**Survey Report**


# National Survey on Blindness, Low Vision and Trachoma in Ethiopia


Federal Ministry of Health of Ethiopia
with support from and in collaboration with
a consortium of NGOs (The Carter Center, CBM, ITI, ORBIS Intl.
Ethiopia and LfW),
Ophthalmological Society of Ethiopia,
and
the Ethiopian Public Health Association

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Addis Ababa, Ethiopia
September 2006

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## SUMMARY

Ethiopia is believed to have one of the world's highest rates of blindness and low vision. However recent data were lacking to accurately determine the magnitude of eye problems in the country. The Federal Ministry of Health along with several non-governmental organizations are working in various parts of the country on blindness prevention and control programs focusing mainly on cataract surgery and trachoma control through the SAFE Strategy (surgery, antibiotics, facial cleanliness and environmental improvement). Planning and tracking the progress of these programs were difficult due to lack of appropriate information on the magnitude of the problems. In order to direct national priorities for blindness control programs and to have a baseline data for program monitoring and evaluation it was imperative to conduct a national survey on blindness, low vision and their causes.

The household survey utilized cross sectional design with multistage sampling strategy. All eleven regions of the country were involved in the survey. Sample size and sampling strategies were developed taking into account population size of the regions with appropriate adjustments to obtain regional estimates for low vision, blindness and active trachoma at both national and regional levels. Survey subjects were permanent members of the selected households in each study kebele. Trained ophthalmic nurses and ophthalmologists made eye examination to determine the presence of low vision, blindness and active trachoma. Visual acuity was tested using the LogMar chart. Trachoma grading was done by standardized ophthalmic nurses following the WHO grading system. The causes of low vision and blindness were determined by ophthalmologists. Persons identified with treatable eye problems in the field were treated by the survey team and those requiring further treatment were referred to the nearest eye care center.

A total of 174 clusters, 6056 households and 30022 individuals were involved in the survey. Based on the presenting visual acuity the national prevalence of blindness is 1.6% (1.1% for urban and 1.6% for rural populations) and that of low vision is 3.7% (2.6% for urban and 3.8% for rural populations). Blindness and Low vision are more prevalent among females:

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1.9% versus 1.2% for blindness, and 4.1% versus 3.1% for low vision. Prevalence of Childhood blindness is 0.1% and accounts for over 6% of the total blindness burden in Ethiopia. The major causes of blindness are cataract (49.9%), trachomatous corneal opacity (11.5%), refractive error (7.8%), other corneal opacity (7.8%), glaucoma (5.2%) and macular degeneration (4.8%). The major causes of low vision are cataract (42.3%), refractive error (33.4%), trachomatous corneal opacity (7.7%), other corneal opacity (5.9%) and macular degeneration (4.6%). The national prevalence of active trachoma (either TF or TI) for children in the age group 1-9 year is 40.1%. Considerable regional variations are observed in the active trachoma prevalence across regional states with the highest prevalence in Amhara (62.6%), Oromia (41.3%), SNNP (33.2%), Tigray (26.5%), Somali (22.6%) and Gambella (19.1%). The rural prevalence of active trachoma is almost fourfold compared to the urban (42.5% rural Vs 10.7% urban). The national prevalence of Trachomatous trichiasis (TT) is 3.1% with the highest prevalence in Amhara regional state (5.2%). Trachomatous trichiasis is highest in females compared to males (4.1% Vs 1.6%). The prevalence of vitamin A deficiency syndrome among the under five children is as follows: 0.1% night blindness, 0.9% conjuctival xerosis, and 0.7% Bitot's spots. Vitamin A deficiency is an important cause of blindness among children. Had serum retinol been done it would have revealed an alarming situation. Some of the corneal opacities are probably related to VAD and they are more relevant than conjuctival xerosis.

Based on the current estimated population size of Ethiopia, which is 75 million, overall there are 1.2 million blind people, 2.8 million people with low vision, 9 million children 1-9 year of age with active trachoma, and 1.3 million adults with Trachomatous trichiasis. Over all about one million people are blind from avoidable causes. Cataract alone account for over 600, 000 blind individuals, and for over 1.1 million people with low vision. About a million individual with low vision need spectacles to correct their vision.

