# RAPID ASSESSMENT OF AVOIDABLE BLINDNESS (RAAB) SURVEY IN NEPAL 2021


Government of Nepal
**Ministry of Health and Population**
Ramshahpath, Kathmandu
Nepal

# RAPID ASSESSMENT OF AVOIDABLE BLINDNESS (RAAB) SURVEY IN NEPAL 2021

## (NATIONAL REPORT)

2030 IN SIGHT


**Government of Nepal**

**Ministry of Health and Population**

Ramshahpath, Kathmandu, Nepal



December 2024

# RAPID ASSESSMENT OF AVOIDABLE BLINDNESS (RAAB) SURVEY IN NEPAL 2021

(NATIONAL REPORT)

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December 2024

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# PREFACE

It is with great pride that I present the *Rapid Assessment of Avoidable Blindness (RAAB-2021) Survey* national report, a significant milestone in Nepal's progress toward improved eye health. Over the past four decades, Nepal has achieved remarkable advancements in delivering quality eye care services. However, expanding these services to underserved populations in remote and rural areas remains a priority.

This report provides critical insights into the current state of blindness and visual impairment in Nepal and the outcomes of existing eye care programs. It will serve as a valuable resource for planning future strategies, aligning with global goals such as the "*2030 In Sight*" strategy and the Integrated People-Centered Eye Care (IPEC) framework.

I extend my sincere gratitude to the Policy, Planning, and Monitoring Division, MoHP (Dr. Krishna Prasad Paudel, Division Chief), Nepal Netra Jyoti Sangh, Tilganga Institute of Ophthalmology, Surkhet Eye Hospital, and all stakeholders for their contributions. I extend my thanks to our international partners, including the Seva Foundation, Eye Care Foundation, CBM, Fred Hollows Foundation, and the Nepal Red Cross Society, for their support.

This report reflects a collaborative effort, and I am confident it will guide us toward achieving equitable and accessible eye care across the country.

.....
Mr. Hari Prasad Mainali
Secretary

.....
Dr. Roshan Pokhrel
Secretary

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# FOREWORD

The *Rapid Assessment of Avoidable Blindness (RAAB-2021) Survey* national report marks an important milestone in Nepal's journey toward improving eye health and reducing preventable blindness. This report provides valuable insights into the current status of eye care services, highlighting progress achieved over the years while identifying areas requiring further attention.

Ensuring equitable access to eye care services remains a key priority, particularly for underserved populations in remote and rural areas. The findings of this survey will serve as a foundation for evidence-based planning and policy development, enabling us to strengthen the integration of eye care into the broader health system.

This achievement is the result of collaborative efforts between the Ministry of Health and Population, Nepal Netra Jyoti Sangh, Tilganga Institute of Ophthalmology, Surkhet Eye Hospital, and various stakeholders. I extend my gratitude to all those who contributed to the successful completion of this survey. I also acknowledge the generous support of international partners, including the Fred Hollows Foundation, Seva Foundation, Eye Care Foundation, CBM, and the Nepal Red Cross Society, whose contributions have been invaluable.

As we move forward, I am confident that the findings of this report will guide us in achieving our shared vision of eliminating avoidable blindness and ensuring accessible, high-quality eye care for all.

| | | |
|---|---|---|
| Dr. Tanka Prasad Barakoti | Dr. Sangeeta Kaushal Mishra | Dr. Dipendra Raman Singh |
| Additional Health Secretary | Additional Health Secretary | Additional Health Secretary |

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# ACKNOWLEDGEMENT

The Rapid Assessment of Avoidable Blindness (RAAB) survey conducted between 2018 and 2021 across all seven provinces of Nepal was a monumental effort, made possible through the dedication and collaboration of numerous individuals and organizations.

We extend our sincere gratitude to Policy, Planning, and Monitoring Division, MoHP (Dr. Pusparaj Paudel, Ravi Kanta Mishra, Samiksha Baral), Nepal Netra Jyoti Sangh (NNJS), the Tilganga Institute of Ophthalmology (TIO), and the Nepal Red Cross Society (NRCS)/Surkhet Eye Hospital for the successful execution of this survey. We are deeply thankful to the eye health workers, ophthalmic assistants, and ophthalmologists who meticulously examined the population aged 50 and above, providing invaluable data for this study.

We are especially grateful to our funding partners Seva Foundation, Eye Care Foundation, Christoffel Blinden Mission (CBM), and The Fred Hollows Foundation whose financial support made this survey possible. Our heartfelt thanks also go to the High-Level Committee for Eye Health for their unwavering support and strategic guidance throughout this process. We would also like to acknowledge the International Agency for the Prevention of Blindness (IAPB) for ensuring high-quality training throughout the survey. Their expertise in capacity-building played a significant role in enhancing the quality of both training and survey implementation. Furthermore, our deepest appreciation goes to the NNJS team for their dedication in report writing, analysis, and resource management, which was essential to the success of this project.

The success of this survey is a testament to the collaborative spirit and commitment to improving eye health in Nepal. We express our deep appreciation to everyone who contributed their time, expertise, and resources to ensure the success of this important initiative. This report reflects the collective commitment to a brighter, healthier future for all.

..... 18 Dec 2024

Dr. Krishna Prasad Paudel

# LIST OF ABBREVIATIONS

| | |
|---|---|
| ARMD | Age Related Macular Degeneration |
| BCVA | Best Corrected Visual Acuity |
| CI | Class Interval |
| CSC | Cataract Surgical Coverage |
| eCSC | Effective Cataract Surgical Coverage |
| eREC | Effective Refractive Error Coverage |
| EVI | Early Visual Impairment |
| FLV | Functional Low Vision |
| IAPB | International Agency for Prevention of Blindness |
| ICEH | International Center for Eye Health |
| IOL | Intraocular Lens |
| IPEC | Integrated People Centered Eye Care |
| LSHTM | London School of Hygiene and Tropical Medicine |
| MVI | Moderate Visual Impairment |
| NNJS | Nepal Netra Jyoti Sangh |
| PVA | Presenting Visual Acuity |
| RAAB | Rapid Assessment of Avoidable Blindness |
| SVI | Severe Visual Impairment |
| TIO | Tilganga Institute of Ophthalmology |
| UHC | Universal Health Coverage |
| VA | Visual Acuity |
| VDC | Village Development Committee |
| VI | Visual Impairment |
| WHA | World Health Assembly |
| WHO | World Health Organization |

# KEY OPERATIONAL DEFINITIONS

| Indicator | Abbreviation | Definition |
|---|---|---|
| Visual acuity | VA | The clarity of vision of an individual |
| Presenting visual acuity | PVA | VA with refraction correction that is available to participant |
| Best corrected visual acuity | BCVA | VA with best available refraction correction -for the purpose of this study, th is is pinhole vision |
| Blindness | n/a | VA <3/60 in the better eye |
| Severe vision impairment | SVI | VA <6/60 to ≥3/60 |
| Moderate vision impairment | MVI | VA <6/18 to ≥6/60 |
| Early vision impairment | EVI | VA <6/12 to ≥6/18 |
| Severe vision impairment or worse | SVI+ | VA <6/60 |
| Moderate vision impairment or worse | MVI+ | VA <6/18 |
| Early vision impairment or worse | EVI+ | VA <6/12 |
| Functional low vision | FLV | BVA<6/18 to better than no light perception, not caused by cataract, refractive error, uncorrected aphakia or pseudophakia with posterior capsule opacification |
| Cataract surgical coverage | csc | [(x+y)/(x+y+z)]*100 |
| | | Where: |
| | | x = individuals with unilateral pseudo/aphakia (i.e. operated cataract) and operable cataract in the other eye; |
| | | y = individuals with bilateral pseudo/aphakia, regardless of visual acuity; |
| Effective cataract surgical coverage | eCSC | z = individuals with bilateral operable cataract. [(a+b )/(x+y+z)]*100 |
| | | Where: |
| | | a = individuals with unilateral pseudo/aphakia achieving presenting visual acuity of 6/12 or better in the operated eye and operable cataract in the other eye; |
| | | b = individuals with bilateral pseudo/aphakia achieving presenting visual acuity of 6/12 or better in at least one eye; |
| | | x, y and z as above for CSC. |

# EXECUTIVE SUMMARY

Nepal is one of the countries where blindness surveys are conducted on regular basis. The first national blindness survey conducted in 1981 was the milestone for eye care services in Nepal, which revealed that the prevalence of blindness as 0.84%. Another series of blindness and visual impairment survey carried out in Nepal from 2006 to 2010 using Rapid Assessment of Avoidable Blindness (RAAB) Survey methodology estimated that the prevalence of blindness among the age 50 years and older as 2.5% and all age extrapolation of it was estimated as 0.35%. That estimate shows that there was an approximately 60% reduction on the prevalence of blindness compared to 1981 blindness survey estimation.

Similarly, the recent population based RAAB survey was conducted in all the seven provinces in Nepal from 2018 to 2021. Main aim of this survey was to determine the prevalence and causes of blindness and vision impairment, coverage and barriers of cataract surgery among people 50 years and older in Nepal. The survey designing and technical support was provided by the International Agency for Prevention of Blindness (IAPB), and International Centre of Eye Health (ICEH)/London School of Hygiene and tropical Medicine (LSHTM).

Provincial prevalence estimates were weighted to give nationally representative estimates. Sampling, enumeration, and examination of the population 50 years and older were done at the province level following standard RAAB protocol. The total sample size required for all seven provinces were 33414 people distributed across 956 clusters of 35 people 50 years or older in each study cluster. Along with causes of blindness and visual impairment, cataract surgical coverage (CSC), effective cataract surgical coverage (eCSC) and visual outcomes of cataract surgery were also documented along with demographic and clinical factors responsible for it. Cataract surgery outcomes were classified as good (vision >6/18), borderline (6/24-6/60) and poor (<6/60). The survey protocol was reviewed and approved by Nepal Health Research Council (NHRC), Government of Nepal.

Across seven surveys 33,228 individuals were enrolled, of whom 32,565 were examined (response rate 98%). Females (n=17,935) made up 55% of the sample. The age-sex-province weighted national prevalence of blindness (better eye PVA <3/60) was 1.1% (95% CI: 1.0-1.2%), and any vision impairment <6/12 was 20.7% (95% CI: 19.9-21.5%). The prevalence of blindness and any vision impairment were both higher in women than men (1.3% 95% CI: 1.1-1.5%) vs 0.9% (95% CI: 0.7-1.0%). Age-sex weighted blindness prevalence was highest in Lumbini Province (1.8% 95% CI: 1.3-2.2%) and lowest in Bagmati Province (0.7% 95% CI: 0.4-0.9%) and Sudurpashchim Province (0.7% 95% CI:

0.4-0.9%). Cataract (65.2%) was the leading cause of blindness in the sample, followed by corneal opacity (6.4%), glaucoma (5.8%) and age-related macular degeneration (ARMD) (5.3%). Other posterior segment diseases accounted for 8.4% of cases.

The CSC in Nepal for the total population 50 years and older was 82.7% (95% CI: 80.8 - 84.4%) among the VA cut off <6/60 due to cataract, similar in both genders, Sudurpashchim (92.2%) had the highest CSC followed by Bagmati (90.7%), while densely populated Madhesh (77.6%) and Lumbini (75.4%) had least. Need not felt (33%), cost (30.4%), inability to access treatment (13%), and fear (12.3%) were the main barriers to accessing cataract surgical services.

The prevalence of blindness in 2021 has decreased to 1.05% from 2.5% among the 50 and older population of Nepal compared to the nationwide RAAB survey in 2010. The extrapolated prevalence for all ages was estimated as 0.35% in 2010 and 0.28% in 2021. The Lumbini and Madesh Provinces had a higher prevalence of blindness compared to the other provinces. Cataract was the still leading cause of blindness and severe vision impairment (SVI) and moderate vision impairment (MVI) while refractive error was the leading cause of mild vision impairment. Based on the World Health Assembly (WHA) endorsed indicator and set global target for 2030 (visual acuity cut off 6/12), the eCSC was found to be 35.4%.

# CHAPTER I: INTRODUCTION

## 1.1 Background

Nepal has a long history of conducting population-based surveys of vision impairment and blindness. The first national blindness survey done in 1981 found the prevalence of blindness (VA <3/60 in the better eye) as 0.84% and MVI to SVI (VA <6/18 and ≥3/60) of 1.85% in the population. Cataract was the leading cause of blindness, accounting for 71.3% of avoidable cases. (1)

The prevalence of blindness and vision impairment in the all-age population was estimated to have decreased from 0.84% in 1981 to 0.35% in 2010 an approximately 60% reduction. Cataract was still found to be the leading cause of blindness and the quality of cataract surgery improved but still did not meet the WHO standard. More than 80% of the avoidable blindness and visual impairment reside among people aged 50 and above mainly caused by cataract and uncorrected refractive errors alone. (2) The extrapolated results of this survey showed that the prevalence of blindness, according to WHO's definition, further reduced to 0.28% in 2021.

