A Report on

Rapid Assessment of Avoidable Blindness Survey 2019

Gandaki Province, Nepal

Conducted By

Nepal Netra Jyoti Sangh

Himalayan Eye Hospital

Technical Support:

International Agency for Prevention of Blindness
IAPB – SEA

Financial Support:

Eye Care Foundation

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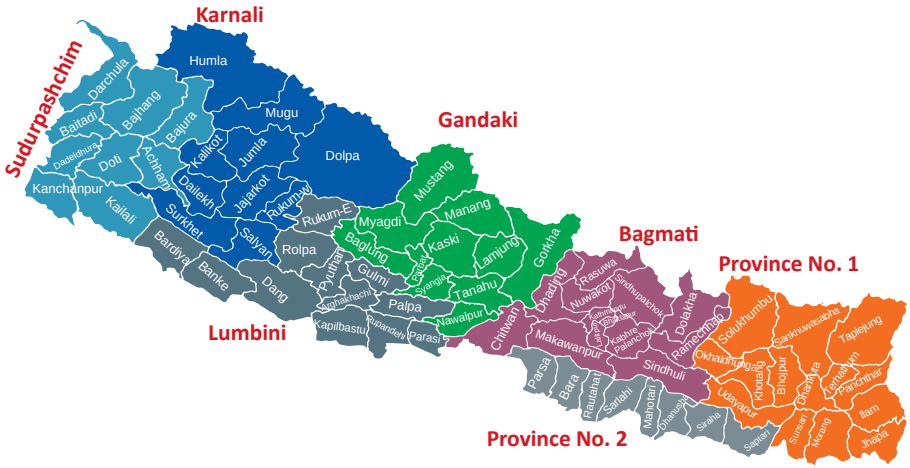

Blindness Scenario 2019

Overall Blindness	1%
Cataract leading cause of Blindness	42.6%
ARMD	17%
Other posterior segment disease	14.9%
Glaucoma	10%
Cataract surgical complication	6.4%
Other	9.1%
Uncorrected Refractive error	63.8%

Gandaki Province, Nepal

Remarks from Chairman, Nepal Netra Jyoti Sangh

This is a proud moment for us to share that the Rapid Assessment of Avoidable Blindness (RAAB-2019) survey report is being published as a book with the joint effort of Himalaya Eye Hospital and all eye care stakeholders.

Needless to say, this report will provide a clear insight on the current eye care situation in the Gandaki province and build up a strong base for the future planning and developing new eye care strategies for the province. There is still a need of quality and accessible eye care services available throughout the province and I strongly believe, with this report we can achieve this dream together.

For this big achievement, I would like to thank each and every individual, organization who were involved directly or indirectly towards the successful accomplishment of the RAAB survey. Last but not least, I would like to thank Mr. Y.D. Sapkota, IAPB for his contribution as RAAB survey expert and Eye Care Foundation for providing the financial support.

Prof Dr. Chet Raj Pant
Chairman, Nepal Netra Jyoti Sangh

Remarks from Chairman, Himalaya Eye Hospital

Its our pleasure that the provincial RAAB survey report-2019 of Gandaki Province is coming up in the form of a concise book. This report will provide evidence-based data and information of current blindness scenario of Gandaki province for future planning of eye care services. As the Chairman of the hospital, I see clear need of Provincial eye health policy and strategy of Gandaki Province. For this we need to advocate jointly with the Provincial Government and work together to achieve it earliest.

I would like to thank NNJS Central office, IAPB and Eye Care Foundation for the technical and financial support to conduct this study. Also, I thank all those who are directly involved in this study including the enumerators and made this study successful. Big congratulations to all the dedicated employees of HEH and its Primary Eye Care Centres on successfully publishing this book.

Senior Advocate Mr. Krishna Gurung
Chairman
Himalaya Eye Hospital

Remarks from Medical Director, Himalaya Eye Hospital

It is our immense pleasure to disseminate the report of RAAB survey conducted by Himalaya Eye Hospital (HEH) with the technical support of International Agency for Prevention of Blindness (IAPB) and financial support of Eye Care Foundation, The Netherlands.

Since the establishment of HEH in 1993 AD, inaugurated by the late King Birendra Bir Bikram Shah Dev, we have been able to provide high quality eye care to prevent avoidable blindness. Our vision is to lead our eye hospital to "Centre of Excellence" in eye care services. Our motto is "no one should be deprived of eye care services for economic or other reasons that may be the barriers to eye care services'.

HEH has been providing preventive, promotive and curative services. Our hospital has lots of potential which can unfold on the basis of the competent, compassionate staff, our ever growing patients who trust in us and our services and ever ready well-wishers.

Our special thanks goes to the Provincial Government, Gandaki Province who had provided financial support so that we were able to extend our outpatient department rooms.

This year had been very challenging because of the Novel Corona Virus disease (COVID-19) pandemic. However, our dedicated and competent staff were always ready to work hard even in challenging circumstances.

We look forward to perform even better in the coming year with enhanced team spirit between the staff, creating pleasant and peaceful working environment.

My special thanks and applause to all hard working employees of HEH, it's district and primary eye care centres, supporters and well-wishers including Nepal Netra Jyoti Sangh and Eye Care Foundation.

Dr. Eliya Shrestha, MD
Medical Director
Himalaya Eye Hospital

Remarks from Chairman, Eye Care Foundation

EYE CARE FOUNDATION

Eye Care Foundation, the Netherlands has been working in Nepal since 1984 as a partner of NNJS covering the eye care services in Gandaki, Karnali and Province # 1 of Nepal.

It gives me immense pleasure to be informed that Rapid Assessment of Avoidable Blindness Survey – 2019 of Gandaki Province to come up in the form of handbook. There has been a commendable progress in the eye care sector of Nepal in past few decades. Now, this report provides evidence-based detailed information on the present situation of blindness and eye care services in Gandaki Province.

We hope, this report will provide evidence-based baseline information which will be helpful in drafting Provincial Eye Health Strategy of Gandaki Province and also for planning future eye care services in the province.

Eye Care Foundation is happy to support the entire cost of this RAAB survey, producing this booklet and the report dissemination program.

Arthur Matthijs Van Praag
Chairman of the Board
Eye Care Foundation, The Netherlands

RAAB Survey Team

This survey was carried out in year 2019 by the following team of Himalaya Eye Hospital with the technical support of Mr. Yuddha Dhoj Sapkota, International Agency for Prevention of Blindness (IAPB).

Name of the Team members	Designation	Organization
Dr. Eliya Shrestha	Medical Director	Himalaya Eye Hospital
Dr Indra Man Maharjan	Ophthalmologist	Himalaya Eye Hospital
Dr. Hari Bikram Adhikari	Ophthalmologist	Himalaya Eye Hospital
Dr Saroj Nemkul	Ophthalmologist	Himalaya Eye Hospital
Dr Anju Gurung	Ophthalmologist	Himalaya Eye Hospital
Dr Krishna Gurung	Ophthalmologist	Himalaya Eye Hospital
Mr. Govinda Nath Yogi	Ophthalmic officer	Himalaya Eye Hospital
Mr. Bijaya Paudel	Ophthalmic Assistant	Himalaya Eye Hospital
Mr. Subhash Nepal	Ophthalmic Assistant	Himalaya Eye Hospital
Mr. Dharmendra Kumar Ghodasaini	Ophthalmic Assistant	Himalaya Eye Hospital
Mr. Rup Singh Bohara	Ophthalmic Assistant	Himalaya Eye Hospital
Mrs. Sashi Kamala Lamichhanne	Ophthalmic Assistant	Himalaya Eye Hospital
Mr. Hari Prasad Aryal	Administration	Himalaya Eye Hospital
Mr. Prem Kumar Nakarmi	Administration	Himalaya Eye Hospital
Mrs. Parbati Gurung	Administration	Himalaya Eye Hospital
Ms. Sakuntala Shrestha	Administration	Himalaya Eye Hospital
Mr. Ramesh Bahadur Baniya	Administration	Himalaya Eye Hospital
Mr. Bamdev Subedi	Administration	Himalaya Eye Hospital
Mr. Min Bahadur Gurung	Driver	Himalaya Eye Hospital
Mr. Deep Bahadur Malla Thakuri	Driver	Himalaya Eye Hospital
Mr. Santosh Baral	Driver	Himalaya Eye Hospital
All the enumerators		

Technical Support

YD Sapkota	Regional Coordinator, South East Asia- IAPB	International Agency for the Prevention of Blindness (IAPB)
Dr. Sailesh Kumar Mishra	Executive Director	Nepal Netra Jyoti Sangh
Ranjan Shah	Program Manager	Nepal Netra Jyoti Sangh
Man Bahadur Kunwar		Nepal Netra Jyoti Sangh

We also like to thank **Mr. Anil Prasad Gorkhaly,** Eye Care Foundation for his encouragement, valuable input, and support during this entire process.