In conclusion blindness and low vision are major public health problems in Ethiopia. Large proportion of low vision (91.2%) and blindness (87.4%) are due to avoidable (either preventable or treatable) causes. Females and rural residents carry greater risk for eye problems. Active Trachoma and Trachomatous trichiasis (TT) are concentrated in the regions of the country with high population density; namely the Amhara, Oromia, and SNNP regional states. The burden of eye disease estimated from the survey is believed to pose huge economic and social impacts on individuals, society and the nation at large. The demand on

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health services/resources (cataract surgery, TT surgery, and trachoma mass treatment with Azithromycin) is also tremendous.

Therefore, it is critical to recognize the severity of the problem of blindness and low vision and enhance the government commitment to improve the situation. Improving organization capacity and capability at all levels; formulating focused policy to alleviate and prevent major causes of blindness and low vision; implementing the time tested and cost-effective strategies to prevent and treat major causes of blindness and low vision as described in VISION 2020 and the five-year strategic plan of the country for prevention of blindness (2006-2010); and developing basic infrastructure and human capacity for prevention, treatment and rehabilitation services at all levels need to be given particular attention by the government and its partners in improving eye care in Ethiopia.

# 1. INTRODUCTION

Eye problems have been recognized worldwide as one of the major public health problems, particularly in developing countries where 90% of the blind live, and international actions to prevent avoidable blindness has been gaining momentum over the last decade. According to the WHO about 37 million people are blind and 124 million people have low vision worldwide. VISION 2020: The Right to Sight is a global initiative of the World Health Organization (WHO) and the International Agency for the Prevention of Blindness (IAPB) in collaboration with international non-governmental organizations launched in 1999 with the aim of eliminating the major causes of avoidable blindness by the year 2020 (1). About 75% of all blindness worldwide is avoidable and is mainly caused by cataract and trachoma. The initiative focuses on improving the planning, development and implementation of sustainable national eye care programs. The three main strategies are disease control, human resources development and infrastructure development.

Ethiopia launched the VISION 2020 Initiative in September 2002. The long-term aim of this important initiative is to develop a sustainable comprehensive health care system to ensure the best possible vision for all people and thereby improve their quality of life. Blindness is not only incapacitating to the individual but also can adversely affect several aspects of poverty reduction strategies. Approximately 80% of blindness in Ethiopia was believed to be avoidable; i.e. either preventable or curable(2) and Ethiopia is believed to have one of the world's highest rates of blindness. The official blindness prevalence used for planning purposes prior to this survey was 1.25%, which was derived based on the various small scale studies in the country and the national blindness survey conducted over two decades ago.

National surveys are essential for making a good strategic plan and to forecast resource requirement for effective prevention and control programs. But they are also very expensive and time consuming activities. Thus, national blindness and low vision surveys are rarely conducted in the African continent. In the last two decades only a few countries in Africa managed to do a national survey (3-6).

Cognizant of the paucity of information on blindness and low vision in Ethiopia (see summary in Table A) the Federal Ministry of Health and the National Committee for Prevention of Blindness put conducting a national blindness and low vision survey as one of the priority activities in implementing the VISION 2020 in Ethiopia.

Table A: Summary of blindness and low vision studies in Ethiopia

| Study | Year of publication | Sample size | Area | Population studied | Blindness % | Low vision % |
|-------|---------------------|-------------|------|--------------------|-------------|--------------|
| Melese et al[7] | 2003 | 2,693 | 1 zone | Adults > 40 | 7.9 | 12.1 |
| Teshome[8] | 2002 | 21,350 | 1 Wereda | All | 1.0 | - |
| Zerihun et al[9] | 1996 | 7,423 | 1 zone | All | 0.85 | 1.7 |
| Cerulli et al [10] | 1984 | 11,441 | 7 regions | - | 1.3 | 5.1 |
| Budden[2] | 1981 | - | National estimate | - | 1.5 | - |

*Year of publication

After relentless effort the FMOH and its partners for VISION 2020 made firm financial commitment for the purpose of the survey in 2004. The partnership includes The Carter Center, Christian Blind Mission (CBM), ORBIS International, International Trachoma Initiative (ITI) and Light for the World.  This group together with the Federal Ministry of Health formed the National Blindness and Low Vision Survey Taskforce that reports to the Executive Committee of the National Committee for the Prevention of Blindness (NCPB). Investigators for the survey were nominated by the NCPB and given the primary task of coordinating and conducting the survey.  The consultants were highly qualified and experienced academicians from Addis Ababa University. The Johns Hopkins University partners from Dana Preventive Ophthalmology Center served as external expert collaborators for this survey.

