National Program for
Control of Blindness

Rapid Assessment of Avoidable Blindness- INDIA

Report

2006-2007

Ophthalmology Section,
Directorate General of Health Services
Ministry of Health and Family Welfare
Government of India
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Rapid Assessment of Avoidable Blindness 2006-2007

Report

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1. BACKGROUND

India is the first country to have launched a National Program for Control of Blindness. Due to the increasing prevalence of cataract related blindness, in 1994, the World Bank provided a soft loan to the Government of India for the implementation of the Cataract Blindness Control Program in the seven States in the country which had the highest prevalence of cataract blindness. The program turned out to be one of the most cost effective health interventions ever supported by the World Bank.

In 1999-2000, the WHO and the IAPB (the umbrella organization for all the international eye NGO's) embarked on a global initiative to eliminate avoidable blindness, globally by 2020. India is committed to realization of the goal of Vision2020: The Right to Sight.

India has a strong tradition of evidence based practice in eye care. Over the past three decades, the implementation of activities under the National Program have been guided by a series of population based surveys. Results of the various surveys have helped in identification of need-based strategies which is one of the reasons for the success of the National Program for Control of Blindness. India is also the first country in the world to have identified a rapid assessment technique for blindness/ cataract blindness. The technique has been widely used in many countries over the last decade. Modifications in the initial methodology were incorporated to improve the technique.

Rapid Assessment of Blindness and Cataract Surgical Services (RACSS) is a simple survey technique to assess the prevalence of blindness, surgical coverage of cataract blind and visual outcomes following cataract surgery. This has found universal acceptance with locally relevant modifications.

Due to the cost involved in conducting detailed surveys for blindness in the country and the rigorous methods that are needed for such surveys, the country has used rapid assessment of blindness to document changes in the prevalence of blindness in India. The first set of rapid assessment for blindness was carried out in 1994 in Karnataka where all the districts in the State were covered. This was followed by similar assessments being carried out in all districts in Gujarat in 1996. The Government of India initiated rapid assessments in the 7 World Bank Assisted States for the first time in 1998. This was quickly followed by a second round of rapid surveys in other States also in 2002 and 2004. During the period 1999-2001, detailed surveys were carried out in 15 States in the country. All these studies provided accurate estimates of the blindness situation in India.

Recently efforts have been made to develop rapid methods for assessment of avoidable blindness. In addition, modified detailed surveys have also been commissioned in Gujarat. In view of the global initiative for the elimination of avoidable blindness, it is imperative that surveys should document the status in the country in relation to the avoidable causes of blindness.

The present set of rapid surveys will therefore concentrate on avoidable blindness. For this purpose a modified RAAB protocol has been developed, tailored to the needs of the country. It is proposed to conduct the surveys in 16 districts where blindness surveys were earlier undertaken over the period 1998-2001. This will enable comparison of trends in the prevalence of blindness in the same population and will be a good indicator of the impact of the blindness control activities in the country.

2. METHODOLOGY

OBJECTIVES

1. To assess the prevalence of blindness among the 50+ population in India
2. To assess the proportion of avoidable to total blindness in 50+ population
3. To ascertain trends in the prevalence of blindness among 50+ over the past five years
4. To estimate the prevalence of blindness in the general population in India
5. To identify the major causes of blindness and avoidable blindness in India
6. To document the surgical trends in India
7. To ascertain the visual outcomes after cataract surgery
8. To estimate the cataract surgical rate in different States
9. To study the barriers to cataract surgery
10. To assess the Cataract Surgical Coverage
11. To assess the effect of socio-demographic factors on the prevalence of blindness.
12. To estimate the total number of blind in India in 2006
13. To identify future strategies for successful implementation of Vision2020 objectives.

2.1.2 EXPECTED OUTCOME

1. Identify the trends in blindness, cataract blindness and avoidable blindness in India over the past five years.
2. Information will help to document what has happened in the country after World Bank assisted Cataract Blindness Control Project ended.
3. Provide information on the future support required from Govt. of India and INGO's for blindness control.
4. Assess the current situation and status with regard to progress towards Vision2020

2.2 SAMPLING STRATEGY

2.2.1 SAMPLING FRAME

1. Stratified cluster random sampling used
2. Two strata – Urban and Rural
3. Separate sampling frame for urban and rural areas.
4. In each district, 80% (20) clusters from rural areas and 20% (5) from urban areas

2.2.2 SAMPLE SIZE

- Prevalence of blindness : As per 2001- 02 Survey
- Prevalence of avoidable blindness : 8.0% (Assuming 80% of all blindness is due to avoidable causes)
- Power : 80%
- Relative précision : 20%
- Confidence Level : 95%
- Design effect : 2

The sample size for each district was 2500 subjects aged 50years and above. A total of 25 clusters (20 rural and 5 urban) will be covered in each district. 100 individuals aged 50+ will be examined in each cluster.

Villages with a population less than 1000 have been clubbed together to yield a cluster where 100 individuals aged 50+ will be available. This was keeping in view that the proportion of population aged 50+ was estimated to be 13% in the 2001 census. The estimated population in 2006 was derived by adding 10% to the population in 2001 (assuming an annual growth rate of approximately 2%).

2.3 SURVEY DESIGN

The survey was undertaken in 16 districts where blindness surveys were earlier undertaken over the period 1998- 2001. This enabled comparison of trends in the prevalence of blindness in the same population and was a good indicator of the impact of the blindness control activities in the country. Since the survey concentrated on avoidable blindness, a modified protocol for Rapid Assessment of Avoidable Blindness (RAAB) have been developed (Annexure- I).

2.4 SURVEY TEAMS

The rapid survey for avoidable blindness were carried out in the following States/ districts by the identified survey teams. All survey teams covered one district in each state 15 states, except in UP were two districts were covered because of its populous.

The following criteria were adopted to identify the survey teams:

a) Experience of having conducted similar surveys on blindness or eye diseases.
b) Availability of adequate resources for conducting surveys, which requires identifying blind persons on the basis of visual acuity & identifying causes of blindness.
c) Have access to epidemiologist and ophthalmologist to monitor and support the survey.

All the survey teams were contacted prior to the sampling process and taken consensus to participate in survey. A workshop on training of survey methodology and guidelines for conducting survey was conducted by the NPCB in Dr. R. P. Centre for Ophthalmic Sciences.

S. No.	Team	State	District
1	Sarojini Devi Eye Hospital (RIO), Hyderabad	Andhra Pradesh	Prakasam
2	Sadguru Seva Sangh, Chitrakoot, Satna, MP	Madhya Pradesh	Shadol
3	H.V.Desai Eye Hospital, Pune	Maharashtra	Parbhani
4	JPM Rotary Eye Hospital, Cuttack	Orissa	Ganjam
5	Venu Eye Hospital, Delhi	Rajasthan	Nagaur
6	Aravind Eye Hospital, Pondicherry	Tamilnadu	Cuddalore
7	Dr. R. P. Centre for Ophthalmic Sciences, Delhi	Uttar Pradesh	Jhansi
8	Bangalore West Lion's Eye Hospital, Bangalore	Karnataka	Gulbarga
9	Netra Nirmay Niketan, Vivekanand Mission Hospital, Haldia	West Bengal	Malda
10	Sewa Rural Bharuch	Gujarat	Surendranagar
11	Shroff Charitable Eye Hospital, Delhi	Bihar	Vaishali
12	St Stephens Hospital, Delhi	Punjab	Bhatinda
13	Christian Medical College, Ludhiana	Himachal Pradesh	Solan
14	Sankara Eye Hospital, Coimbatore	Kerala	Palakkad
15	MGIMS, Sevagram	Chhattisgarh	Rajnandgoan
16	State Institute of Ophthalmology, Allahabad	Uttar Pradesh	Deoria

Each District Team comprised of the following personnel:

(a)	District Coordination Team:	Chief Medical Officer (CMO)	1
		District Ophthalmic Surgeon (DOS)	1
		District Programme Manager (DPM)	1
(b)	Survey Organization (Supervisors)	Chief Investigator	1
		Epidemiologist	1
		Ophthalmologist	2
(c)	Survey Team	Ophthalmic Assistants	2
		Field Supervisors	2
		Field Investigators	4
		Data Entry Operator	1
		Volunteer	1

2.5 SURVEY SCHEDULE AND DATA MANAGEMENT

The survey was conducted between November 2006- April 2007. All the survey data were fed on computer by the survey team in a dedicated schedule made in MS-Access and analysed using STATA (ver. 9.0). A copy of the data and the physical forms were then sent to Dr. R. P. Centre, New Delhi for analysis and interpretation.

2.6 INSTRUCTIONS FOR THE SURVEY TEAMS

A. Responsibilities of the Ophthalmologist & Epidemiologist:

1. Operational planning for the survey in the allocated clusters in consultation with the Chief Medical Officer (CMO), District Ophthalmic Surgeon (DOS), District Programme Manager (DPM) etc.
2. Training of the Field Supervisor & Ophthalmic Assistants (OA) on procedure for carrying out the survey.
3. Field training of the survey team on selection of the first household in the cluster to be surveyed; filling up performa and cross-checking a 10% sample of those recorded as normal vision by the OA to ensure quality of data.
4. Supervision of the survey work in the selected clusters and accompanying the OA in the house-to-house visit.
5. Making sure that all the 25 selected 'clusters' in each district have been surveyed and dispatching all the 25 survey books along with the data base to RP Centre for data analysis.
6. Managing unforeseen problems encountered during the field-work.
7. Maintaining close liaison with the Programme Office (NPCB), New Delhi for any major alteration/decision required.
8. The ophthalmologist will examine all individuals with vision < 6/18 and record all relevant findings.
9. The epidemiologist will liaise with the community, select the segment for the survey, identify the central location for clinical examination, ensure that all identified personnel reach the examination site and verify all records before leaving the village, in addition to all the other responsibilities stated above.

   The other responsibilities to be handled by the epidemiologist include:

10. Preparing day-wise schedule for carrying out the survey in the selected clusters and
    arranging the vehicles for the survey teams
11. Organizing materials required for the survey - books, 'E' charts, measuring tapes, torch, batteries, patient referral slips, pencils/erasers and hard board.
12. Providing advance information to the residents in the selected clusters through the
    Local Health Worker to ensure better coverage of the eligible persons.

B. Responsibilities of the Field Supervisors:

1. Participation in training programme organized by Surveyors on procedure.
2. Identification of first household in the selected cluster.
3. Supervision of the survey work in the selected clusters.
4. Making sure that all the 100 persons above the age of 50 years have been covered by the survey team.
5. Ensuring that quality and reliability of information collected is maintained by the survey teams.
6. Managing unforeseen problems encountered during the field-work.

C. Responsibilities of the Ophthalmic Assistants:

1. Participating in the training programme organized by Chief Surveyors covering the methodology of the survey, filling up the performa and procedures for visual acuity testing.

2. Carrying out the actual survey in the selected clusters under the supervision of the Field Supervisor/Chief Surveyors.
3. Following the instructions and guidelines given by the Field Supervisor and starting the survey once the first household has been selected by him/her. This includes confirmation of the age of the person to be included, carrying out the visual acuity testing using simplified `ETDRS' chart & measuring tape and filling up the performa.
4. Completing the survey in the allotted cluster by covering 100 persons aged 50+ with the assistance of the local helpers.

D. Responsibilities of Survey Assistants (local Health Worker or volunteer):

1. Visiting all the households and introducing the OA to the family members.
2. Identifying individuals aged 50+.
3. Helping vision testing by explaining the procedure to the person, by holding the measuring-tape and covering the other eye while one is being examined.

3. RESULTS

3.1 Basic Demographic Characteristics of Survey Population

The rapid assessment of avoidable blindness covered 16 districts, from 15 of the most populated States in India, over the period Nov 2006- Mar 2007. 11 of these districts were covered under the detailed national level blindness survey in 2001 and another 5 were covered under the Rapid Assessment in 1998. One district was covered in 1998, 2001 and again in 2007.

Overall 42722 individuals aged 50 or more years were enumerated across the country, of whom 40447 (94.7%) were examined. The response rate was above 85% in all districts of which 8 had response rate above 95% (Table 1).

Amongst the enumerated, 54.5% were females while 55.1% of the examined were females (Table 2). Only in three districts (Bhatinda, Solan and Vaishali) males outnumbered females among the enumerated as well as among the examined.

Amongst the enumerated, a fifth of all respondents were aged 50-54 years, 55-59 years and 60-64 years (22.8%, 21.5% and 20.6% respectively) (Table 3). 44.6% of the examined were aged 50-59 years (Table 4). In Ganjam and Parbhani districts, less individuals were enumerated and examined at the younger ages (50-59 years) compared to the other age groups.

The mean age of the respondents was 61.5 years (Range: 50-110) across the country. The mean age of male respondents was 62.4 years compared to 60.9 years amongst the females. The mean age of respondents was lowest in Shahdol district (59.7 years) in Madhya Pradesh while the highest was 63.9 years in Ganjam district in Orissa.

Amongst the enumerated, 35.2% were working and earning an income while 18% had no work (Table 5). Proportion not working was highest in Ganjam (26.9%) and the lowest in Shahdol (8.7%).

3.2 Visual Acuity and Prevalence of Blindness

Based on bilateral presenting vision, 68.8% of the examined individuals could be categorized as having 'normal' vision (> 6/18 in both eyes) (Table 6). The proportion of 'normal' category was highest in Palakkad (84.9%) while the lowest was in Rajnandgaon (53.1%).

The prevalence of low vision (< 6/18 – 6/60 in the better eye) was 16.8% based on presenting vision. This varied from a low of 6.7% in Palakkad to a high of 30.8% in Rajnandgaon.

The prevalence of economic blindness (Vision < 6/60 – 3/60 in the better eye) was 4.4% pooling data from all districts together with a low of 2% in Bhatinda to a high of 9.2% in Deoria.

The prevalence of social blindness (vision < 3/60 in the better eye) was 3.6% across all districts with a low of 1% in Palakkad and a high of 7.8% in Ganjam district. This level of blindness corresponds to the WHO definition of blindness based on presenting vision.

The prevalence of one-eye blind (vision < 6/60 in one eye and better than 6/18 in the fellow eye) was 6.4%, with a low of 3% in Rajnandgaon and a high of 10% in Nagaur.

The vision of all individuals was also tested with a pinhole if their presenting vision was less than 6/18 in any eye. The proportion of individuals who could be categorized as normal increased to 77.9% (Table 7). The prevalence of low vision, economic blindness, social blindness and one-eye blindness were 9.5%, 2.9%, 3% and 6.8% respectively.

The National Program for Control of Blindness defines individuals with a vision less than 6/60 in the better eye as blind. Using this cut off, the prevalence of blindness was observed to be 8.0% among the 50+ population across the country, based on presenting vision (Table 8). Using pinhole vision, the prevalence of blindness was 5.9%. The lowest prevalences based on presenting vision were observed in Solan (3.2%), Palakkad (3.7%) and Bhatinda (4.4%). The highest prevalence was observed in Rajnandgaon (13.2%), Deoria (12.4%) and Parbhani(11.3%). The lowest prevalence using pinhole vision was in Palakkad (2.7%) and the highest was in Ganjam (9%).

3.2.1 Association of Blindness with Gender

Using the NPCB cut-off, based on presenting vision, the prevalence of blindness among women was 1.34 times higher compared to men. The prevalence of blindness among males was 6.6% and among females it was 9.2% (Table 9). The trend of higher prevalence among females was observed in all districts. Based on pinhole vision, the prevalence of blindness was 4.9% among males and 6.7% among females (Table 10).

3.2.2. Association of Blindness with Age

It was observed that the prevalence of blindness (vision < 6/60 in the better eye) based on presenting vision increased with increasing age. The prevalence was 1.3% at 50-54 years of age and increased to 20.6 above the age of 70 years which is a 16 fold increase (Table 11). The prevalence at 50-54 years was lowest in Solan (0.1%)

while above the age of 70 years, the prevalence was the highest in Rajnandgoan (38.7%).

With pinhole, the prevalence in the age group of 50-54 years was 0.8% while it was 16.2% above the age of 70 years (Table 12).

3.3 Cataract Surgical Coverage

3.3.1 Surgical Coverage (Persons)

The cataract surgical coverage among persons was calculated as follows:

$$\text{Coverage (Persons)} = \frac{\text{No. of persons operated in one/both eyes}}{\text{No. of persons operated + No. of unoperated cataract blind persons}} \times 100$$

The cataract surgical rates was calculated separately for cataract blind persons with vision < 3/60 in the better eye and for persons with vision < 6/60 in the better eye.

Using < 3/60 to define the cataract blind persons, 82.3% of persons needing cataract surgery were covered by surgery (Table 13) while using < 6/60 to define the cataract blind, 66% of persons had one or both eyes operated. It is well known that the definition of the cataract blind influences surgical coverage rates. The coverage rates were low in Ganjam and Vaishali where only half the persons needing cataract surgery had access to surgery compared to districts like Bhatinda, Cuddalore, Palakkad, Solan and Surndranagar where more than 90% of those blind due to cataract (vision < 3/60 in the better eye) had been operated in at least one eye.

3.3.2 Surgical Coverage (Eyes)

The cataract surgical coverage foe individual eyes was calculated as follows:

$$\text{Coverage (Persons)} = \frac{\text{Eyes operated for cataract}}{\text{Operated eyes + Unoperated cataract blind eyes}} \times 100$$

The coverage was 62.9% using < 3/60 to define cataract blindness and 47.7% using < 6/60 to define cataract blindness (Table 14). These results show that a significant proportion of the cataract blind in the country still get operated at a vision worse than 3/60 in the affected eye.

3.4 Profile of Cataract Operated Individuals

A total of 7296 cataract surgeries were reported from the 16 districts (Table 15). 901 cataract surgeries (12.3% of all districts) were reported from Cuddalore, while 787 (10.8%) were reported from Surendranagar and 683 (9.4%) were reported from Prakasam district. Thus a third of all surgeries (32.5%) were from just three districts in the 16 districts. Malda, Shahdol and Deoria reported the least surgeries. More females reported surgery (4192) compared to males(3104) and more surgeries were reported in the last 5 years(4582) which was responsible for 62.8% of all surgeries reported. As mortality increases with age, it is logical that most surgeries would be reported by survivors (the most recently operated).

The proportion of surgeries with an IOL implant was 63.6% (Table 16). The proportion of IOL surgery was highest in Palakkad district (83.4%) and lowest in Jhansi district (36.1%). It was observed that districts with access to NGO hospitals and private surgeons reported higher proportion of IOL surgeries.