Abbreviations

ARMD	Age Related Macular Degeneration
BCVA	Best Corrected Visual Acuity
CSC	Cataract Surgical Coverage
CSR	Cataract Surgical Rate
DR	Diabetic Retinopathy
ECF	Eye Care Foundation
EVI	Early Visual Impairment
GoN	Government of Nepal
HEH	Himalaya Eye Hospital
IAPB	International Agency for Prevention of Blindness
IOL	Intra Ocular Lens
MVI	Moderate Visual Impairment
NGO	Non-Government Organization
NNJS	Nepal Netra Jyoti Sangh
PVA	Presenting Visual Acuity
RAAB	Rapid Assessment of Avoidable Blindness
SVI	Severe Visual Impairment
SICS	Small Incision Cataract Surgery
VA	Visual Acuity
WHO	World Health Organization

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EXECUTIVE SUMMARY

Background

The main objective of the Rapid Assessment of Avoidable Blindness (RAAB) survey 2019 was to assess the magnitude of blindness and visual impairment, its causes and impact of existing eye care services in Gandaki Province, Nepal.
Results:

Prevalence of Blindness and Visual Impairment

The survey achieved a 98.4 % response rate. The crude prevalence of bilateral blindness among people aged 50 years and above was 1.0 % (95% CI 0.7-1.3). The age and sex adjusted prevalence of bilateral blindness based on the presenting visual acuity <3/60 in the better eye was 0.9% (95% CI 0.6 to 1.2). The prevalence of blindness in female was found relatively more 1.3% (0.8-1.7) compared to that of male 0.7% (0.3-1.0). A total of 3,733 people aged 50 years and above were estimated to be bilaterally blind in the survey province.

Age and sex adjusted prevalence of severe visual impairment, moderate visual impairment and early visual impairment were estimated to be 1.2% (0.9 - 1.5), 5.6% (4.8 - 6.4) and 12.0% (10.5 - 13.4) respectively.

The survey also estimated a total 4,771 people with bilateral severe visual impairment, 22,403 people with bilateral moderate visual impairment and 47,812 people with bilateral early visual impairment. It is estimated that total 26,550 eyes were blind due to various causes in this province.

Prevalence of Cataract Causing Blindness and Vision Impairment

The crude prevalence of blindness due to bilateral cataract among people aged 50 years and older was 0.4% (0.2-0.6). The crude prevalence of SVI, MVI and EVI due to bilateral cataract were 0.9% (0.6-1.2), 3.2% (2.7-3.7) and 8.4% (7.3-9.4) respectively.

The age- and sex-adjusted prevalence of blindness due to bilateral cataract among people aged 50 years and older was 0.4 (0.2 - 0.5) corresponding to an estimated 1,430 people aged 50 years and older blind due to cataract in Gandaki Province. We also estimated that 12,019 eyes (prevalence 1.5 %) are blind due to cataract among people aged 50 years and older in Gandaki Province of Nepal.

The age- and sex-adjusted prevalence of SVI due to bilateral cataract was 0.5% (0.2 - 0.7) corresponding to an estimated 1,874 people aged 50 years and older in Gandaki Province. The estimated number of eyes with SVI due to cataract was 6,568 (prevalence 0.8 %) in the province.

The age- and sex-adjusted prevalence of MVI due to bilateral cataract was 2.2% (1.8 - 2.6) corresponding to an estimated 8,845 people aged 50 years and older in Gandaki Province. We also estimated that 25,708 eyes (prevalence 3.2%) are affected by MVI due to cataract.

The age- and sex-adjusted prevalence of EVI due to bilateral cataract was 2.3% (1.5 - 3.2) corresponding to an estimated 18,737 people aged 50 years and older in Gandaki Province. We also estimated that 44,139 eyes (prevalence 5.5%) are affected by EVI due to cataract.

The total workload of vision impairment due to bilateral cataract (BCVA<6/12 in the better eye) is estimated to be 30,885 (prevalence 7.7%) people aged 50 years and older. The total number of eyes affected with vision impairment (BCVA<6/12) including blindness due to cataract is estimated to be 88,434 (prevalence 11.1%) in this province.

Causes of Blindness and Visual Impairment

The main cause of bilateral blindness was untreated cataract (42.6%).Cataract was still the leading cause of SVI (76.7%) and MVI (64.0%). Uncorrected refractive error was the leading cause of EVI (63.8%).

Nearly more than two thirds (68.1%) of all blindness in the study population was avoidable. Specifically, 42.6 % of blindness was treatable, 8.5% was preventable with primary health care and/or primary eye care, and 17.0 % was preventable through more advanced ophthalmic services. Posterior segment disease accounted for 44.7% of all bilateral blindness.

Cataract surgery should be the main priority. Because blindness and vision impairment due to posterior segment diseases might be prevented through regular control and timely intervention, targeted health education and specialist ophthalmic services might contribute to reducing avoidable blindness and vision impairment further. Low vision training and services are required for the remaining 31.9 % of all blindness that is permanent and untreatable.

Cataract Surgical Coverage

The cataract surgical coverage (CSC) in persons indicates which proportion of people with cataract at a predefined VA have been operated in one or both eyes. This indicator measures the coverage of cataract surgical services.

At 92.2%, the age- and sex-adjusted CSC among people who are blind (PVA<3/60) is higher than the target of at least 85% recommended by the International Agency for the Prevention of Blindness (IAPB).

The age- and sex-adjusted CSC for eyes with cataract at a VA of <6/60 found to be 84.0 % which indicates the coverage of the total workload of operable cataract in the province.

The effective CSC (eCSC) combines coverage and outcome of cataract surgery and indicates what proportion of the people with bilateral operable cataract have been operated upon in one or both eyes and can see 6/18 or better after surgery. The CSC among people having bilateral blindness due to cataract was 75.7%.

Visual Outcome of Cataract Surgery

In this survey, 99.3% of the total evaluated eyes had an intraocular lens (IOL) implanted. Overall good visual outcome by WHO definition was seen in 76.5% (PVA ≥6/18) and 83.4% (BCVA ≥6/18) of the cataract operated eyes. Overall poor outcome was seen in 12.1% (PVA<6/60) and 10.6% (BCVA <6/60) after cataract surgery.

The proportion of surgeries with a very good or good outcome was 73.8% in eye camps while it was higher in those done in different facilities (75.0% to 78.2%).

The main causes of poor visual outcomes following cataract surgery were ocular co-morbidities (59.0%), long term surgical complications (22.3%), immediate surgical complications (11.1%) and absence and/or inadequate optical corrections (7.6%).

Refractive Error, Presbyopia and Functional Low Vision

The prevalence of refractive error was 17.5% among the people 50 years and older. Among those, 8.8% of people aged 50 years and older who had a refractive error did not have glasses. On the other hand, 75.2% of the study population did not wear glasses for near.

The age- and sex-adjusted prevalence of FLV requiring low vision services in people aged 50 years and older in Gandaki Province was 1.2%. Out of the estimated 30,907 people aged 50 and older with PVA <6/18, 14.9% (4,608) require low vision services or training.

Barriers to Cataract Surgery

Among the people having bilateral cataract with BCVA <6/60, the most prominent barriers to uptake cataract surgery services were Need not felt as 27.4%, local reasons as 17.7%, Cost as 14.5%, Accessibility as 12.9%, Treatment denied by the provider as 11.3%, Fear as 8.1% and Unawareness as 8.1%.

Conclusion and Recommendation

Blindness and vision impairment from all causes still remains as a major public health problem among the people aged 50 years and above in Gandaki Province, of Nepal. There remains a significant workload of avoidable blindness and vision impairment to be addressed by the eye health system. The visual outcome of cataract surgery below the WHO standards despite more than 90.0% of service coverage suggests further improvement in quality of surgical services. Along with cataract as the leading cause, posterior segment diseases account for significant proportion of blindness and vision impairment. Besides, uncorrected refractive error, diabetic retinopathy and functional low vision are other issues to be resolved by the eye care system in this province.

To conclude, this survey provides evidence of public health significance regarding the magnitude of blindness and visual impairment, its causes and performance evaluation of ongoing eye care programs in the province. The information from this survey will help the concerned decision makers to formulate appropriate strategies to combat this needless burden of avoidable blindness and visual impairment.

To recommend, the findings from this survey make sensitization to the concerned authorities toscale up eye care services to those whose eye health needs are often not met yet as a goal to achieve Universal Eye Health Coverage.

CHAPTER I: INTRODUCTION

1.1 Background

The first nationwide epidemiological blindness survey was conducted in 1981 to estimate the prevalence and causes of blindness in Nepal. The survey was the first activity of the Nepal Blindness Prevention and Control Project, a joint initiative of the then Government of Nepal and World Health Organization. The survey estimated prevalence of bilateral blindness 0.84%, unilateral blindness 1.66% and low vision 1.85% in the Nepalese population. Cataract was found to be the leading cause of blindness accounting for 80% of all avoidable blindness [(1)]. The findings of the first blindness survey were enormous milestones for the development of one of the efficient and elaborate eye health systems that exists in Nepal after more than 3 decades [(2)].