## 2. OBJECTIVES

The following were the major objectives of the survey:

### 2.1 Primary objective

- To determine the prevalence of blindness and low vision at national and regional levels.
- To determine the national and regional prevalence of active trachoma among children 1-9 years using the WHO simplified trachoma grading.

### 2.2 Secondary objectives

- To determine the causes of blindness and low vision at national level; the focus for determination of cause of blindness/low vision will be cataract, glaucoma, trachoma and refractive error.

## 3. SURVEY METHODOLOGY

### 3.1 Study design

The national blindness and low vision survey is a population based cross sectional study using a multi- stage cluster sampling design with stratification by region and by urban/rural strata.

### 3.2. Study population

The national blindness and low vision survey is a household survey and excludes individuals living in institutions and homeless people. Ethiopia is divided into 9 regions (Tigray, Amhara, Oromia, SNNP, Somali, Gambella, Benishangul-Gumuz, Harari and Afar) and 2 special city administrations: Addis Ababa and Dire Dawa. All regions of the country are included in the survey. All household members in the selected households were included in the survey. Specific population groups are selected during analysis to calculate standard indicators. For instance, active trachoma is assessed among 1-9 year old children; Trachomatous trichiasis (TT) is assessed among people over 15 year of age.
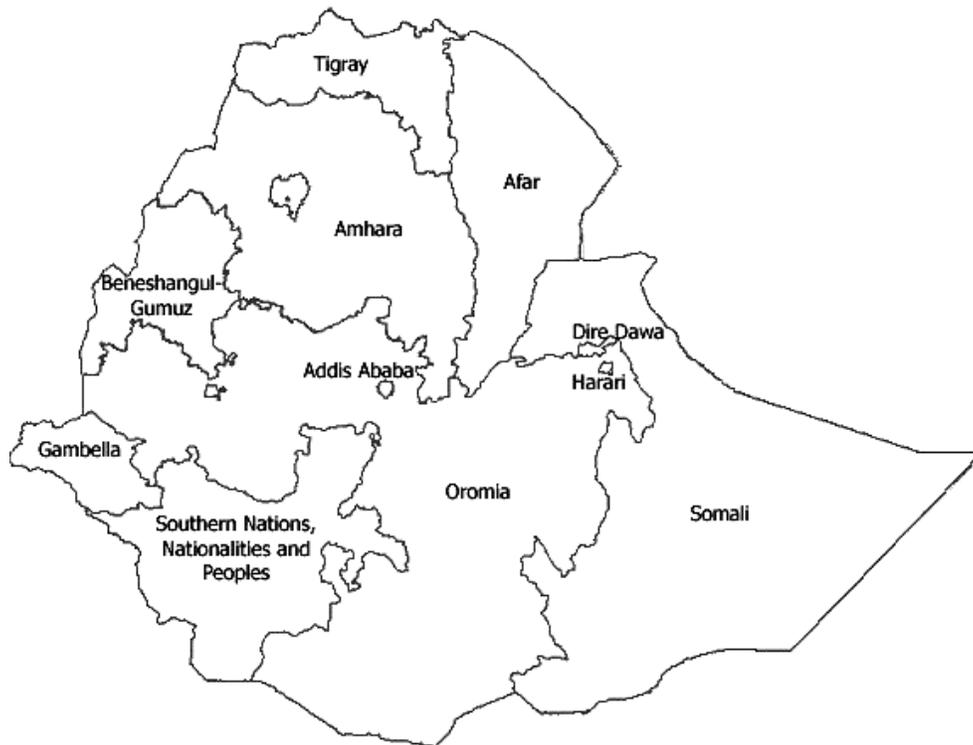