RAAB survey methodology used in this survey has been adopted in more than 170 countries worldwide and is considered a cost-effective method to estimate the prevalence of blindness in the population 50 and older. This survey aimed to reveal the prevalence of blindness and visual impairment which are provincially representative and consolidation of the same will provide the national data.

## 1.2 Rational

Nepal was one of the first countries in South Asia to endorse the WHO–IAPB global initiative "VISION 2020 The Right to Sight" and, in 1999, developed its first national eye health plan in 2001 which ended by 2020. However, the blindness and visual impairment remain as persistent challenge. In order to address these challenges, WHA 74, in 2021 endorsed Integrated People Centered Eye Care (IPEC) and identified two of the eye health indicators, Effective Cataract Surgical Coverage (eCSC) and Effective Refractive Error Coverage (eREC) as tracer indicator for monitoring. It was recommended to all member states to conduct population-based surveys to determine baseline and set the target for 2030. This survey data provides the baseline data for Nepal which is crucial for planning and setting the target for 2030.

## 1.3 Objective of the survey

### 1.3.1 General Objective

The main objective of this survey was to assess the magnitude of blindness and visual impairment and its causes and to assess the impact of ongoing eye care service in Nepal among the people aged 50 and older of Nepal.

### 1.3.2 Specific objectives

The specific objectives of this survey were to assess the:

- Prevalence of blindness, severe, moderate, and early vision impairment
- Proportion of blindness, severe, moderate, and early vision impairment that is avoidable
- Main causes of blindness, severe, moderate, and early vision impairment
- Cataract surgical coverage and effective cataract surgical coverage
- Visual outcomes of cataract surgery
- Causes of poor outcomes of cataract surgery
- Prominent barriers for not using available cataract surgical services
- Prevalence of uncorrected refractive errors and presbyopia
- Prevalence and causes of low vision

## 1.4 Operational Definitions

Vision impairment and blindness based on PVA (i.e., with correction if available) in the better eye, was defined according to the International Classification of Disease (ICD-11) thresholds. (3)

- Blindness: A study participant having PVA < 3/60 in the better was considered as blind. PVA is VA measured with available correction if any.
- Best 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 Impairement (SVI): PVA of < 6/60 – 3/60 in the better eye was considered as SVI.
- Moderate Visual Impairment (MVI): PVA of < 6/18 – 6/60 in the better eye was considered as MVI.
- Early Visual Impairment (EVI): EVI with PVA of <6/12 – 6/18 in the better eye was considered as EVI.
- Functional Low Vision (FLV): BCVA of < 6/18 – PL+ in the better eye (not due to cataract or refractive error) was considered as FLV.
- Cataract Surgical Coverage (CSC): The number of people in a defined population who have been operated for cataract as a proportion of all people/eye operated on or still requiring surgery.
- Effective Cataract Surgical Coverage (eCSC): the number of people in a defined population with operated cataract with good outcome (i.e. presenting vision 6/12 or better) as a proportion of those having operable plus operated cataract.
- Effective Refractive Error coverage (eREC): the number of people in a defined population wearing refractive correction with presenting visual acuity 6/12 or better as a proportion of total visual impairment (VA<6/12) due to refractive error.

# CHAPTER II: SURVEY METHODOLOGY

## 2.1 Survey Design

Following the quantitative and cross-sectional survey design this population-based blindness survey was carried out in all seven provinces (as a sampling frame) of Nepal using standardized RAAB methodology in 2018-2021.

## 2.2 Survey Population

The survey population was all adults living in seven provinces of the country, who were aged 50 years or older at the time of data collection. To help verify age, a citizenship card and a national ID was taken as basis to determine the age. Within a cluster, anyone residing for at least six months of the year in the selected survey cluster was considered eligible and enrolled in the survey. Temporary visitors in the cluster and people below the age 50 years who refused to participate in the survey were excluded.

## 2.3 Sampling Frame

The available population unit with a defined known boundary before 2015 was the ward level population of the political division of Village Development Committees (VDCs) of the country. The census data (2011) of these population units (ward) was also available. Therefore, the VDC's ward was considered as a single population unit as one survey cluster for this survey. The total list of wards of VDC or Municipality ward as per the 2011 census of each province comprises the sampling frame for this survey.

## 2.4 Sample Size

Sample size calculations were performed using the ICEH - RAAB software. Each provincial-level sample size calculation used the prevalence of bilateral blindness in the population aged 50 years and older from a previous RAAB survey in Nepal conducted in 2010. Other parameters in the sample size calculations were consistent across the provinces: a relative precision of 20%, 95% confidence level, a design effect of 1.4 for a cluster size of 35 people and a 10% non-response rate. The minimum sample size required was considered to be able to generalize the results at the province level and consolidation of the same will represent the weightage national data. The total sample size required for all provinces was 33,414 people distributed across 956 clusters of 35 people 50 years or older in each cluster (Table 1).

## Table 1: Sampling and Data Collection Information

| Province | Sampling Information | | | | Data Collection | |
|---|---|---|---|---|---|---|
| | Estimated prevalence of blindness 2010 | Population 50 years and older (2011 census) | Sample size required | Number of clusters (size 35) | Data collection period | RAAB version used |
| Koshi | 3.3% | 743,329 | 4360 | 125 | Dec 2018 - Mar 2020 | 6 |
| Madhesh | 3.5% | 760,911 | 4109 | 118 | Sept 2019 - Feb 2020 | 7 |
| Bagmati | 2.5% | 831,208 | 5800 | 166 | June 2019 - Dec 2019 | 7 |
| Gandaki | 3.0% | 399,059 | 4789 | 137 | Jan 2019 - Feb 2020 | 6 |
| Lumbini | 3.0% | 655,927 | 5670 | 161 | July 2018 - Dec 2018 | 6 |
| Karnali | 2.5% | 190,016 | 4067 | 117 | Jun 2019 - Dec 2019 | 7 |
| Sudurpashchim | 2.9% | 250,982 | 4619 | 132 | Feb 2020 - May 2021 | 7 |
| Total | | | 33,414 | 956 | | |

## 2.5 Sampling Methods

The RAAB Survey deployed a two-stage cluster random sampling methodology, with enumeration and examination conducted on the same day. Initially, the required number of clusters was selected from wards based on probability proportional to the size of the population. For the second stage of sampling, considering that approximately 15% of the population aged 50 and older was identified from the 2011 census data, each study cluster required a population unit of approximately 235 individuals to achieve the enrolment of 35 participants aged 50 and older. In cases where a selected population unit had fewer than 235 individuals, an adjacent population unit was randomly chosen to ensure a sufficient sample size. Conversely, if a selected cluster contained more than 470 individuals, a compact segment sampling procedure was employed. This involved dividing the cluster into segments, each containing at least 235 people, and one segment randomly selected for study. Once a cluster was selected and demarcated, with an approximate estimate of 35 eligible study participants, a starting household was randomly selected. All eligible households within this cluster were enumerated sequentially until the target of 35 study participants was reached. If the initial segment did not provide 35 eligible participants, an adjacent population unit was randomly selected, and enumeration continued until the target sample size was achieved.

## 2.6 Data Collection Methods

Three teams were trained for data collection in each province. In the selected clusters, a team led by an ophthalmologist carried out house-to-house visits to enroll and examine the eligible survey participants. After obtaining written consent, participants underwent a visual acuity assessment, anterior segment examination with a torch light, media and fundus examination with a direct and indirect ophthalmoscope. Data collection was carried out using tablets with the mRAAB data collection software installed.

The survey teams, accompanied by a local guide mostly female community health

volunteers in every cluster, visited all households in the selected clusters door-to-door until 35 individuals aged 50 years or older were enrolled. If an eligible person was absent during the initial visit, the survey team revisited to their household on the same day to complete the examination. If the individual remained unavailable, information about their visual status was collected from relatives or neighbors and recorded as not available .

## 2.7 Examination Protocol

Examinations were conducted at participants' households on the same day as enrolled. The study team recorded the age and gender, distance and near spectacle ownership status, and PVA (i.e., with spectacles if available) in each eye. The best corrected pinhole VA was recorded for those with PVA worse than 6/12 in each eye. VA was measured using tumbling E optotype cards (6/60, 6/18, and 6/12 sizes) outdoors at 6 meters, 3 meters, or 1 meter as required to test VA at 1/60, 3/60, 6/60, 6/18, and 6/12 thresholds. Four out of five correct responses were considered to record each threshold of VA. Perception of light was tested for any eye VA worse than 1/60. All eyes underwent a lens examination with a torch light and distant direct ophthalmoscopy. Any eyes with PVA worse than 6/12 was assigned a cause of vision impairment from a standardized list and then a principal cause of vision impairment assigned per participant. If more than one condition is detected the principal cause was determined as the one more amenable to treatment or prevention. Eyes with PVA worse than 6/12 and no obvious anterior segment cause of vision impairment were dilated for fundus examination with direct ophthalmoscopy. Any participants with cataract and pinhole VA worse than 6/12 were asked about barriers to accessing treatment. Any participants who had received cataract surgery were examined further (type of surgery, reason for PVA worse than 6/12 if relevant) and asked about their surgical history (age at surgery, cost, place of surgery etc).

## 2.8 Data Management

Data was collected using android powered mobile devices, utilizing digitized questionnaires and examination protocols on tablet devices equipped with the mRAAB application. In three provinces (Koshi, Lumbini, Gandaki), the RAAB6 application was employed, while the RAAB7 platform's beta version was used in four provinces (Madhesh, Bagmati, Karnali and Sudurpashchim). Following review and approval by the team lead, an ophthalmologist, the data were synchronized to the main server. For the data collected using the mRAAB6 application, synchronization occurred upon the completion of each cluster. Data collected with the mRAAB7 app was automatically synchronized to a cloud-based server whenever internet connectivity was available.

## 2.9 Analysis of Data

A standardized epidemiological report was generated for each province utilizing the RAAB7 automated analysis code available at https://github.com/raabteam/raab7-analysis. This analysis provided provincial age-sex weighted prevalence estimates of vision impairment, post-stratified to the provincial 2021 census population counts, and identified the principal causes of blindness and vision impairment within the sample. To estimate a weighted national prevalence of vision impairment and blindness, each provincial dataset was exported from the RAAB software as a CSV (comma separated value) file. These files were merged into a single dataset and imported into STATA 17.
For reporting age-sex-province weighted national estimates, probability weights were created for fourteen 5-year age-sex categories (50-54, 55-59, 60-64, 65-69, 70-74, 75-79, 80+ for both males and females). The probability weight was calculated by multiplying two weights: a provincial design weight (the proportion of the national population in each province divided by 1/7, for both males and females) and a sampling weight (the proportion of the sample in each 5-year age-sex group divided by the census proportion in the same age-sex group). The extrapolated magnitude of vision impairment was estimated by applying the age-sex-province weighted prevalence values reported in the study to the 2021 census counts for female, male, and total populations separately. Consequently, male and female estimates may not sum to the total estimates. This survey was reported by the relevant items in the STROBE checklist for cross-sectional studies.

## 2.10 Limitations

RAAB is a rapid survey methodology that uses simple examination equipment and a protocol that prioritizes identifying avoidable causes of vision impairment. RAAB is not designed to estimate the prevalence of eye conditions and risk factors for vision impairments among the population age below 50 years old. The seven surveys took longer to complete (2018-2021 AD) than the anticipated timeline as data collection was interrupted by the COVID-19 pandemic in 2020.

## 2.11 Validity of the Survey

The RAAB survey methodology is a scientifically validated approach endorsed by the ICEH at LSHTM and WHO for conducting population-based surveys. This method has been employed in over 170 countries for similar assessments. The survey design and technical support were provided by the IAPB, Southeast Asia, and the ICEH at the LSHTM.

Before commencing fieldwork and data collection, teams underwent standardized training conducted by certified RAAB trainers Mr. YD Sapkota, Hans Limburg, and Ian

McCornick. The training program included an interobserver variation exercise and a supervised pilot cluster. All teams were ensured to achieve at least a Kappa score of 0.6 or greater for interobserver agreement on visual acuity, lens status, and assigning the cause of vision impairment.

## 2.12 Ethical Considerations

The survey adhered to the principles outlined in the Declaration of Helsinki. All eligible participants were informed about the survey's purpose and procedures, and written informed consent was obtained prior to their enrollment. This process ensured voluntary participation in both data collection and examination procedures. Additionally, appropriate remedial actions were taken to address any eye or other health-related issues identified among participants.