In 1995, a population based cross sectional study was done among 5112 people aged 45 years and above in Bheri and Lumbini zones of Nepal by using stratified cluster sampling design. The main purpose of the study was to estimate prevalence and causes of blindness and visual impairment and to assess the impact after 1981 blindness survey. The study revealed the prevalence of blindness reduced from 5.45% (in 50 years and above) in 1981 to 3.0% in population aged 45 years and above. Cataract surgical coverage among bilateral cataract blind people increased from 35.0% in 1981 to 58.0% in 1995. But, almost 30.0% of the cataract operated cases were still blind or with severe visual impairment [(3)].

Two customized population-based blindness surveys were conducted between 2002 and 2006 in Gandaki, Lumbini and Narayani zones of Nepal by using stratified cluster sampling and multi stage cluster sampling techniques respectively [(4, 5)]. The study from the Gandaki zone among 5863 people aged 45 years and above found the prevalence of blindness 2.6% and cataract as the leading cause of blindness in 60.5%. Cataract surgical coverage was found to be improved reaching to 59.5% among the cataract blind people [(4)].

Another population based cross sectional study conducted among 5138 people aged 50 years and above in Lumbini and Narayani zones of Nepal found the age and sex adjusted prevalence of Blindness and Visual Impairment to be 4.6% and 18.9% respectively. The overall cataract surgical coverage was found to be 66.6% among the cataract blind people [(5)].

Eleven Rapid Assessment of Avoidable Blindness (RAAB) surveys were conducted from 2006-2010 in different zones of Nepal. The main purpose of these surveys was to assess the prevalence of blindness and visual impairment, to evaluate the impact of eye care delivery system of Nepal after 1981 National Blindness Survey. The prevalence of blindness was found reduced from 0.84% in 1981 to an estimated 0.35% in 2011, a 58% reduction. Cataract was still found to be the leading cause of blindness and quality of cataract surgery improved but still did not meet the WHO standard [(6)].

Towards Universal Eye Health: A Global Action Plan (GAP) 2014-2019 was endorsed and adopted by its member countries at the Sixty Sixth World Health Assembly in 2013 in Geneva, Switzerland. The vision of the global action plan is a world in which nobody is needlessly visually impaired, where those with unavoidable vision loss can achieve their full potential, and where there is universal access to comprehensive eye care services [7].

Nepal has already been one of the signatories of the Global Action Plan 2014-2019 at the World Health Assembly in 2013 and has complied to operationalize the global target of reducing prevalence of avoidable visual impairment by 25% from the baseline of 2010 by 2019. It strongly recommends conducting population-based surveys to provide evidences on magnitude and causes of blindness and visual impairment for planning and evaluating impact of eye health programs.

More than 80% of the avoidable blindness and visual impairment resides among the people aged 50 years and above mainly caused by cataract and uncorrected refractive errors alone[8]. So, the greatest gains will be achieved through reduction of prevalence of avoidable visual impairment among the population aged 50 years and above.

1.2 Problem Statement

There is paucity of current evidence on the prevalence, trend and causes of visual impairment in Nepal since the completion of population surveys in 2010 to inform the evidence-based decision making for formulating plans, policies and strategies to accomplish the unfinished agenda of The Vision 2020: The Right to Sight, a global initiative of the World Health Organization (WHO) and International Agency for Prevention of Avoidable Blindness (IAPB).

Gandaki Province is one of seven provinces of the Federal Democrative Republic of Nepal as provisioned by the new constitution which came on effect on September2015. The total area of the province is 27,984 square kilometers making it the largest province in Nepal. According to the 2011 Nepal census, the population of the province was 24, 03,757making. The total number of people 50 years and above in this province was 399,059 (male 187,948 and female 211, 111).

In the new political and administration system, health service delivery is the main responsibility of provincial government. Hence, a population based RAAB survey was conducted for assessing the prevalence and causes of blindness and visual impairment in this provincein order to provide the evidence for monitoring the target set by the WHO GAP 2014-2019.

1.3 Rationale of the Survey

The survey aimed to assess the prevalence of blindness and visual impairment among the selected participants of aged 50 years and above in the Gandaki Provinceof Nepal by using RAAB survey methodology. The findings from this

survey will inform the decision makers to plan universal, equitable and sustainable eye care policies and programs for the future.

1.4 General Objective

The main objective of the survey was to assess the magnitude and causes of blindness and visual impairment among people 50 years and above, impact of eye care services, in Gandaki Provinceof Nepal by using epidemiologically sound survey methodology.

1.5 Specific Objectives

The specific objectives of the survey were to assess:

- Prevalence of blindness and visual impairment from all causes
- Prevalence of blindness and visual impairment from avoidable causes
- Prevalence of blindness and visual impairment from cataract
- Main causes of blindness and visual impairment
- Cataract surgical coverages
- Visual outcomes of cataract surgery
- Causeofpooroutcome after surgery
- Barriers to cataract surgical services
- Prevalence of uncorrected refractive errors, presbyopia and low vision
- Prevalence of diabetic retinopathy

CHAPTER II: METHODOLOGY

This cross-sectional population-based blindness survey was conducted in Gandaki Provinceof Nepal by using standardized RAAB methodology in 2019 by Himalayan Eye Hospital under the aegis of Nepal Netra Jyoti Sangh (NNJS). It was accomplished with the technical support from the International Agency for Prevention of Avoidable Blindness, South East Asia.

2.1 Study Population

The study population was adults living in Gandaki Province who were aged 50 years or older at the time of data collection.

2.2 Sampling Frame

The national census data of 2011 was used for creating the sampling frame. Based on the census data, ward level population was used as population units/clusters.

2.3 Sample Size

The total sample size required was 4794 people, distributed across 137 clusters of 35 people 50 years or older in each. Sample size calculations were perfomed using the RAAB7 software. We assumed a prevelance of bilateral blindndess of 2.5% (P). This was based on the observed prevalence of blindess in Nepal in the previous RAAB survey, a worst tolerable alfa error consideration of 20% (D), 95% cofidence level (Z=1.96), and 10% non-reponse rate. The formula used for the sample size calcuation was $N = (1.96)^2(P(1-P))/D*D$. As we used cluster sampling, adjusting cluster design effect of 1.4 for the cluster size of 35 people with 10% non-response rate required sample size was 4794 people. In order to enroll adequate sample in the survey, a total of 137 clusters were randomly selected from the sampling frame according to population proportionalte to size.

2.4 Recruitment Approach

The sampling frame for the survey was a list of wards, obtained from the 2011 census data. Each ward was considered a cluster. A total of 137 clusters were randomly selected using a probability proportional to size approach based on the clusters' population size.

The survey teams, accompanied by a local guide, visited all households in the selected clusters door-to-door until 35 people aged 50 years or older were identified. The purposes of the study and examination procedure were explained to the subjects and informed consent was sought before data collection.

In cases where an eligible person lived in one of the visited households but was not present at the time of data collection, the survey team returned to their household once again on the same day to examine them. If they still could not be examined, information about their visual status was collected from relatives or neighbours. If the data collection team visited all households in a cluster but failed to identify 35 eligible residents, then the team continued recruitment in the closest cluster

2.5 Data Collection Process

Three teams were trained for data collection in this survey. In the selected clusters, the team led by an Ophthalmologist visited house to house to enroll the eligible survey participants.After informed written consent, the eligible survey particpants underwent visual acuity assessment, anterior segment examination with torch light and media and fundus examination with direct ophthalmoscope. The data collection was done in tablelts with mRAAB7 data collection software installed.

In this survey, we also included the Diabetic Retinopathy module of RAAB7. All eligible participants also underwent for blood glucose test. Participants with random blood glucose 200 mg/dl and known daibetic particpants also underwent detail fundus examiantion to assess the Diabetic Retinopathy.

2.6 Ethical Consideration

The survey confirms to the tenets of the Declaration of Helsinki. The survey protocol was reviewed and approved by Nepal Health Research Council under the Ministry of Health, Government of Nepal. Before enrollment and examination, all eligible participants were explained about the purpose and procedures of the survey. Written informed consent was taken from each respondent to voluntarilly participate in data collection and examination procedures. Appropriate remedial actions were taken to address any eye and other health related problems if found among the participants.

2.7 Operational Definitions

We will refer to key indicators of eye health throughout the remainder of this report. In this section, we provide a list of abbreviations as well as the definition of key indicators used.

Blindness : A study participant having presenting visual acuity (PVA) < 3/60 in the better was considered as blind.

Presenting Visual Acuity(PVA) : Visual Acuity measured with available correction if any.

Bset Corrected Visual Acuity (BCVA) : Visual Acuity measured and recorded after pinhole correction. Blindness and Visual Impairment due to cataract in this survey were based on the BCVA.

Severe Visual Impairment (SVI) : Ptresenting Visual Acuity of < 6/60 – 3/60 in the better eye was considered as SVI.

Modewrate Visual Impairment (MVI) : Presenting Visual Acuity of < 6/18 – 6/60 in the better eye was considered as MVI.