The IOL surgery rate was only 11.4% in surgeries reported before 1997 compared to 82.2% among surgeries in the last 5 years (Table 17). In Palakkad and Surendranagar, more than 90% of surgeries in the recent five years were IOL surgeries.

Amongst the males, 66.3% surgeries were done with an IOL implant compared to 61.6% among the females. The male-female differentials were significant in some districts like Palakkad and Bhatinda (Table 18).

3.5 Visual Outcome after Surgery

Visual acuity after surgery was analyzed separately for non IOL and IOL surgery. When no IOL was used, 31.5% had a vision better than 6/18 in the operated eye while 30.6% had vision less than 3/60 (Table 19). In Ganjam district, 59% of surgeries resulted in a vision less than 3/60 in the operated eye. Based on presenting vision, one third to half the operated eyes had vision less than 6/60 in the operated eye.

With IOL surgery, 89.5% had vision better than 6/60 in the operated eye while only 5.4% had vision less than 3/60 (Table 20). There was significant difference in visual outcome after IOL surgery compared to non-IOL surgery, in all districts surveyed.

3.5.1 Spectacle Usage After Cataract Surgery

Amongst operated persons, 59.3% were not using spectacles at the time of the examination (Table 21). The proportion not using spectacles currently was higher in some districts like Cuddalore, Ganjam, Rajnandgaon, Surendranagar and Shahdol where more than 70% were not using spectacles.

The condition of spectacles that were used currently varied widely across the districts (Table 22). Overall only half the aphakic spectacles and a third of spectacles used after IOL surgery were found to be of good quality.

3.5.2 Payment for Cataract Surgery

It was observed that 78% of the non-IOL and 58.1% of the IOL surgery was provided at no cost to the client (Table 23). In Prakasam district, 59.4% of non-IOL surgeries, were paid for, by the clients. A higher proportion paid for IOL surgery compared to non-IOL surgery.

3.5.3 Place of Surgery

The proportion of cataract surgeries performed in make shift camps or outreach locations has decreased over the last five years (Table 24). Over the period 2002-2007, only 14.6% surgeries were performed in such locations. About a quarter of all surgeries were performed at private facilities while another quarter were at Government facilities. The largest provider of surgical services was the NGO sector. In Ganjam, Parbhani and Shahdol districts, even in recent years, the government

sector was the most prominent while in Cuddalore, Palakkad, Surendranagar and Rajnandgaon, the NGO sector was the predominant partner. In Bhatinda, Gulbarga, Prakasam and Vaishali, the private surgeons were the predominant source for cataract surgery.

In Cuddalore, only 2.8% went to private facilities.

3.5.4 Causes of Blindness and Visual Impairment

Cataract continues to be the single largest cause of bilateral blindness in India (Table 25). Among all the blind, 77.5% were blind due to cataract. Uncorrected aphakia was responsible for 4.6% of blindness. Trachoma and other corneal scarring was responsible for 3.9% of blindness, uncorrected refractive errors for 3.4% and glaucoma for 3%. Posterior segment pathology was responsible for 2.8% of all bilateral blindness. There was no district in the country where cataract was not responsible for more than half the blindness.

When causes of low vision were analyzed, it was observed that cataract was responsible for 58.1% of low vision (vision < 6/18 – 6/60 in the better eye) while uncorrected refractive errors were responsible for 32.9% (Table 26). In Deorai and Malda districts, refractive errors were more important causes of low vision than cataract.

More than half of all one eye blind were due to Cataract (Table 27). Uncorrected aphakia and cataract surgical complications together were responsible for more than 10% of one eye blindness across the country. Corneal scarring was another important cause of one eye blindness with 8% suffering due to corneal pathology other than trachoma.

3.5.5 Comparison of Presenting and Pinhole Vision

Even though best correction was not done as part of the survey, all individuals with a presenting vision < 6/18 in any eye were examined with a pinhole. It was observed that with a pinhole, more than half (54.7%) the individuals with low vision could improve to better than 6/18 (Table 28). However those with a presenting vision < 3/60 would not benefit much from correction as 88.6% of them did not improve with pinhole. Even among the economically blind, less than half improved with pinhole.

3.5.6 Comparison of Presenting and Pinhole Vision among Cataract Operated

Presenting and pinhole vision was also compared among the cataract operated. Even among those with an IOL implant, 60% could improve from < 6/18 to better than 6/18 with pinhole while 46% of those with a presenting vision of < 6/60-3/60 could be improved by pinhole. This signifies that many individuals need spectacles even after IOL surgery as standard power IOLs may be in vogue in many districts (Table 29). At the same time those who had an IOL implant and a presenting vision < 3/60 hardly improved as 87.2% continued to have a vision < 3/60 after pinhole.

Individuals who had a non-IOL cataract surgery did not seem to benefit much by correction as the proportion whose vision could improve with pinhole was much

smaller than with IOL (Table 30). 65.9% of those with a presenting vision < 3/60 did not improve with pinhole.

3.5.7 Comparison of Blindness Prevalence With Previous Surveys

Observations from the Rapid Assessment of Blindness in 2006-2007 were compared with the observations from the same districts which were surveyed over the period 1998-2001 (Table 31). It was observed that overall there was a significant decrease in the prevalence of blindness when results were compared with earlier rapid assessments. Even in comparison to the earlier comprehensive detailed surveys, there was a 0.5% reduction in the prevalence of blindness (vision < 6/60 in the better eye) among the 50+ population. Since 90% of blindness is seen among the 50+ population and this segment of the population is steadily increasing due to increased life expectancy, a decrease of 0.5% is significant. Only in two districts (Rajnandgaon and Parbhani) was the prevalence higher than in 2001. The increase in Rajnandgaon was marginal but the increase in Parbhani was significant.

3.5.8 Barriers to Cataract Surgery

The barriers to cataract surgery among the cataract blind (vision < 6/60 in the better eye with cataract as the cause of blindness in one or both eyes) were also studied. The barriers were categorized as awareness related, service related and other barriers.

Among the awareness related barriers, 22.3% did not get operated as they were unaware of their cataract (Table 32). Fear was stated by 6.8% while 8% stated that they were asked to wait for the cataract to mature before surgery. There were wide variations across the different districts in relation to the awareness related barriers.

Affordability was a barrier reported by 11.9% across the country (Table 33) while in another 15% either age or the fact that they did not feel the need for surgery were important barriers reported. The proportion who stated that they could not afford surgery was the highest in Malda district (28.5%).

Lack of escorts, adequate vision in the fellow eye and lack of time were other barriers reported (Table 34). Only 0.2% stated that they did not go for surgery as they were using other anti-cataract medications.

4. Extrapolating Blindness Prevalence to General Population

Most literature available in India and other parts of the world show that 90% of blindness is concentrated among the 50+ population as most blindness is age related. This assumption has been used to extrapolate the prevalence of blindness among the 50+ population to the population of all ages. As there has been a reduction in blindness in the 50+ population, it would lead to a decrease in the blindness load in the country.

Using the assumptions mentioned above, it is estimated that the prevalence of blindness in the total population would be 1.36% if presenting vision is considered and 1% if pinhole vision is considered (using a vision of < 6/60 in the better eye) (Table 35).

Using the WHO definition of vision < 3.60 in the better eye, the prevalence of blindness in the general population would be 0.61% with presenting vision and 0.51% with pinhole vision (Table 36).

5. Conclusions and Recommendations

The National Program for Control of Blindness has consistently based its projections and program implementation on evidence collected by reputed eye care institutions through population based surveys over the past three decades. For the first time in the country, a Rapid Assessment of Avoidable Blindness was undertaken. This methodology improves upon the methodology used in Rapid Assessment and allows causes of blindness to be established. This is achieved by coupling an eye examination by an ophthalmologist to the methodology used in rapid assessments. Therefore data can be comparable to both the rapid assessment as well as the detailed surveys conducted earlier.

It was observed that overall, the prevalence of low vision, economic blindness and social blindness had decreased in the districts covered compared to the earlier surveys. Lowest prevalence of all blindness (social + economic) was seen in Solan (Himachal Pradesh), Bhatinda (Punjab) and Palakkad (Kerala). Pooling data of all districts together the prevalence of blindness as defined by the National Program for Control of Blindness has shown a reduction of 6% in overall prevalence of blindness above the age of 50 years. This reduction is significant as there is an increasing life expectancy in India which translates into more and more people living beyond 50 years of age. Since a significant proportion of blindness in India is age related, any reduction above the age of 50 years is a direct gain from the strategies adopted by the National Program in the country.

The prevalence of blindness was observed to be 1.34 times higher in females compared to males. It is difficult to state whether this is due to a true rate of higher incidence among females or because of lack of access to services. Though a larger number of surgeries were reported by women this would be expected as 55% of the respondents were female.

The prevalence of blindness increased with age, with those above 70 years having a 16 times higher risk of being blind compared to those aged 50-54 years.

Cataract surgical coverage showed a significant increase compared to the previous surveys with 82.3% having at least one eye operated among those who had a vision < 3/60 and were blind from cataract. This is much higher than the previous surveys. In RAAB, analysis was also presented for cataract surgical coverage using the NPCB definition of blindness. For the first time this is being used in the country as it was felt that this would act as a baseline for future surveys as more and more people would get operated before they reach a stage of vision < 3/60.

The survey showed that the gains in Southern States (Andhra Pradesh, Kerala and Tamilnadu) and in high performing States like Gujarat continued to improve over the years. The biggest turnaround can be seen in the districts of Prakasam in Andhra Pradesh and Gulbarga in Karnataka compared to the earlier surveys. In fact three districts (Cuddalore, Prakasam and Surendranagar) were together responsible for a third of all surgeries reported in the country. Public-private partnership seems to be the key to the future as all three districts had a strong presence of NGO/private institutions in addition to the Government facilities.

Performance in the States of Orissa (Ganjam district) and West Bengal (Malda district) needs to be augmented so that the gains of the technological revolution in eye care can be effectively harnessed across the country.

There is a distinct increase in IOL surgeries in the past five years when results are compared to the earlier surveys. This is a welcome sign as more and more ophthalmologists are now adept at IOL implants than previously. Most of the survey districts have achieved more than 80% IOL rate in the past five years. However, though the total number of surgeries was higher among women, the IOL rate was 5% higher among men. This gender disparity needs to be addressed through innovative approaches.

A large proportion of individuals were not using spectacles after surgery and there were many who in-spite of an IOL implant needed correction as they showed significant improvement with a pinhole.

Cataract remains the single largest cause of blindness, low vision and one eye blindness in India if the data of the 16 districts are pooled together. The trend is observed across all districts also. Results indicate that the country should continue to prioritize cataract surgical services and their augmentation. The support to other blinding conditions should not be at the cost of cataract as any slackening may prove catastrophic in the long run.

Lack of awareness and affordability still continue to be barriers to the uptake of cataract surgery in many parts of the country and efforts need to be made to surmount these barriers so that no person needlessly remains blind because of lack of knowledge or the lack of access due to financial constraints.

Extrapolating the results to the population of all ages across the country, it is evident that there has been a perceptible reduction in the prevalence of blindness in the country inspite of increased life expectancy. The country seems headed in the right direction and attention to problem regions on a priority basis will provide a further impetus to blindness control efforts in India.

Table 1: Coverage of Survey Population (50+)

S.No.	State	District	Persons aged 50+		%
			Enumerated	Examined	
1	Himachal Pradesh	Solan	2544	2535	99.6
2	Punjab	Bhatinda	2559	2548	99.6
3	Rajasthan	Nagaur	2510	2492	99.3
4	Uttar Pradesh	Deoria	2793	2452	87.8
5	Uttar Pradesh	Jhansi	2755	2464	89.4
6	Bihar	Vaishali	2772	2646	95.5
7	West Bengal	Malda	2744	2474	90.2
8	Orissa	Ganjam	2679	2543	94.9
9	Chhattisgarh	Rajnandgaon	2556	2556	100
10	Madhya Pradesh	Shahdol	2792	2505	89.7
11	Gujarat	Surendranagar	2775	2674	96.4
12	Maharastra	Parbhani	2727	2456	90.1
13	Andhra Pradesh	Prakasam	2688	2578	95.9
14	Karnataka	Gulbarga	2721	2488	91.4
15	Kerala	Palakkad	2546	2475	97.2
16	Tamil Nadu	Cuddalore	2561	2561	100
Total			42722	40447	94.7

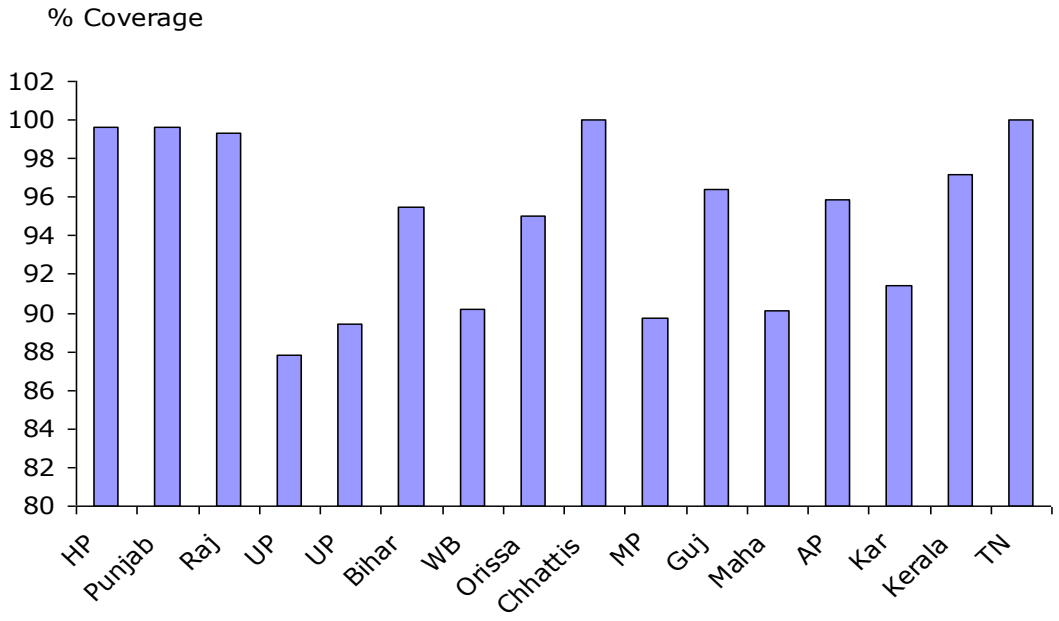


Table 2: Gender distribution of Subjects

District	Enumerated			Examined		
	Male (%)	Female (%)	Total	Male (%)	Female (%)	Total
Bhatinda	1416 (55.3)	1143 (44.7)	2559	1412 (55.4)	1136 (44.6)	2548
Cuddalore	1109 (43.3)	1452 (56.7)	2561	1109 (43.3)	1452 (56.7)	2561
Deoria	1209 (43.3)	1584 (56.7)	2793	1020 (41.6)	1432 (58.4)	2452
Ganjam	1071 (40.0)	1608 (60.0)	2679	1023 (40.2)	1520 (59.8)	2543
Gulbarga	1053 (38.7)	1668 (61.3)	2721	944 (37.9)	1544 (62.1)	2488
Jhansi	1306 (47.4)	1449 (52.6)	2755	1123 (45.6)	1341 (54.4)	2464
Malda	1260 (45.9)	1484 (54.1)	2744	1083 (43.8)	1391 (56.2)	2474
Nagaur	1115 (44.4)	1395 (55.6)	2510	1105 (44.3)	1387 (55.7)	2492
Palakkad	1045 (41.0)	1501 (59.0)	2546	1004 (40.6)	1471 (59.4)	2475
Parbhani	1089 (39.9)	1638 (60.1)	2727	928 (37.8)	1528 (62.2)	2456
Prakasam	1167 (43.4)	1521 (56.6)	2688	1105 (42.9)	1473 (57.1)	2578
Rajnandgaon	1150 (45.0)	1406 (55.0)	2556	1150 (45.0)	1406 (55.0)	2556
Shahdol	1388 (49.7)	1404 (50.3)	2792	1239 (49.5)	1266 (50.5)	2505
Solan	1412 (55.5)	1132 (44.5)	2544	1405 (55.4)	1130 (44.6)	2535
Surendrangr	1257 (45.3)	1518 (54.7)	2775	1190 (44.5)	1484 (55.5)	2674
Vaishali	1413 (51.0)	1359 (49.0)	2772	1341 (50.7)	1305 (49.3)	2646
Total (%)	19460 (45.6)	23262 (54.5)	42722	18,181 (45.0)	22266 (55.1)	40447