Figure 1: Map of Ethiopia

**3.3 Sample size**

The working prevalence of blindness in Ethiopia is 1.25%. This was calculated by the Federal Ministry of Health in collaboration with National Committee for the Prevention of Blindness (NCPB) based on a number of small scale published and unpublished studies performed during the last two decades. The estimated 2004 national population is just over 71 million (11). This national population was used to calculate the sample size. Using an expected prevalence of blindness of 1.25%, a precision that would produce a 95% confidence interval of 1.05 to 1.45 the sample size required, including a design effect of 2 and a 10% increase for non- response was calculated to be 25, 777. The STATCALC function of Epi Info version 6 was used for this calculation. A design effect of 2 was used as a multiplier to increase the sample size to account for the effect of the cluster sampling methodology utilized for the survey. With cluster sampling methodology, households that are too close often exhibit similarities in their health behaviors. Trachoma in particular is more common in certain families, neighborhoods and villages.

An estimated 16% of the population lives in urban areas (11), giving Ethiopia one of the lowest levels of urbanization in the world. The national survey would allow an adequate sample size for an urban and a rural prevalence to be calculated with a wider confidence interval for the urban sample (Table 1). The Central Statistic Authority definition of urban center was used for the survey.

Table 1: Sample size calculation for national, urban and rural estimates.

|  | National population§ | % of total | Expected prevalence of blindness | Expected Precision (%) | 95% LCI | 95% UCI | Sample size | Design effect x 2 and 10% for non response |
|---|---|---|---|---|---|---|---|---|
| Total | 71,066,000 | 100 | 1.25 | 0.20 | 1.05 | 1.45 | **11717** | **25777** |
| Urban | 11,199,000 | 16 | 1.25 | 0.50 | 0.75 | 1.75 | 1875 | 4124 |
| Rural | 59,867,000 | 84 | 1.25 | 0.22 | 1.03 | 1.47 | 9985 | 21653 |

§ Source: Census abstract 2003 (11)

One of the objectives of the survey is to produce regional estimates for blindness and low vision as well as for active trachoma. Thus the total sample size calculated for the country is distributed for the regions based on their population size; sample allocation using probability

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proportional to size (PPS) technique. With PPS the percentage of the population that each region contributes to the national total is reflected in the distribution of the sample size (Table 2).

Table 2: Distribution of Regional Population and Cluster Allocation. National Low Vision and Blindness Survey, 2005-6.

| Region | Est. pop (2004) § | Pop as % of total | Probability proportional to size (PPS) | Design effect*2 and 10% for non response | Distribution of clusters |
|---|---|---|---|---|---|
| Tigray | 4,113,000 | 5.8 | 681 | 1497 | 10 |
| Afar | 1,330,000 | 1.9 | 224 | 492 | 3 |
| Amhara | 18,143,000 | 25.5 | 2988 | 6575 | 46 |
| Oromia | 25,098,000 | 35.3 | 4137 | 9101 | 63 |
| Somali | 4,109,000 | 5.8 | 681 | 1497 | 10 |
| B- Gumuz | 594,000 | 0.8 | 95 | 209 | 1 |
| SNNP | 14,085,000 | 19.8 | 2321 | 5106 | 35 |
| Gambella | 234,000 | 0.3 | 36 | 80 | 1 |
| Harari | 185,000 | 0.3 | 36 | 80 | 1 |
| Addis Ababa* | 2,805,000 | 3.9 | 458 | 1007 | 7 |
| Dire Dawa* | 370,000 | 0.5 | 60 | 133 | 1 |
| **Total** | **71,066,000** | **100** | **11717** | **25777** | **178** |

*Administrative councils   § Source: Census abstract 2003 (11)

The proportional allocation based merely on population size however posed problem in producing reasonable regional estimates since about 80% of the nation's population live in three regions: Amhara, Oromia and SNNP.  The biggest region Oromia got 63 clusters and Harari the smallest region got one cluster. In order to produce reasonable regional estimates the number of clusters assigned to each region was adjusted considering each region as independent sample as shown in Table 3. Table 3 also presents the 95% confidence intervals for each region based on an expected prevalence of blindness of 1.25%. The confidence intervals for the small regions are wide but more precise estimates are produced for the larger regions.