Early Visual Impairment (EVI) : Mild visual impairment with presenting visual acuity of <6/12 – 6/18 in the better eye was considered as EVI.

Functional Low Vision (FLV) : Best corrected visual acuity of < 6/18 – PL+ in the better eye (not due to cataract or refractive error) was considered as FLV.

CHAPTER III: FINDINGS

3.1 Response Rate

Out of the total 4794 expected participants, 4717 were included in the survey for data collection and analysis yielding response rate of 98.4%. Among the enrolled participants, 49(1.0%) people were absent during home visits, 10 (0.2%) people refused to be examined and 18(0.4%) were unable to communicate. So, they were excluded for the survey purpose (Table 1).

Table 1: Eligible Participants, Coverage and Refusals

Participants	Examined		Not Available		Refused		Not Capable		Total Expected	
	n	%	n	%	n	%	n	%	n	%
Male	2134	98.1	27	1.2	4	0.2	11	0.5	2176	100.0
Female	2583	98.7	22	0.8	6	0.2	7	0.3	2618	100.0
Total	4717	98.4	49	1.0	10	0.2	18	0.4	4794	100.0

3.2 Age and Sex Distribution of the Study Participants

The age distribution comprises of 50 years and above in which most of the participants 1827(38.7%) were from age group 50-59 years with successive decreasing rate being lowest 359(7.6%) at 80 years and above (Table 2).

Table 2: Age and Sex Distribution of the Study Participants

Age Group (in years)	Male		Female		Total	
	n	%	N	%	n	%
50-59	782	36.6	1045	40.5	1827	38.7
60-69	705	33.0	816	31.6	1521	32.2
70-79	463	21.7	547	21.2	1010	21.4
80 above	184	8.6	175	6.8	359	7.6
Total	2134	100.0	2583	100.0	4717	100.0

3.3 Age and Sex Distribution of People 50 years and above in the Survey Area

According to the national census 2011 conducted by the National Bureau of Statistics, there were 190016(male 96844 and female 93172) people aged 50 years and above in the province. There were highest number of people 92739(48.8%) aged 50-59 years with successive decreasing rate being lowest 6123(3.2%) aged 80 years and above. (Table3).

To check whether the study population is representative of the Nepalese population aged 50 years and older, the age and sex composition of the sample was compared with that of broader population ofGandaki Province.

Ideally, the study population should have the same composition by age and by sex as the total population aged 50 years and older in the survey area. However, we found that men and women below60 years were under-represented, and men and women aged 70-79 years were over represented (Table 3).

To account for these discrepancies, we have provided both crude (study population) and age- and sex-adjusted estimates where appropriate.

Table 3: Age and Sex Distribution of People 50 years and above in the Survey Area

Age Group (in years)	Male		Female		Total	
	n	%	n	%	n	%
50 –59	79856	42.5	91024	43.1	170880	42.8
60 – 69	58966	31.4	68139	32.3	127105	31.9
70 – 79	35441	18.9	36665	17.4	72106	18.1
80 above	13685	7.3	15283	7.2	28968	7.3
Total	187948	100.0	211111	100.0	399059	100.0

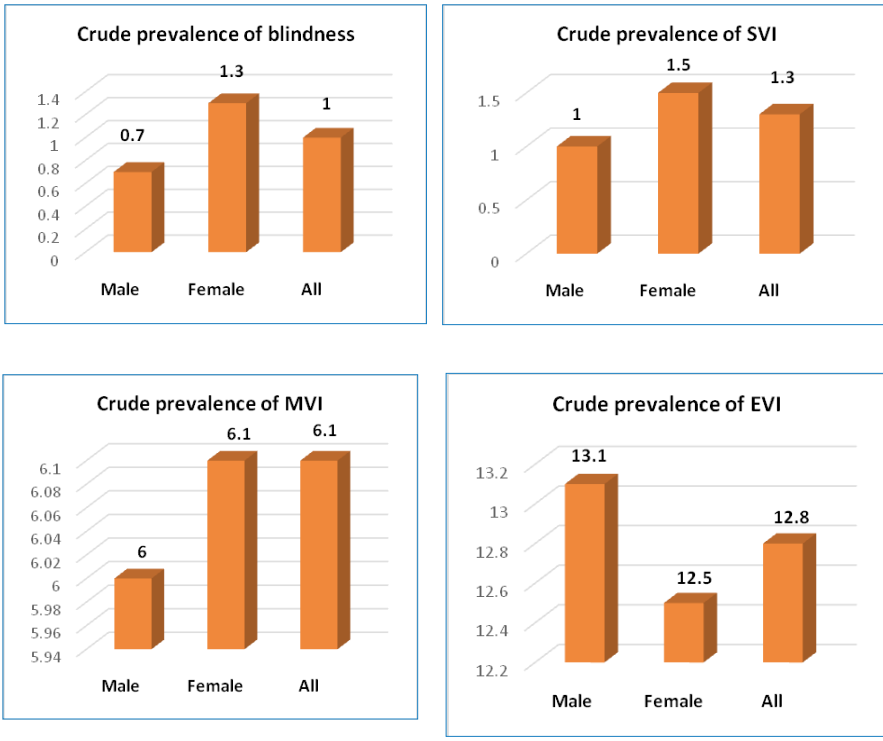
3.4 Crude Prevalence of Blindness and Visual Impairment

In this survey, overall prevalence of bilateral blindness based on presenting visual acuity <3/60 in better eye, in the sample population was found to be 1.0% (95% CI 0.7- 1.4).The prevalence of bilateral severe visual impairment, moderate visual impairment and early visual impairment were 1.7%, 9.2% and 10.7% respectively (Table 4).

Table 4: Crude Prevalence of Blindness and Visual Impairment

Vision Category	Male, % (95% CI)	Female, % (95% CI)	All, % (95% CI)
Blindness	0.7(0.3-1.0)	1.3(0.8-1.7)	1.0 (0.7-1.3)
SVI+	1.0(0.6-1.4)	1.5(1.0-2.0)	1.3 (1.0-1.6)
MVI+	6.0(4.9-7.2)	6.1(5.1-7.1)	6.1(5.2-6.9)
EVI+	13.1(11.2-15.1)	12.5(10.8-14.1)	12.8 (11.3-14.2)
FLV	1.1(0.6-1.6)	1.4(0.9-1.8)	1.3 (0.9-1.6)

Figure 1: Crude prevalence of blindness and visual impairment



The prevalence of blindness among survey participants aged 50 years and above was 1.0%(95%CI 0.7-1.4) and increased with age. The prevalence of bilateral blindness was found maximum 4.8%(95%CI 1.6-7.9) among the participants aged 80 years and above (Table 5).

Table 5: Prevalence of Blindness According to Age Group

Prevalence of Bilateral Blindness according to age group – PVA < 3/60 in the better eye									
Age Group	Male			Female			Total		
	n	%	95% CI	n	%	95% CI	n	%	95% CI
50 – 59	6	0.8	0.2-1.3	4	0.4	0.0-0.8	10	0.6	0.2-0.9
60 – 69	6	1.0	0.2-1.7	3	0.5	0.0-1.0	9	0.7	0.3-1.2
70 – 79	5	1.4	0.2-2.6	9	2.4	0.9-3.8	14	1.9	0.9-2.9
80 above	5	6.0	0.9-11.1	3	3.5	0.0-7.5	8	4.8	1.6-7.9
Total	22	1.2	0.7-1.7	19	0.9	0.4-1.4	41	1.0	0.7-1.4

3.4.1 Age and Sex Adjusted Prevalence for All Causes of Blindness and Visual Impairment

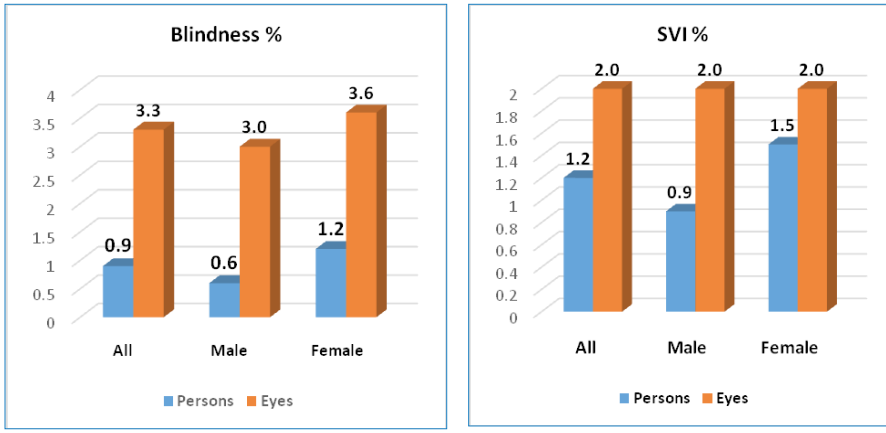
The age and sex adjusted prevalence of bilateral blindness based on the presenting visual acuity <3/60 in the better eye was 0.9% (95% CI 0.6 - 1.2). The prevalence of blindness in male was found relatively less0.6% (95% CI 0.3- 1.0) compared to that of female 1.2% (95% CI 0.7-1.7). Similarly, age and sex adjusted prevalence of severe visual impairment, moderate visual impairment and early visual impairment were estimated to be 1.2% (95%CI 0.9-1.5), 5.6% (95%CI 4.8-6.4) and 12.0 % (95%CI 10.5-13.4) respectively.