Ethical approval for the survey was also obtained from the NHRC, Government of Nepal. A letter from the Department of Health Services (DOHS), Ministry of Health and Population was also circulated to local government authorities to ensure necessary cooperation for the survey team and data collection procedures.

# CHAPTER III: DATA PRESENTATION AND ANALYSIS

## 3.1 Provincial and National Response Rate

Out of 33,228 participants enrolled, 32,565 were examined. Nationally, the response rate was 98.0% with a slight edge in participation among females compared to males. The response rates varied by province, ranging from 95.4% in Bagmati to 99.5% in Madhesh. This data highlights the effective implementation of the survey and a high level of participation with minimal non-response (Table 2).

### Table 2: The Response Rate (Provincial and National)

| | Female | | | Male | | | Total | | |
|---|---|---|---|---|---|---|---|---|---|
| Province | Enrolled n | Examined n | Examined % | Enrolled n | Examined n | Examined % | Enrolled n | Examined n | Examined % |
| Koshi | 2,266 | 2,221 | 98.0 | 1,965 | 1,900 | 96.7 | 4,231 | 4,121 | 97.4 |
| Madhesh | 2,168 | 2,158 | 99.5 | 1,907 | 1,897 | 99.5 | 4,075 | 4,055 | 99.5 |
| Bagmati | 3,331 | 3,204 | 96.2 | 2,479 | 2,338 | 94.3 | 5,810 | 5,542 | 95.4 |
| Gandaki | 2,618 | 2,583 | 98.7 | 2,176 | 2,134 | 98.1 | w4,794 | 4,717 | 98.4 |
| Lumbini | 3,104 | 3,082 | 99.3 | 2,538 | 2,500 | 98.5 | 5,642 | 5,582 | 98.9 |
| Karnali | 2,157 | 2,114 | 98.0 | 2,538 | 2,500 | 98.5 | 4,069 | 3,983 | 97.9 |
| Sudurpashchim | 2,603 | 2,573 | 98.9 | 2,004 | 1,992 | 99.4 | 4,607 | 4,565 | 99.1 |
| National | 18,247 | 17935 | 98.3 | 14,981 | 14630 | 97.7 | 33,228 | 32,565 | 98.0 |

## 3.2 Age-Sex- Weighted Estimates of Blindness and Vision Impairment

Nationally, the age-sex-province weighted prevalence of blindness among the population 50 years and older was 1.1% (95% CI: 1.0 - 1.2%). It was estimated that 60,138 people aged 50 years and older were blind in Nepal. The prevalence of blindness was higher among females 1.3% (95% CI: 1.1 - 1.5%) than males 0.9% (95% CI: 0.7 - 1.0%). The prevalence of any vision impairment <6/12 was 20.7% (95% CI: 19.9 - 21.5%) which was higher among females 21.8% (95%CI: 20.9 - 22.7%) than males 19.5% (95% CI: 18.6 - 20.5%) (Table 3, Figure 1).

### Table 3: Age-Sex Weighted Estimates of Blindness and Vision Impairment

| VI | Female | | | Male | | | Total | | |
|---|---|---|---|---|---|---|---|---|---|
| | Weighted % | 95% CI | Extrapolated magnitude | Weighted % | 95% CI | Extrapolated magnitude | Weighted % | 95% CI | Extrapolated magnitude |
| Blind | 1.3 | 1.1 - 1.5 | 36,311 | 0.9 | 0.7 - 1.0 | 24,066 | 1.1 | 1.0 - 1.2 | 60,138 |
| Severe VI | 1.9 | 1.7 - 2.1 | 53,070 | 1.5 | 1.3 - 1.8 | 40,109 | 1.7 | 1.5 - 1.9 | 92,941 |
| Moderate VI | 7.9 | 7.4 - 8.5 | 220,659 | 7.2 | 6.7 - 7.8 | 192,525 | 7.6 | 7.2 - 8.0 | 415,501 |
| Mild VI | 10.7 | 10.1 - 11.3 | 298,868 | 10.0 | 9.4 - 10.6 | 267,396 | 10.3 | 9.9 - 10.8 | 563,113 |

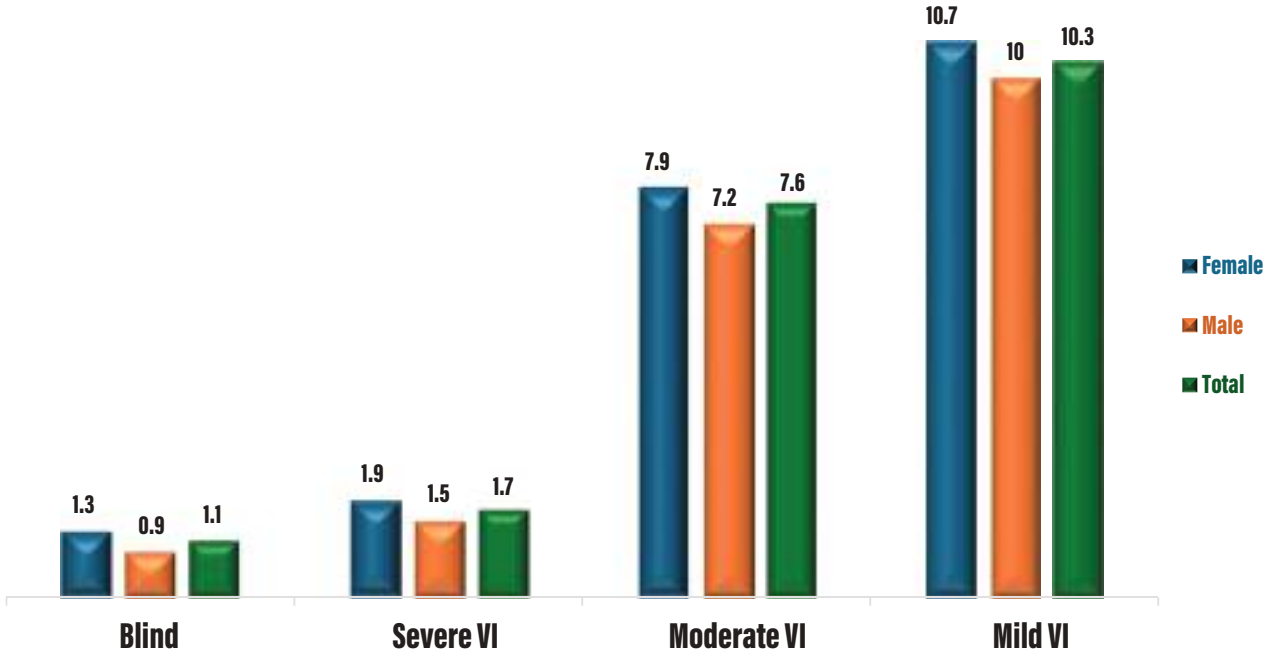



**Figure 1: Age Sex Weightage Blindness and Visual impairment (%)- National**

## 3.3 Provincial Age-Sex Weighted Prevalence of Bilateral Blindness

The overall prevalence of blindness was highest in Lumbini Province (1.8%) (95% CI: 1.3 - 2.2%) followed by Madhesh Province (1.4%) (95% CI: 1.0 - 1.8%). More than half (52.0%) of the total extrapolated magnitude of blindness cases were in Madhesh and Lumbini Provinces. The lowest prevalence of blindness was seen in Bagmati and Sudurpashchim Province (0.7%) (95% CI: 0.4 – 0.9%) equally (Table 4, Figure 2).

## Table 4: Age-Sex Weighted Prevalence of Bilateral Blindness by Province

| Province | Female | | | Male | | | Total | | |
|---|---|---|---|---|---|---|---|---|---|
| | Weighted % | 95% CI | Extrapolated magnitude | Weighted % | 95% CI | Extrapolated magnitude | Weighted % | 95% CI | Extrapolated magnitude |
| Koshi | 0.9 | 0.4 - 1.3 | 4,581 | 0.8 | 0.4 - 1.2 | 4,017 | 0.8 | 0.5 - 1.1 | 8,598 |
| Madhesh | 1.7 | 1.0 - 2.3 | 8,017 | 1.1 | 0.6 - 1.7 | 5,943 | 1.4 | 1.0 - 1.8 | 13,960 |
| Bagmati | 1.0 | 0.6 - 1.3 | 5,998 | 0.4 | 0.0 - 0.8 | 2,384 | 0.7 | 0.4 - 0.9 | 8,382 |
| Gandaki | 1.2 | 0.7 - 1.7 | 3,736 | 0.6 | 0.2 - 1.0 | 1,614 | 0.9 | 0.6 - 1.2 | 5,351 |
| Lumbini | 2.1 | 1.6 - 2.7 | 9,939 | 1.4 | 0.8 - 2.1 | 6,323 | 1.8 | 1.3 - 2.2 | 16,262 |
| Karnali | 0.9 | 0.4 - 1.3 | 1,144 | 1.1 | 0.6 - 1.6 | 1,372 | 1.0 | 0.6 - 1.3 | 2,517 |
| Sudurpashchim | 0.8 | 0.4 - 1.1 | 1,903 | 0.6 | 0.3 - 1.0 | 1,284 | 0.7 | 0.4 - 0.9 | 3,187 |

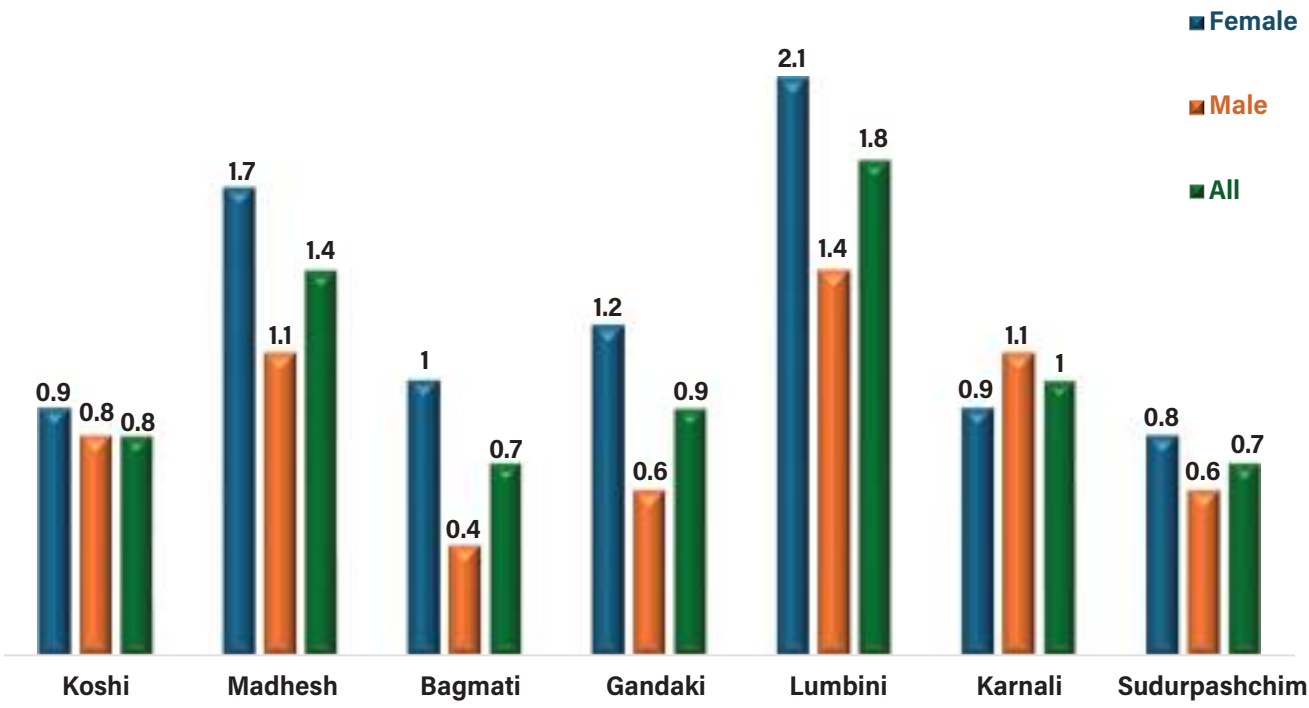



**Figure 2: Prevalence of Bilateral blindness by Province (%)**

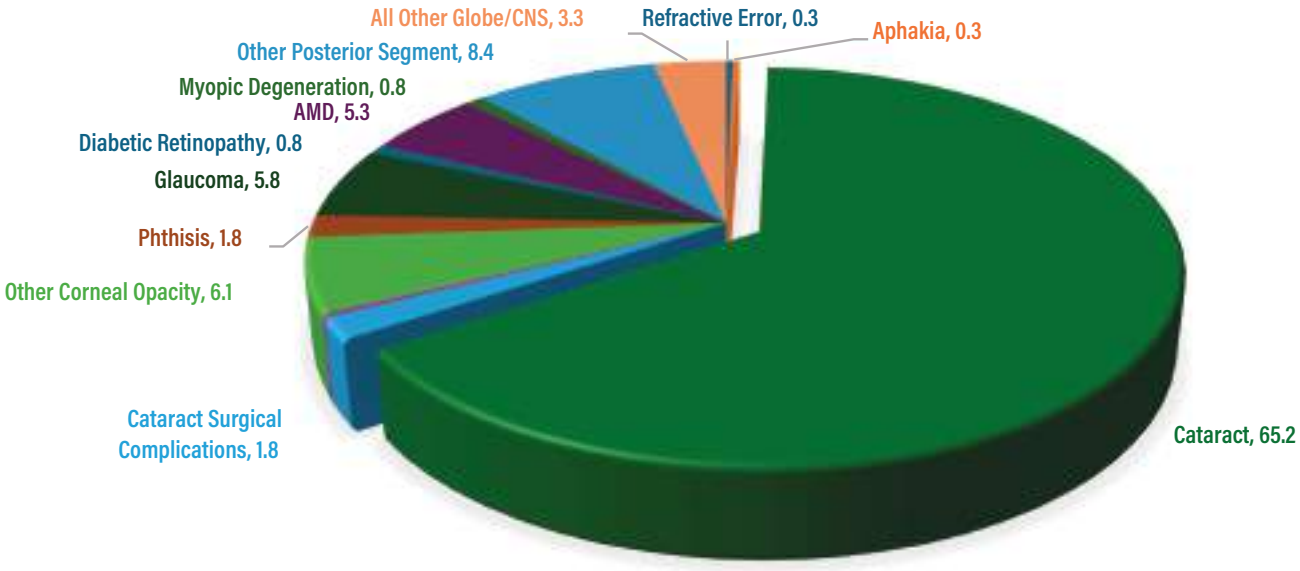
## 3.4 Causes of Blindness and Vision Impairment

