5.9	4.3 - 7.5	58	4.3	3.0 - 5.7	141	5.1	3.9 - 6.4
PinVA <6/12	179	12.7	10.1 - 15.2	155	11.6	9.3 - 13.8	334	12.1	10.2 - 14.1
Unilateral									
PinVA <3/60	33	2.3	1.2 - 3.5	18	1.3	0.7 - 2.0	51	1.9	1.2 - 2.5
PinVA <6/60	51	3.6	2.1 - 5.1	45	3.4	2.3 - 4.4	96	3.5	2.6 - 4.4
PinVA <6/18	122	8.6	6.4 - 10.9	117	8.7	6.9 - 10.6	239	8.7	7.1 - 10.3
PinVA <6/12	153	10.8	8.7 - 13.0	151	11.3	9.2 - 13.3	304	11.1	9.5 - 12.6

* Unilateral cases can have any level of VA in the eye without operable cataract

Table 18: Adjusted prevalence and extrapolated magnitude of cataract at surgical thresholds <3/60, <6/60, <6/18 and <6/12

Cataract surgical threshold	Female			Male			Total		
	Adj. %	*95% CI*	*Extrapolated magnitude*	*Adj. %*	*95% CI*	*Extrapolated magnitude*	*Adj. %*	*95% CI*	*Extrapolated magnitude*
Bilateral									
PinVA <3/60	1.4	0.9 - 1.9	201	0.8	0.4 - 1.3	163	0.9	0.5 - 1.3	304
PinVA <6/60	2.3	1.6 - 3.1	337	2.4	1.7 - 3.0	454	1.8	1.3 - 2.3	609
PinVA <6/18	7.7	6.0 - 9.4	1 121	8.2	6.6 - 9.8	1 575	6.7	5.4 - 8.0	2 266
PinVA <6/12	15.2	12.5 - 17.9	2 205	17.1	14.4 - 19.8	3 286	14.5	12.5 - 16.6	4 904
Unilateral									
PinVA <3/60	2.9	1.8 - 4.1	423	2.1	1.4 - 2.8	400	2.4	1.8 - 3.1	824
PinVA <6/60	4.5	3.0 - 6.0	660	5.1	3.9 - 6.2	980	4.9	3.9 - 5.9	1 640
PinVA <6/18	10.1	7.9 - 12.4	1 473	11.1	9.1 - 13.0	2 127	10.7	9.0 - 12.3	3 600
PinVA <6/12	12.5	10.3 - 14.7	1 809	13.2	11.1 - 15.3	2 538	12.9	11.2 - 14.5	4 347

* Unilateral cases can have any level of VA in the eye without operable cataract

These tables enable planning the number of surgeries required to eliminate vision impairment from cataract at a particular PinVA threshold. Assuming services will aim to operate on all eyes of people with vision impairing cataract, two surgeries are required for ‘bilateral cases’ and one surgery is required for ‘unilateral cases’.

Table 19

Table 19: Adjusted cataract surgical coverage and effective cataract surgical coverage at the person level

	Female		**Male**		**Total**		**Relative Quality Gap**
	Adj. %	*95% CI*	*Adj. %*	*95% CI*	*Adj. %*	*95% CI*	*%*
Cataract surgical threshold <6/12							
CSC	44.9	37.7 - 52.1	39.2	32.1 - 46.4	41.8	35.7 - 47.9	
eCSC	18.1	12.8 - 23.5	17.7	12.8 - 22.7	17.9	13.7 - 22.1	57.2
Cataract surgical threshold <6/18							
CSC	57.5	49.3 - 65.7	55.0	46.4 - 63.5	56.2	49.4 - 62.9	
eCSC	22.2	15.4 - 29.0	24.5	17.5 - 31.5	23.4	18.1 - 28.8	58.3
Cataract surgical threshold <6/60							
CSC	78.7	71.4 - 85.9	79.4	71.7 - 87.1	79.1	73.5 - 84.6	
eCSC	30.4	22.3 - 38.4	34.8	25.5 - 44.1	32.7	26.1 - 39.3	58.6
Cataract surgical threshold <3/60							
CSC	85.7	79.6 - 91.7	91.1	83.4 - 98.8	88.4	83.1 - 93.7	
eCSC	32.7	24.1 - 41.2	41.9	31.1 - 52.6	37.3	30.3 - 44.3	57.8