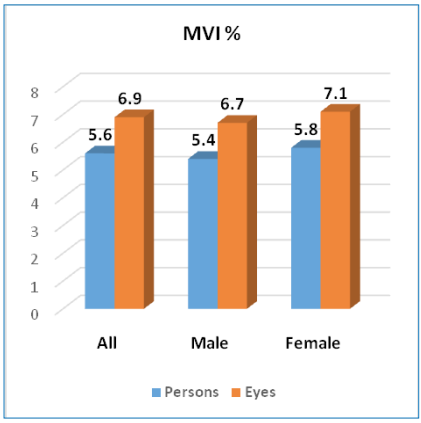
The survey estimated a total 3733 people aged 50 years and above with both eyes blind in the same age group total population of the survey province. The survey also estimated a total 4771 people with bilateral severe visual impairment, 22403 people with bilateral moderate visual impairment and 47812 people with bilateral early visual impairment. It is estimated that total 26550 eyes were blind due to various causes in this province (Table 6).

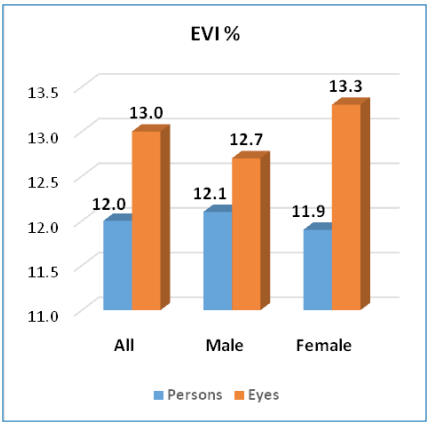
Table 6: Age and Sex Adjusted Prevalence for All Causes of Blindness and VI

Age and Sex Adjusted Prevalence for All Causes of Blindness and VI - Persons									
PVA Category	Male			Female			All		
	N	%	95% CI	N	%	95% CI	n	%	95% CI
Blindness	1151	0.6	0.3-1.0	2582	1.2	0.7-1.7	3733	0.9	0.6-1.2
SVI	1637	0.9	0.5-1.3	3134	1.5	1.0-2.0	4771	1.2	0.9-1.5
MVI	10189	5.4	4.3-6.5	12214	5.8	4.8-6.8	22403	5.6	4.8-6.4
EVI	22691	12.1	10.1-14.0	25121	11.9	10.3-13.5	47812	12.0	10.5-13.4
Age and Sex Adjusted Prevalence for All Causes of Blindness and VI – Eyes									
Blindness	11336	3.0	2.4-3.6	15214	3.6	3.0-4.2	26550	3.3	2.9-3.8
SVI+	7441	2.0	1.5-2.5	8531	2.0	1.5-2.5	15972	2.0	1.7-2.3
MVI+	25228	6.7	5.7-7.8	30048	7.1	6.1-8.2	55276	6.9	6.1-7.7
EVI+	47641	12.7	10.9-14.5	56053	13.3	11.9-14.7	103694	13.0	11.4-14.3

Figure 2: Age and Sex Adjusted Prevalence for All Causes of Blindness and Visual Impairment

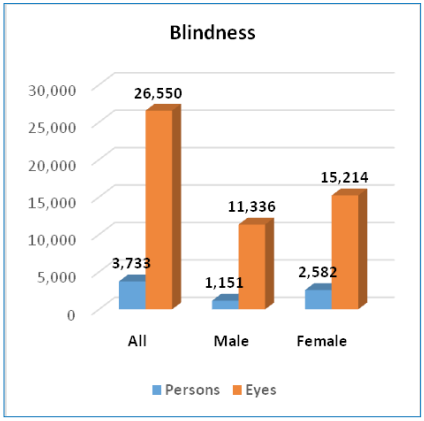


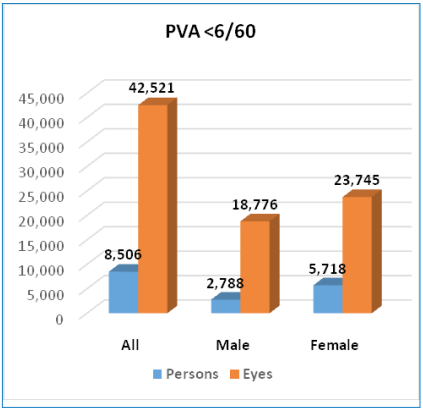


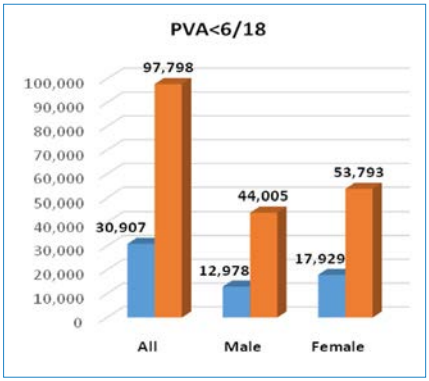


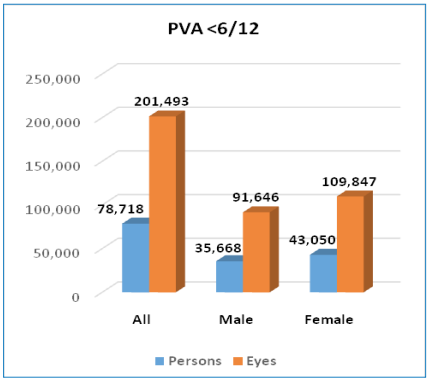
A total backload of 78,718 persons (35,668 male, 43,050 female) and 201,493 eyes (male 91,646, 109,847 female) was estimated to be found among the people aged 50 and above in Gandaki Province from all causes having all grades of vision impairment with PVA < 6/12 (Figure 3).

Figure 3: Estimated burden of blindness VI in Gandaki Province









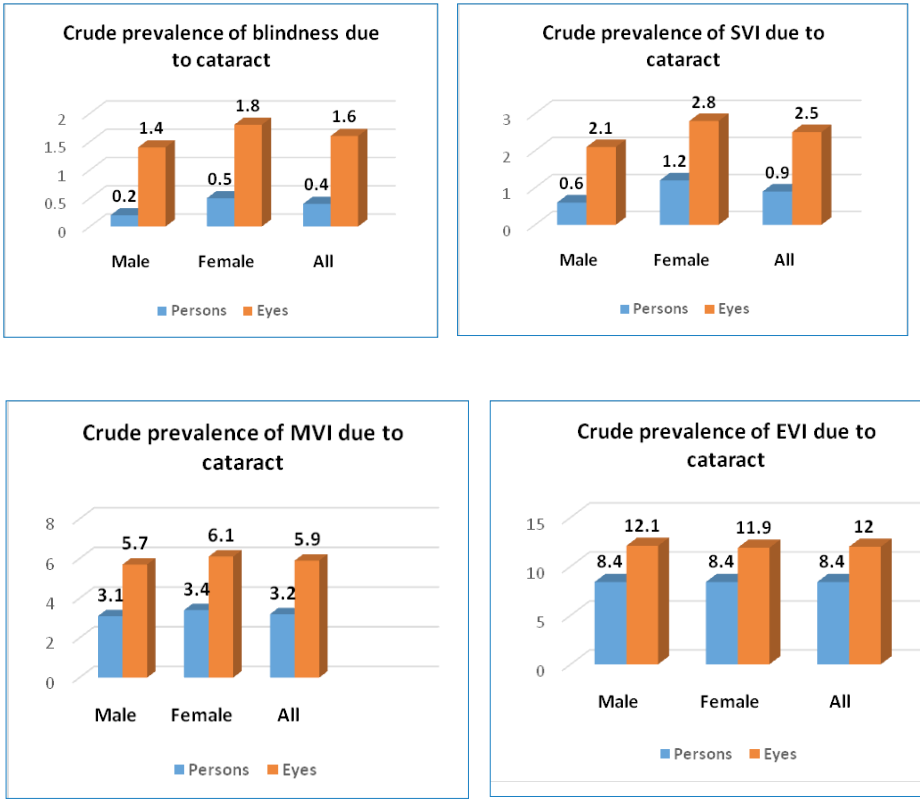
3.5 CrudePrevalence of Blindness and Visual Impairment due to Cataract

Prevalence of bilateral blindness due to cataract based on the best corrected visual acuity was 0.4% (95% CI 0.2-0.6) among the survey participants aged 50 years and above. Similarly prevalence rates of bilateral severe visual impairment, moderate visual impairment and early visual impairment due to cataract were 0.9% (95% CI 0.6-1.2), 3.2% (95% CI 2.7- 3.7) and 8.4 %(95% CI 7.3-9.4) respectively (Table7).