Table 3: Adjusted number of clusters and population with 95% Confidence Intervals

| Region | Distribution of clusters (table 4) | Adjusted number of clusters § | Adjusted population | Expected prevalence | Expected Precision (%) | 95% LCI~ | 95% UCI~ | Total number of HH* |
|---|---|---|---|---|---|---|---|---|
| Tigray | 10 | 10 | 1440 | 1.25 | 0.85 | 0.40 | 2.10 | 300 |
| Afar | 3 | 10 | 1440 | 1.25 | 0.85 | 0.40 | 2.10 | 300 |
| Amhara | 46 | 33 | 4752 | 1.25 | 0.47 | 0.78 | 1.72 | 990 |
| Oromia | 63 | 33 | 4752 | 1.25 | 0.47 | 0.78 | 1.72 | 990 |
| Somali | 10 | 10 | 1440 | 1.25 | 0.85 | 0.40 | 2.10 | 300 |
| Benshangul Gumuz | 1 | 10 | 1440 | 1.25 | 0.85 | 0.40 | 2.10 | 300 |
| SNNP | 35 | 33 | 4752 | 1.25 | 0.47 | 0.78 | 1.72 | 990 |
| Gambella | 1 | 10 | 1440 | 1.25 | 0.85 | 0.40 | 2.10 | 300 |
| Harari | 1 | 10 | 1440 | 1.25 | 0.85 | 0.40 | 2.10 | 300 |
| Addis Ababa | 7 | 10 | 1440 | 1.25 | 0.85 | 0.40 | 2.10 | 300 |
| Dire Dawa | 1 | 10 | 1440 | 1.25 | 0.85 | 0.40 | 2.10 | 300 |
| Total | 178 | 179 | 25776 | | | | | 5370 |

~LCI/UCI Lower/Upper confidence interval. *Adjusted population /4.8 (average HH size)

Table 4 below provides justification for setting the maximum number of clusters per region to 33. Increasing from 10 to 20 clusters doubles the sample size and produces a significant narrowing of the confidence interval (64%) making the result more precise. Increasing from 20 to 30 clusters again increases the sample size and results in a further narrowing of the confidence interval by 19%. However, as the number of clusters and the sample size continues to increase the efficiency gains in terms of improved precision and narrowing of the confidence interval is minimal and is not worth the extra resource implications. The final decision to use a maximum of 33 clusters per region was mainly for efficiency reasons and in line with the calculated number of clusters at a national level, which was 178.

Table 4: Changes in precision with increase in number of clusters

| Number of clusters | Sample size | % Sample size increase | CI around estimate of 1.25% | % increase (narrowing) of LCI |
|---|---|---|---|---|
| 10 | 648 | -- | 0.39 - 2.11 | -- |
| 20 | 1,296 | 50 | 0.64 - 1.86 | 64 |
| 30 | 1,944 | 33 | 0.76 - 1.74 | 19 |
| 35 | 2,268 | 14 | 0.80 - 1.70 | 5 |
| 40 | 2.592 | 12 | 0.82 - 1.68 | 2 |

To combine all estimates into a single national estimate each regional estimate needs to be multiplied by its weight. The weight of a region is its percentage of the national population as

shown in Table 2. The sample size calculation was based on the expected prevalence of blindness. This sample size obtained with that assumption is sufficient to produce reliable estimates for the other main outcome measures such as low vision, trachomatous trichiasis and active trachoma that have a prevalence of greater than 1.25%.

## 3.4. Sampling procedures

All zones in the country were included in the survey in order to avoid too much clustering of the survey areas and to increase the national geographic coverage (Figure 2). The number of clusters in each region was distributed to zones proportional to the size of their population. Table 5 shows the number of clusters allocated to each zone of a region. One woreda was selected in each zone if the total number of clusters to be selected is five or less. When the number of clusters needed from the zone was greater than five then two woredas were selected per zone. A simple random sampling technique was used to select woredas in order to give equal chance for every woreda in the zone to be selected for the survey. It is however very important to note the selection procedure does only ensure representativeness of the sample at both regional and national levels but does not allow making estimates at zonal and woreda level. Zonal and woreda level estimates require a much larger sample size at the lower level.