* CSC: Cataract Surgical Coverage; eCSC: Effective Cataract Surgical Coverage

Effective cataract surgical coverage (eCSC) measures the number of people in a population who have been operated on for cataract, and had a good outcome (at least 6/12 post-operative presenting VA), as a proportion of all people operated on or still requiring surgery. Therefore, eCSC describes service access (ie, cataract surgical coverage, [CSC]) adjusted for quality. eCSC and CSC are reported at four cataract surgical thresholds. The gap between CSC and eCSC values can be considered a quality gap; the relative quality gap is calculated as (total CSC–total eCSC)/ total CSC, with lower values reflecting better quality of cataract surgical services. See notes section for more details.

Table 20

Table 20: Barriers to cataract surgery among participants with bilateral cataract and PinVA <6/60

Barrier	Female		Male		Total	
	n	*%*	*n*	*%*	*n*	*%*
Unaware treatment possible	2	6.1	0	0.0	2	3.8
Surgery denied by provider	1	3.0	1	5.3	2	3.8
Cannot access surgery	3	9.1	1	5.3	4	7.7
Cost	10	30.3	9	47.4	19	36.5
Felt not needed	2	6.1	0	0.0	2	3.8
Fear	15	45.5	8	42.1	23	44.2
Other	0	0.0	0	0.0	0	0.0
Total	33	100.0	19	100.0	52	100.0

* Participants can report 1 or 2 barriers each

The standard RAAB survey protocol does not allow for in-depth interviews to determine why people with cataract have not yet been operated. This preliminary data on barriers to surgery should be regarded as an indication whether more detailed qualitative studies are required.

Surgical outcomes

Surgical outcomes are reported for all operated eyes in the sample, not at the person level. RAAB gives population based data on post-operative visual outcomes, not specific to one surgeon or one hospital and with follow-up periods ranging from months to decades.

Table 21

Table 21: Type of cataract surgery performed, count by eyes

Surgery type	Female		Male		Total	
	n	%	*n*	%	*n*	%
IOL	271	99.3	180	97.3	451	98.5
Non-IOL	2	0.7	5	2.7	7	1.5
Couching	0	0.0	0	0.0	0	0.0
Total	273	100.0	185	100.0	458	100.0

Table 22, table 23

Table 22: Post-operative visual outcome (PVA), count by eyes

Outcome (PVA)	Female		Male		Total	
	n	%	*n*	%	*n*	%
Good (6/12)	119	43.6	89	48.1	208	45.4
Borderline (<6/12 to 6/60)	126	46.2	81	43.8	207	45.2
Poor (<6/60)	28	10.3	15	8.1	43	9.4
Total	273	100.1	185	100.0	458	100.0

Table 23: Post-operative visual outcome (PinVA), count by eyes

Outcome (PinVA)	Female		Male		Total	
	n	%	*n*	%	*n*	%
Good (6/12)	167	61.2	117	63.2	284	62.0
Borderline (<6/12 to 6/60)	87	31.9	58	31.4	145	31.7
Poor (<6/60)	19	7.0	10	5.4	29	6.3
Total	273	100.1	185	100.0	458	100.0

Table 24, table 25

Table 24: Post-operative visual outcomes (PVA) in eyes by place of surgery (male)

Post-surgical VA	Gov. Hosp.		Vol. Hosp.		Priv. Hosp.		Camp Improv.		Trad.	
	n	%	*n*	%	*n*	%	*n*	%	*n*	%
Good (6/12)	38	39.6	10	66.7	33	67.3	7	29.2	1	100.0
Borderline (<6/12 to 6/60)	48	50.0	4	26.7	15	30.6	14	58.3	0	0.0
Poor (<6/60)	10	10.4	1	6.7	1	2.0	3	12.5	0	0.0
Total	96	100.0	15	100.1	49	99.9	24	100.0	1	100.0

Table 25: Post-operative visual outcomes (PVA) in eyes by place of surgery (female)

Post-surgical VA	Gov. Hosp.		Vol. Hosp.		Priv. Hosp.		Camp Improv.		Trad.	
	n	%	*n*	%	*n*	%	*n*	%	*n*	%
Good (6/12)	66	44.0	15	60.0	26	38.2	12	38.7	0	0.0
Borderline (<6/12 to 6/60)	66	44.0	6	24.0	37	54.4	17	54.8	0	0.0
Poor (<6/60)	18	12.0	4	16.0	5	7.4	2	6.5	0	0.0
Total	150	100.0	25	100.0	68	100.0	31	100.0	0	0.0

Variation in outcome by place of surgery allows for monitoring of quality across providers. Where providers are outliers, in terms of poor quality, steps to address this should be incorporated in service planning.