Table 7: Crude Prevalence of Blindness and Visual Impairment due to Cataract

	Male			Female			Total		
	n	%	95%CI	n	%	95%CI	n	%	95%CI
Cataract causing blindness									
Bilateral cataract	5	0.2	0.0-0.4	13	0.5	0.2-0.8	18	0.4	0.2-0.6
Unilateral cataract	50	2.3	1.6-3.1	65	2.5	1.9-3.1	115	2.4	2.0-2.9
Cataract eyes	60	1.4	1.0-1.8	91	1.8	1.4-2.1	151	1.6	1.3-1.9
Cataract causing SVI+									
Bilateral cataract	12	0.6	0.2-0.9	30	1.2	0.8-1.6	42	0.9	0.6-1.2
Unilateral cataract	66	3.1	2.6-4.2	85	3.3	3.2-4.8	151	3.2	3.2-4.3
Cataract eyes	90	2.1	1.6-2.6	145	2.8	2.3-3.3	235	2.5	2.1-2.9
Cataract causing MVI+									
Bilateral cataract	66	3.1	2.4-3.8	87	3.4	2.7-4.1	153	3.2	2.7-3.7
Unilateral cataract	113	5.3	4.2-6.4	141	5.5	4.5-6.4	254	5.4	4.6-6.1
Cataract eyes	245	5.7	4.9-6.6	315	6.1	5.3-6.9	560	5.9	5.3-6.6
Cataract causing EVI+									
Bilateral cataract	179	8.4	7.0-9.7	216	8.4	7.1-9.6	395	8.4	7.3-9.4
Unilateral cataract	158	7.4	6.2-8.6	181	7.0	6.0-8.0	339	7.2	6.4-8.0
Cataract eyes	516	12.1	10.5-13.6	613	11.9	10.5-13.2	1129	12.0	10.8-13.2

Figure 4: Crude prevalence of blindness and visual impairment due to cataract



3.5.1 Age and Sex Adjusted Prevalence of Cataract Causing Blindness and VI

The age and sex adjusted prevalence of bilateral blindness (BCVA <3/60 in the better eye) due to cataract in the province was estimated to be 0.4 % (95% CI 0. 0.2-0.5). The prevalence rates of bilateral severe visual impairment, moderate visual impairment and early visual impairment were 0.5% (95% CI 0.2-0.7), 2.2% (95% CI 1.8-2.6) and 2.3% (95% CI 1.5-3.2) respectively. By using these adjusted prevalence rates, there were1, 430 bilaterally blind people due to cataract in the province.

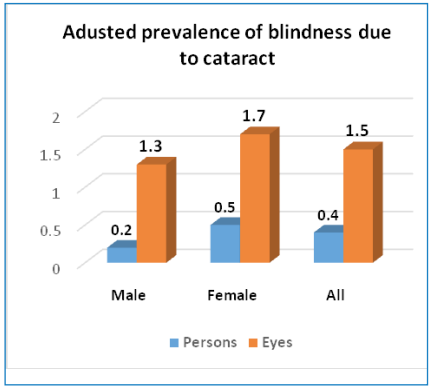
Similarly, the survey estimated a total 1,874 people with bilaterally severe visual impairment, 8,845 people with moderate visual impairment and 18,737 people with early visual impairment due to cataract among the population aged 50 years and above in the province.

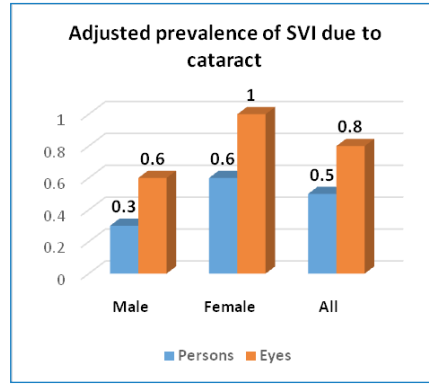
The total number of cataract affected blind eyes 12,019, severely visual impaired eyes 6,568, moderately visually impaired eyes 25,708 and early visual impaired eyes 44,139 were estimated in the population aged 50 years andabove in the province (Table 8).

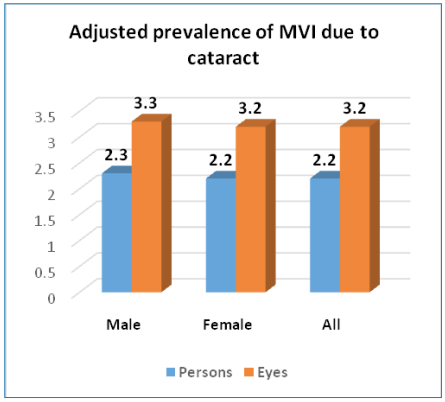
Table 8: Age and Sex Adjusted Prevalence of Cataract Causing Blindness and VI

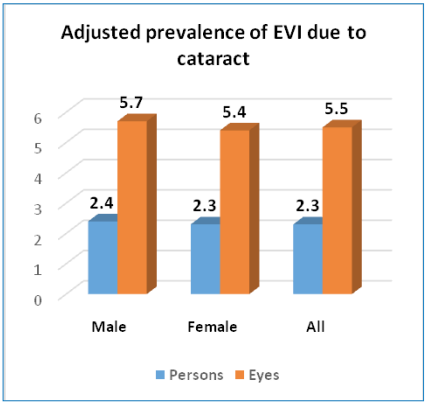
Cataract Causing Bilateral Blindness and VI in persons									
BCVA Category	Male			Female			All		
	n	%	95% CI	N	%	95% CI	n	%	95% CI
Blindness	404	0.2	0.0-0.4	1026	0.5	0.2-0.7	1430	0.4	0.2-0.5
SVI+	535	0.3	0.0-0.6	1339	0.6	0.3-1.0	1874	0.5	0.2-0.7
MVI+	4256	2.3	1.6-2.9	4589	2.2	1.6-2.8	8845	2.2	1.8-2.6
EVI+	8915	2.4	1.2-3.5	9822	2.3	1.3-3.4	18737	2.3	1.5-3.2
Cataract Causing Blindness and VI in eyes									
Blindness	4912	1.3	0.9-1.7	7107	1.7	1.3-2.1	12019	1.5	1.8-1.8
SVI+	2340	0.6	0.3-0.9	4228	1.0	0.7-1.3	6568	0.8	0.6-1.1
MVI+	12243	3.3	2.5-4.0	13465	3.2	2.5-3.8	25708	3.2	2.7-3.7
EVI+	21450	5.7	4.5-6.9	22689	5.4	4.4-6.3	44139	5.5	4.7-6.4

Figure 5: Age and Sex Adjusted Prevalence of Blindness and Visual Impairment due to Cataract



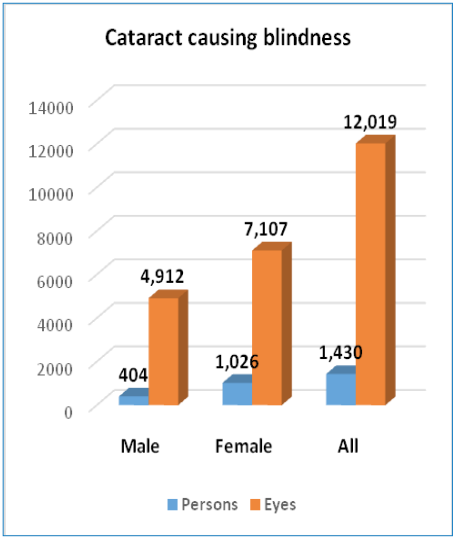


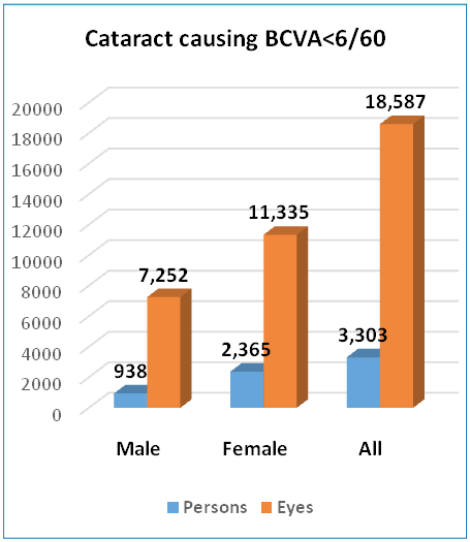


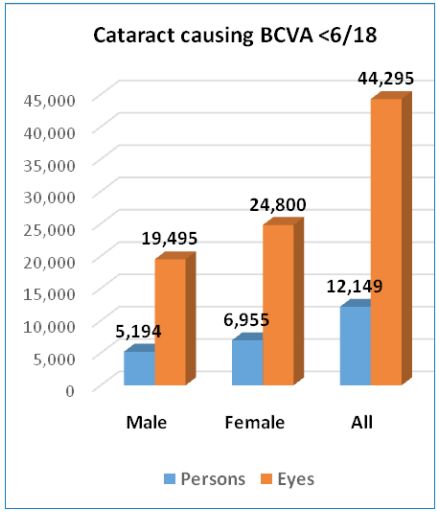


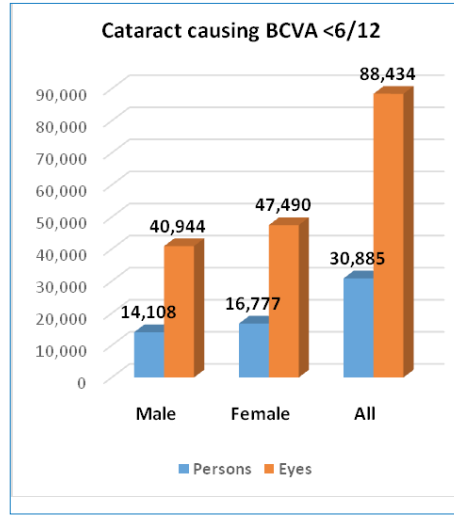
A total backload of 30,885 persons (14,108 male, 16,777 female) and 88,434 eyes (male 40,944, 47,490 female) was estimated to be found among the people aged 50 and above in Gandaki Province due to cataract having all grades of vision impairment with PVA < 6/12 (Figure 6).