Urban and rural dichotomy is not made at the regional level but in order to ensure that sufficient number of urban clusters is selected 16% of the sample were from urban areas. According to the CSA an urban center in principle is defined as a locality with 2000 or more inhabitants. However, for practical purposes an urban center includes the following regardless of the number of inhabitants;

      (1) All administrative capitals (Regional, Zonal and Woreda capitals)

      (2) Localities with Urban Dweller's Associations not included in (1)

      (3) All localities which are not included either in (1) or (2) above having a population of 1000 or more persons, and whose inhabitants are primarily engaged in non-agricultural activities.

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│  Federal Democratic Republic of Ethiopia    │
└────────────────────────────────────────────┘
                    │
                    │──────►  *All regions*
                    │
┌────────────────────────────────────────────┐
│              Regional States                 │
│  9 regional states and 2 special city        │
│             administrations                   │
└────────────────────────────────────────────┘
                    │
                    │──────►  *All zones*
                    │
┌────────────────────────────────────────────┐
│           Administrative Zones               │
│          All administrative zones            │
└────────────────────────────────────────────┘
                    │
                    │──────►  *Simple random sampling*
                    │
              ╭──────────────╮
              │   Woredas     │
              │ At least one  │
              │ woreda per    │
              │    zone       │
              ╰──────────────╯
                    │
                    │──────►  *Simple random sampling*
                    │
              ╭──────────────╮
              │ Kebeles (PAs) │
              ╰──────────────╯
                    │
                    │──────►  *Modified proximity sampling*
                    │
              ╭──────────────────╮
              │  Households (HH)   │
              │ All individuals in │
              │ the selected HHs   │
              │ 35 HH ≈ 144        │
              │ individuals per    │
              │ cluster            │
              ╰──────────────────╯
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Figure 2: Sample Selection Framework for the National Blindness and Low Vision Survey of Ethiopia, 2005-6.

Table 5: Distribution of clusters by Region, Zone and Woreda. National Blindness and Low Vision Survey. Ethiopia, 2005-6.

| Region | Zone | Pop as % of regional total | Adjusted number of clusters in a Zone | Woredas selected for the survey[1] |
|---|---|---|---|---|
| Tigray | Mirabawi Tigray | 23.4 | 2 | Medebay Zana |
|  | Mehakelegnaw Tigray | 30.1 | 3 | Laelay Michew |
|  | Misrakawi Tigray | 18.7 | 2 | Erob |
|  | Debubawi Tigray | 27.9 | 3 | Rayaazebo |
|  | **Total** | **100.0** | **10** |  |
| Afar | Zone 1 | 29.6 | 3 | Mile |
|  | Zone 2 | 19.8 | 2 | Koneba |
|  | Zone 3 | 13.5 | 1 | Argoba special |
|  | Zone 4 | 11.5 | 1 | Yalo |
|  | Zone 5 | 25.6 | 3 | Fursi |
|  | **Total** | **100.0** | **10** |  |
| Amhara | Semen Gondar | 15.1 | 5 | Chilga |
|  | Debub Gondar | 12.8 | 4 | Ebenat |
|  | Semen Wello | 9.1 | 3 | Meket |
|  | Debub Wello | 15.4 | 5 | Werebabu |
|  | Semen Shewa | 11.3 | 3 | Kewet |
|  | Misrak Gojam | 12.3 | 4 | Enemay |
|  | Mirab Gojam | 12.9 | 4 | Merawi |
|  | Wag Hemra | 2.0 | 1 | Sekota |
|  | Agew | 5.2 | 2 | Ankesha |
|  | Oromia | 3.3 | 1 | Artuma-Fursina |
|  | Bahir Dar | 0.7 | 1 | Bahir-dar town |
|  | **Total** | **100.0** | **33** |  |
| Oromia | Mirab Wellega | 8.3 | 3 | Gimbi |
|  | Misrak Wellega | 6.7 | 2 | Jimma-Arjo |
|  | Illubabor | 4.5 | 2 | Bure |
|  | Jimma | 10.5 | 3 | Limu-Kosa |
|  | Mirab Shewa | 12.4 | 4 | Kokir |
|  | Semen Shewa | 6.2 | 2 | Hidabu-Abote |
|  | Misrak Shewa | 8.9 | 3 | Adami-tulu Jido Kombolcha |
|  | Arssi | 11.8 | 4 | Ziway Dugda |
|  | Mirab Harerge | 6.8 | 2 | Boke |
|  | Misrak Harerge | 9.8 | 3 | Girawa |
|  | Bale | 6.5 | 2 | Raytu |
|  | Borena | 7.6 | 3 | Arero |
|  | Total | 100.0 | 33 |  |
| Somali | Shinile | 10.4 | 1 | Erer |
|  | Jigjiga | 23.6 | 3 | Jijiga |
|  | FIQ | 6.8 | 1 | Fiq |
|  | Degehabur | 8.8 |  | [2] |
|  | Warder | 9.5 |  | § |
|  | Korahe | 7.0 |  | § |
|  | Gode | 9.5 | 1 | Kelafo |
|  | Afder | 10.5 | 2 | Afder |
|  | Liben | 13.9 | 2 | Dolo-Odo |
|  | **Total** | **100.0** | **10** |  |