Within the nationwide sample, cataract was the leading cause of blindness (65.2%), followed by non-trachomatous corneal opacity (6.1%), glaucoma (5.8%), and age-related macular degeneration (5.3%). Cataract surgical complications caused 1.8% of blindness and 4.6% of moderate visual impairment. Diabetic retinopathy was 0.8% of blindness cases nationally, while 'other posterior segment conditions' contributed 8.4% of blindness cases. Cataract was also the leading cause of SVI (83.9%) and MVI (66.8%), while refractive error was the leading cause of mild vision impairment (66.5%) (Table 5, Figure 3).

## Table 5: The Causes of Blindness and Vision Impairment in the National Sample

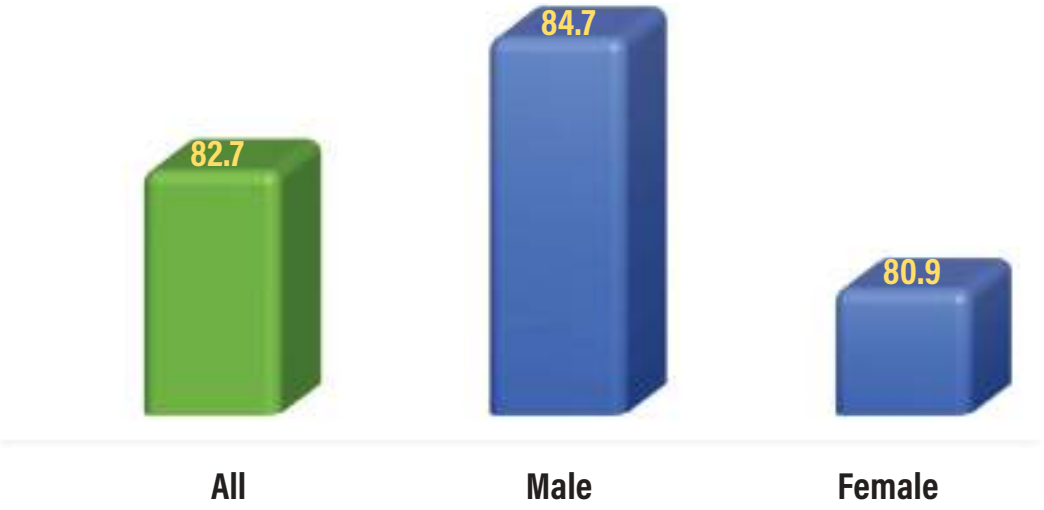
| Causes | Blindness | | Severe VI | | Moderate VI | | Mild VI | |
|---|---|---|---|---|---|---|---|---|
| | N | % | n | % | n | % | n | % |
| Refractive Error | 1 | 0.3 | 12 | 2.0 | 534 | 19.7 | 2,358 | 66.5 |
| Aphakia | 1 | 0.3 | 2 | 0.3 | 3 | 0.1 | 2 | 0.1 |
| Cataract | 257 | 65.2 | 501 | 83.9 | 1,810 | 66.8 | 953 | 26.9 |
| Cataract Surgical Complications | 7 | 1.8 | 11 | 1.8 | 126 | 4.6 | 79 | 2.2 |
| Trachomatous Corneal Opacity | 1 | 0.3 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 |
| Other Corneal Opacity | 24 | 6.1 | 7 | 1.2 | 35 | 1.3 | 31 | 0.9 |
| Pterygium | 0 | 0.0 | 0 | 0.0 | 9 | 0.3 | 8 | 0.2 |
| Phthisis | 7 | 1.8 | 1 | 0.2 | 4 | 0.1 | 5 | 0.1 |
| Glaucoma | 23 | 5.8 | 11 | 1.8 | 20 | 0.3 | 12 | 0.3 |
| Diabetic Retinopathy | 3 | 0.8 | 3 | 0.5 | 16 | 0.3 | 11 | 0.3 |
| AMD | 21 | 5.3 | 19 | 3.2 | 64 | 2.4 | 39 | 1.1 |
| Myopic Degeneration | 3 | 0.8 | 4 | 0.7 | 11 | 0.2 | 6 | 0.2 |
| Other Posterior Segment | 33 | 8.4 | 22 | 3.7 | 70 | 1.0 | 36 | 1.0 |
| All Other Globe/CNS | 13 | 3.3 | 4 | 0.7 | 8 | 0.2 | 7 | 0.2 |
| Total | 394 | 100.0 | 597 | 100.0 | 2,711 | 100.0 | 3,547 | 100.0 |

## Figure 3: Causes of Blindness in Person- National (%)




## 3.5 Cataract Surgical Coverage Among 50 Years and Older Population

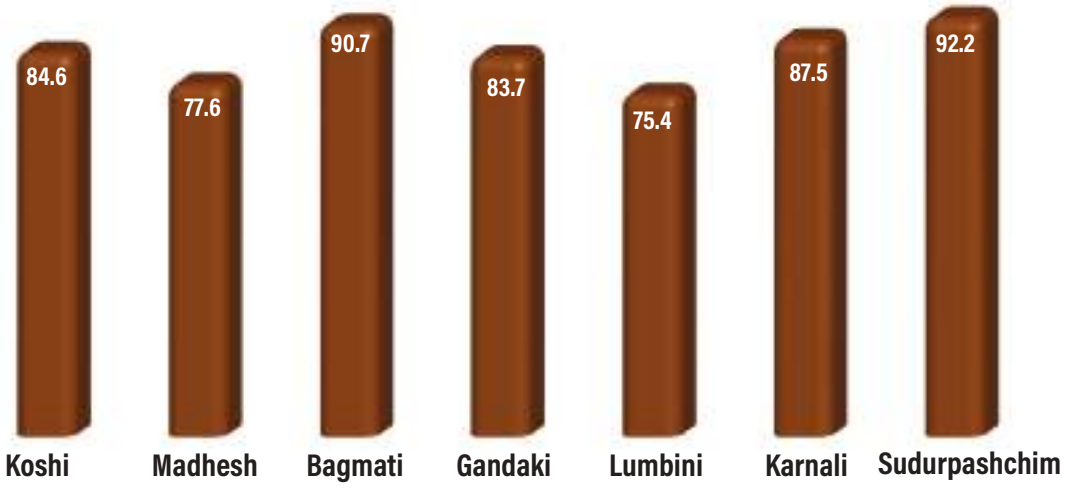
The CSC in Nepal for the total population 50 years and older was 82.7% (95% CI: 80.8 - 84.4%). It was found almost similar in women (80.9%, 95% CI: 78.4 - 83.2%) and men (84.7%, 95% CI: 82.2 - 86.8%). The relatively Sudurpashchim had the best CSC, followed by Bagmati Province. (Figure 4, 5 and Table 6).




## Figure 4: Cataract Surgical Coverage National (%) VA Cut off <6/60

## Table 6: Cataract Surgical Coverage (CSC) Among 50 Years and Older Nepali Population

| Cases | | Population | Examined | Cataract Surgical Coverage (Aphakic/ pseudophakic, VA<6/60) | |
|---|---|---|---|---|---|
| | | | | CSC (%) | 95% CI |
| National | | 5,467,114 | 32,503 | 82.7 | 80.8 - 84.4 |
| Gender | Male | 2,673,959 | 14,602 | 84.7 | 82.2 - 86.8 |
| | Female | 2,793,155 | 17,901 | 80.9 | 78.4 - 83.2 |
| Age group | 50 to 59 | 4,217,018 | 13,453 | | |
| | 60 and more | 1,250,096 | 19,050 | | |
| Province | Koshi | 1,028,640 | 4,121 | 84.6 | 80.3 - 88.1 |
| | Madhesh | 1,002,014 | 4,055 | 77.6 | 72.5 - 81.9 |
| | Bagmati | 1,235,014 | 5,472 | 90.7 | 87.5 - 93.1 |
| | Gandaki | 574,152 | 4,717 | 83.7 | 77.7 - 88.4 |
| | Lumbini | 905,487 | 5,582 | 75.4 | 71.0 - 79.3 |
| | Karnali | 257,871 | 3,983 | 87.5 | 82.9 - 91.1 |
| | Sudurpashchim | 463,936 | 4,573 | 92.2 | 89.3 - 94.4 |




## Figure 5: Cataract Surgical Coverage by Province (%)

## 3.6 Effective Cataract Surgical Coverage (eCSC) Among 50 and Above Population

The national eCSC was found to be 35.4% (95% CI: 33.6- 37.3%). Gender-wise, males have a slightly higher eCSC (36.5%) compared to females (34.5%). The highest eCSC was observed in the Sudurpashchim (52.1%) and Bagmati (42.5%) Provinces, while the lowest was in Gandaki (25.2%) and Lumbini (29.7%) (Table 7, Figure 6,7).

## Table 7: eCSC Among 50 Years and Older Nepali Population

| | | Population | Examined | CSC (%) | Effective Cataract Curgical Coverage eCSC (%) (Aphakic/pseudophakic with VA >6/12) | |
|---|---|---|---|---|---|---|
| | | | | | eCSC(%) | 95% CI |
| National | | 5,467,114 | 32,503 | 82.7 | 35.4 | 33.6 - 37.3 |
| Gender | Male | 2,673,959 | 14,602 | 84.7 | 36.5 | 34.1 - 38.9 |
| | Female | 2,793,155 | 17,901 | 80.9 | 34.5 | 32.4 - 36.7 |
| Age group | 50 to 59 | 4,217,018 | 13,453 | | | |
| | 60 and more | 1,250,096 | 19,050 | | | |
| Province | Koshi | 1,028,640 | 4,121 | 84.6 | 40.2 | 35.9 - 44.7 |
| | Madhesh | 1,002,014 | 4,055 | 77.6 | 32.6 | 28.6 - 36.9 |
| | Bagmati | 1,235,014 | 5,472 | 90.7 | 42.5 | 37.8 - 47.3 |
| | Gandaki | 574,152 | 4,717 | 83.7 | 25.2 | 20.9 - 30.0 |
| | Lumbini | 905,487 | 5,582 | 75.4 | 29.7 | 26.6 - 33.0 |
| | Karnali | 257,871 | 3,983 | 87.5 | 33.1 | 28.7 - 37.9 |
| | Sudurpashchim | 463,936 | 4,573 | 92.2 | 52.1 | 47.3 - 56.9 |