Figure 6: Estimated backlog of cataract causing blindness and VI in Gandaki Province









3.6 Cataract Surgical Coverage

The cataract surgical coverage (CSC) in persons indicates which proportions of people with cataract at a predefined VA have been operated in one or both eyes. This indicator measures the coverage of cataract surgical services.

At 92.2%, the age- and sex-adjusted CSC among people who are blind (PVA<3/60) is higher than the target of at least 85% recommended by the International Agency for the Prevention of Blindness (IAPB). The age- and sex-adjusted CSC was higher in men (95.0%) compared with women (90%) (Table 9).

The age- and sex-adjusted CSC among people at a VA of <6/60 and <6/18 are 81.0% and 61.5%, respectively. This suggests that fewer people who have cataract receive surgery if they are not blind (Table 9).

The age- and sex-adjusted CSC for eyes with cataract (as opposed to individuals with cataract) at a VA of <3/60 indicates the coverage of the total workload of operable cataract. This is 80.3%, with slightly higher coverage in men (81.8%) than in women (79.1%) (Table 9).

The effective CSC (eCSC) combines coverage and outcome of cataract surgery and indicates what proportion of the people with bilateral operable cataract have been operated upon in one or both eyes and can see 6/18 or better after surgery.

The eCSC among people who are blind due to cataract was 75.7%. The eCSC among people with a VA of <6/60 and <6/18 are 69.1% and 50.7%, respectively. The eCSC was higher among men as compared to women in all vision categories (Table 9).

Table 9: Cataract Surgical Coverage

Vision Category	Male	Female	Total
Cataract Surgical Coverage (Persons) – percentages			
VA <3/60	95.0	90.0	92.2
VA <6/60	89.1	80.3	84.0
VA <6/18	63.3	62.2	62.7
Cataract Surgical Coverage (Eyes) – percentages			
VA <3/60	81.8	79.1	80.3
VA <6/60	74.9	70.4	72.3
VA <6/18	52.3	52.3	52.3
Effective Cataract Surgical Coverage (persons)- percentages			
VA <3/60	80.0	72.3	75.7
VA <6/60	75.5	64.5	69.1
VA <6/18	53.3	48.7	50.7

3.7 Causes of Blindness and VI

The main cause of bilateral blindness was untreated cataract (42.6%). The other causes ARMD (17.0%), other posterior segment diseases (14.9%), glaucoma (10.0%), cataract surgical complications (6.4%), and non-trachomatous corneal opacity (4.3%). Cataract was still the leading cause of SVI (76.7%) and MVI (64.0%). Uncorrected refractive error was the leading cause of EVI (63.8%) (Table 10).

The proportion of blindness due to glaucoma was 10.0 %. However, it should be noted that with glaucoma the central vision remains unaffected until very late in the disease process. It is not possible to conduct reliable visual field analysis in this survey. The number of patients who have glaucoma and still have normal VA is likely to be higher.

Almost two thirds (68.1%) of all blindness in the study population was avoidable. Specifically, 42.6% of blindness was treatable, 17.0% was preventable through more advanced ophthalmic services and 8.5% was preventable with primary health care and/or primary eye care. Posterior segment disease accounted for nearly one third (31.9%) of all bilateral blindness (Table 10).

The main intervention strategies to reduce avoidable blindness in Gandaki Province are shown in Figure 7. Cataract surgery should be the main priority.

Because blindness and vision impairment due to posterior segment diseases like glaucoma, diabetic retinopathy and ARMD might be prevented through regular control and timely intervention, targeted health education and the development of specialist ophthalmic services might contribute to reducing avoidable blindness and vision impairment further.

Table 10: Causes of Blindness and VI in Sample Population

By cause	Blindness		SVI		MVI		EVI	
	n	%	n	%	n	%	n	%
Cataractuntreated	20	42.6	46	76.7	183	64.0	164	27.2
ARMD	8	17.0	7	11.7	17	5.9	13	2.2
Other posterior segment disease	7	14.9	3	5.0	26	9.1	19	3.2
Glaucoma	5	10.6	1	1.7	7	2.4	2	0.3
Cataract surgical complications (CSC)	3	6.4	0	0.0	10	3.5	12	2.0
Non-trachomatous corneal opacity (CO)	2	4.3	1	1.7	3	1.0	3	0.5
Onchocerciasis	1	2.1	0	0.0	1	0.3	0	0.0
Phthisis	1	2.1	0	0.0	0	0.0	1	0.2
Myopic Degeneration	0	0.0	0	0.0	2	0.7	2	0.3
All other globe/CNS abnormalities	0	0.0	0	0.0	2	0.7	0	0.0
Refractive error	0	0.0	1	1.7	31	10.8	384	63.8
Aphakia uncorrected	0	0.0	0	0.0	0	0.0	0	0,0
Diabetic retinopathy	0	0.0	1	1.7	7	2.4	2	0.3
Total	47	100.0	60	100.0	286	100.0	602	100.0
By intervention category								
A. Treatable	20	42.6	47	78.3	214	74.8	548	91.0
B. Preventable (PHC/PEC services)	4	8.5	1	1.7	6	2.1	6	1.0
C. Preventable (Ophthalmic services)	8	17.0	2	3.3	21	7.3	16	2.7
D. Avoidable (A+B+C)	32	68.1	50	83.3	241	84.3	570	94.7
E. Posterior segment causes	21	44.7	12	20.0	55	19.2	36	6.0

Figure 7: Causes of blindness

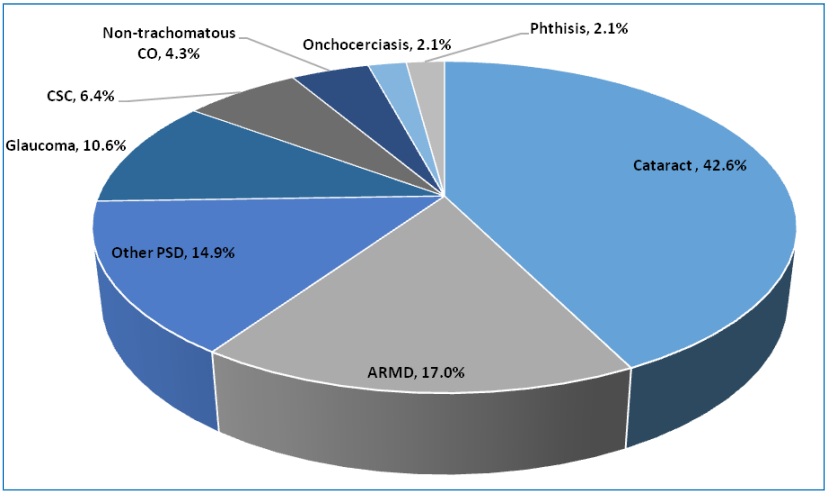
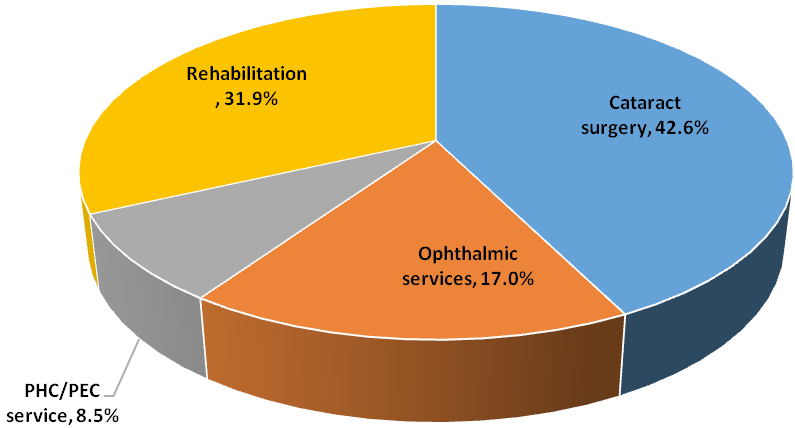


Figure 8: Actions required to reduce blindness



3.8 Visual Outcome of Cataract Surgery

Good visual outcome of cataract surgery (PVA 6/18 or better) according to the WHO standard was found among 76.5 % of the operated eyes. This was further improved to 83.4% after best correction (Table 11). The difference between PVA and BCVA can be minimized by adequate biometry, good surgical technique, individually adjusted IOLs, and optical correction after cataract surgery.