[1] Except in Addis Ababa, Harari, Dire-Dawa town, and Bahir-Dar all clusters will be from rural areas in order to maintain the proportion of urban clusters at the national level.
[2] Woreda excluded due to inaccessibility.

| Region | Zone | Pop as % of regional total | Adjusted number of clusters in a Zone | Woredas selected for the survey[1] |
|---|---|---|---|---|
| Benshangul Gumuz | Metekel | 43.8 | 4 | Wembera |
| | Asosa | 45.2 | 5 | Komesha |
| | Kamashi | 11.0 | 1 | Kamashi |
| | **Total** | **100.0** | **10** | |
| SNNP | Gurage | 15.7 | 5 | Gumer |
| | Hadiya | 10.6 | 4 | Soro |
| | Kembata | 7.3 | 2 | Angacha |
| | Sidama (two woredas) | 20.6 | 7 | Awassa and Dara |
| | Gedeo | 5.7 | 2 | Yirga-chefe |
| | Semen Omo (two woeredas) | 26.2 | 9 | Basketo and Zala-Ubamale |
| | Debub Omo | 3.3 | 1 | Bako-Gazar |
| | Keficho | 7.3 | 2 | Yeki |
| | Bench-Maji | 3.3 | 1 | Bench |
| | **Total** | **100.0** | **33** | |
| Gambella | Zone 1 | 24.9 | 3 | Itang |
| | Zone 2 | 19.9 | | § |
| | Zone 3 | 37.5 | 4 | Akobo |
| | Zone 4 | 17.7 | 3 | Godere special |
| | Total | 100.0 | 10 | |
| Harari | **Harari** | **100** | **10** | Harer |
| Addis Ababa | Zone 1 | 14.9 | 1 | 04 |
| | Zone 2 | 20.2 | 2 | 24 |
| | Zone 3 | 18.0 | 2 | 17 |
| | Zone 4 | 21.8 | 2 | 13 |
| | Zone 5 | 20.6 | 2 | 10 |
| | Zone 6 | 4.5 | 1 | 27 |
| | **Total** | **100.0** | **10** | |
| Dire Dawa | Dire dawa town | 65.5 | 7 | Dire dawa town |
| | Gurgura | 34.5 | 3 | Gurgura |
| | **Total** | **100.0** | **10** | |
| **Total** | **National** | **100** | **179** | |

### 3.4.1 Primary sampling unit

The primary sampling unit (PSU) for the survey was kebele; each kebele was regarded as a cluster. At the woreda level kebeles were selected using a simple random sampling procedure. The list of current kebeles in each woreda was obtained from the local administration. Then, random selection of kebeles was made by generating random number for each woreda from Epi Info statistical program. Kebeles that are not reached within one day walking from the furthest driving point were regarded geographically inaccessible. Inaccessible clusters due to insecurity or geographical barriers were excluded from the survey prior to random selection of the clusters. As inaccessible clusters were excluded in advance of random selection no clusters was substituted.