Gov. Hosp. = Government hospital

Vol. Hosp .= NGO hospital

Priv. Hosp. = Private hospital

Camp Improv. = Improvised surgical camp

Trad. = Traditional setting

Refractive error

Refractive error as a cause of vision impairment is defined as better eye PVA worse than 6/12 improving to 6/12 with pinhole. Note: As these estimates are based on presenting VA, i.e., with correction if available, participants with corrected refractive error are not included, only those with under- or uncorrected refractive error.

Table 26, table 27

Table 26: Crude prevalence of blindness (PVA <3/60), severe (PVA <6/60), moderate (PVA <6/18) and mild (PVA <6/12) vision impairment due to refractive error

VI level	**Female**			**Male**			**Total**		
	n	*%*	*95% CI*	*n*	*%*	*95% CI*	*n*	*%*	*95% CI*
Blind	0	0.0	0.0 - 0.0	0	0.0	0.0 - 0.0	0	0.0	0.0 - 0.0
Severe	0	0.0	0.0 - 0.0	0	0.0	0.0 - 0.0	0	0.0	0.0 - 0.0
Moderate	8	0.6	0.2 - 0.9	7	0.5	0.1 - 0.9	15	0.5	0.2 - 0.9
Mild	237	16.8	12.1 - 21.5	278	20.7	14.9 - 26.6	515	18.7	13.8 - 23.6

Table 27: Adjusted prevalence and extrapolated magnitude of blindness (PVA <3/60), severe (PVA <6/60), moderate (PVA <6/18) and mild (PVA <6/12) vision impairment due to refractive error

VI level	**Female**			**Male**			**Total**		
	%	*95% CI*	*Extraplotated magnitude*	*%*	*95% CI*	*Extrapolated magnitude*	*%*	*95% CI*	*Extrapolated magintude*
Blind	0.0	0.0 - 0.0	0	0.0	0.0 - 0.0	0	0.0	0.0 - 0.0	0
Severe	0.0	0.0 - 0.0	0	0.0	0.0 - 0.0	0	0.0	0.0 - 0.0	0
Moderate	0.6	0.3 - 1.0	92	0.5	0.1 - 1.0	105	0.6	0.2 - 0.9	197
Mild	17.1	12.5 - 21.8	2 488	19.7	13.9 - 25.6	3 794	18.6	13.7 - 23.5	6 281

Table 28

Effective refractive error coverage (eREC) measures the number of people in a population in need of optical correction who have received correction and had a good outcome (ie, can see at least 6/12 corrected) as a proportion of all people in need of optical correction who have accessed correction or still require it. Therefore, eREC describes service access (ie, refractive error coverage, [REC]) adjusted for quality. See notes section for more details.

Note: Both indicators refer to distance refractive error

Table 28: Adjusted distance refractive error coverage and effective refractive error coverage

	Female		**Male**		**Total**	
	Adj. %	*95% CI*	*Adj. %*	*95% CI*	*Adj. %*	*95% CI*
eREC	NaN	NaN - NaN	NaN	NaN - NaN	NaN	NaN - NaN
REC	NaN	NaN - NaN	NaN	NaN - NaN	NaN	NaN - NaN

* eREC: Effective Refractive Error Coverage; REC: Refractive Error Coverage

Table 29

Table 29: Distance and near vision spectacle use among study participants

	Female		Male		Total	
	n	%	*n*	%	*n*	%
Distance vision spectacles	58	4.1	69	5.1	127	4.6
Near vision spectacles	154	10.9	155	11.6	309	11.2

This table reports the sample (crude) prevalence of distance and near spectacle use by gender. The categories of distance and near use are not mutually exclusive, i.e., some participants will use both. Near visual acuity is not currently measured in RAAB7; however, near vision spectacle use (for presbyopia) can be used as a proxy for refractive error coverage at near if it is assumed that 100% of the population 50 years and older will require near vision (presbyopic) correction.