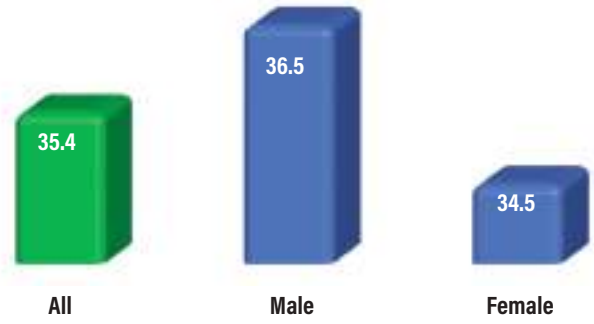



**Figure 6: Effective Cataract Surgery Coverage (%) VA Cutoff 6/12 (WHO)**

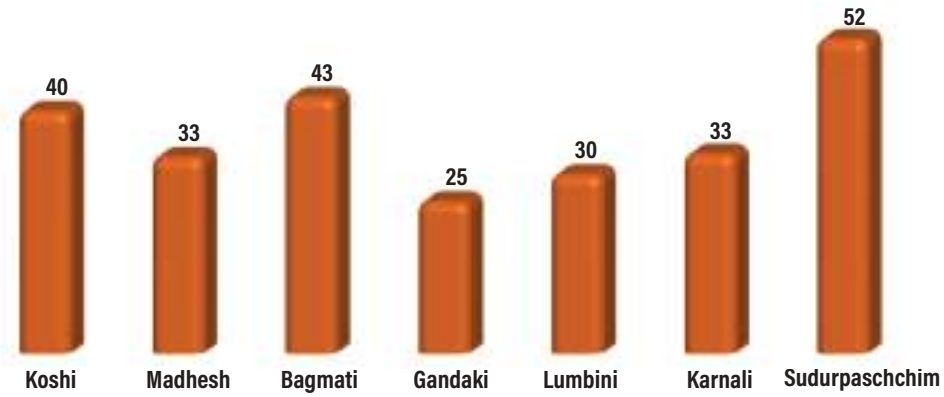



**Figure 7: Province Wise Effective Cataract Surgery (%) Coverage VA Cut off 6/12 (WHO)**

## 3.7 Barriers to Cataract Surgery

Need not felt (33%), cost (30.4%), inability to access treatment (13%), and fear (12.3%) were the main barriers to accessing cataract surgery. Lack of accompanying person (5.6%), lack of awareness (2.5%) and treatment denied (3.3%) were other barriers. Fear and lack of accompanying persons were slightly more common in females as compared to males. One of the causes of treatment denied by the provider was that blood sugar or blood pressure was not controlled. Unable to pay was never the cause as all the eye care providers had a facility to get a surgery done free of cost. But the cost of transportation, investigation, follow-up and loss of wages for the patient and caregiver was an issue. Cannot access treatment was due to geography and in persons who were without family support, disabled or homeless. Many senior citizens could get by even with <6/60 vision and hence did not feel the need for cataract surgery (Table 8, Figure 8).

### Table 8: Prominent Barriers to Cataract Surgery Among 50 Years and Older Population

| Barriers | Male | | Female | |
|---|---|---|---|---|
| | n | % | n | % |
| Need not felt | 92 | 33.9 | 145 | 32.4 |
| Fear | 28 | 10.3 | 60 | 13.4 |
| Cost | 87 | 32.1 | 131 | 29.3 |
| Treatment denied by provider | 6 | 2.2 | 18 | 4.0 |
| Unaware treatment is possible | 9 | 3.3 | 9 | 2.0 |
| Cannot access treatment | 36 | 13.3 | 57 | 12.8 |
| Lack of accompanying person | 13 | 4.8 | 27 | 6.0 |

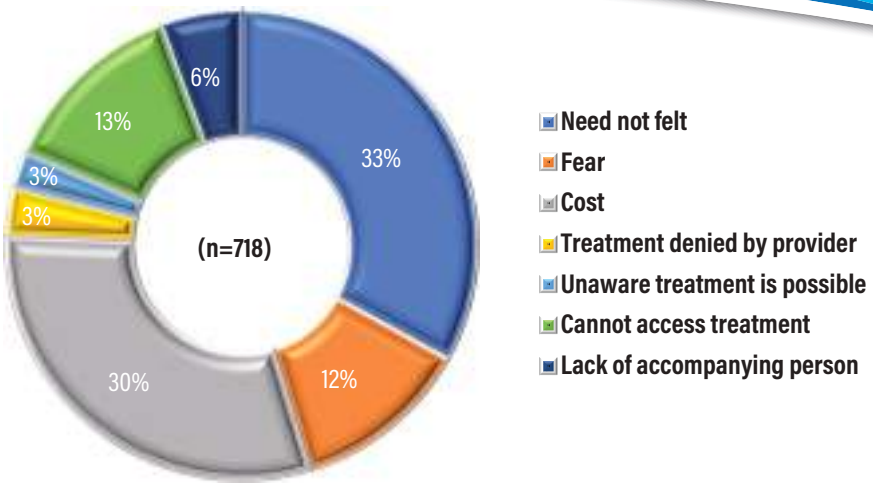



**Figure 8: Prominent Barriers of Cataract Surgery Among 50 Years and Older Population**

## 3.8 Barriers as Perceived by Cataract Blind 50 and Older Population by Province

The barriers perceived by the cataract blind 50 and older population were found to be varied by province. In the Koshi Province, high costs and local reasons were the main barriers. In the Madhesh Province, fear of surgery, low visual needs, and high cost of cataract surgery were the main barriers. In the Bagmati Province, high cost and fear of surgery were the main contributors to barriers. Low visual needs were the only significant barrier to cataract surgery in the Gandaki Province. Lumbini Province, with the highest number of cataract blind participants, showed high cost and low visual needs as the main deterrent for cataract surgery. The participants of Karnali Provinces expressed that a lack of easy access to cataract surgery and the high cost of services are leading barriers. In Sudurpashchim, nearly half of the cataract-blind participants faced high costs as the main barrier (Table 9).

**Table 9: Barriers as Perceived by Cataract Blind 50 and Older Population by Province**

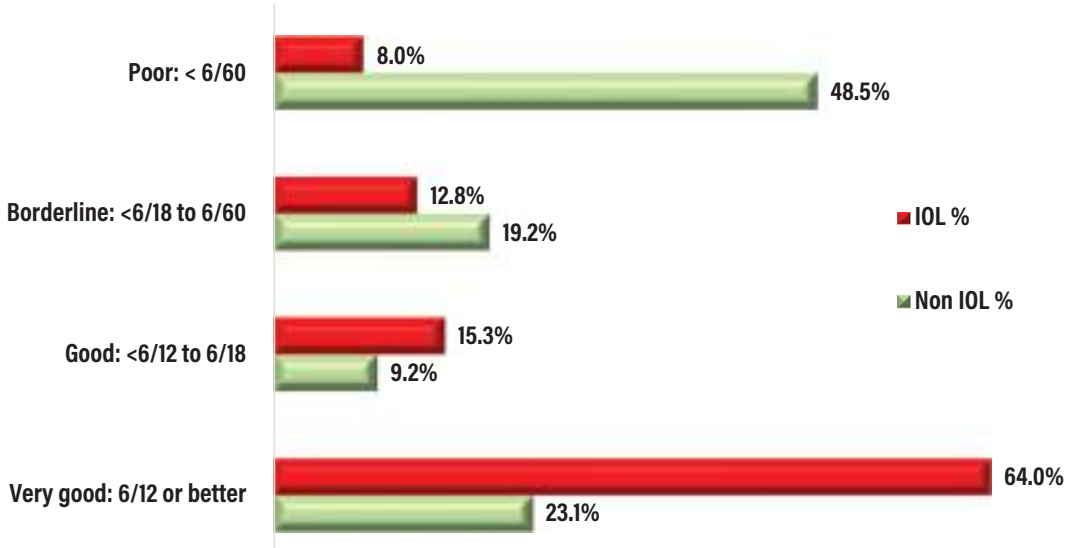
| | Koshi (N = 56) | Madhesh (N = 169) | Bagmati (N = 61) | Gandaki (N = 62) | Lumbini (N = 234) | Karnali (N = 63) | Sudurpashchim (N = 56) |
|---|---|---|---|---|---|---|---|
| No need felt | 21.9 | 49.7 | 16.4 | 27.4 | 41.0 | 6.3 | 17.9 |
| Fear | 9.6 | 24.3 | 27.9 | 8.1 | 2.6 | 1.6 | 19.6 |
| Cost | 28.8 | 21.9 | 21.3 | 14.5 | 35.9 | 39.7 | 51.8 |
| Treatment denied | 2.7 | 4.1 | 8.2 | 11.3 | 0.0 | 3.2 | 1.8 |
| Unaware of treatment possible | 4.1 | 0.0 | 6.6 | 8.1 | 0.9 | 1.6 | 5.4 |
| Cannot access treatment | 9.6 | 0.0 | 9.8 | 12.9 | 19.7 | 38.1 | 3.6 |
| Local reasons | 23.3 | 0.0 | 9.8 | 17.7 | 0.0 | 9.5 | 0.0 |
| Total | 100% | 100% | 100% | 100% | 100% | 100% | 100% |

## 3.9 Visual Outcome of Cataract Surgery (National Weightage)

In the non-IOL group, 23.1% of patients achieved very good vision (6/12 or better), while in the IOL group, 64.0% of patients reached this level, leading to an overall 63.2% achieving very good vision. For good vision (<6/12 to 6/18), 9.2% of non-IOL patients and 15.3% of IOL patients attained this outcome, with a combined total of 15.1%. In the borderline category (<6/18 to 6/60), 19.2% of non-IOL patients and 12.8% of IOL patients fell within this range, totaling 12.9%. The poor outcome category (<6/60) was most common among non-IOL patients, with 48.5%, compared to just 8.0% in the IOL group, resulting in an overall 8.7%. These results indicate significantly better visual outcomes for patients who received IOLs (Table 10, Figure 9).

## Table 10: VA in Operated Eyes in Sample with Available Correction (PVA)

| Visual Outcome | Non-IOL | | IOL | | Total | |
|---|---|---|---|---|---|---|
| | N | % | N | % | n | % |
| Very good: 6/12 or better | 30 | 23.1% | 4,325 | 64.0% | 4,355 | 63.2% |
| Good: <6/12 to 6/18 | 12 | 9.2% | 1,032 | 15.3% | 1,044 | 15.1% |
| Borderline: <6/18 to 6/60 | 25 | 19.2% | 865 | 12.8% | 890 | 12.9% |
| Poor: < 6/60 | 63 | 48.5% | 540 | 8.0% | 603 | 8.7% |
| Total | 130 | 100.0% | 6,762 | 100.0% | 6,892 | 100.0% |




## Figure 9: VA in Operated Eyes in Sample with Available Correction (PVA)

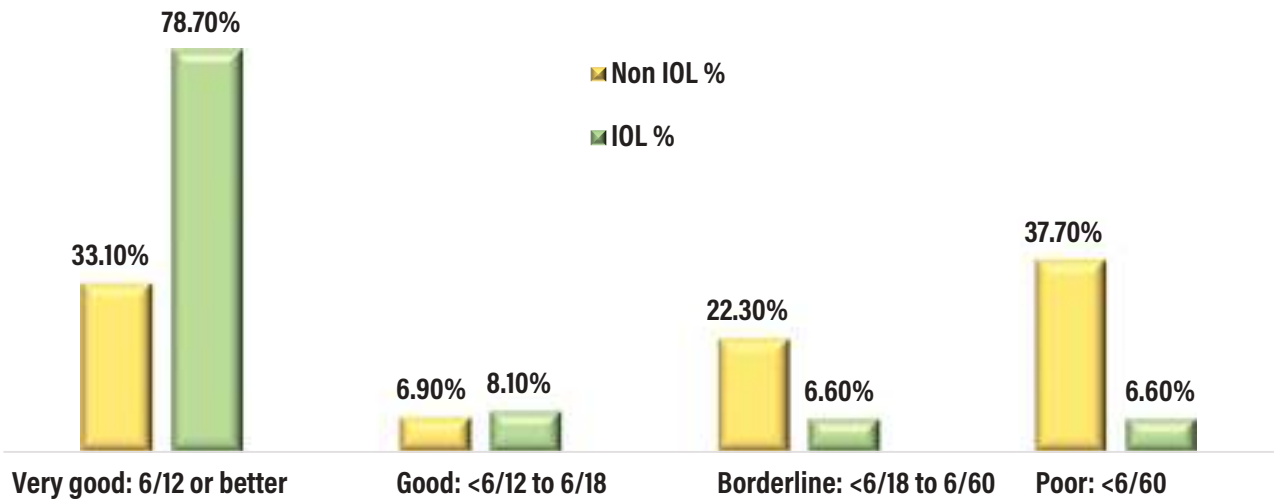
## 3.10 VA in Operated Eyes in Sample with Best Correction (BCVA)

In the non-IOL group, 33.1% of patients achieved very good vision (6/12 or better), whereas in the IOL group, 78.7% reached this level, showing a significant advantage for those with IOLs. For good vision (<6/12 to 6/18), 6.9% of non-IOL patients and 8.1% of IOL patients fell into this category, with an overall total of 8.1%. In the borderline outcome category (<6/18 to 6/60), 22.3% of non-IOL patients and 6.6% of IOL patients

had borderline vision, highlighting better outcomes for those with IOLs. Lastly, poor outcomes (<6/60) were much higher in the non-IOL group (37.7%) compared to only 6.6% in the IOL group, reflecting the greater likelihood of worse vision for patients without IOLs. Overall, 77.8% of patients with IOLs achieved very good vision, underscoring the superior visual outcomes in patients who received IOLs after cataract surgery (Table 11, Figure 10).