Gender distribution of examined

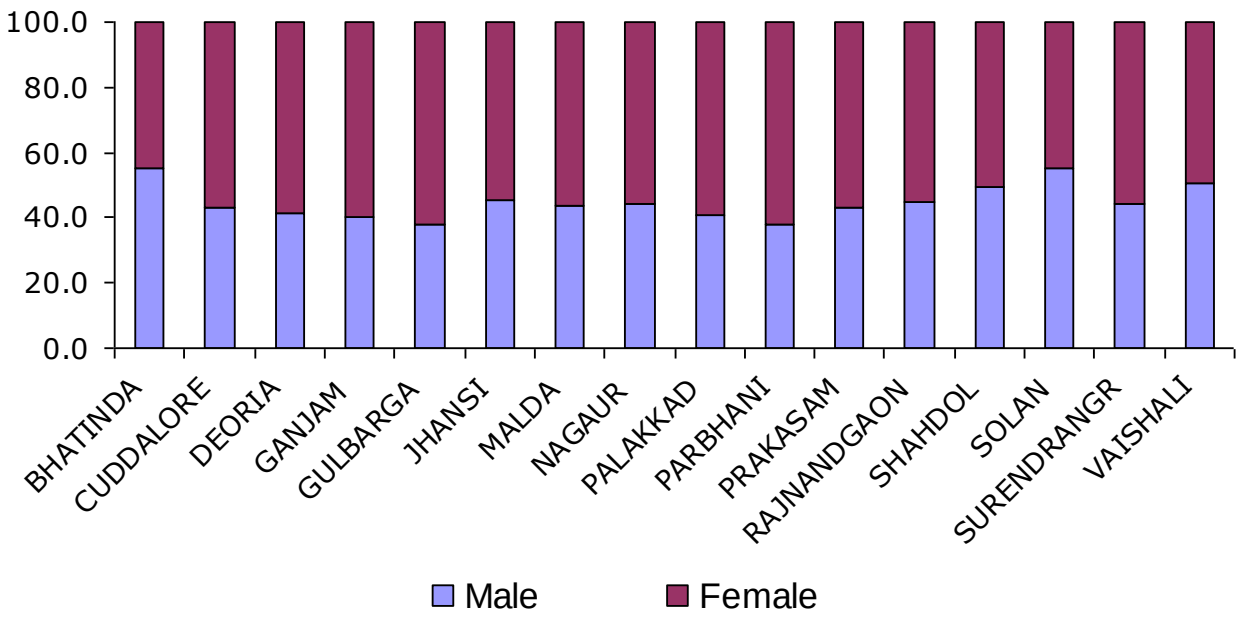


Table 3: Age distribution of enumerated population

District	50-54 (%)	55-59 (%)	60-64 (%)	65-69 (%)	70+ (%)	Total	Mean Age
Bhatinda	578 (22.6)	546 (21.3)	485 (19.0)	382 (14.9)	568 (22.2)	2559	61.9
Cuddalore	559 (21.8)	565 (22.1)	533 (20.8)	365 (14.3)	539 (21.1)	2561	61.3
Deoria	562 (20.1)	570 (20.4)	571 (20.4)	415 (14.9)	675 (24.2)	2793	62.0
Ganjam	294 (11.0)	477 (17.8)	714 (26.7)	390 (14.6)	804 (30.0)	2679	63.5
Gulbarga	585 (21.5)	604 (22.2)	645 (23.7)	356 (13.1)	531 (19.5)	2721	61.4
Jhansi	657 (23.9)	581 (21.1)	573 (20.8)	427 (15.5)	517 (18.8)	2755	61.9
Malda	784 (28.6)	663 (24.2)	521 (19.0)	315 (11.5)	461 (16.8)	2744	60.5
Nagaur	669 (26.7)	415 (16.5)	407 (16.2)	393 (15.7)	626 (24.9)	2510	62.8
Palakkad	591 (23.2)	482 (18.9)	527 (20.7)	346 (13.6)	600 (23.6)	2546	62.1
Parbhani	392 (14.4)	587 (21.5)	670 (24.6)	557 (20.4)	521 (19.1)	2727	61.9
Prakasam	611 (22.7)	538 (20.0)	524 (19.5)	356 (13.2)	659 (24.5)	2688	61.7
Rajnandgaon	555 (21.7)	654 (25.6)	554 (21.7)	462 (18.1)	331 (13.0)	2556	61.0
Shahdol	686 (24.6)	703 (25.2)	666 (23.9)	349 (12.5)	388 (13.9)	2792	59.7
Solan	777 (30.5)	664 (26.1)	372 (14.6)	233 (9.2)	498 (19.6)	2544	60.3
Surendrangr	702 (25.3)	664 (23.9)	547 (19.7)	388 (14.0)	474 (17.1)	2775	60.4
Vaishali	723 (26.1)	449 (16.2)	500 (18.0)	351 (12.7)	749 (27.0)	2772	62.0
Total (%)	9725 (22.8)	9162 (21.5)	8809 (20.6)	6085 (14.2)	8941 (20.9)	42722	61.5

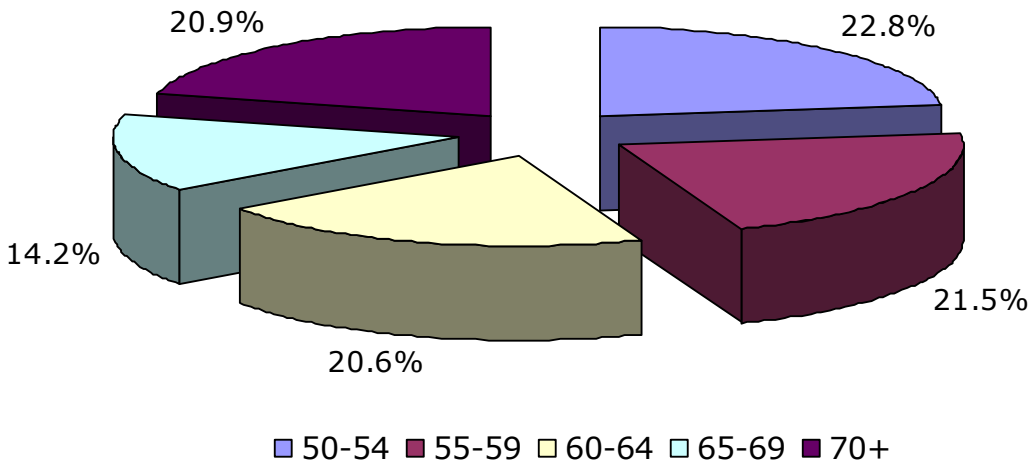


Table 4: Age distribution of examined

District	50-54 (%)	55-59 (%)	60-64 (%)	65-69 (%)	70+ (%)	Total	Mean Age
Bhatinda	576 (23.0)	544 (21.0)	483 (19.0)	380 (14.9)	565 (22.2)	2548	61.9
Cuddalore	559 (21.8)	565 (22.1)	533 (20.8)	365 (14.3)	539 (21.1)	2561	61.3
Deoria	511 (21.0)	485 (20.0)	496 (20.0)	368 (15.0)	592 (24.1)	2452	61.9
Ganjam	290 (11.4)	457 (18.0)	674 (26.5)	373 (14.7)	749 (29.5)	2543	63.4
Gulbarga	550 (22.0)	542 (22.0)	588 (24.0)	329 (13.2)	479 (19.3)	2488	61.3
Jhansi	606 (24.6)	502 (20.4)	503 (20.4)	382 (15.5)	471 (19.1)	2464	62.0
Malda	763 (31.0)	602 (24.0)	436 (18.0)	267 (10.8)	406 (16.4)	2474	60.2
Nagaur	665 (26.7)	412 (16.5)	401 (16.1)	391 (15.7)	623 (25.0)	2492	62.8
Palakkad	578 (23.0)	473 (19.0)	506 (20.0)	334 (13.5)	584 (23.6)	2475	62.1
Parbhani	362 (14.7)	539 (22.0)	587 (23.9)	494 (20.1)	474 (19.3)	2456	61.9
Prakasam	589 (23.0)	513 (20.0)	506 (20.0)	340 (13.2)	630 (24.4)	2578	61.7
Rajnandgaon	555 (21.7)	654 (25.6)	554 (21.7)	462 (18.1)	331 (13.0)	2556	61.0
Shahdol	621 (24.8)	630 (25.2)	577 (23.0)	319 (12.7)	358 (14.3)	2505	59.7
Solan	776 (30.6)	661 (26.1)	368 (14.5)	233 (9.2)	497 (19.6)	2535	60.3
Surendrangr	688 (25.7)	641 (24.0)	519 (19.4)	366 (13.7)	460 (17.2)	2674	60.4
Vaishali	699 (26.4)	419 (15.8)	474 (17.9)	335 (12.7)	719 (27.2)	2646	62.0
Total (%)	9388 (23.2)	8639 (21.4)	8205 (20.3)	5738 (14.2)	8477 (21.0)	40447	61.5

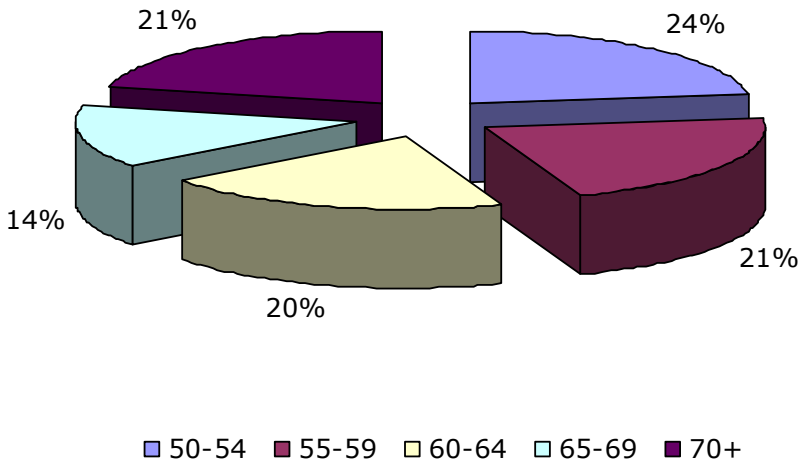


Table 5: Occupation status of Enumerated

District	Work & earns income (%)	Work & no income (%)	House work (%)	No work (%)	No response (%)	Total
Bhatinda	1145 (44.7)	172 (6.7)	854 (33.4)	354 (13.8)	34 (1.3)	2559
Cuddalore	638 (24.9)	309 (12.1)	1009 (39.4)	605 (23.6)	0	2561
Deoria	710 (25.4)	147 (5.3)	1445 (51.7)	471 (16.9)	20 (0.7)	2793
Ganjam	518 (19.3)	799 (29.8)	622 (23.2)	721 (26.9)	19 (0.7)	2679
Gulbarga	1230 (45.2)	45 (1.7)	888 (32.6)	556 (20.4)	2 (0.1)	2721
Jhansi	906 (32.9)	61 (2.2)	1028 (37.3)	733 (26.6)	27 (1.0)	2755
Malda	775 (28.2)	104 (3.8)	1467 (53.5)	393 (14.3)	5 (0.2)	2744
Nagaur	373 (14.9)	354 (14.1)	1123 (44.7)	660 (26.3)	0	2510
Palakkad	659 (25.9)	175 (6.9)	1388 (54.5)	321 (12.6)	3 (0.1)	2546
Parbhani	1037 (38.0)	26 (1.0)	909 (33.0)	657 (24.1)	98 (3.6)	2727
Prakasam	1504 (56.0)	75 (2.8)	644 (24.0)	463 (17.2)	2 (0.1)	2688
Rajnandgaon	1579 (61.8)	295 (11.5)	354 (13.9)	328 (12.8)	0 (0)	2556
Shahdol	705 (25.3)	1139 (40.8)	699 (25.0)	244 (8.7)	5 (0.2)	2792
Solan	1152 (45.3)	10 (4.2)	924 (36.3)	363 (14.3)	3 (0.1)	2544
Surendrangr	946 (34.1)	253 (9.1)	1291 (46.5)	281 (10.1)	4 (0.1)	2775
Vaishali	1145(41.3)	33 (1.2)	1042 (37.6)	552 (19.9)	0	2772
Total (%)	15022 (35.2)	4089 (9.6)	15687 (36.7)	7702 (18.0)	222 (0.5)	42722

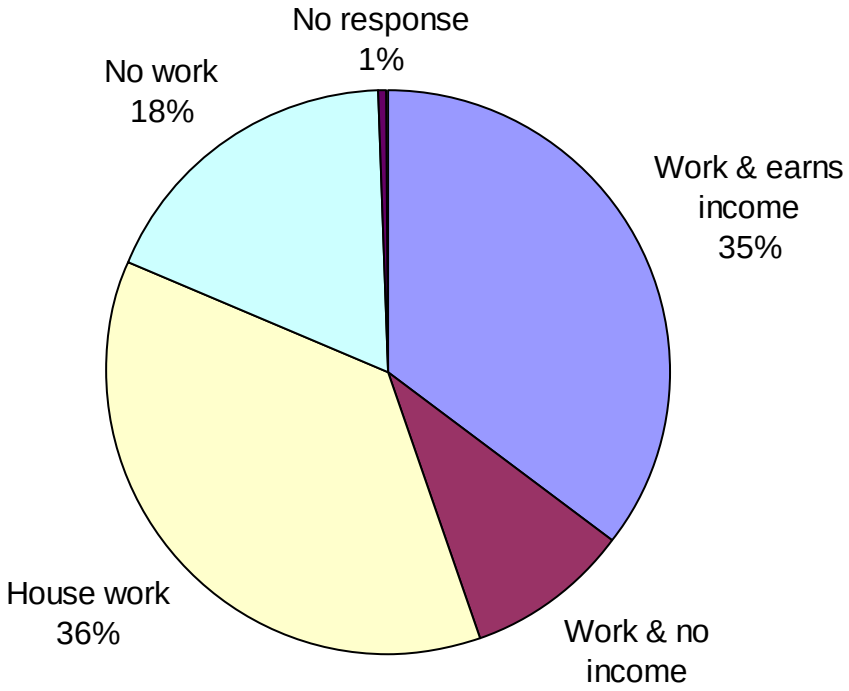


Table 6: Blindness Categories based on Presenting Vision

District	Normal Vision (NN) (%)	Low Vision (LV) (%)	Economic Blindness (EB) (%)	Social Blindness (SB) (%)	One Eye Blind (UB) (%)	Total Examined
Bhatinda	2047 (80.4)	199 (7.8)	51 (2.0)	61 (2.4)	188 (7.4)	2546
Cuddalore	1600 (62.5)	546 (21.3)	115 (4.5)	72 (2.8)	228 (8.9)	2561
Deoria	1325 (54.0)	677 (27.6)	225 (9.2)	78 (3.2)	147 (6.0)	2452
Ganjam	1774 (69.8)	399 (15.7)	55 (2.2)	199 (7.8)	114 (4.5)	2541
Gulbarga	1667 (67.0)	393 (15.8)	90(3.6)	107 (4.3)	231 (9.3)	2488
Jhansi	1586 (64.4)	391(15.9)	116 (4.7)	146 (5.9)	224 (9.1)	2463
Malda	1849 (74.8)	363 (14.7)	104 (4.2)	63 (2.6)	94 (3.8)	2473
Nagaur	1701 (68.3)	325 (13.0)	83 (3.3)	135 (5.4)	248 (10.0)	2492
Palakkad	2101 (84.9)	166 (6.7)	66 (2.7)	25 (1.0)	117 (4.7)	2475
Parbhani	1576 (64.2)	395 (16.1)	166 (6.8)	111 (4.5)	208 (8.5)	2456
Prakasam	1576 (61.1)	569 (22.1)	131 (5.1)	88 (3.4)	214 (8.3)	2578
Rajnandgaon	1357 (53.1)	786 (30.8)	225 (8.8)	112 (4.4)	76 (3.0)	2556
Shahdol	1870 (74.7)	411 (16.4)	84 (3.4)	50 (2.0)	90 (3.6)	2505
Solan	2030 (80.1)	319 (12.6)	46 (1.8)	35 (1.4)	103 (4.1)	2533
Surendrangr	2055 (76.9)	314 (11.7)	111 (4.2)	42 (1.6)	152 (5.7)	2674
Vaishali	1717 (64.9)	533 (20.1)	129 (4.9)	119 (4.5)	148 (5.6)	2646
Total (%)	27831 (68.8)	6786 (16.8)	1797 (4.4)	1443 (3.6)	2582 (6.4)	40439

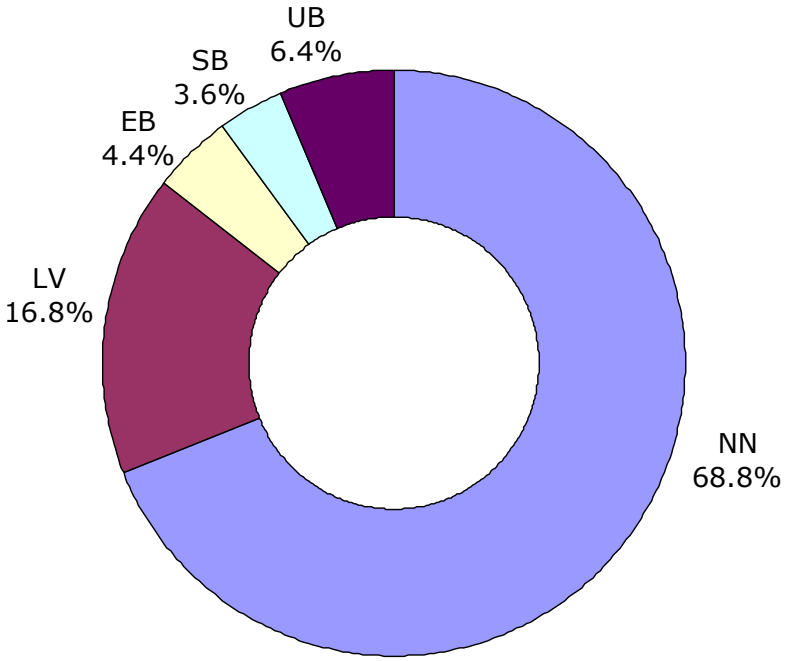

UB
6.4%
SB
3.6%
EB
4.4%
LV
16.8%
NN
68.8%

Table 7: Blindness Categories based on Pinhole Vision

District	Normal (%)	Low Vision (%)	Economic Blindness (%)	Social Blindness (%)	One Eye Blind (%)	Total Examined
Bhatinda	2083 (81.8)	163 (6.4)	49 (1.9)	60 (2.4)	191 (7.5)	2546
Cuddalore	1917 (74.9)	347 (13.6)	43 (1.7)	50 (2.0)	204 (8.0)	2561
Deoria	1773 (72.3)	317 (12.9)	122 (5.0)	61 (2.5)	179 (7.3)	2452
Ganjam	1929 (75.9)	237 (9.3)	63 (2.5)	167 (6.6)	145 (5.7)	2541
Gulbarga	1900 (76.4)	180 (7.2)	67 (2.7)	80 (3.2)	261 (10.5)	2488
Jhansi	1771 (71.9)	249 (10.1)	82 (3.3)	129 (5.2)	232 (9.4)	2463
Malda	2107 (5.2)	150 (6.1)	62 (2.5)	46 (1.9)	108 (4.4)	2473
Nagaur	1902 (76.3)	178 (7.1)	56 (2.3)	110 (4.4)	246 (9.9)	2492
Palakkad	2164 (87.4)	129 (5.2)	44 (1.8)	23 (0.9)	115 (4.7)	2475
Parbhani	1811 (73.7)	211 (8.6)	119 (4.9)	96 (3.9)	219 (8.9)	2456
Prakasam	1877 (72.8)	352 (13.7)	81 (3.1)	76 (2.9)	192 (7.5)	2578
Rajnandgaon	1808 (70.7)	404 (15.8)	133 (5.2)	86 (3.4)	125 (4.9)	2556
Shahdol	2117 (84.5)	174 (7.0)	48 (1.9)	42 (1.7)	124 (5.0)	2505
Solan	2173 (85.8)	179 (7.1)	41 (1.6)	34(1.4)	106 (4.2)	2533
Surendrangr	2237 (83.7)	189 (7.1)	67 (2.5)	39 (1.5)	142 (5.3)	2674
Vaishali	1918 (72.5)	362 (13.7)	89 (3.4)	108 (4.1)	169 (6.4)	2646
Total (%)	31487 (77.9)	3821 (9.5)	1166 (2.9)	1207 (3.0)	2758 (6.8)	40439