Notes

Abbreviations

CI = Confidence interval

CNS = Central nervous system

CSC = Cataract surgical coverage

eCSC = Effective cataract surgical coverage

eREC = Effective refractive error coverage

NGO = Nongovernmental organisation

PinVA = Pinhole visual acuity

PVA = Presenting visual acuity

REC = Refractive error coverage

VI = Vision impairment

Snellen to logMAR conversion

Historic RAAB survey data variables have been updated to align with RAAB7 variable names and levels. RAAB7 records visual acuity in logMAR notation (or a code number representing light perception)

0.3 = Can see 6/12

0.47 = Cannot see 6/12 but can see 6/18

1.0 = Cannot see 6/18 but can see 6/60

1.3 = Cannot see 6/60 but can see 3/60

1.8 = Cannot see 3/60 but can see 1/60

3 = Light perception

4 = No light perception

Bilateral VI

Blindness: PVA less than 3/60 in the better eye

Severe VI: PVA less than 6/60 to 3/60 in the better eye

Moderate VI: PVA less than 6/18 to 6/60 in the better eye

Mild VI: PVA less than 6/12 to 6/18 in the better eye

Unilateral VI

Blindness: PVA less than 3/60 in one eye, PVA 6/12 in the other eye

Severe VI: PVA less than 6/60 to 3/60 in one eye, PVA 6/12 in the other eye

Moderate VI: PVA less than 6/18 to 6/60 in one eye, PVA 6/12 in the other eye

Mild VI: PVA less than 6/12 to 6/18 in one eye, PVA 6/12 in the other eye

Cataract-related VI and surgical outcomes

Cataract surgical threshold (operable cataract): PinVA at <3/60, <6/60 and <6/18 thresholds plus lens opacity plus untreated cataract as principal cause

Operated cataract: Aphakia (excluding couched eyes) or pseudoaphakia (with or without posterior capsule opacification [PCO]) or no view of lens but cataract surgical complications as cause of vision impairment

Cataract surgical coverage (CSC) and effective cataract surgical coverage (eCSC)

eCSC and CSC are calculated at the person level, not by eyes, and calculated at various cataract surgical thresholds.

CSC is defined as (X + Y) / (X + Y + Z)

eCSC is defined as (A + B) / (X + Y + Z)

where, e.g., at the <6/12 cataract surgical threshold:

A = individuals with unilateral operated cataract attaining 6/12 or better post-operative presenting VA in the operated eye, who have BCVA <6/12 in the other eye

B = individuals with bilateral operated cataract attaining 6/12 or better post-operative presenting VA in at least one eye

X = individuals with unilateral operated cataract (regardless of visual acuity in the operated eye) and BCVA <6/12 in the other eye

Y = individuals with bilateral operated cataract (regardless of visual acuity in the operated eyes)

Z = individuals with BCVA <6/12 in both eyes with cataract as the main cause of vision impairment in one or both eyes

For more information see: McCormick, I, Butcher, R, Evans, JR et al. Effective cataract surgical coverage in adults aged 50 years and older: estimates from population-based surveys in 55 countries. Lancet Global Health. 2022. https://doi.org/10.1016/S2214-109X(22)00419-3

Refractive error coverage (REC) and effective refractive error coverage (eREC)

REC is defined as (A + B) / (A + B + C)

eREC is defined as (A) / (A + B + C)

where:

A = Individuals who present with spectacles or contact lenses for distance and whose UCVA is <6/12 in the better eye and CVA is 6/12 in the better eye (Met Need)

B = Individuals who present with spectacles or contact lenses for distance and whose UCVA is <6/12 in the better eye and whose CVA is <6/12 in the better eye, but who improve to 6/12 on PinVA (Undermet Need)

C = Individuals who present without spectacles and whose UCVA is <6/12 in the better eye and whose PinVA is 6/12 in the better eye (Unmet Need)

Note: This is the 'gold-standard' eREC calculation described here: McCormick I, Mactaggart I, Bastawrous A, Burton MJ, Ramke J. Effective refractive error coverage: an eye health indicator to measure progress towards universal health coverage. Ophthalmic Physiol Opt. 2020;40(1):1-5. https://doi:10.1111/opo.12662

95% Confidence Interval

The 95% confidence intervals are based on standard errors calculated for the clustering of the sample and the variability between clusters, specifically using the formula provided by:

Bennett S, Woods T, Liyanage WM, Smith DL. A simplified general method for cluster-sample surveys of health in developing countries. World Health Stat Q. 1991;44(3):98-106.