## Table 11: VA in Operated Eyes in Sample with Best Correction (BCVA)

| Visual Outcome | Non-IOL | | IOL | | Total | |
|---|---|---|---|---|---|---|
| | N | % | N | % | n | % |
| Very good: 6/12 or better | 43 | 33.1% | 5,320 | 78.7% | 5,363 | 77.8% |
| Good: <6/12 to 6/18 | 9 | 6.9% | 549 | 8.1% | 558 | 8.1% |
| Borderline: <6/18 to 6/60 | 29 | 22.3% | 445 | 6.6% | 474 | 6.9% |
| Poor: <6/60 | 49 | 37.7% | 448 | 6.6% | 497 | 7.2% |
| Total | 130 | 100.0% | 6,762 | 100.0% | 6,892 | 100.0% |




## Figure 10: VA in Operated Eyes in Sample with Best Correction (BCVA)

## 3.11 Causes of Poor Visual Outcome of Cataract Surgery

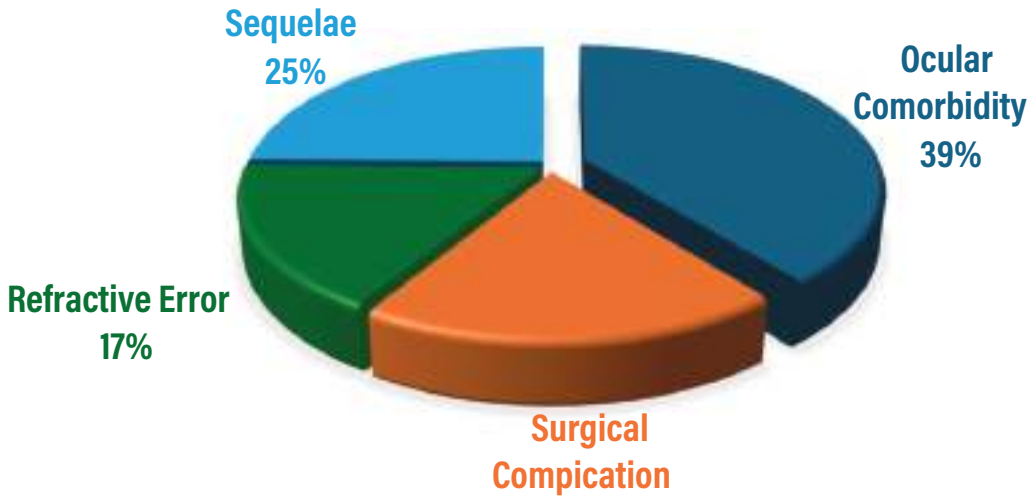
Among the 6,892 patients, 63.2% achieved very good vision (6/12), with no major complications. For those with good vision (6/18), 15.1%, the need for spectacles was the most common factor (75.1%). Borderline outcomes (12.9%, seeing 6/60) were mainly due to surgical issues (52.2%) and post-surgical complications (49.6%). Poor outcomes (8.7%, seeing worse than 6/60) were largely linked to patient selection and surgical factors (Table 12, Figure 11).

## Table 12: Causes of Poor Visual Outcome of Cataract Surgery

| Visual Outcome | Ocular Comorbidity | | Surgical Complications | | Refractive Error | | Sequelae | | Can see 6/12 | | Total | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | N | % | N | % | N | % | N | % | N | % | n | % |
| Very good: can see >6/12 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 4,355 | 100.0 | 4,355 | 63.2 |
| Good: can see 6/18 | 67 | 10.2 | 70 | 19.4 | 744 | 75.1 | 163 | 30.6 | 0 | 0.0 | 1,044 | 15.1 |
| Borderline: can see 6/60-6/24 | 220 | 33.6 | 188 | 52.2 | 218 | 22.0 | 264 | 49.6 | 0 | 0.0 | 890 | 12.9 |
| Poor: cannot see 6/60 | 367 | 56.1 | 102 | 28.3 | 29 | 2.9 | 105 | 19.7 | 0 | 0.0 | 603 | 8.7 |
| Total | 654 | 100.0 | 360 | 100.0 | 991 | 100.0 | 532 | 100.0 | 4,355 | 100.0 | 6,892 | 100.0 |

## (Reduced table for cause of borderline and poor VA only)

| Visual Outcome | Ocular Comorbidity | | Surgical Complication | | Refractive Error | | Sequelae | | Total | |
|---|---|---|---|---|---|---|---|---|---|---|
| | N | % | N | % | N | % | N | % | n | % |
| Borderline: PVA >6/18 - 6/60 | 220 | 24.7 | 188 | 21.1 | 218 | 24.5 | 264 | 29.7 | 890 | 100 |
| Poor: PVA< 6/60 | 367 | 60.9 | 102 | 16.9 | 29 | 4.8 | 105 | 17.4 | 603 | 100 |
| Total | 587 | | 290 | | 247 | | 369 | | 1493 | |




## Figure 11: Causes of Poor Visual Outcome of Cataract Surgery

## 3.12 Proportion of Cataract Surgery Performed According to Places

Most patients were operated upon in charitable eye hospitals (62.9%), most affiliated to the NNJS, whilst others received surgery in eye camps (25.4%), private eye hospitals (8.0%), and government hospitals (3.7%). More than 26.0% of females underwent surgery in the eye camps which is higher than males (24.6%) (Table 13).

## Table 13: Proportion of Cataract Surgery Performed According to Places

| Places of Surgery | Male | | Female | | Total | |
|---|---|---|---|---|---|---|
| | n | % | n | % | N | % |
| Government Hospital | 126 | 4.1 | 130 | 3.3 | 256 | 3.7 |
| Voluntary/Charitable Hospital | 1914 | 63.0 | 2441 | 62.9 | 4355 | 62.9 |
| Private Hospital | 253 | 8.3 | 301 | 7.8 | 554 | 8.0 |
| Eye Camp | 747 | 24.6 | 1011 | 26.0 | 1758 | 25.4 |
| Total | 3040 | 100.0 | 3883 | 100.0 | 6923 | 100.0 |

## 3.13 Post-Operative Visual Acuity of Cataract Operated Eyes by Length of Time Since Surgery

Findings showed that the eyes operated on more than seven years ago had a lower proportion of good outcomes than those operated on more recently (Table 14). This may be due to other co-morbidities that developed post-operatively, posterior capsular opacification or unaddressed changes in refractive error. The relative contributions of such factors to borderline and poor outcomes are already described in Table 12 of this report.

## Table 14: Post-Operative Visual Acuity of Cataract Operated Eyes by Length of Time Since Surgery

| Visual Outcome in Cataract Operated Eyes by years after surgery (n= 6820) | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Category PVA | 0-3 years | | 4-6 years | | 7+ years | | Total | |
| | N | % | n | % | n | % | N | % |
| Very Good ≥6/12 | 1926 | 69.2 | 1136 | 61.9 | 1221 | 55.5 | 4283 | 62.8 |
| Good: ≥6/18 | 407 | 14.6 | 298 | 16.2 | 339 | 15.4 | 1044 | 15.3 |
| Borderline :<6/18 - 6/60 | 270 | 9.7 | 251 | 13.7 | 369 | 16.8 | 890 | 13.0 |
| Poor: < 6/60 | 181 | 6.5 | 151 | 8.2 | 271 | 12.3 | 603 | 8.8 |
| Total | 2784 | 100.0 | 1836 | 100.0 | 2200 | 100.0 | 6820 | 100.0 |

# CHAPTER IV: CONCLUSION AND RECOMMENDATION

## 4.1 Conclusion

The prevalence of blindness is notably higher among women than men, with remarkable variation across the provinces. The Lumbini and Madhesh Provinces, located in the Terai region, exhibit the highest prevalence of blindness. Cataract remains the leading cause of blindness, SVI, and MVI, while refractive error is attributed to the mild vision impairment category.

Blindness and vision impairment continue to remain public health challenges for individuals aged 50 years and older across all provinces of Nepal. Despite provincial differences in CSC and outcomes, cataract persists as the predominant cause of blindness in all seven provinces. Additional significant contributors to the overall burden of visual impairment include posterior segment diseases, such as ARMD and glaucoma, as well as uncorrected refractive errors, diabetic retinopathy, and functional low vision.

The visual outcome of cataract surgeries across all provinces either meet or fall short of WHO standards, underscoring a critical need for quality enhancement. The backlog of vision-impairing cataracts is substantial, exacerbated by barriers including lack of perceived need, fear of surgical intervention, financial constraints, and limited accessibility. These barriers disproportionately affect women and other underserved populations, reducing the uptake of cataract surgery.

The findings of this survey underscore the need for comprehensive and coordinated interventions to address the preventable burden of blindness and visual impairment. The results provided by this survey serve as crucial evidence for informing policy and guiding the strategic allocation of resources. It is imperative to inform policymakers of the ongoing challenges in eye care and to scale up services to address these needs. These actions are essential for achieving UHC in Nepal, thereby alleviating the unnecessary burden of preventable blindness and visual impairment across all provinces.

In the federal government system in Nepal, the responsibility for health administration and planning is devolved to the provincial level. Historically, vision impairment in Nepal is yet to be equally distributed across geographic regions. In a 2011 survey, people aged 50 and older in three ecological region (Mountain, Hill and Terai/Plains) found that the prevalence of vision impairment was higher in the plain region than in the hills or mountains region. (4) Similarly, this study also found that Lumbini and Madesh Provinces had a higher prevalence of blindness and any vision impairment compared to the hilly provinces.

Cataract was the leading cause of blindness (65%), severe vision impairment (84%) and moderate vision impairment (67%). Cataract surgical complications caused 2% of blindness and 5% of moderate vision impairment; however, population-based surveys reflect the outcomes of surgery done by multiple providers over many years, therefore it is also important to routinely monitor current outcomes through facility level data to promote effective and safe surgery. A separate publication reporting effective cataract surgical coverage and surgical outcomes from this survey series is in preparation. Non-trachomatous corneal opacity (6% of bilateral blindness) was a significant issue in a populace where ocular trauma and corneal infection are common. (5) Investment in prevention and early referral strategies, as well as eye banking, is needed to address corneal blindness, particularly when the additional magnitude of unilateral corneal opacification is considered.

## 4.2 Recommendations

Based on the findings across all seven provinces, the following recommendations are proposed to address the significant burden of avoidable blindness and vision impairment:

1. Enhance the quality of cataract surgery for better visual outcome
2. Increase cataract surgical coverage and service uptake
3. Expand sub-specialty services for posterior segment diseases
4. Improve accessibility of low vision and vision rehabilitation services
5. Strengthen primary eye care and awareness campaign with focus on prevention
6. Improve eye health governance, monitoring and quality assurance mechanism in eyes health

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# Appendix I: Information And Consent Form

नेपाल नेत्रज्योति संघ
त्रिपुरेश्वर, काठमाडौं
**"Rapid Assessment of Avoidable Blindness** सम्बन्धि सर्वेक्षण २०१९"
प्रदेश नं. २
सुसुचित मञ्जुरीनामा पत्र

आदरणीय सहभागी.....