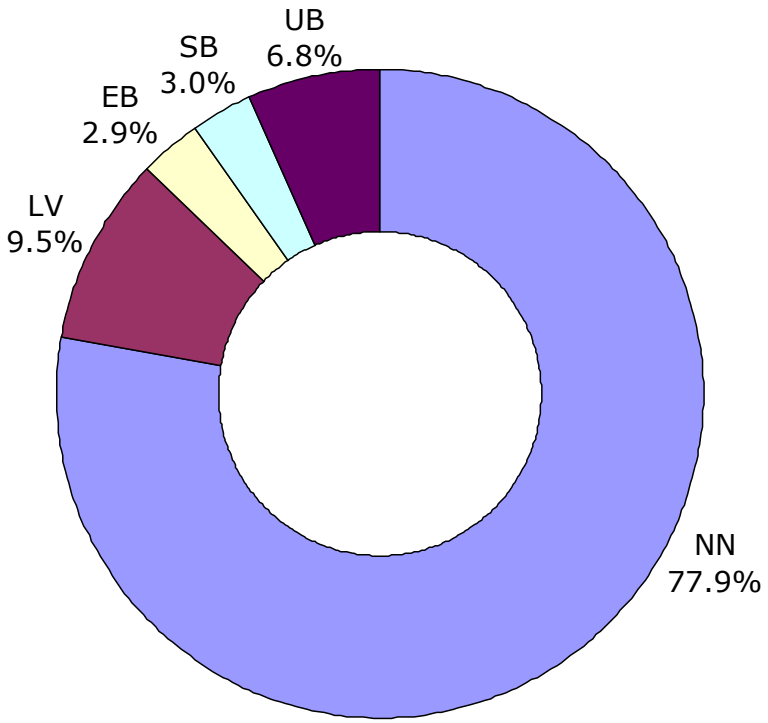


Table 8: Bilateral Blind persons (NPCB <6/60)

District	Presenting (%)	Pinhole (%)	Total
Bhatinda	112 (4.4)	109 (4.3)	2548
Cuddalore	187 (7.3)	93 (3.6)	2561
Deoria	303 (12.4)	183 (7.5)	2452
Ganjam	254 (10.0)	230 (9.0)	2543
Gulbarga	197 (7.9)	147 (5.9)	2488
Jhansi	262 (10.6)	211 (8.6)	2464
Malda	167 (6.8)	108 (4.4)	2474
Nagaur	218 (8.8)	166 (6.7)	2492
Palakkad	91 (3.7)	67 (2.7)	2475
Parbhani	277 (11.3)	215 (8.8)	2456
Prakasam	219 (8.5)	157 (6.1)	2578
Rajnandgaon	337 (13.2)	219 (8.6)	2556
Shahdol	134 (5.4)	90 (3.6)	2505
Solan	81 (3.2)	75 (3.0)	2535
Surendrangr	153 (5.7)	106 (4.0)	2674
Vaishali	248 (9.4)	197 (7.5)	2646
Total (%)	3240 (8.0)	2373 (5.9)	40447

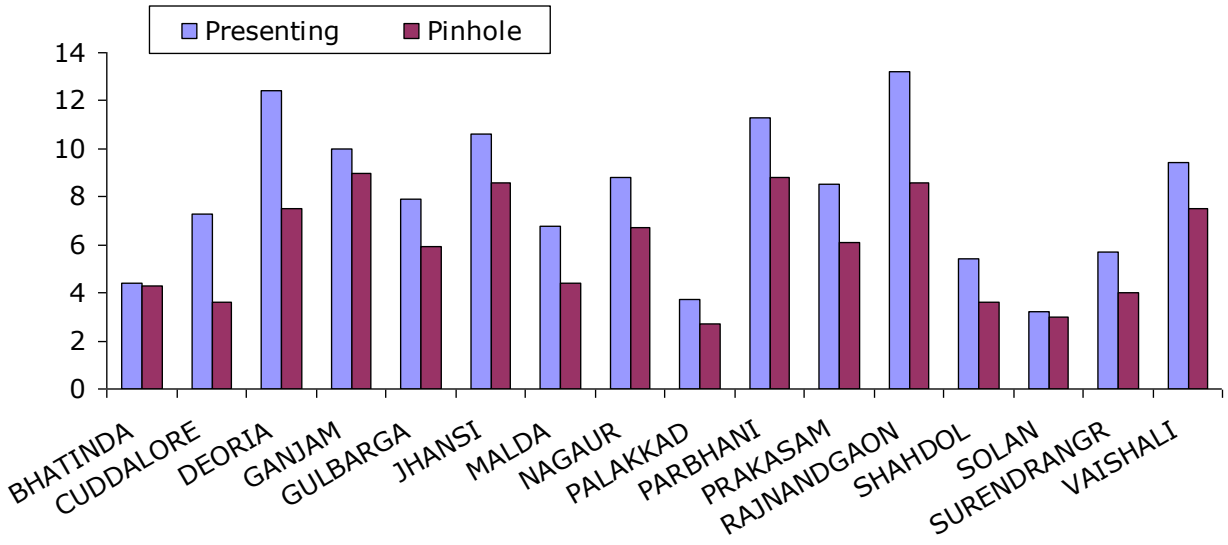


Table 9: Gender wise NPCB blind (<6/60) - Presenting Vision

District	Male (%)	Total	Female (%)	Total
Bhatinda	52 (3.7)	1412	60 (5.3)	1136
Cuddalore	64 (5.8)	1109	123 (8.5)	1452
Deoria	104 (10.2)	1020	199 (13.9)	1432
Ganjam	87 (8.5)	1023	167 (11.0)	1520
Gulbarga	73 (7.7)	944	124 (8.0)	1544
Jhansi	92 (8.2)	1123	170 (12.7)	1341
Malda	65 (6.0)	1083	102 (7.3)	1391
Nagaur	87 (7.9)	1105	131 (9.4)	1387
Palakkad	24 (2.4)	1004	67 (4.6)	1471
Parbhani	90 (9.7)	928	187 (12.2)	1528
Prakasam	77 (7.0)	1105	142 (9.6)	1473
Rajnandgaon	122 (10.6)	1150	215 (15.3)	1406
Shahdol	56 (4.5)	1239	78 (6.2)	1266
Solan	40 (2.9)	1405	41 (3.6)	1130
Surendrangr	62 (5.2)	1190	91 (6.1)	1484
Vaishali	95 (7.1)	1341	153 (11.7)	1305
Total (%)	1190 (6.6)	18181	2050 (9.2)	22266

Table 10: Gender wise NPCB blind (<6/60)- Pinhole Vision

DISTRICT	Male (%)	Total	Female (%)	Total
Bhatinda	51 (3.6)	1412	58 (5.1)	1136
Cuddalore	36 (3.3)	1109	57 (3.9)	1452
Deoria	61 (6.0)	1020	122 (8.5)	1432
Ganjam	78 (7.6)	1023	152 (10.0)	1520
Gulbarga	54 (5.7)	944	93 (6.0)	1544
Jhansi	72 (6.4)	1123	139 (10.4)	1341
Malda	44 (4.1)	1083	64 (4.6)	1391
Nagaur	63 (5.7)	1105	103 (7.4)	1387
Palakkad	17 (1.7)	1004	50 (3.4)	1471
Parbhani	70 (7.5)	928	145 (9.5)	1528
Prakasam	57 (5.2)	1105	100 (6.8)	1473
Rajnandgaon	83 (7.2)	1150	136 (9.7)	1406
Shahdol	39 (3.2)	1239	51 (4.0)	1266
Solan	40 (2.9)	1405	35 (3.1)	1130
Surendrangr	42 (3.5)	1190	64 (4.3)	1484
Vaishali	76 (5.7)	1341	121 (9.3)	1305
Total (%)	883 (4.9)	18181	1490 (6.7)	22266

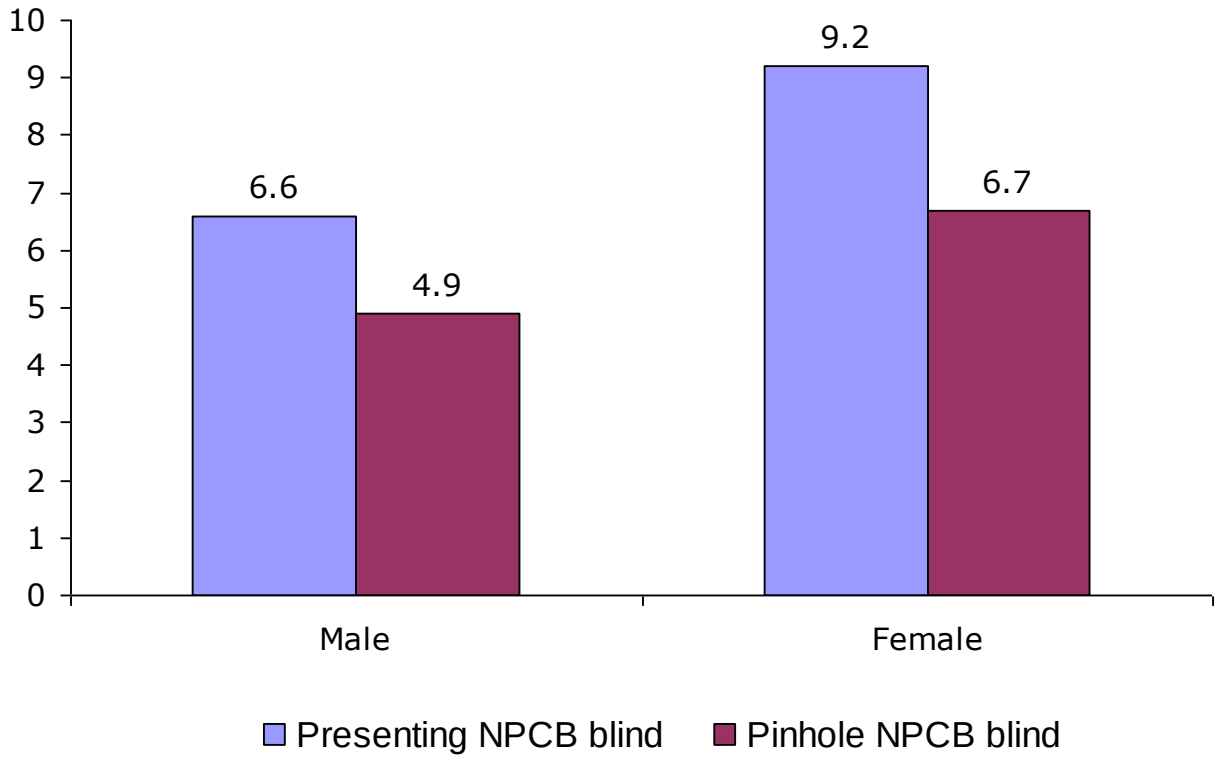

10
9
8
7
6
5
4
3
2
1
0
6.6
4.9
9.2
6.7
Male
Female
Presenting NPCB blind
Pinhole NPCB blind

Table 11: Age specific prevalence of NPCB Blindness (Presenting)

District	50-54 years		55-59 years		60-64 years		65-69 years		70 years and above	
	No. of blind (%)	No. Exam	No. of blind (%)	No. Exam	No. of blind (%)	No. Exam	No. of blind (%)	No. Exam	No. of blind (%)	No. Exam
Bhatinda	4 (0.7)	576	7 (1.3)	544	17 (3.5)	483	12 (3.2)	380	72 (12.7)	565
Cuddalore	16 (2.9)	559	22 (3.9)	565	42 (7.9)	533	36 (9.9)	365	71 (13.2)	539
Deoria	11 (2.2)	511	22 (4.5)	485	55 (11.1)	496	51 (13.9)	368	164 (27.7)	592
Ganjam	2 (0.7)	290	9 (2.0)	457	52 (7.8)	674	31 (8.3)	373	160 (21.4)	749
Gulbarga	7 (1.3)	550	15 (2.8)	542	41 (7.0)	588	40 (12.2)	329	94 (19.6)	479
Jhansi	9 (1.5)	606	23 (4.6)	502	52 (10.3)	503	54 (14.1)	382	124 (26.3)	471
Malda	9 (1.2)	763	14 (2.3)	602	21 (4.8)	436	32 (12.0)	267	91 (22.4)	406
Nagaur	10 (1.5)	665	11 (2.7)	412	23 (5.7)	401	41 (10.5)	391	133 (21.4)	623
Palakkad	1 (0.2)	578	3 (0.6)	473	8 (1.6)	506	9 (2.7)	334	70 (12.0)	584
Parbhani	2 (0.6)	362	19 (3.5)	539	48 (8.2)	587	70 (14.2)	494	138 (29.1)	474
Prakasam	11 (1.9)	589	23 (4.5)	513	29 (5.7)	506	28 (8.2)	340	128 (20.3)	630
Rajnandgaon	12 (2.2)	555	33 (5.1)	654	73 (13.2)	554	91 (19.7)	462	128 (38.7)	331
Shahdol	6 (0.97)	621	7 (1.1)	630	15 (2.6)	577	25 (7.8)	319	81 (22.6)	358
Solan	1 (0.1)	776	7 (1.1)	661	10 (2.7)	368	7 (3.0)	233	56 (11.3)	497
Surendrangr	9 (1.3)	688	12 (1.9)	641	20 (3.9)	519	31 (8.5)	366	81 (17.6)	460
Vaishali	13 (1.9)	699	13 (3.1)	419	31 (6.5)	474	39 (11.6)	335	152 (21.1)	719
Total	123 (1.3)	9388	240 (2.8)	8639	537 (6.5)	8205	597 (10.4)	5738	1743(20.6)	8477

Table 12: Age specific prevalence of NPCB Blindness (Pinhole vision)

District	50-54 years		55-59 years		60-64 years		65-69 years		70 years and above	
	No. of blind (%)	No. Exam	No. of blind (%)	No. Exam	No. of blind (%)	No. Exam	No. of blind (%)	No. Exam	No. of blind (%)	No. Examined
Bhatinda	4 (0.7)	576	7 (1.3)	544	16 (3.3)	483	12 (3.2)	380	70 (12.4)	565
Cuddalore	6 (1.1)	559	4 (0.7)	565	21 (3.9)	533	16 (4.4)	365	46 (8.5)	539
Deoria	6 (1.2)	511	7 (1.4)	485	34 (6.9)	496	27 (7.3)	368	109 (18.4)	592
Ganjam	2 (0.7)	290	7 (1.5)	457	46 (6.8)	674	28 (7.5)	373	147 (19.6)	749
Gulbarga	5 (0.9)	550	9 (1.7)	542	30 (5.1)	588	27 (8.2)	329	76 (15.9)	479
Jhansi	7 (1.2)	606	18 (3.6)	502	40 (8.0)	503	47 (12.3)	382	99 21.0	471
Malda	7 (0.9)	763	10 (1.7)	602	13 (3.0)	436	18 (6.7)	267	60 (14.8)	406
Nagaur	6 (0.9)	665	8 (1.9)	412	15 (3.7)	401	27 (6.9)	391	110 (17.7)	623
Palakkad	1 (0.2)	578	2 (0.4)	473	5 (0.99)	506	7 (2.1)	334	52 (8.9)	584
Parbhani	1 (0.3)	362	11 (2.0)	539	32 (5.5)	587	52 (10.5)	494	119 (25.1)	474
Prakasam	7 (1.2)	589	12 (2.3)	513	16 (3.2)	506	20 (5.9)	340	102 (16.2)	630
Rajnandgaon	5 (0.9)	555	19 (2.9)	654	44 (7.9)	554	57 (12.3)	462	94 (28.4)	331
Shahdol	5 (0.8)	621	6 (0.95)	630	10 (1.7)	577	15 (4.7)	319	54 (15.1)	358
Solan	1 (0.1)	776	6 (0.9)	661	10 (2.7)	368	6 (2.6)	233	52 (10.5)	497
Surendrangr	6 (0.9)	688	7 (1.1)	641	16 (3.1)	519	18 (4.9)	366	59 (12.8)	460
Vaishali	9 (1.3)	699	9 (2.2)	419	24 (5.1)	474	30 (9.0)	335	125 (17.4)	719
Total	78 (0.8)	9388	142 (1.6)	8639	372 (4.5)	8205	407 (7.1)	5738	1374 (16.2)	8477

Age specific prevalence of NPCB Blindness

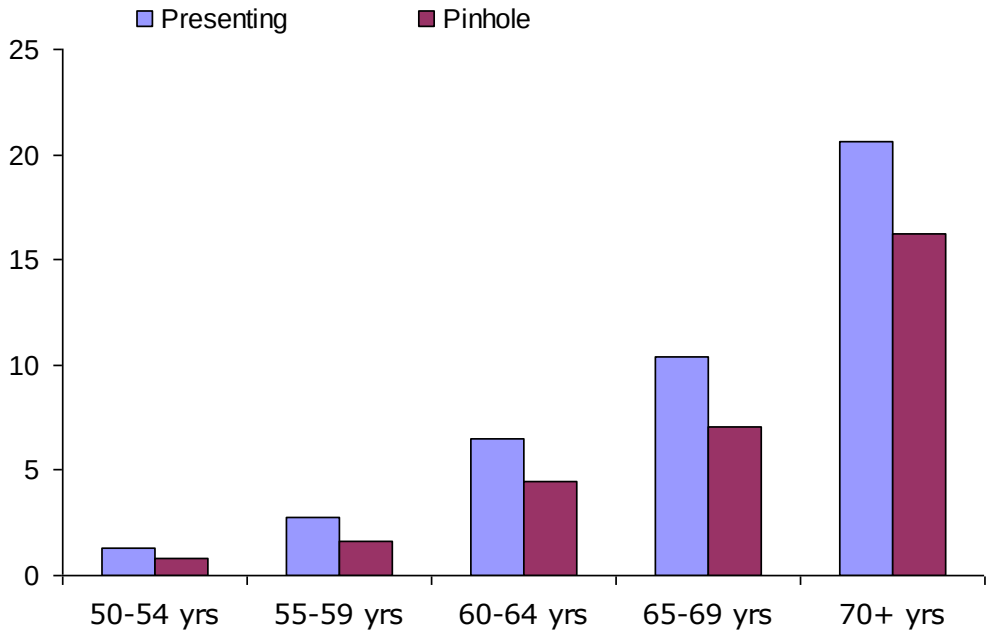


Table 13: Cataract surgical coverage (Persons)