Table 11: Visual Outcome of cataract surgery in the study population

Visual outcome	VA Type	Non-IOL		IOL		Total	
		n	%	n	%	n	%
Very good ≥ 6/12	PVA	0	0.0	347	56.9	347	56.5
	BCVA	0	0.0	445	73.0	445	72.5
Good: ≥ 6/18	PVA	0	0.0	123	20.2	123	20.0
	BCVA	0	0.0	67	11.0	67	10.9
Borderline: <6/18 - 6/60	PVA	0	0.0	70	11.5	70	11.4
	BCVA	0	0.0	37	6.1	37	6.0
Poor: < 6/60	PVA	4	100.0	70	11.5	74	12.1
	BCVA	4	100.0	61	10.0	65	10.6

3.8.1 Visual Outcome of Cataract Surgery According to Postoperative period

Good visual outcome was seen in 81.1% and 80.2%of the cataract operated eyes within 3 years and 4 – 6 years after postoperative period compared to that of more than 7+ years after surgery (Table 12).

Table 12: Visual Outcome of Cataract Surgery According to Postoperative period

Category PVA	0-3 years		4-6 years		7+ years		Total	
	n	%	n	%	n	%	n	%
Very Good ≥6/12	171	64.5	79	55.6	97	46.9	347	56.5
Good : ≥6/18	44	16.6	35	24.6	44	21.3	123	20.0
Borderline :<6/18 - 6/60	23	8.7	20	14.1	27	13.0	70	11.4
Poor : < 6/60	27	10.2	8	5.6	39	18.8	74	12.1
Total	265	100.0	142	100.0	207	100.0	614	100.0

3.8.2 Visual Outcome of Cataract Surgery According to Place of Surgery

A great majority, 74.4% of the cataract surgeries were performed in NGO run eye hospitalsand 19.9 % of cataract surgeries were conducted in community eye camps. Very few were done in private hospitals (3.7) and government hospitals (2.0%) as shown in (Table 13).

Table 13: Proportion of Cataract Surgeries Performed According to Places

Places of Surgery	Male		Female		Total	
	n	%	n	%	n	%
Government Hospital	4	1.5	8	2.3	12	2.0
Voluntary/Charitable Hospital	223	82.9	234	67.8	457	74.4
Private Hospital	6	2.2	17	4.9	23	3.7
Eye Camp	36	13.4	86	24.9	122	19.9
Total	269	100.0	345	100.0	614	100.0

Good visual outcome was found in more than three fourths of the cataract operated eyes performed in hospitals and it was 73.8 in community eye camps (Table 14).

Table14: Post-Operative Visual Outcome According to Place of Surgery

Visual Outcome (PVA)	Government Hospital		Charitable Hospital		Private Hospital		Eye Camps		Total	
	n	%	n	%	n	%	n	%	n	%
Very good : can see 6/12	8	66.7	263	57.5	17	73.9	59	48.4	347	56.5
Good : can see 6/18	1	8.3	90	19.7	1	4.3	31	25.4	123	20.0
Borderline : can see 6/60	0	0.0	52	11.4	2	8.7	16	13.1	70	11.4
Poor : cannot see 6/60	3	25.0	52	11.4	3	13.0	16	13.1	74	12.1
Total	12	100.0	457	100.0	23	100.0	122	100.0	614	100.0

The major causes of poor visual outcome were ocular comorbidities as 59.0%, sequelae or long-term surgical complications as 22.3%. Immediate surgical complications as 11.1% and inadequate optical correction/wearing no spectacles as 7.6% were other causes for poor visual outcome of cataract surgery found in this province (Table 15).

Table 15: Causes of Poor Outcome among Cataract Operated Eyes

Causes	Borderline Outcome		Poor Outcome		Total	
	n	%	n	%	n	%
Comorbidity	35	50.0	50	67.5	85	59.0
Surgery	7	10.0	9	12.2	16	11.1
Spectacles	11	15.7	0	0.0	11	7.6
Sequelae	17	24.3	15	20.3	32	22.3
Total	70	100.0	74	100.0	144	100.0

3.9 Barriers to Uptake Cataract Surgical Services

Among the people having bilateral cataract with BCVA <6/60, the most prominent barriers to uptake cataract surgery services were Need not felt as 27.4%, local reasons as 17.7%, Cost as 14.5%, Accessibility as 12.9%, Treatment denied by the provider as 11.3%, Fear as 8.1% and Unawareness as 8.1% (Table 16).

Table 16: Barriers to Uptake Cataract Surgical (Bilateral Cataract with BCVA <6/60)

Barriers	Men		Women		Total	
	n	%	n	%	n	%
Need not felt	5	25.0	12	28.6	17	27.4
Local reasons	4	20.0	7	16.7	11	17.7
Cost	3	15.0	6	14.3	7	14.5
Cannot access treatment	4	20.0	4	9.5	8	12.9
Treatment denied by provider	1	5.0	6	14.3	7	11.3
Fear	1	5.0	4	9.5	5	8.1
Unaware treatment is possible	2	10.0	3	7.1	5	8.1
Total	20	100.0	42	100.0	62	100.0

3.10 Refractive Errors, Presbyopia and Functional Low Vision

The prevalence of refractive error was 17.5% among the people 50 years and older. Among those,8.8% of people aged 50 years and older who had a refractive error did not have glasses. On the other hand, 75.2% of the study population did not wear glasses for near. The prevalence of uncorrected refractive error was slightly higher in women than in men. More women (83.6%) than men (65.0%) were uncorrected for their near vision (Table 17).

Table17: Prevalence of Uncorrected Refractive Error and Uncorrected Presbyopia

Types	Male		Female		Total	
	n	%	n	%	n	%
Total Refractive Error	392	18.4	432	16.7	824	17.5
Uncorrected Refractive Error	181	8.5	235	9.1	416	8.8
Total Presbyopia	2134	100.0	2583	100.0	4717	100.0
Uncorrected Presbyopia	1387	65.0	2159	83.6	3546	75.2

3.11 Functional Low Vision Requiring Low Vision Services

The age- and sex-adjusted prevalence of FLV requiring low vision services in people aged 50 years and older in Gandaki Province was 1.2%. Out of the estimated 30,907 people aged 50 and older with PVA <6/18, 14.9% (4,608) require low vision services or training. The number of women is higher than

men requiring low vision services. The most common cause of FLV were other posterior segment diseases (35.6%), ARMD (33.9%), diabetic retinopathy (8.5%), non-trachomatous corneal opacity (8.5%) and glaucoma (6.8%).

Table18: Prevalence of Functional Low Vision

By Type	Male		Female		Total	
	N	%	n	%	n	%
Crude prevalence	24	1.1	35	1.4	59	1.3
Adjusted prevalence	1,884	1.0	2,724	1.3	4,608	1.2
By Cause						
Other posterior segment diseases	8	33.3	13	37.1	21	35.6
ARMD	10	41.7	10	28.6	20	33.9
Diabetic Retinopathy	3	12.5	2	5.7	5	8.5
Non-trachomatous corneal opacity	0	0.0	5	14.5	5	8.5
Glaucoma	3	12.5	1	2.9	4	6.8
Cataract surgical complications	0	0.0	2	5.7	2	3.4
Globe /CNS abnormalities	0	0.0	1	2.9	1	1.7
Onchocerciasis	0	0.0	1	2.9	1	1.7

Conclusion and Recommendation

Blindness and visionimpairment from all causes still remains as a major public health problem among the people aged 50 years and above in Gandaki Province, of Nepal. There remains a significant workload of avoidable blindness and vision impairment to be addressed by the eye health system. The visual outcome of cataract surgery below the WHO standards despite more than 90.0% of service coverage suggests further improvement in quality of surgical services. Along with cataract as the leading cause, posterior segment diseases account for significant proportion of blindness and vision impairment. Besides, uncorrected refractive error, diabetic retinopathy and functional low vision are other issues to be resolved by the eye care system in this province.

To conclude, this survey provides evidence of public health significance regarding the magnitude of blindness and visual impairment, its causes and performance evaluation of ongoing eye care programs in the province. The information from this survey will help the concerned decision makers to formulate appropriate strategies to combat this needless burden of avoidable blindness and visual impairment.

To recommend, the findings from this survey make sensitization to the concerned authorities toscale up eye care services to those whose eye health needs are often not met yet as a goal to achieve Universal Eye Health Coverage.

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