पृष्ठभूमी र उद्धेश्य

नेपाल नेत्रज्योति संघ, नेपालमा आँखा स्वास्थ्य सेवाको क्षेत्रमा कामगर्ने एउटा मुनाफा रहित गैर सरकारी स्वास्थ्य संस्था हो । यस संस्थाले आफ्नो १८ वटा आँखा अस्पताल तथा ८६ वटा आँखा उपचार केन्द्रको सञ्जालमार्फत नेपालमा आँखा सम्बन्धी जनचेतना एवम् सूचनाप्रवाह तथा देशमा कुल आँखा स्वास्थ्य सेवाको ९०% सेवाजनमानसमा पुऱ्याउँदै आइरहेको छ । यस वर्ष संघले आफ्नो मातहतका यसै प्रदेशमा सेवारत आँखा अस्पतालहरुको आन्तरिक बजेटबाट नेपालको प्रदेश नं २ मा "Rapid Assessment of Avoidable Blindness सम्बन्धि सर्वेक्षण २०१९" सञ्चालन गरिरहेको छ । नेपालको प्रदेश नं २ मा अन्धोपन तथा आँखा सम्बन्धि समस्याहरुको अवस्था एवं समस्याका मुख्य कारणहरु पत्ता लगाउनु यस सर्वेक्षण कार्यको प्रमुख उद्धेश्य हो । यस सर्वेक्षण कार्यको लागि नेपाल स्वास्थ्य अनुसन्धान परिषद, ERB बाट स्वीकृतिप्राप्त भएको छ । यो सर्वेक्षण नेपाल नेत्रज्याति संघ अर्न्तगतका यसै प्रदेशमा सेवारत आँखा अस्पतालका तालिमप्राप्त नेत्र चिकित्सक, नेत्र सहायक एवं नेत्र स्वास्थ्य कार्यकर्ता/तथ्याङ्क संकलकद्धारा सञ्चालन गरिनेछ ।

सहभागीको भूमिका

यस अध्ययनमा तपाईंलाई सोधिएको प्रश्नको जवाफ निर्धक्क भई इमान्दारीका साथ यस सर्वेक्षण कार्यमा सहभागी हुनुहुन अनुरोध छ ।

फाइदा र जोखिम

यस सर्वेक्षणमा तपाईंले दिनुभएको प्रतिक्रिया एवं सहभागिताले आँखा स्वास्थ्य सेवा संचालन तथा यस सम्बन्धि सेवा सम्पूर्ण आँखा अस्पतालहरुमा विस्तार गर्न, आँखा स्वास्थ्य सेवाको प्रभावकारिता बढाउन, समयानुकुल रणनीति तयार गर्न सहयोग पुग्नेछ । यस सर्वेक्षणमा सहभागी भएकोमा तपाईलाई कुनैपनि किसिमको जोखिम नहुने साथै कुनैपनि किसिमको प्रत्यक्षलाभ (नगद तथा जिन्सी समान प्रदान नगरिने) नहुने कुरामा विश्वास दिलाउन चाहन्छु । तर यदी तपाईको आँखामा कुनैपनि किसिमको समस्या देखिएको खण्डमा तपाईलाई निशुल्क उपचारको लागी सम्बन्धित अस्प( तालमा तुरुन्त रिफर गरिने छ ।

गोपनीयता

तपाईले दिएका तथ्याङकहरु गोप्यताका साथ वा राष्ट्रिय महत्वको अन्य अनुसन्धानमा प्रयोग गरिनेछ । तपाईको नाम, ठेगाना तथा अन्य व्यक्तिगत विवरणहरु कुनै पनि प्रतिवेदन वा संचार माध्यममा उल्लेख नगरी परिचयात्मक कोडको मात्र प्रयोग गरिनेछ ।

सहभागिता

यस सर्वेक्षणमा तपाईको सहभागिता स्वेच्छिक हुनेछ । करिब २० मिनेटको यस अन्तरवार्ता एवं सामान्य आँखा जाँच तथा दृष्टि परिक्षणमा ५० वा सो भन्दा माथिको आमा बुवाहरुलाई मात्र सहभागी गराइने छ । तपाईले सम्पूर्ण प्रश्नहरुको उत्तर दिनुका साथै आँखा जाँच कार्यमा सहकार्य गर्नु हुनेछ भन्ने अपेक्षा गर्दछौं । तर तपाईले चाहेको खण्डमा यहाँलाई चित्त नबुझेका प्रश्नको जवाफ नदिनु वा कुनैपनि बेला यस सर्भेक्षणबाट अलग्गिन सक्नुहुनेछ । यसरी अलग्गिनु भयो भने पनि तपाईलाई कुनै हानी नोक्सानी हुनेछैन, तपाईले कुनै हर्जाना पनि तिर्नुपर्ने छैन । तपाईलाई यस सवे ंक्षणको बारेमा कुनैपनि कुराको जिज्ञासा भएमा जुनसुकै बेलामा पनि सर्वेक्षण टोलीलाई सम्पर्क राख्न सक्नुहुनेछ । अनुसन्धानको सम्बन्धमा थप जानकारीका लागि नेपाल नेत्रज्योति संघ, त्रिपुरेश्वर काठमाडौ, टेलिफोन नं ०१-४२६१९२१ मा सम्पर्क राख्न सक्नुहुनेछ ।

.....

सुसूचित मञ्जुरीनामा पत्र  सहभागीको परिचय कोड:

हामीले तपाईलाई यस सर्वेक्षणको उद्धेश्य र आधार, अन्तवार्ता प्रक्रिया, यहाँको भूमिका, सम्भावित जोखिम र फाईदा तथा गोपनीयताका बारेमा पूर्ण जानकारी दिएका छौं । तपाई आफ्नो स्वेच्छाले कुनै पनि बेला यो सर्वेक्षण कार्यबाट अलग हुन सक्ने कुराको वारेमा पनि जानकारी गराएका छौं ।

के तपाई यस सर्वेक्षण कार्यमा सहभागी हुन तयार हुनुहुन्छ ?

तयार छु, सहभागीको हस्ताक्षर.....  अन्तरर्वाता लिनेको हस्ताक्षर.....

तयार छैन, मिति :.....  मिति : .....

# Appendix II: Data Collection Tools

## RAPID ASSESSMENT FOR AVOIDABLE BLINDNESS

**A. GENERAL INFORMATION**

Survey area: _____ Cluster: ☐☐☐ Year - month: ☐☐☐☐ - ☐☐

Name: _____ Sex: Male: O (1) Female: O (2) Individual no.: ☐☐ Age (years): ☐☐

Optional 1: ☐☐ Optional 2: ☐☐

**Examination status:**

Examined: O (1) (go to B) Refused: O (3) (go to E)

Not available: O (2) (go to E) Not able to communicate: O (4) (go to E)

*Always ask: "Did you ever have any problems with your eyes?"* Yes: O (1) No: O (2)

*If not available - details (availability / tel number / address)*

**B. VISION**

**Uses distance glasses:** No: O (1) Yes: O (2)

**Uses reading glasses:** No: O (1) Yes: O (2)

| Presenting vision | Right eye | Left eye |
|---|---|---|
| Can see 6/12 | O (1) | O (1) |
| Cannot see 6/12 but can see 6/18 | O (2) | O (2) |
| Cannot see 6/18 but can see 6/60 | O (3) | O (3) |
| Cannot see 6/60 but can see 3/60 | O (4) | O (4) |
| Cannot see 3/60 but can see 1/60 | O (5) | O (5) |
| Light perception (PL+) | O (6) | O (6) |
| No light perception (PL-) | O (7) | O (7) |

| Pinhole vision | Right eye | Left eye |
|---|---|---|
| Can see 6/12 | O (1) | O (1) |
| Cannot see 6/12 but can see 6/18 | O (2) | O (2) |
| Cannot see 6/18 but can see 6/60 | O (3) | O (3) |
| Cannot see 6/60 but can see 3/60 | O (4) | O (4) |
| Cannot see 3/60 but can see 1/60 | O (5) | O (5) |
| Light perception (PL+) | O (6) | O (6) |
| No light perception (PL-) | O (7) | O (7) |

**C. LENS EXAMINATION**

| | Right eye | Left eye |
|---|---|---|
| Normal lens / minimal lens opacity: | O (1) | O (1) |
| Obvious lens opacity: | O (2) | O (2) |
| Lens absent (aphakia): | O (3) | O (3) |
| Pseudophakia without PCO: | O (4) | O (4) |
| Pseudophakia with PCO: | O (5) | O (5) |
| No view of lens: | O (6) | O (6) |

**D. MAIN CAUSE OF PRESENTING VA<6/12**

*(Mark only one cause for each eye)*

| | Right eye | Left eye | Principal cause in person |
|---|---|---|---|
| Refractive error: | O (1) | O (1) | O (1) |
| Aphakia, uncorrected: | O (2) | O (2) | O (2) |
| Cataract, untreated: | O (3) | O (3) | O (3) (F) |
| Cataract surg. complications: | O (4) | O (4) | O (4) |
| Trachoma corneal opacity: | O (5) | O (5) | O (5) |
| Other corneal opacity: | O (6) | O (6) | O (6) |
| Phthisis: | O (7) | O (7) | O (7) |
| Onchocerciasis: | O (8) | O (8) | O (8) |
| Glaucoma: | O (9) | O (9) | O (9) |
| Diabetic retinopathy: | O (10) | O (10) | O (10) |
| ARMD: | O (11) | O (11) | O (11) |
| Other posterior segment: | O (12) | O (12) | O (12) |
| All globe/CNS abnormalities: | O (13) | O (13) | O (13) |
| Not examined: can see 6/12 | O (14) | O (14) | O (14) |

**E. HISTORY, IF NOT EXAMINED**

*(From relative or neighbour)*

| Believed | Right eye | Left eye |
|---|---|---|
| Not blind | O (1) | O (1) |
| Blind due to cataract | O (2) | O (2) |
| Blind due to other causes | O (3) | O (3) |
| Operated for cataract | O (4) | O (4) |

**F. WHY CATARACT SURGERY WAS NOT DONE**

*(Mark up to 2 responses, if VA<6/18, not improving with pinhole, with visually impairing lens opacity in one or both eyes)*

| | |
|---|---|
| Need not felt | O (1) |
| Fear of surgery or poor result | O (2) |
| Cannot afford operation | O (3) |
| Treatment denied by provider | O (4) |
| Unaware that treatment is possible | O (5) |
| No access to treatment | O (6) |
| Local reason (optional) | O (7) |

**G. DETAILS ABOUT CATARACT OPERATION**

| | Right eye | Left eye |
|---|---|---|
| **Age at operation (years)** | ☐☐ | ☐☐ |
| **Place of operation** | | |
| Government hospital | O (1) | O (1) |
| Voluntary / charitable hospital | O (2) | O (2) |
| Private hospital | O (3) | O (3) |
| Eye camp / improvised setting | O (4) | O (4) |
| Traditional setting | O (5) | O (5) |
| **Type of surgery** | | |
| Non IOL | O (1) | O (1) |
| IOL implant | O (2) | O (2) |
| Couching | O (3) | O (3) |
| **Cost of surgery** | | |
| Totally free | O (1) | O (1) |
| Partially free | O (2) | O (2) |
| Fully paid | O (3) | O (3) |
| **Cause of VA<6/12 after cataract surgery** | | |
| Ocular comorbidity (Selection) | O (1) | O (1) |
| Operative complications (Surgery) | O (2) | O (2) |
| Refractive error (Spectacles) | O (3) | O (3) |
| Longterm complications (Sequelae) | O (4) | O (4) |
| Does not apply - can see 6/12 | O (5) | O (5) |

## DIABETES AND DIABETIC RETINOPATHY

**H. Diabetes Assessment** (complete for everyone)

1 Have you ever been told by a doctor or nurse that you have diabetes, sugar in your urine or high blood sugar? No O (1) Yes O (2)

2 Action: Measure blood sugar ☐☐☐☐ mg/dl 3 Refused blood test O

**I. Questions for known diabetics** (i.e. said 'YES' to question H1)

4 What age were you when you were told you had diabetes? ☐☐ Years

5 Are you currently receiving treatment for diabetes? No / Yes
- If 'Yes', what type of treatment do you receive?

No treatment O (1)
Diet only O (2)
Tablets O (3)
Insulin O (4)
Tablets and insulin O (5)
Other O (6)

6 Before today, have you ever had your eyes examined because of your diabetes e.g. drops were put in your eyes before the examination or a photograph was taken of the back of your eye? No / Yes
- If 'Yes', when was the last time you had your eyes examined because of your diabetes?