District	Cataract operated persons	Cat. Not operated with vision<6/60	Total unop+op. (<6/60)	Surgical coverage <6/60	Vision<3/60 with cataract	Total unop+op. (<3/60)	Surgical cov. <3/60
Bhatinda	309	77	386	80.1	31	340	90.9
Cuddalore	621	149	770	80.6	51	672	92.4
Deoria	224	270	494	45.3	69	293	76.5
Ganjam	217	215	432	50.2	170	387	56.1
Gulbarga	229	172	401	57.1	91	320	71.6
Jhansi	356	187	543	65.6	98	454	78.4
Malda	151	157	308	49.0	59	210	71.9
Nagaur	433	165	598	72.4	96	529	81.9
Palakkad	297	76	373	79.6	19	316	94.0
Parbhani	338	240	578	58.5	91	429	78.8
Prakasam	476	195	671	70.9	72	548	86.9
Rajnandgaon	349	284	633	55.1	85	434	80.4
Shahdol	195	106	301	64.8	38	233	83.7
Solan	275	56	331	83.1	20	295	93.2
Surendrangr	511	96	607	84.2	18	529	96.6
Vaishali	193	223	416	46.4	107	300	64.3
Total	5174	2668	7842	66.0	1115	6289	82.3

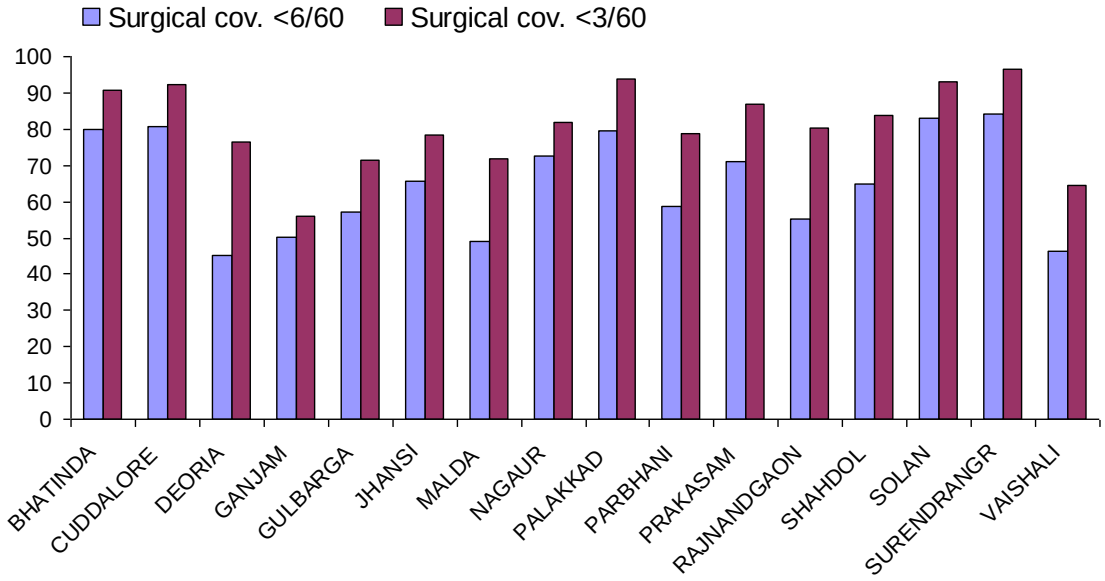


Table 14: Cataract surgical coverage (Eyes)

District	Eyes operated for cataract	Unop. Eyes with vision <6/60	Total	Surgical Coverage %	Unop. Eyes with vision <3/60	Total	Surgical Coverage %
Bhatinda	440	258	698	63.0	150	590	74.6
Cuddalore	909	532	1441	63.1	277	1186	76.6
Deoria	283	748	1031	27.4	315	598	47.3
Ganjam	302	547	849	35.6	457	759	39.8
Gulbarga	286	606	892	32.1	392	678	42.2
Jhansi	491	581	1072	45.8	367	858	57.2
Malda	199	436	635	31.3	214	413	48.2
Nagaur	588	535	1123	52.4	387	975	60.3
Palakkad	441	261	702	62.8	104	545	80.9
Parbhani	440	659	1099	40.0	320	760	57.9
Prakasam	677	640	1317	51.4	310	987	68.6
Rajnandgaon	499	692	1191	41.9	258	757	65.9
Shahdol	264	304	568	46.5	149	413	63.9
Solan	407	207	614	66.3	105	512	79.5
Surendrangr	786	273	1059	74.2	89	875	89.8
Vaishali	241	684	925	26.1	391	632	38.1
Total	7253	7963	15216	47.7	4285	11538	62.9

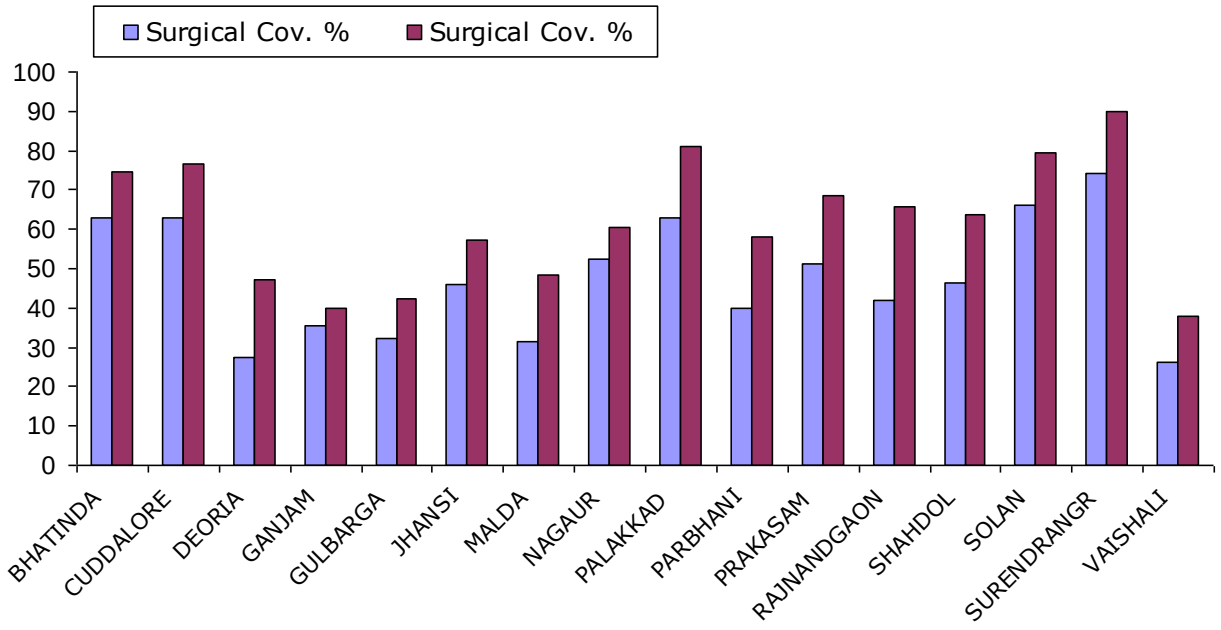


Table 15: Distribution of Cataract Operated in Districts

District	Total Catops	Male	Female	2002-2007	1997-2001	< 1997	Don't know
Bhatinda	408	203	205	209	108	60	31
Cuddalore	901	406	495	639	172	71	19
Deoria	280	120	160	175	82	15	8
Ganjam	302	128	174	193	81	22	6
Gulbarga	371	137	234	203	91	32	45
Jhansi	487	182	305	310	107	56	14
Malda	197	92	105	113	48	23	13
Nagaur	583	270	313	354	130	89	10
Palakkad	447	161	286	266	114	58	9
Parbhani	422	178	244	262	121	34	5
Prakasam	683	291	392	447	160	70	6
Rajnandgaon	508	211	297	359	113	27	9
Shahdol	268	123	145	185	54	27	2
Solan	413	200	213	242	103	56	12
Surendrangr	787	289	498	453	202	111	21
Vaishali	239	113	126	172	45	19	3
Total	7296	3104	4192	4582	1731	770	213

Table 16: District wise IOL rate

District	Total cats done	No. of IOLs	% IOL
Bhatinda	408	198	48.5
Cuddalore	901	685	76.0
Deoria	280	158	56.4
Ganjam	302	180	59.6
Gulbarga	371	220	59.3
Jhansi	487	176	36.1
Malda	197	94	47.7
Nagaur	583	364	62.4
Palakkad	447	373	83.4
Parbhani	422	265	62.8
Prakasam	683	471	69.0
Rajnandgaon	508	321	63.2
Shahdol	268	168	62.7
Solan	413	254	61.5
Surendrangr	787	557	70.8
Vaishali	239	157	65.7
Total	7296	4641	63.6

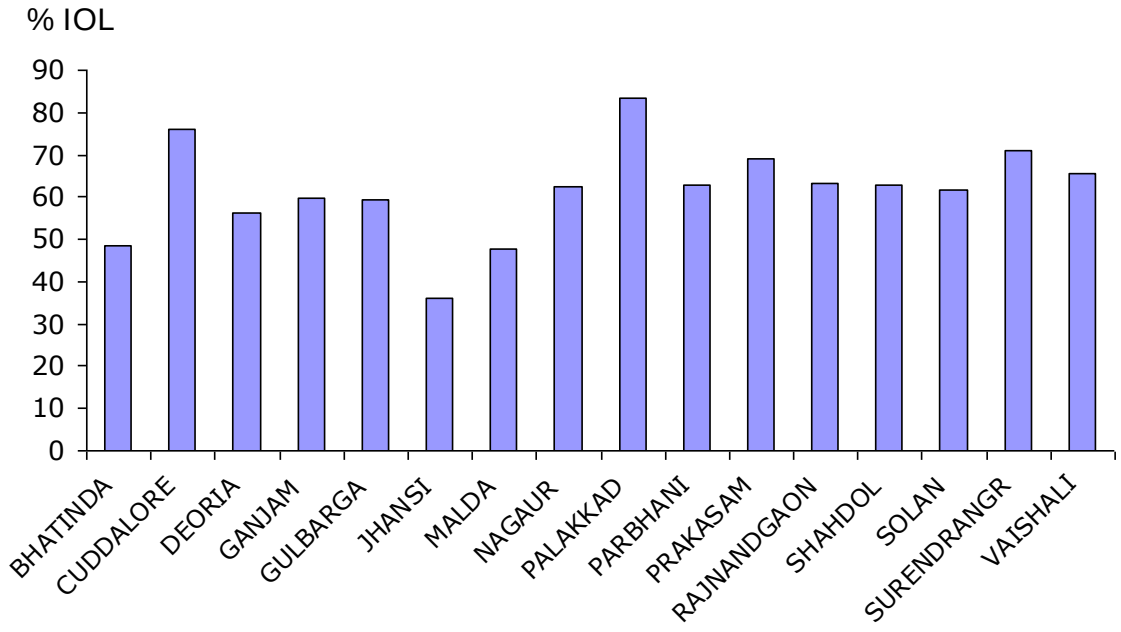


Table 17: Distribution of IOL rate in IOL Operated cases by year

District	2002-2007			1997-2001			Before 1997		
	RE+LE IOL	Total surgery	IOL rate (%)	RE+LE IOL	Total sugery	IOL rate (%)	RE+LE IOL	Total sugery	IOL rate (%)
Bhatinda	148	209	70.8	27	108	25.0	10	60	16.7
Cuddalore	574	639	89.8	101	172	58.7	9	71	12.7
Deoria	125	175	71.4	25	82	30.5	3	15	20.0
Ganjam	161	193	83.4	17	81	21.0	0	22	0.0
Gulbarga	150	203	73.9	30	91	33.0	6	32	18.8
Jhansi	153	310	49.4	18	107	16.8	0	56	0.0
Malda	74	113	65.5	10	48	20.8	0	23	0.0
Nagaur	289	354	81.6	54	130	41.5	13	89	14.6
Palakkad	258	266	97.0	94	114	82.5	19	58	32.8
Parbhani	217	262	82.8	44	121	36.4	2	34	5.9
Prakasam	393	447	87.9	72	160	45.0	6	70	8.6
Rajnandgaon	287	359	79.9	26	113	23.0	2	27	7.4
Shahdol	162	185	87.6	6	54	11.1	0	27	0.0
Solan	212	242	87.6	38	103	36.9	3	56	5.4
Surendrangr	421	453	92.9	123	202	60.9	11	111	9.9
Vaishali	141	172	82.0	11	45	24.4	4	19	21.1
Total	3765	4582	82.2	696	1731	40.2	88	770	11.4

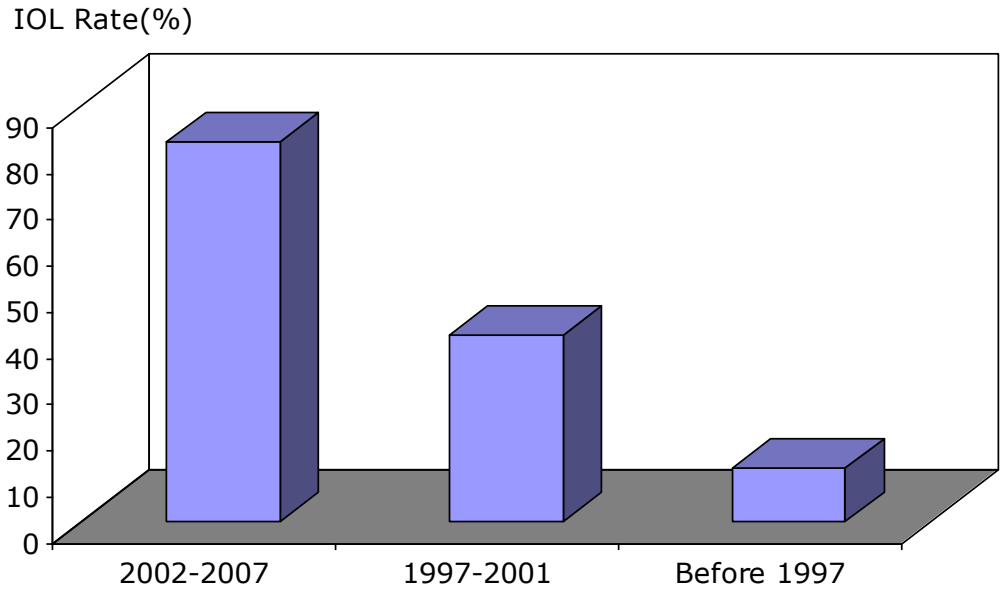


Table 18: Gender distribution of IOL rate in Operated cases

District	Male	Total surgery	% IOL	Female	Total surgery	% IOL
Bhatinda	112	203	55.2	86	205	42.0
Cuddalore	306	406	75.4	379	495	76.6
Deoria	78	120	65.0	80	160	50.0
Ganjam	73	128	57.0	107	174	61.5
Gulbarga	79	137	57.7	141	234	60.3
Jhansi	73	182	40.1	103	305	33.8
Malda	46	92	50.0	48	105	45.7
Nagaur	176	270	65.2	188	313	60.1
Palakkad	151	161	93.8	222	286	77.6
Parbhani	114	178	64.0	151	244	61.9
Prakasam	208	291	71.5	263	392	67.1
Rajnandgaon	140	211	66.4	181	297	60.9
Shahdol	84	123	68.3	84	145	57.9
Solan	127	200	63.5	127	213	59.6
Surendrangr	216	289	74.7	341	498	68.5
Vaishali	74	113	65.5	83	126	65.9
Total	2057	3104	66.3	2584	4192	61.6

Gender distribution of IOL rate in Operated cases

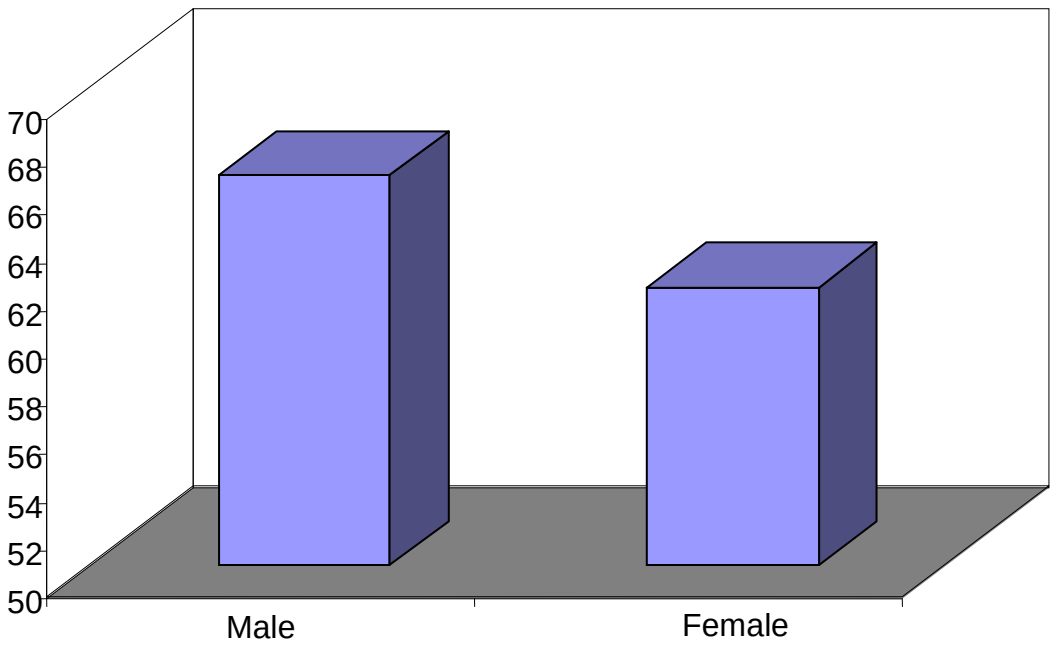


Table 19: Visual Acuity of Operated cases by type of surgery (Non-IOL)

District	> 6/18 (%)	6/18-6/60 (%)	6/60-3/60 (%)	<3/60 (%)	Total
Bhatinda	118 (56.2)	49 (23.3)	11 (5.2)	32 (15.2)	210
Cuddalore	72 (33.3)	35 (16.2)	16 (7.4)	93 (43.1)	216
Deoria	29 (23.8)	48 (39.3)	25 (20.5)	20 (16.4)	122
Ganjam	9 (7.4)	32 (26.2)	9 (7.4)	72 (59.0)	122
Gulbarga	56 (37.1)	25 (16.6)	13 (8.6)	57 (37.7)	151
Jhansi	114 (36.7)	64 (20.6)	38 (12.2)	95 (30.5)	311
Malda	55 (53.4)	14 (13.6)	6 (5.8)	28 (27.2)	103
Nagaur	78 (35.6)	50 (22.8)	24 (11.0)	67 (30.6)	219
Palakkad	34 (45.9)	12 (16.2)	20 (27.0)	8 (10.8)	74
Parbhani	27 (17.2)	55 (35.0)	32 (20.4)	43 (27.4)	157
Prakasam	57 (26.9)	51 (24.1)	29 (13.7)	75 (35.4)	212
Rajnandgaon	31 (16.6)	44 (23.5)	40 (21.4)	72 (38.5)	187
Shahdol	10 (10.0)	32 (32)	18 (18.0)	40 (40.0)	100
Solan	55 (34.6)	56 (35.2)	15 (9.4)	33 (20.8)	159
Surendrangr	71 (30.9)	58 (25.2)	53 (23.0)	48 (20.9)	230
Vaishali	19 (23.2)	23 (28.0)	10 (12.2)	30 (36.6)	82
Total (%)	835 (31.5)	648 (24.4)	359 (13.5)	813 (30.6)	2655