Not examined O (1)
0-12 months ago O (2)
13-24 months ago O (3)
>24 months ago O (4)

**J. Diabetic retinopathy assessment** Complete if known diabetic ('YES' to H1) or if blood sugar ≥200mg/dl

7 Examination method:
dilatation and fundoscopy O (1)
fundus camera O (2)
refused dilatation and/or fundus photograph O (3)

| 8 Retinopathy | Right Eye | Left Eye |
|---|---|---|
| R0 (No visible retinopathy) | O (1) | O (1) |
| R1 (mild)* | O (2) | O (2) |
| R2 (observable background)* | O (3) | O (3) |
| R3 (referable)* | O (4) | O (4) |
| R4 (proliferative)* | O (5) | O (5) |
| R6 (Not adequately visualized)* | O (6) | O (6) |
| Reason not adequately visualised? | ---------- | ---------- |
| | ---------- | ---------- |

| 9 Maculopathy | | |
|---|---|---|
| M0 (No maculopathy) | O (1) | O (1) |
| M1 (Observable)* | O (2) | O (2) |
| M2 (Referable)* | O (3) | O (3) |
| M6 (Not adequately visualized)* | O (4) | O (4) |

| 10 Laser photocoagulation scars | | |
|---|---|---|
| Laser scars absent | O (1) | O (1) |
| Scars present – pan retinal laser | O (2) | O (2) |
| Scars present – macular laser | O (3) | O (3) |
| Scars present – pan retinal and macular laser | O (4) | O (4) |
| Not adequately visualized* | O (5) | O (5) |

*Refer if newly diagnosed/uncontrolled diabetes. Refer if any signs of retinopathy or if not visualized (R1-6/M1-M6)

# Appendix III: Survey Team

| S. N | Name | Role in Survey | Designation/Institution |
|---|---|---|---|
| 1 | Mr. YD Sapkota | Certified RAAB survey trainer | Head of the Region-South East Asia, IAPB |
| 2 | Mr. Hans Limburg | Certified RAAB survey trainer | London School of Hygiene and Tropical Medicine |
| 3 | Ian McComick | Certified RAAB survey trainer | London School of Hygiene and Tropical Medicine |
| 4 | Dr. Sailesh Kumar Mishra | RAAB survey lead | Executive Director, Nepal Netra Jyoti Sangh |
| 5 | Mr. Ranjan Shah | National RAAB survey coordinator | Program Manager, Nepal Netra Jyoti Sangh |

| **Koshi Province** | | | |
|---|---|---|---|
| S. N | Name | Designation | Hospital |
| 1 | Dr. Tejsu Singh Malla | Ophthalmologist | NNJS/Sagarmatha Choudhary Eye Hospital, Lahan |
| 2 | Mr. Harihar Shrestha | Ophthalmic Assistant | |
| 3 | Mr. Jogindra Pd. Mahato | Account Assistant | |
| 4 | Mr. Shrawan Chaudhary | Eye Health Worker | |
| 5 | Dr. Nisha Manandhar | Ophthalmologist | Mechi Eye Hospital, Jhapa |
| 6 | Dr. Pranav Shrestha | Ophthalmologist | |
| 7 | Mr. Mohan Adhikari | MRD In-Charge | |
| 8 | Md. Adil Khan | Ophthalmic Assistant | |
| 9 | Ms. Binita Adhikari | Ophthalmic Assistant | |
| 10 | Mr. Mohan Ghimire | Admin Assistant | |
| 11 | Dr. Vishal Kumar Choudhary | Ophthalmologist | NNJS/Biratnagar Eye Hospital, Biratnagar |
| 12 | Dr. Girish Sharma | Ophthalmologist | |
| 13 | Dr. Vivek Jha | Ophthalmologist | |
| 14 | Dr. Pradhan Badugu | Ophthalmologist | |
| 15 | Mr. Rajiv Ranjan Karna | Research Officer | |
| 16 | Mr. Rukesh Kumar | Ophthalmic Assistant | |
| 17 | Ms. Sharmila Chaudhary | Ophthalmic Assistant | |
| 18 | Mr. Dipal Subedi | Ophthalmic Assistant | |
| 19 | Mr. Manish Khawas | Eye Health Worker | |
| 20 | Mr. Shrawan Kumar Majhi | Eye Health Worker | |
| **Madhesh Province** | | | |
| 1 | Dr. Tejsu Singh Malla | Ophthalmologist | NNJS/Sagarmatha Choudhary Eye Hospital, Lahan |
| 2 | Dr. Maheshwar Chaudhary | Ophthalmologist | |
| 3 | Dr. Bipin Bista | Ophthalmologist | |
| 4 | Mr. Shravan Kumar Chaudhary | Ophthalmic Assistant | |
| 5 | Mr. Debendra Kumar Singh | Ophthalmic Assistant | |
| 6 | Mr. Shrawan Kumar Chaudhary | Eye Health Worker | |
| 7 | Mr. Rabindra Sah | Eye Health Worker | |
| 8 | Mr. Jogindra Prasad Mahato | Account Assistant | |
| 9 | Mr. Tuladhar Prasad Singh | Vehicle Operator | |
| 10 | Mr. Sushil Kumar Yadav | Vehicle Operator | |
| 11 | Dr. Gaurav Dhungana | Ophthalmologist | NNJS/RM Kedia Eye Hospital, Birganj |
| 12 | Mr. Rasdeo Sah | Ophthalmic Officer | |
| 13 | Mr. Sudarshan Prasad Kafle | Eye Health Worker | |
| 14 | Dr. Prakash Sah | Ophthalmologist | NNJS/Gaur Eye Hospital, Gaur |
| 15 | Mr. Suyogya Balampaki | Ophthalmic Assistant | |
| 16 | Mr. Mukesh Kumar Jha | Eye Health Worker | |
| 17 | Mr. Bhakta Bahadur Pulami | Vehicle Operator | |

| | | | |
|---|---|---|---|
| **Bagmati Province** | | | |
| 1 | Dr. Pushpa Giri Shrestha | Ophthalmologist | NNJS/Bharatpur Eye Hospital, Bharatpur |
| 2 | Ms. Radha Dangol | Ophthalmic Assistant | |
| 3 | Ramesh Ghimire | Outreach Coordinator | |
| 4 | Dr. Rabindra P. Sah | Ophthalmologist | Tilganga Institute of Ophthalmology, Kathmandu |
| 5 | Dr. Anup Raj Joshi | Ophthalmologist | |
| 6 | Dr. Sunil Thakali | Ophthalmologist | |
| 7 | Dr. Bandana Khanal | Ophthalmologist | |
| 8 | Dr. Sebanata Shrestha | Ophthalmologist | |
| 9 | Dr. Bikram Shrestha | Ophthalmologist | |
| 10 | Mr. Sushil Singh | Ophthalmic Assistant | |
| 11 | Mr. Bimal BC | Ophthalmic Assistant | |
| 12 | Mr. Ram Chandra Chaudhary | Ophthalmic Assistant | |
| 13 | Mr. Babi Dahal | Ophthalmic Assistant | |
| 14 | Mr Pradeep Banjara | Field Enumerators | |
| 15 | Mr Keshab Raj joshi | Field Enumerators | |
| 16 | Mr Ashok Pandeya | Field Enumerators | |
| 17 | Ms. Sanjina Joshi | Field Enumerators | |
| 18 | Ms. Sita KC | Field Enumerators | |
| 19 | Mr. Manish Poudel | M&E | |
| 20 | Ms. Radhika Upreti | M&E | |
| 21 | Mr. Pradeep Banjara | M&E | |
| **Gandaki Province** | | | |
| 1 | Dr. Eliya Shrestha | Ophthalmologist | NNJS/ Himalaya Eye Hospital, Pokhara |
| 2 | Dr. Indra Man Maharjan | Ophthalmologist | |
| 3 | Dr. Hari Bikram Adhikari | Ophthalmologist | |
| 4 | Dr. Saroj Nemkul | Ophthalmologist | |
| 5 | Dr. Anju Gurung | Ophthalmologist | |
| 6 | Dr. Krishna Gurung | Ophthalmologist | |
| 7 | Mr. Govinda Nath Yogi | Ophthalmic Officer | |
| 8 | Mr. Bijaya Paudel | Ophthalmic Assistant | |
| 9 | Mr. Subhash Nepal | Ophthalmic Assistant | |
| 10 | Mr. Dharmendra Kumar Ghodasaini | Ophthalmic Assistant | |
| 11 | Mr. Rup Singh Bohara | Ophthalmic Assistant | |
| 12 | Mrs. Sashi Kamala Lamichhane | Ophthalmic Assistant | |
| 13 | Mr. Hari Prasad Aryal | Administration | |
| 14 | Mr. Prem Kumar Nakarmi | Administration | |
| 15 | Ms. Parbati Gurung | Administration | |
| 16 | Ms. Sakuntala Shrestha | Administration | |
| 17 | Mr. Ramesh Bahadur Baniya | Administration | |
| 18 | Mr. Bamdev Subedi | Administration | |
| 19 | Mr. Min Bahadur Gurung | Vehicle Operator | |
| 20 | Mr. Deep Bahadur Malla Thakuri | Vehicle Operator | |
| 21 | All Enumerators | | |

| | | | |
|---|---|---|---|
| **Lumbini Province** | | | |
| 1 | Dr. Anjita Hirachan | Ophthalmologist | NNJS/Lumbini Eye Institute & Research Center, Bhirahawa |
| 2 | Dr. Amrit Banstola | Ophthalmologist | |
| 3 | Dr. Saurav Man Shrestha | Ophthalmologist | |
| 4 | Ms. Saraswati Khadka Thapa | Research Coordinator | |
| 5 | Mr. Sanjeev Adhikari | Outreach Coordinator | |
| 6 | Mr. Sunil Bhusal | Ophthalmic Assistant | |
| 7 | Mr. Bishal Mani Tripathi | Ophthalmic Assistant | |
| 8 | Mr. Mohammad Rafik | Ophthalmic Assistant | |
| 9 | Mr. Ashok Kumar Yadav | Ophthalmic Assistant | |
| 10 | Mr. Ramesh Bajracharya | Vehicle Operator | |
| 11 | Mr. Bishwa Raj Thapa | Vehicle Operator | |
| 12 | Mr. Ramu Bhandari | Vehicle Operator | |
| 13 | Dr. Suresh Rasaily | Ophthalmologist | NNJS/Rapti Eye Hospital, Dang |
| 14 | Mr. Madan Chaudhary | Optometrist | |
| 15 | Mr. Salik Ram Gautam | Ophthalmic Officer | |
| 16 | Mr. Opendra Chand | Ophthalmic Assistant | |
| 17 | Mr. Jeevan Paharai | Eye Health Worker | |
| 18 | Mr. Man Bahadur Oli | Vehicle Operator | |
| 19 | Mr. Chhedu Chaudhary | Vehicle Operator | |
| 20 | Dr. Rajesh Shrestha | Ophthalmologist | NNJS/Fateh Bal Eye Hospital, Nepalgunj |
| 21 | Mr. Umar Ahamad Sadiq | Ophthalmic Officer | |
| 22 | Mr. Anup Raj Sharma Adhikari | IT | |
| 23 | Mr. Badshah Khan | Vehicle Operator | |
| **Karnali Province** | | | |
| 1 | Dr. Shakti Prasad Subedi | Ophthalmologist | NRCS/ Surkhet Eye Hospital, Surkhet |
| 2 | Dr. Manish Khatiwada | Ophthalmologist | |
| 3 | Mr. Ghana Bahadur Thapa | Survey Coordinator | |
| 4 | Mr. Prem Kumar Dixit | Ophthalmic Officer | |
| 5 | Mr. Shanta Kumar Sherpa | Ophthalmic Assistant | |
| 6 | Mr. Dipak Koirala | Eye Health Worker | |
| 7 | Dr. Hari Bikram Adhikari | Ophthalmologist | NNJS/Himalaya Eye Hospital, Pokhara |
| 8 | Mr. Dharmendra Kumar Dhodasaini | Ophthalmic Assistant | |
| 9 | Mr. Om Bahadur Budha | Eye Health Worker | |
| 10 | Dr. Kaushal Kumar Pokhrel | Ophthalmologist | NNJS/Rapti Eye Hospital, Dang |
| 11 | Ms. Manju Bohara | Ophthalmic Assistant | |
| 12 | Mr. Shyam Bhandari | Eye Health Worker | |
| 13 | Dr. Rajesh Shrestha | Ophthalmologist | NNJS/Fateh Bal Eye Hospital, Nepalgunj |
| 14 | Mr. Sunil Tharu | Ophthalmic Assistant | |
| 15 | Mr. Khum Bhandari | Eye Health Worker | |
| 16 | Mr. Brish Bahadur Shahi | Public Health Division Head | Ministry of Social Development, Karnali Province |
| 17 | Mr. Man Bahadur Kunwar | Project Manager | NNJS/IEEC Project, Karnali |
| **Sudurpashchim Province** | | | |
| 1 | Dr. Smadh Adhikari | Ophthalmologist | NNJS/Geta Eye Hospital |
| 2 | Dr. Sunil Thapa | Ophthalmologist | |
| 3 | Dr. Sibant Shrestha | Ophthalmologist | |
| 4 | Mr. Ramesh Chandra Bhatta | Outreach Manager | |
| 5 | Mr. Dev Raj Paneru | Ophthalmic Officer | |
| 6 | Mr. Narendra Bista | Ophthalmic Assistant | |
| 7 | Ms. Sunita Rana | Ophthalmic Assistant | |
| 8 | Mr. Jay Bdr. Bumi | Eye Health Worker | |
| 9 | Mr. Siddha Raj Bista | Eye Health Worker | |
| 10 | Mr. Dan Bdr. Bista | Eye Health Worker | |

# Appendix-IV: Glimpses of Survey


RAAB SURVEY-2018
SURE EVERYWHERE"
seva.org


Nepal Netra Jyoti Sangh
Rapid Assessment of Avoidable Blindness
State No 5
Training of Survey Team
10th-13th July 2018


विराटनगर आँखा अस्पताल


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**Ministry of Health and Population**

Ramshahpath, Kathmandu

Nepal