Table 20: Visual Acuity of Operated cases by type of surgery (IOL)

District	> 6/18 %	6/18-6/60 %	6/60-3/60 %	<3/60 %	Total
Bhatinda	154 (78.6)	24 (12.2)	3 (1.5)	15 (7.7)	196
Cuddalore	494 (72.1)	133 (19.4)	32 (4.7)	26 (3.8)	685
Deoria	115 (72.8)	27 (17.1)	9 (5.7)	7 (4.4)	158
Ganjam	100 (55.6)	49 (27.2)	7 (3.9)	24 (13.3)	180
Gulbarga	169 (78.2)	29 (13.4)	6 (2.8)	12 (5.6)	216
Jhansi	109 (61.9)	40 (22.7)	11 (6.3)	16 (9.1)	176
Malda	69 (73.4)	20 (21.3)	3 (3.2)	2 (2.1)	94
Nagaur	220 (60.4)	76 (20.9)	26 (7.1)	42 (11.5)	364
Palakkad	322 (86.8)	29 (7.8)	8 (2.2)	12 (3.2)	371
Parbhani	193 (72.8)	47 (17.7)	12 (4.5)	13 (4.9)	265
Prakasam	341 (72.4)	93 (19.7)	18 (3.8)	19 (4.0)	471
Rajnandgaon	169 (52.6)	118 (36.8)	22 (6.9)	12 (3.7)	321
Shahdol	116 (69.0)	34 (20.2)	9 (5.4)	9 (5.4)	168
Solan	177 (69.7)	56 (22.0)	12 (4.7)	9 (3.5)	254
Surendrangr	380 (68.2)	97 (17.4)	57 (10.2)	23 (4.1)	557
Vaishali	110 (70.1)	35 (22.3)	5 (3.2)	7 (4.5)	157
Total (%)	3238 (69.9)	907 (19.6)	240 (5.2)	248 (5.4)	4633

Visual Acuity of Operated cases by type of surgery

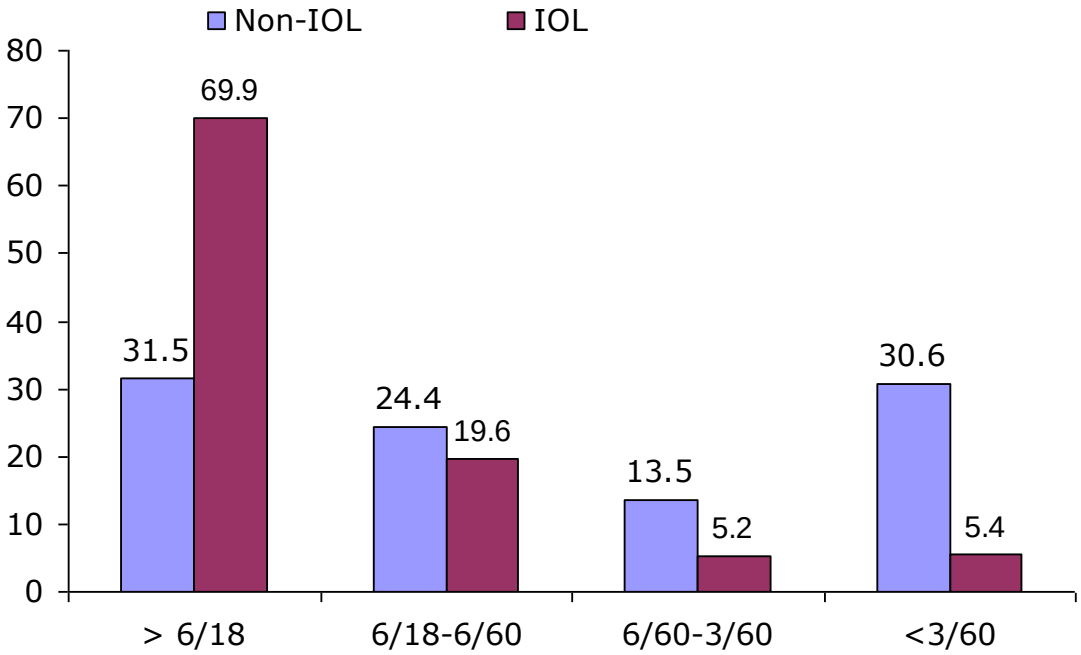


Table 21: Status of Current Spectacle Use by operated persons

District	Using Currently (%)	Not using Currently (%)	Total
Bhatinda	116 (44.4)	145 (55.6)	261
Cuddalore	118 (19.8)	478 (80.2)	596
Deoria	140 (65.4)	74 (34.6)	214
Ganjam	55 (25.6)	160 (74.4)	215
Gulbarga	138 (63.0)	81 (37.0)	219
Jhansi	175 (50.0)	175 (50.0)	350
Malda	94 (64.4)	52 (35.6)	146
Nagaur	186 (44.8)	229 (55.2)	415
Palakkad	111 (53.4)	97 (46.6)	208
Parbhani	186 (61.8)	115 (38.2)	301
Prakasam	187 (39.5)	287 (60.6)	474
Rajnandgaon	77 (22.1)	271 (77.9)	348
Shahdol	56 (29.6)	133 (70.4)	189
Solan	125 (47.0)	141 (53.0)	266
Surendrangr	149 (29.4)	358 (70.6)	507
Vaishali	72 (41.9)	100 (58.1)	172
Total (%)	1985 (40.1)	2896 (59.3)	4,881

Status of Current Spectacle Use by operated persons

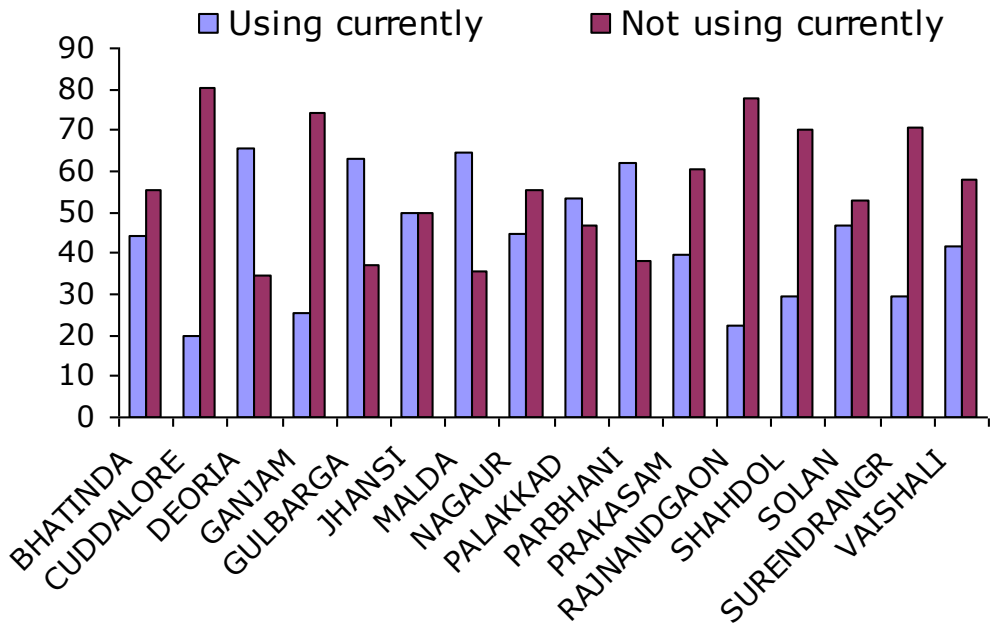
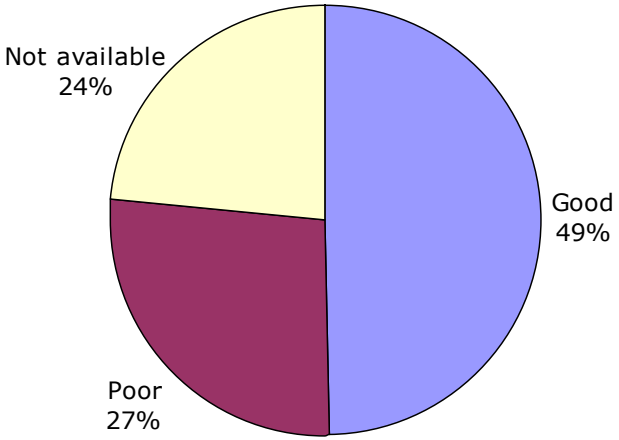


Table 22: Condition of spectacles and type of surgery

District	NON-IOL				IOL			
	Good (%)	Poor (%)	Not available (%)	Total	Good (%)	Poor (%)	Not available (%)	Total
Bhatinda	118 (62.1)	22 (11.6)	50 (26.3)	190	29(19.9)	6 (4.1)	111(76.0)	146
Cuddalore	86 (62.8)	50 (36.5)	1 (0.7)	137	56(81.2)	13(18.8)	0	69
Deoria	23 (26.4)	55 (63.2)	9 (10.3)	87	46(41.1)	28(25.0)	38(33.9)	112
Ganjam	33 (31.7)	21(20.2)	50 (48.1)	104	11(8.1)	0	124(91.9)	135
Gulbarga	85 (59.0)	28(19.4)	31 (21.5)	144	98(61.3)	3(1.9)	59(36.9)	160
Jhansi	146 (52.7)	56(20.2)	75 (27.1)	277	35(22.7)	3(1.9)	116(75.3)	154
Malda	50 (80.6)	12(19.4)	0	62	36(94.7)	0	2(5.3)	38
Nagaur	70 (32.3)	99(45.6)	48(22.1)	217	94(26.3)	28(7.8)	235(65.8)	357
Palakkad	45 (68.2)	8(12.1)	13(19.7)	66	126(48.1)	13(5.0)	123(46.9)	262
Parbhani	59 (50.9)	35(30.2)	22(19.0)	116	95(53.1)	20(11.2)	64(35.8)	179
Prakasam	101 (55.5)	30(16.5)	51(28.0)	182	140(31.4)	9(2.0)	297(66.6)	446
Rajnandgaon	61 (37.9)	35(21.7)	65(40.4)	161	13(6.0)	2(0.9)	201(93.1)	216
Shahdol	18 (20.7)	46(52.9)	23(26.4)	87	21(15.3)	2(1.5)	114(83.2)	137
Solan	96 (65.3)	35(23.8)	16(10.9)	147	47(23.7)	4(2.0)	147(74.2)	198
Surendrangr	112 (52.6)	41(19.2)	60(28.2)	213	103(20.7)	2(0.4)	393(78.9)	498
Vaishali	16 (26.7)	29(48.3)	15(25.0)	60	23(45.1)	5(9.8)	23(45.1)	51
Total (%)	1119 (49.7)	602(26.8)	529(23.5)	2250	973(30.8)	138(4.4)	2047(64.8)	3158

Condition of spectacles and type of surgery

Non IOL Surgery



IOL Surgery

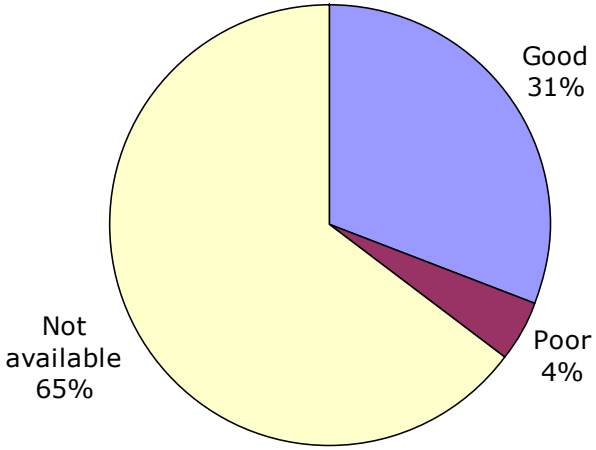
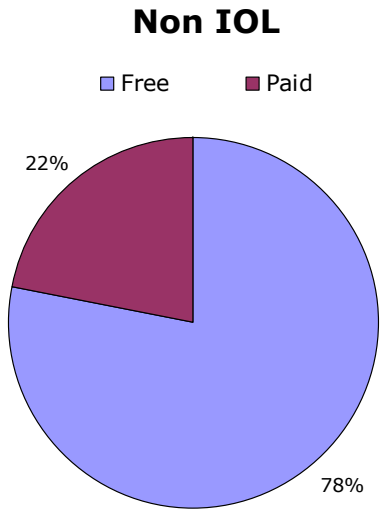


Table 23: Payment status for cataract surgical services (IOL and Non-IOL)

District	NON-IOL			IOL		
	Free (%)	Paid (%)	Total	Free (%)	Paid (%)	Total
Bhatinda	154 (75.1)	51 (24.9)	205	68 (44.7)	84 (55.3)	152
Cuddalore	191 (88.4)	25 (11.6)	216	452 (78.1)	127 (21.9)	579
Deoria	106 (86.9)	16 (13.1)	122	51 (40.8)	74 (59.2)	125
Ganjam	98 (81.7)	22 (18.3)	120	103 (75.2)	34 (24.8)	137
Gulbarga	107(70.9)	44 (29.1)	151	56 (38.6)	89 (61.4)	145
Jhansi	258 (83.5)	51 (16.5)	309	79 (61.7)	49 (38.3)	128
Malda	93 (94.9)	5 (5.1)	98	17 (25.4)	50 (74.6)	67
Nagaur	146 (67.3)	71 (32.7)	217	138 (51.7)	129 (48.3)	267
Palakkad	54 (73.0)	20 (27.0)	74	154 (49.7)	156 (50.3)	310
Parbhani	131(85.1)	23 (14.9)	154	133 (69.6)	58 (30.4)	191
Prakasam	86 (40.6)	126 (59.4)	212	167 (42.9)	222 (57.1)	389
Rajnandgaon	172 (92.0)	15 (8.0)	187	191 (71.5)	76 (28.5)	267
Shahdol	94 (94.0)	6 (6.0)	100	114 (84.4)	21 (15.6)	135
Solan	128 (81.5)	29 (18.5)	157	79 (40.1)	118 (59.9)	197
Surendrangr	175 (77.1)	52 (22.9)	227	316 (65.6)	166 (34.4)	482
Vaishali	59 (72.0)	23 (28.0)	82	21 (18.9)	90 (81.1)	111
Total (%)	2052 (78.0)	579 (22.0)	2631	2139 (58.1)	1543 (41.9)	3682



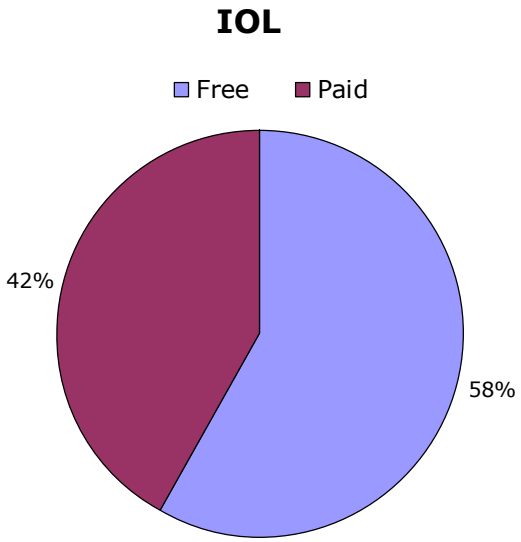


Table 24: Location where cataract surgery performed in different years

District	2002-2007					1997-2001					< 1997				
	Govt %	NGO %	Pvt %	Camps %	Total Surg. N	Govt %	NGO %	Pvt %	Camps %	Total Surg. N	Govt %	NGO %	Pvt %	Camps %	Total Surg. N
Bhatinda	15.2	4.3	40.8	39.8	211	10.8	3.6	36.9	48.6	111	17.2	0.9	37.9	43.1	58
Cuddalore	14.7	82.5	2.8	0.0	641	19.7	76.9	3.5	0.0	173	26.8	28.3	2.8	1.4	71
Deoria	48.3	17.4	31.5	2.8	178	56.5	11.8	21.2	10.6	85	73.3	1.2	20.0	0.0	15
Ganjam	60.6	7.8	14.0	17.6	193	34.1	6.1	15.9	43.9	82	54.5	0.0	13.6	31.8	22
Gulbarga	37.2	5.8	49.3	7.7	207	44.1	6.5	40.9	8.6	93	31.3	2.2	50.0	12.5	32
Jhansi	38.1	26.3	17.0	18.6	312	26.9	25.0	18.5	29.6	108	28.1	5.6	22.8	38.6	57
Malda	20.9	51.3	19.1	8.7	115	8.3	25.0	20.8	45.8	48	30.4	18.8	4.3	26.1	23
Nagaur	12.9	4.4	30.5	52.2	364	6.7	4.4	48.1	40.7	135	6.5	0.7	46.7	45.7	92
Palakkad	4.9	60.9	32.7	1.5	266	5.3	77.2	17.5	0.0	114	13.8	29.8	27.6	0.0	58
Parbhani	65.5	1.5	26.1	6.9	261	59.0	1.6	19.7	19.7	122	73.5	0.0	14.7	11.8	34
Prakasam	22.8	25.4	47.8	4.0	448	18.8	16.3	60.0	5.0	160	18.6	5.0	65.7	4.3	70
Rajnandgaon	19.8	32.9	7.8	39.6	359	14.2	39.8	5.3	40.7	113	14.8	9.7	7.4	37.0	27
Shahdol	58.6	17.2	10.2	14.0	186	33.3	14.8	9.3	42.6	54	18.5	14.8	3.7	48.1	27
Solan	33.3	1.2	41.6	23.9	243	45.6	0.0	23.3	31.1	103	48.2	1.9	17.9	30.4	56
Surendrangr	24.4	54.6	20.3	0.7	454	17.5	61.5	18.5	2.5	200	11.7	31.5	24.3	7.2	111
Vaishali	31.1	6.2	58.8	4.0	177	51.1	2.1	36.2	10.6	47	35.0	2.1	55.0	5.0	20
Total	28.4	31.3	25.7	14.6	4615	25.9	28.4	25.2	20.5	1748	25.0	11.2	28.6	21.1	773

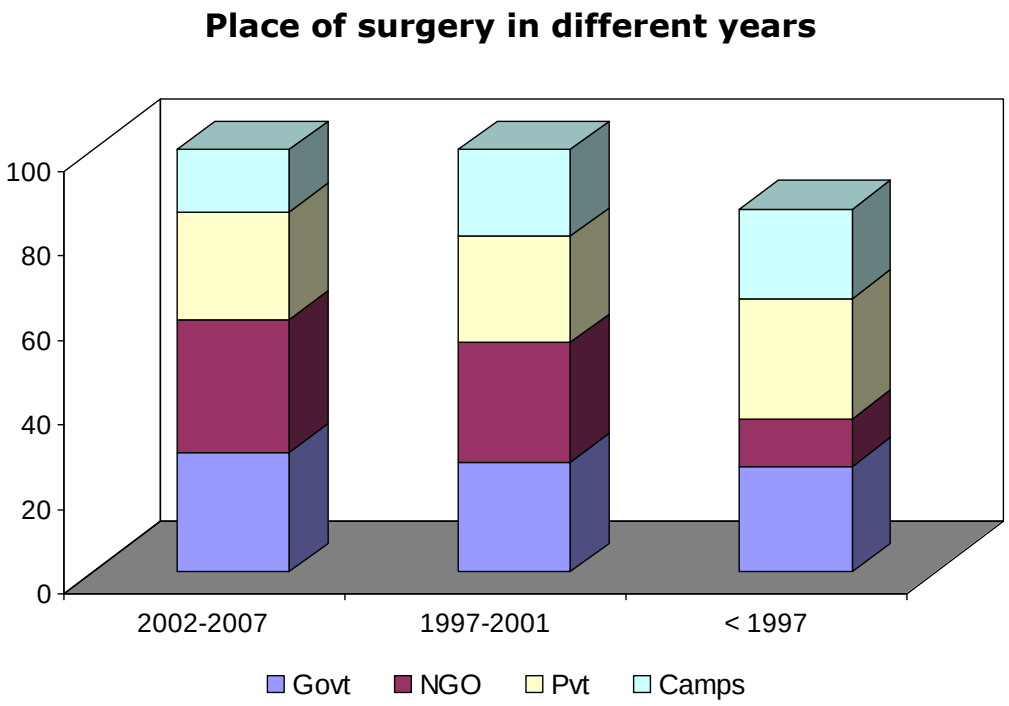

Place of surgery in different years
100
80
60
40
20
0
2002-2007
1997-2001
< 1997
Govt
NGO
Pvt
Camps

Table 25: Causes of blindness (presenting vision <6/60 better eye-NPCB definition)

	RE	Cat	Uncorr. Aphakia	Cat sur compli	Phtisis	Trach	Other cor scar	Globe abnor	Glau	DR	AMD	Other post seg	Other	Undet.	Total
Bhatinda	0	72 (66.0)	6 (5.5)	2 (1.8)	0	1 (0.9)	23 (21.1)	0	4 (3.7)	0	0	0	1 (0.9)	0	109
Cuddalore	8 (4.3)	136 (72.7)	14 (7.5)	5 (2.7)	1 (0.5)	0	5 (2.7)	0	2 (1.1)	2 (1.1)	3 (1.6)	8 (4.3)	2 (1.1)	1 (0.5)	187
Deoria	30 (9.9)	256 (84.5)	6 (2.0)	2 (1.0)	3 (0.99)	0	5 (1.7)	0	1 (0.3)	0	0	0	0	0	303
Ganjam	2 (0.8)	212 (86.2)	21 (8.5)	2 (0.8)	2 (0.8)	0	2 (0.8)	0	3 (1.2)	0	0	2 (0.8)	0	0	246
Gulbarga	8 (4.1)	158 (80.2)	4 (2.0)	2 (1.0)	1 (0.5)	0	4 (2.0)	2 1.0	9 (4.6)	1 (0.5)	0	7 (3.6)	0	1 (0.5)	197
Jhansi	11 (4.2)	160 (61.1)	26 (9.9)	7 (2.7)	8 (3.1)	0	20 (7.6)	0	8 (3.1)	0	1 (0.4)	5 (1.9)	14 (5.3)	2 (0.8)	262
Malda	10 (6.0)	140 (83.8)	7 (4.2)	0	1 (0.6)	0	1 (0.6)	0	4 (2.4)	0	0	2 (1.2)	2 (1.2)	0	167
Nagaur	4 (1.8)	146 (67.0)	8 (3.7)	7 (3.2)	2 (0.9)	2 (0.9)	25 (11.5)	1 0.5	9 (4.1)	2 (0.9)	5 (2.3)	6 (2.8)	1 (0.5)	0	218
Palakkad	0	71 (78.0)	5 (5.5)	0	0	0	1 (1.1)	1 1.1	8 (8.8)	0 0	1 (1.1)	4 (4.4)	0	0	91
Parbhani	7 (2.6)	229 (83.3)	5 (1.8)	8 (2.9)	1 (0.4)	1 (0.4)	6 (2.2)	1 0.4	10 (3.6)	1 (0.5)	4 (1.5)	0	1 (0.4)	1 0.4)	275
Prakasam	3 (1.4)	190 (86.8)	0	14 (6.4)	0	0	2 (0.9)	2 0.9	3 (1.4)	0	0	2 (0.9)	2 (0.9)	1 (0.5)	219
Rajnandgaon	5 (1.5)	274 (81.3)	19 (5.6)	6 (1.8)	3 (0.9)	3 (0.9)	6 (1.8)	0	12 (3.6)	0	2 (0.6)	4 (1.2)	2 (0.6)	1 (0.3)	337
Shahdol	5 (3.7)	99 (73.9)	9 (6.7)	1 (0.8)	0	1 (0.8)	2 (1.5)	0	5 (3.7)	1 (0.8)	5 (3.7)	3 (2.2)	2 (1.5)	1 (0.8)	134
Solan	1 (1.3)	54 (67.5)	0	14 (17.5)	1 (1.3)	0	3 (3.8)	0	3 (3.8)	0	0	0	3 (3.8)	1 (1.3)	80
Surendrangr	7 (4.6)	88 (57.5)	11 (7.2)	0	4 (2.6)	2 (1.3)	9 (5.9)	0	8 (5.2)	0	9 (5.9)	8 (5.2)	7 (4.6)	0	153
Vaishali	8 (3.2)	216 (87.1)	7 (2.8)	0	0	0	3 (1.2)	1 0.4	7 (2.8)	0	1 (0.4)	1 (0.4)	2 0.8	2 (0.8)	248
Total	109 (3.4)	2501 (77.5)	148 (4.6)	70 (2.2)	27 (0.8)	10 (0.3)	117 (3.6)	8 0.3	96 (3.0)	7 (0.2)	31 (1.0)	52 (1.6)	39 1.2	11 (0.3)	3226

Causes of Blindness (Vision < 6/60 better eye)

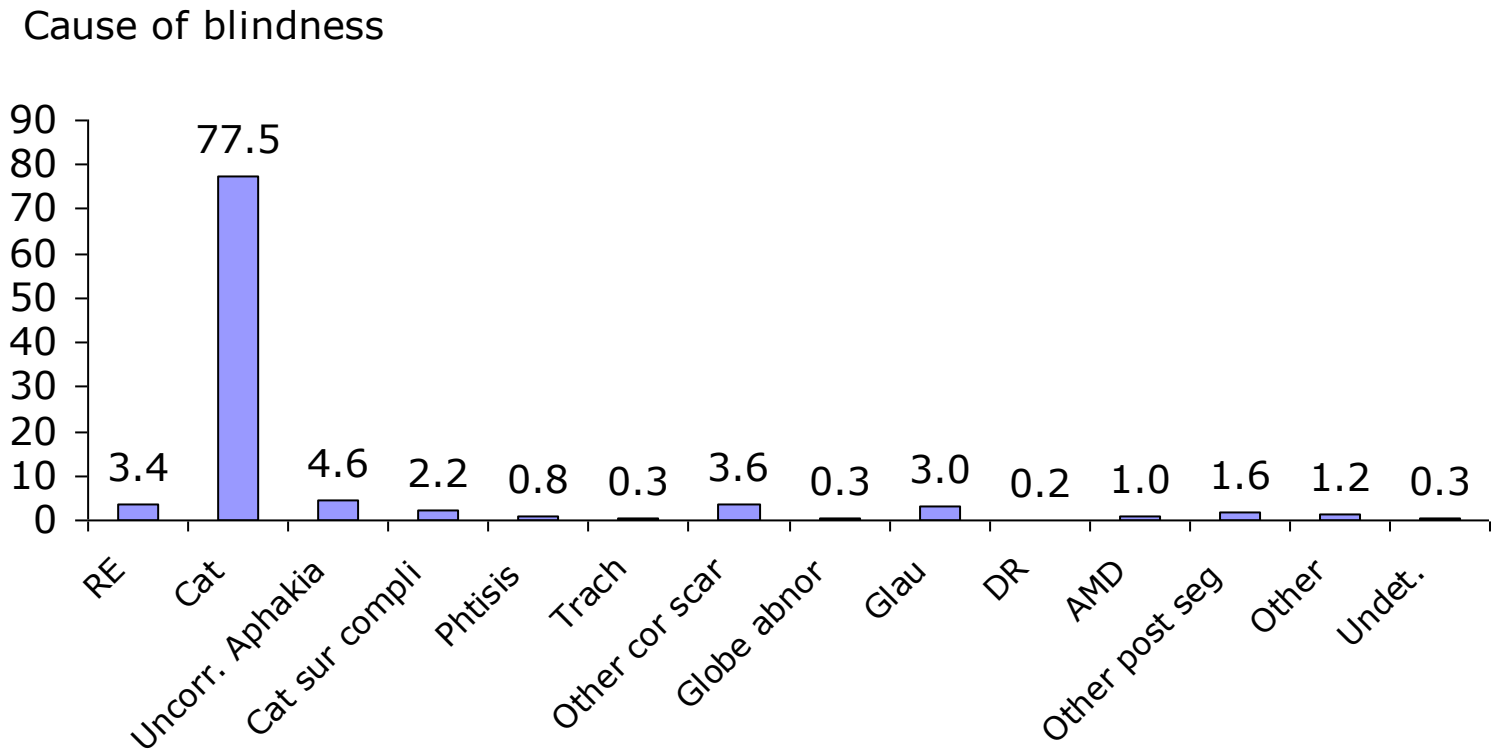


Table 26: Causes of low vision (presenting vision < 6/18-6/60 better eye)

District	RE	Cat	Uncorr. Aphakia	Cat sur compli	Phtisis	Trach	Other cor scar	Globe abnor	Glau	DR	AMD	Other post seg	Other	Undet.	Total
Bhatinda	28 (14.9)	131 (69.7)	14 (7.5)	5 (2.7)	0	0	3 (1.6)	0	3 (1.6)	1 (0.5)	1 (0.5)	0	1 (0.5)	1 (0.5)	188
Cuddalore	149 (27.3)	348 (63.7)	14 (2.6)	3 (0.6)	0	0	3 (0.6)	0	8 (1.5)	2 (0.4)	4 (0.7)	9 (1.7)	6 (1.1)	0	546
Deoria	332 (49.0)	323 (47.7)	14 (2.1)	2 (0.3)	2 (0.3)	0	0	0	0	0	1 (0.2)	2 (0.3)	1 (0.2)	0	677
Ganjam	18 (6.6)	226 (83.4)	18 (6.6)	5 (1.9)	0	0	1 (0.4)	0	0	1 (0.4)	1 (0.4)	0	1 (0.4)	0	271
Gulbarga	137 (34.9)	222 (56.5)	6 (1.5)	5 (1.3)	3 (0.8)	1 (0.3)	8 (2.0)	0	3 (0.8)	0	1 (0.3)	5 (1.3)	1 (0.3)	1 (01.3)	393
Jhansi	115 (29.6)	221 (56.8)	21 (5.4)	1 (0.3)	0	0	8 (2.1)	0	3 (0.8)	0	1 (0.3)	3 (0.8)	16 (4.1)	0	389
Malda	226 (62.6)	118 (32.7)	9 (2.5)	0	0	0	2 (0.6)	0	4 (1.1)	0	0	0	2 (0.6)	0	361
Nagaur	33 (10.2)	240 (73.9)	7 (2.2)	18 (5.5)	0	0	11 (3.4)	0	9 (2.8)	1 (0.3)	4 (1.2)	2 (0.6)	0	0	325
Palakkad	14 (8.4)	128 (77.1)	2 (1.2)	0	0	0	2 (1.2)	0	5 (3.01)	6 (3.6)	3 (1.8)	5 (3.0)	0	1 (0.6)	166
Parbhani	82 (21.1)	256 (65.8)	15 (3.9)	5 (1.3)	0	0	8 (2.1)	0	5 (1.3)	0	10 (2.6)	8 (2.1)	0	0	389
Prakasam	156 (27.5)	365 (64.4)	3 (0.5)	18 (3.2)	0	0	4 (0.7)	1 (0.2)	9 (1.6)	0	0	6 (1.1)	4 (0.7)	1 (0.2)	567
Rajnandgaon	368 (46.8)	372 (47.3)	17 (2.2)	3 (0.4)	0	0	3 (0.4)	0	11 (1.4)	0 0	4 (0.5)	6 (0.8)	2 (0.3)	0	786
Shahdol	232 (56.5)	140 (34.1)	16 (3.9)	3 (0.7)	0	2 (0.5)	2 (0.5)	0	1 (0.2)	0 0	8 (2.0)	6 (1.5)	1 (0.2)	0	411
Solan	125 (40.7)	144 (46.9)	4 (1.3)	30 (9.8)	0	0	1 (0.3)	0	1 (0.3)	0 0	1 (0.3)	1 (0.3)	0	0	307
Surendrangr	55 (17.5)	207 (65.9)	11 (3.5)	4 (1.3)	0	0	8 (2.6)	0	1 (0.3)	1 (0.3)	16 (5.1)	4 (1.3)	7 (2.2)	0	314
Vaishali	107 (20.1)	405 (76.0)	6 (1.1)	1 (0.2)	0	0	0	0	1 (0.2)	2 (0.4)	5 (0.9)	4 (0.8)	1 (0.2)	1 (0.2)	533
Total	2177 (32.9)	3846 (58.1)	177 (2.7)	103 (1.6)	5 (0.08)	3 (0.05)	64 (1.0)	1 (0.02)	64 (1.0)	14 (0.2)	60 (0.9)	61 (0.9)	43 (0.7)	5 (0.08)	6623

Cause of Low Vision (presenting vision < 6/18-6/60 in the better eye)

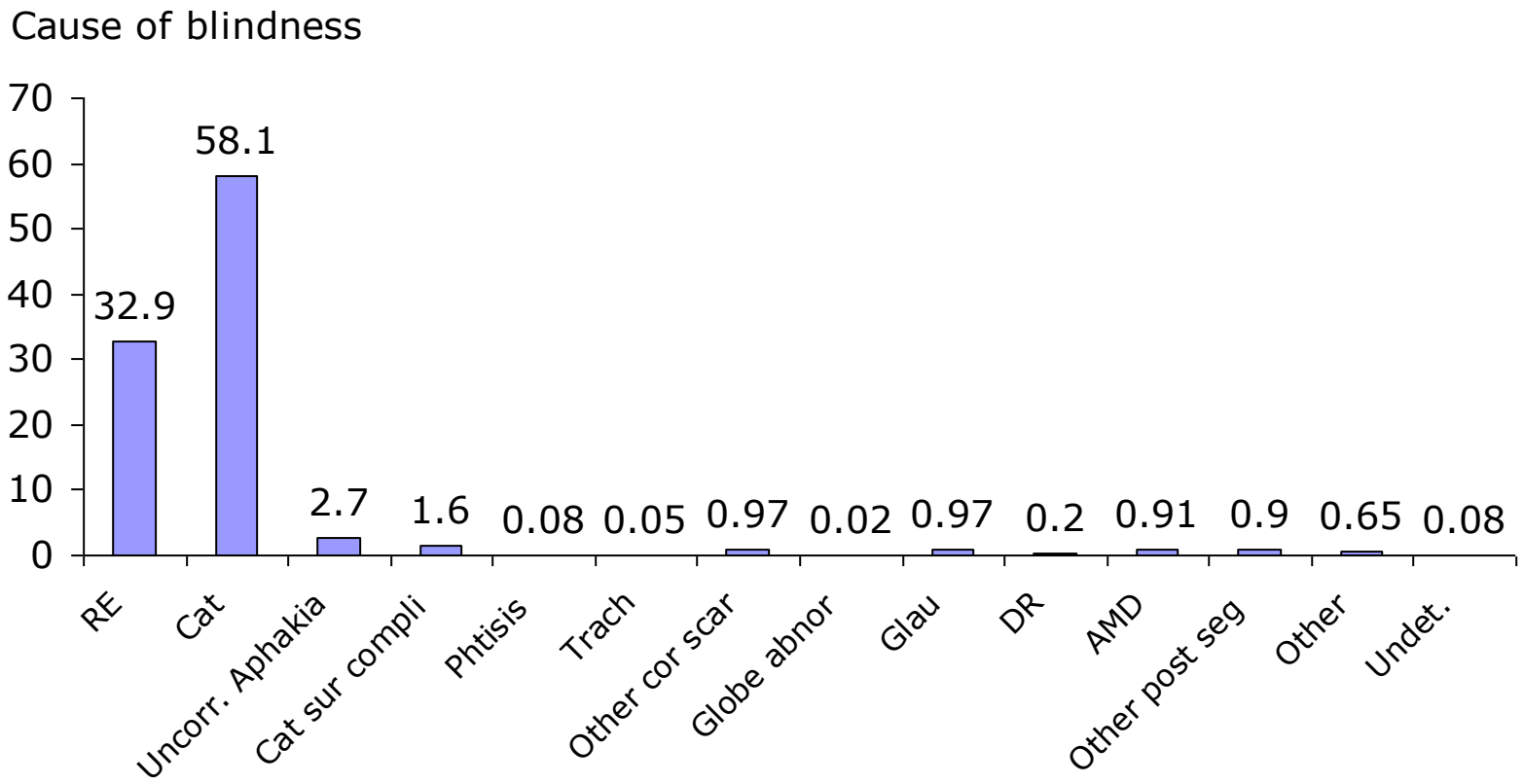


Table 27: Causes of Unilateral blindness (presenting vision < 6/60 in worst eye)

District	RE	Cat	Uncorr. Aphakia	Cat sur compli	Phtisis	Trach	Other cor scar	Globe abnor	Glau	DR	AMD	Other post seg	Other	Undet.	Total
BHATINDA	3 (1.64)	89 (48.6)	13 (7.1)	13 (7.1)	13 (7.1)	0	23 (12.6)	0	12 (6.6)	0	0	1 (0.6)	16 (8.7)	0	183
CUDDALORE	5 (2.2)	117 (51.5)	31 (13.7)	15 (6.6)	7 (3.1)	0	19 (8.4)	6 (2.6)	6 (2.6)	1 (0.4)	0	11 (4.9	7 (3.1)	2 (0.9)	227
DEORIA	14 (9.6)	96 (65.8)	5 (3.4)	5 (3.4)	6 (4.1)	0	12 (8.2)	0	3 (2.1)	1 (0.7)	0	1 (0.7)	3 (2.1)	0	146
GANJAM	0	80 (71.4)	9 (8.0)	6 (5.4)	3 (2.7)	0	9 (8.0)	0	3 (2.7)	0	0	1 (0.9)	1 (0.9)	0	112
GULBARGA	10 (4.3)	155 (67.1)	15 (6.5)	11 (4.8)	7 (3.0)	0	10 (4.3)	1 (0.4)	7 (3.0)	1 (0.4)	0	10 (4.3)	4 (1.7)	0	231
JHANSI	10 (4.5)	126 (56.3)	13 (5.8)	6 (2.7)	23 (10.3)	0	15 (6.7)	1 (0.5)	8 (3.6)	0	0	8 (3.6)	14 (6.3)	0	224
MALDA	4 (4.3)	60 (63.8)	4 (4.3)	2 (2.1)	5 (5.3)	0	5 (5.3)	0	1 (1.1)	0	0	8 (8.5)	5 (5.3)	0	94
NAGAUR	8 (3.2)	141 (56.9)	11 (4.4)	8 (3.2)	15 (6.1)	0	28 (11.3)	5 (2.0)	6 (2.4)	0	2 (0.8)	10 (4.0)	13 (5.2)	1 (0.4)	248
PALAKKAD	0	67 (57.3)	6 (5.1)	2 (1.7)	5 (4.3)	0	9 (7.7)	0	8 (6.8)	3 (2.6)	3 (2.6)	11 (9.4)	3 (2.6)	0	117
PARBHANI	7 (3.4)	127 (61.1)	6 (2.9)	8 (3.9)	8 (3.9)	0	29 (13.9)	6 (2.9)	8 (3.9)	0	0	7 (3.4)	1 (0.5)	1 (0.5)	208
PRAKASAM	10 (4.7)	129 (60.6)	4 (1.9)	26 (12.2)	2 (0.9)	0	7 (3.3)	3 (1.4)	9 (4.2)	1 (0.5)	0	9 (4.2)	13 (6.1)	0	213
RAJNANDGAON	6 (7.9)	36 (47.4)	2 (2.6)	1 (1.3)	5 (6.6)	0	5 (6.6)	2 (2.6)	2 (2.6)	0	0	11 (14.5)	6 (7.9)	0	76
SHAHDOL	1 (1.1)	42 (46.7)	7 (7.8)	7 (7.8)	8 (8.9)	0	8 (8.9)	0	3 (3.3)	0	0	3 (3.3)	9 (10.0)	2 (2.2)	90
SOLAN	3 (2.9)	55 (53.9)	1 (1.0)	11 (10.8)	9 (8.8)	0	9 (8.8)	0	4 (3.9)	0	0	4 (3.9)	5 (4.9)	1 (1.0)	102
SURENDRANGR	6 (4.0)	65 (43.1)	20 (13.3)	3 (2.0)	15 (9.9)	1 (0.7)	9 (6.0)	0 0	3 (2.0)	0	1 (0.7)	11 (7.3)	17 (11.3)	0	151
VAISHALI	8 (5.4)	93 (62.8)	5 (3.4)	4 (2.7)	6 (4.1)	0	10 (6.8)	1 (0.7)	5 (3.4)	0	2 (1.4)	4 (2.7)	5 (3.4)	5 (3.4)	148
Total	95 (3.7)	1478 (57.5)	152 (5.9)	128 (5.0)	137 (5.3)	1 (4)	207 (8.1)	25 (0.97)	88 (3.4)	7 (0.3)	8 (0.3)	110 (4.3)	122 (4.8)	12 (0.5)	2570

Causes of Unilateral Blindness/One Eye Blindness

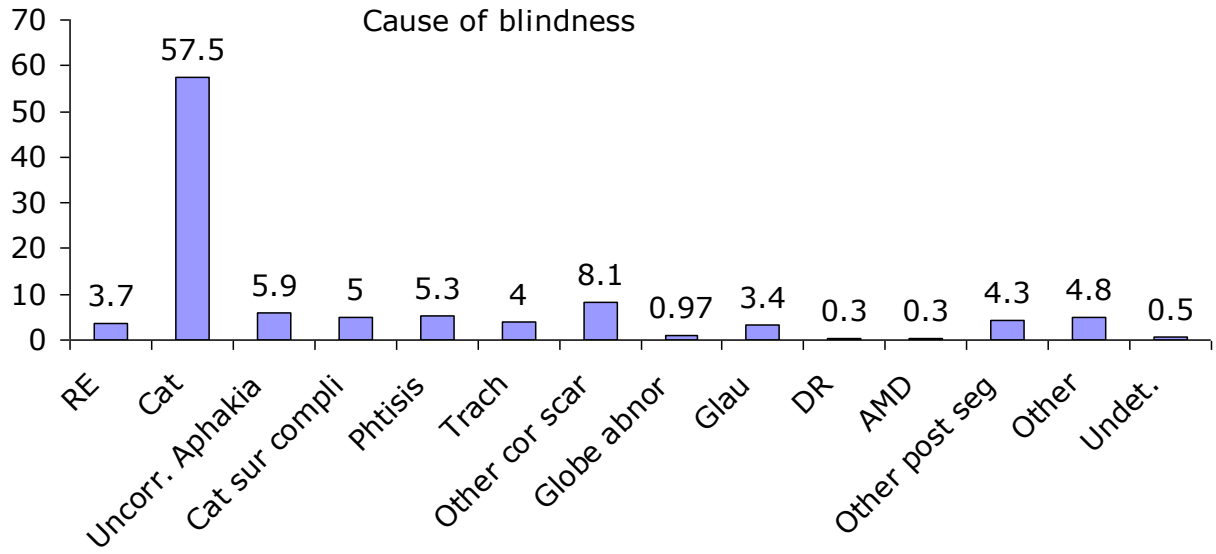


Table 28: Comparison of presenting and pinhole VA among all respondents

Presenting	Pinhole								Total
	> 6/18	%	< 6/18-6/60	%	< 6/60-3/60	%	< 3/60	%	
> 6/18	55405	100	0	0	0	0	0	0	55505
< 6/18-6/60	7758	54.7	6437	45.3	0	0	0	0	14195
< 6/60-3/60	380	8.1	1696	36.1	2627	55.9	0	0	4703
< 3/60	105	1.6	216	3.3	424	6.5	5813	88.6	6558
Total	63648	78.7	8349	10.3	3051	3.8	5813	7.2	80861

Table 29: Comparison of presenting and pinhole VA among all operated respondents (IOL surgery)

Presenting	Pinhole								Total
	> 6/18	%	< 6/18-6/60	%	< 6/60-3/60	%	< 3/60	%	
> 6/18	3131	100	0	0	0	0	0	0	3131
< 6/18-6/60	546	60.5	356	39.5	0	0	0	0	902
< 6/60-3/60	31	13.1	79	33.3	127	53.6	0	0	237
< 3/60	4	1.8	8	3.7	16	7.3	191	87.2	219
Total	3712	82.7	443	9.9	143	3.2	191	4.3	4489

Table 30: Comparison of presenting and pinhole VA among all operated respondents (Non IOL surgery)

Presenting	Pinhole								Total
	> 6/18	%	< 6/18-6/60	%	< 6/60-3/60	%	< 3/60	%	
> 6/18	799	100	0		0	0	0	0	799
< 6/18-6/60	176	27.5	463	72.5	0	0	0	0	639
< 6/60-3/60	53	20.7	114	44.5	189	73.8	0	0	256
< 3/60	81	10.6	105	13.8	74	9.7	502	65.9	762
Total	1109	45.2	682	27.8	263	10.7	502	20.4	2456

Table 31: Comparison of Blindness Prevalence (VA < 6/60 in better eye) over the last decade

State	District	Blindness Prevalence Rates (%)		
		1998	2001	2007
Himachal Pradesh	Solan		5.4**	3.2*
Punjab	Bhatinda		7.8**	4.4*
Rajasthan	Nagaur	24.9*		8.7*
Uttar Pradesh	Deoria	19.3*		12.4*
Uttar Pradesh	Jhansi	23.8*		10.6*
Bihar	Vaishali		6.0**	9.4*
West Bengal	Malda		9.2**	6.7*
Orissa	Ganjam	19.9*		10.0*
Chhattisgarh	Rajnandgaon		12.4**	13.2*
Madhya Pradesh	Shahdol	21.0*		5.3*
Gujarat	Surendranagar		8.1**	5.7*
Maharastra	Parbhani		7.9*	11.3*
Andhra Pradesh	Prakasam	21.8*	10.9**	8.5*
Karnataka	Gulbarga		13.7**	7.9*
Kerala	Palakkad		4.2**	3.7*
Tamil Nadu	Cuddalore		15.3*	7.3*
INDIA		18.4*	11.5*	8.0*
			8.5**	

* Rapid Assessment / Rapid Assessment of Avoidable Blindness (VA Outdoor)
** Detailed Blindness Surveys (VA in Clinic)

Table 32: Barriers to cataract surgery (awareness related) among cataract blind persons

States	District	Total	Unaware of cataract (%)	Told to wait for cataract to mature (%)	Believes it to be fate (%)	Fear of losing eyesight (%)	Fear of operation (%)
Andhra pradesh	Prakasam	1066	167 (15.7)	165 (15.5)	2 (0.2)	12 (1.1)	24 (2.3)
Bihar	Vaishali	1007	584 (58.0)	97 (9.6)	1 (0.1)	14 (1.4)	14 (1.4)
Chattisgarh	Rajnandgaon	1214	259 (21.3)	78 (6.4)	27 (2.2)	63 (5.2)	207 (17.1)
Gujarat	Surendera nagar	617	141 (22.9)	109 (17.7)	3 (0.5)	10 (1.6)	29 (4.7)
Himachal Pradesh	Solan	403	240 (59.6)	42 (10.4)	0 (0.0)	1 (0.2)	8 (2.0)
Karnataka	Gulbarga	1709	48 (2.8)	304 (17.8)	23 (1.3)	51 (3.0)	63 (3.7)
Kerala	Palakkad	643	132 (20.5)	28 (4.4)	31 (4.8)	5 (0.8)	20 (3.1)
Madhya Pradesh	Shadol	449	115 (25.6)	30 (6.7)	1 (0.2)	14 (3.1)	10 (2.2)
Maharashtra	Parbhani	1730	307 (17.7)	120 (6.9)	30 (1.7)	38 (2.2)	95 (5.5)
Orissa	Ganjam	1155	167 (14.5)	9 (0.8)	9 (0.8)	21 (1.8)	29 (2.5)
Punjab	Bhatinda	422	87 (20.6)	6 (1.4)	1 (0.2)	1 (0.2)	14 (3.3)
Rajasthan	Nagaur	819	54 (6.6)	65 (7.9)	5 (0.6)	43 (5.3)	59 (7.2)
Tamil Nadu	Cuddalore	1425	337 (23.6)	38 (2.7)	2 (0.1)	12 (0.8)	75 (5.3)
Uttar Pradesh	Jhansi	1127	395 (35.0)	22 (2.0)	4 (0.4)	3 (0.3)	3 (0.3)
Uttar Pradesh	Deoria	2229	459 (20.6)	215 (9.6)	59 (2.6)	34 (1.5)	143 (6.4)
West Bengal	Malda	701	243 (34.7)	18 (2.6)	1 (0.1)	8 (1.1)	11 (1.6)
All India		16716	3735 (22.3)	1346 (8.1)	199 (1.2)	330 (2.0)	804 (4.8)

Table 33: Barriers to cataract surgery (service related) among cataract blind persons

States	District	Total	Surgical Services not available (%)	Cannot afford operation (%)	Need not felt (%)	Old age & need not felt (%)
Andhra Pradesh	Prakasam	1066	2 (0.2)	168 (15.8)	176 (16.5)	74 (6.9)
Bihar	Vaishali	1007	6 (0.6)	97 (9.6)	49 (4.9)	26 (2.6)
Chattisgarh	Rajnandgaon	1214	5 (0.4)	23 (1.9)	171 (14.1)	61 (5.0)
Gujarat	Surenderanagar	617	2 (0.3)	11 (1.8)	145 (23.5)	46 (7.5)
Himachal Pradesh	Solan	403	0 (0.0)	10 (2.5)	25 (6.2)	36 (8.9)
Karnataka	Gulbarga	1709	144 (8.4)	297 (17.4)	22 (1.3)	75 (4.4)
Kerala	Palakkad	643	10 (1.6)	76 (11.8)	25 (3.9)	82 (12.8)
Madhya Pradesh	Shadol	449	2 (0.4)	29 (6.5)	9 (2.0)	65 (14.5)
Maharashtra	Parbhani	1730	37 (2.1)	163 (9.4)	85 (4.9)	106 (6.1)
Orissa	Ganjam	1155	30 (2.6)	103 (8.9)	102 (8.8)	30 (2.6)
Punjab	Bhatinda	422	0 (0.0)	41 (9.7)	51 (12.1)	94 (22.3)
Rajasthan	Nagaur	819	10 (1.2)	54 (6.6)	225 (27.5)	42 (5.1)
Tamil Nadu	Cuddalore	1425	3 (0.2)	164 (11.5)	97 (6.8)	103 (7.2)
Uttar Pradesh	Jhansi	1127	24 (2.1)	175 (15.5)	40 (3.5)	110 (9.8)
Uttar Pradesh	Deoria	2229	54 (2.4)	389 (17.5)	164 (7.4)	84 (3.8)
West Bengal	Malda	701	12 (1.7)	197 (28.1)	42 (6.0)	97 (13.8)
All India		16716	341 (2.0)	1997 (11.9)	1428 (8.5)	1131 (6.8)

Table 34: Barriers to cataract surgery (other reasons) among cataract blind persons

States	District	Total	No one to accompany (%)	No time available/ other priorities (%)	One eye adequate vision (%)	Other disease contra-indicating operation (%)	Using other anti cataract medicines (%)	Others (%)
Andhra Pradesh	Prakasam	1066	126 (11.8)	41 (3.8)	19 (1.8)	27 (2.5)	1 (0.1)	36 (3.4)
Bihar	Vaishali	1007	27 (2.7)	20 (2.0)	18 (1.8)	3 (0.3)	3 (0.3)	9 (0.9)
Chattisgarh	Rajnandgaon	1214	110 (9.1)	57 (4.7)	36 (3.0)	52 (4.3)	2 (0.2)	5 (0.4)
Gujarat	Surenderangr	617	26 (4.2)	19 (3.1)	41 (6.6)	7 (1.1)	0 (0.0)	5 (0.8)
Himachal Pradesh	Solan	403	3 (0.7)	9 (2.2)	2 (0.5)	0 (0.0)	0 (0.0)	0 (0.0)
Karnataka	Gulbarga	1709	165 (9.7)	32 (1.9)	108 (6.3)	24 (1.4)	1 (0.1)	0 (0.0)
Kerala	Palakkad	643	34 (5.3)	37 (5.8)	40 (6.2)	44 (6.8)	19 (3.0)	1 (0.2)
Madhya Pradesh	Shadol	449	20 (4.5)	2 (0.4)	12 (2.7)	1 (0.2)	0 (0.0)	30 (6.7)
Maharashtra	Parbhani	1730	245 (14.2)	119 (6.9)	133 (7.7)	37 (2.1)	0 (0.0)	1 (0.1)
Orissa	Ganjam	1155	107 (9.3)	12 (1.0)	32 (2.8)	3 (0.3)	0 (0.0)	2 (0.2)
Punjab	Bhatinda	422	6 (1.4)	48 (11.4)	40 (9.5)	11 (2.6)	1 (0.2)	3 (0.7)
Rajasthan	Nagaur	819	69 (8.4)	25 (3.1)	66 (8.1)	63 (7.7)	1 (0.1)	11 (1.3)
Tamil Nadu	Cuddalore	1425	253 (17.8)	179 (12.6)	28 (2.0)	81 (5.7)	4 (0.3)	13 (0.9)
Uttar Pradesh	Jhansi	1127	54 (4.8)	15 (1.3)	133 (11.8)	15 (1.3)	0 (0.0)	17 (1.5)
Uttar Pradesh	Deoria	2229	147 (6.6)	75 (3.4)	179 (8.0)	7 (0.3)	0 (0.0)	0 (0.0)
West Bengal	Malda	701	12 (1.7)	5 (0.7)	33 (4.7)	3 (0.4)	1 (0.1)	8 (1.1)
All India		16716	1404 (8.4)	695 (4.2)	920 (5.5)	378 (2.3)	33 (0.2)	141 (0.8)

Table 35: Prevalence of Blindness in General Population (vision < 6/60 better eye)

Assumption	Prev of Blind 50+ (< 6/60)	Population 50+ (2007)	No. of Blind 50+ (2007)	Total Population (2007)	No. of Blind All Ages	Prevalence of Blindness Total Population
Presenting Vision						
90% of blindness is seen in 50+ & 10% at other ages	8.0%	174,110,134	13,928,811	1129866154	15321692	1.36%
Pinhole Vision						
90% of blindness is seen in 50+ & 10% at other ages	5.9%	174,110,134	10272498	1129866154	11299748	1.0%

Table 36: Prevalence of Blindness in General Population (vision < 3/60 better eye)

Assumption	Prev of Blind 50+ (< 3/60)	Population 50+ (2007)	No. of Blind 50+ (2007)	Total Population (2007)	No. of Blind All Ages	Prevalence of Blindness Total Population
Presenting Vision						
90% of blindness is seen in 50+ & 10% at other ages	3.6%	174,110,134	6267965	1129866154	6964405	0.62%
Pinhole Vision						
90% of blindness is seen in 50+ & 10% at other ages	3.0%	174,110,134	5223304	1129866154	5745634	0.51%