### 3.4.2. Secondary sampling unit

The secondary sampling units were households within the cluster/kebele. A modified EPI cluster sampling methodology was used as shown in Figure 3. The procedure involved identifying the center of a cluster; selecting a direction by spinning a pencil on a clip board; and identifying 35 households on an approximately straight line pattern on the selected direction. The advance teams (composed of the woreda coordinator, local field guide and the interviewer) visited the cluster prior to the survey day in order to identify boundaries of the cluster, number the selected houses using chalk, and register the name of the head of the household. All members of the household were included in the survey.

A household constitutes a person or group of persons, irrespective of whether related or not, who normally live together in the same housing unit or group of housing units and who have common cooking arrangements. A head of household is a person who economically supports or manages the household or for reasons of age or respect, is considered as head by members of the household or declares himself or herself as head of a household. Member of a household are persons who lived and ate with the household for at least six months including those who are not within the household at the time of the survey and were expected to be absent from the household for less than six months; visitors who ate and stayed with the household for six months and more; and house maids, guards, and baby-sitters who lived and ate with the household irrespective of the duration of stay. As the national blindness and low vision is a household survey homeless people, even if they live in the survey area, were not included in the survey.

1. Identify the centre of the selected cluster (kebele)

2. Identify the first HH by rotating pencil or bottle, the house indicated by the sharp end of the object will be the starting house

3. Continue selection of households in a straight direction until 35 HHs are selected

4. If 35 households are not obtained in the selected direction, which is unlikely, turn to the right and follow another straight direction within the kebele (as shown using a broken line in the figure)
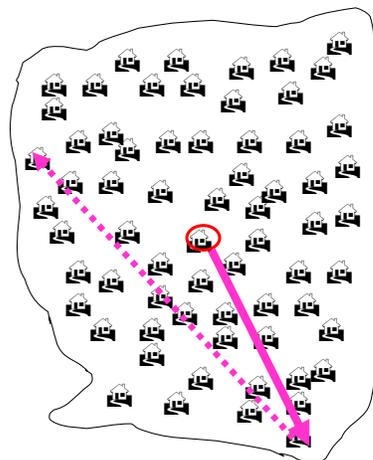
Figure 3: Household selection Procedure for the National Blindness and Low Vision Survey in Ethiopia, 2005-6.

All members of selected households were invited to participate in the survey. The sensitization and household registration made by the advance team helped in enhancing community and household participation. For household members who were absent during the survey information relevant to the eye was collected using appropriate forms.

The average household size in Ethiopia is 4.8 persons (8, statistical abstract 2003). Therefore a cluster of 30 households would result in approximately 144 individuals. The breakdown of this population is expected to be as outlined in Table 6 with an equal distribution by gender. These figures are based on the household distribution described in the Ethiopian Demographic and Health Survey. Due to logistics and financial constraints the survey in each cluster need to be completed in one day. Thus, the number of households per cluster was raised to 35 in order to account for absentees and non-response.

Table 6: Expected age distribution of the population per cluster. National Blindness and Low Vision Survey. Ethiopia, 2005-6.

| Age group | Number (%) |
|---|---|
| 0-4 | 24 (17) |
| 5-9 | 22 (15) |
| 10-14 | 19 (13) |
| 15-64 | 73 (51) |
| 65+ | 6 (4) |
| Total | 144 (100) |

## 3.5. Data collection

The survey was coordinated by a central coordinating office established at the Ethiopian Public Health Association (EPHA) project office. A public health expert was in charge of the survey coordination including making the teams. Designated regional coordinators were responsible for the regional level coordination and community sensitization. Designated woreda coordinators were responsible for identifying clusters and making the necessary pre-survey arrangements including community sensitization and mobilization.

The actual field data collection was done from December 2005 to March 2006. This period was selected in order to avoid the heavy rainy season that can potentially hamper data collection and make some remote clusters inaccessible. Due to shortage of health workers to do the survey and limited availability of eye examination equipments the survey was actually conducted in a manner that allows efficient utilization of the available work force and equipments. Thus, overlapping schedules were used depending on the size of the region (Figure 4). The procedure enabled the completion of the survey during dry season and no cluster was excluded from the survey because of inaccessibility due to rain.
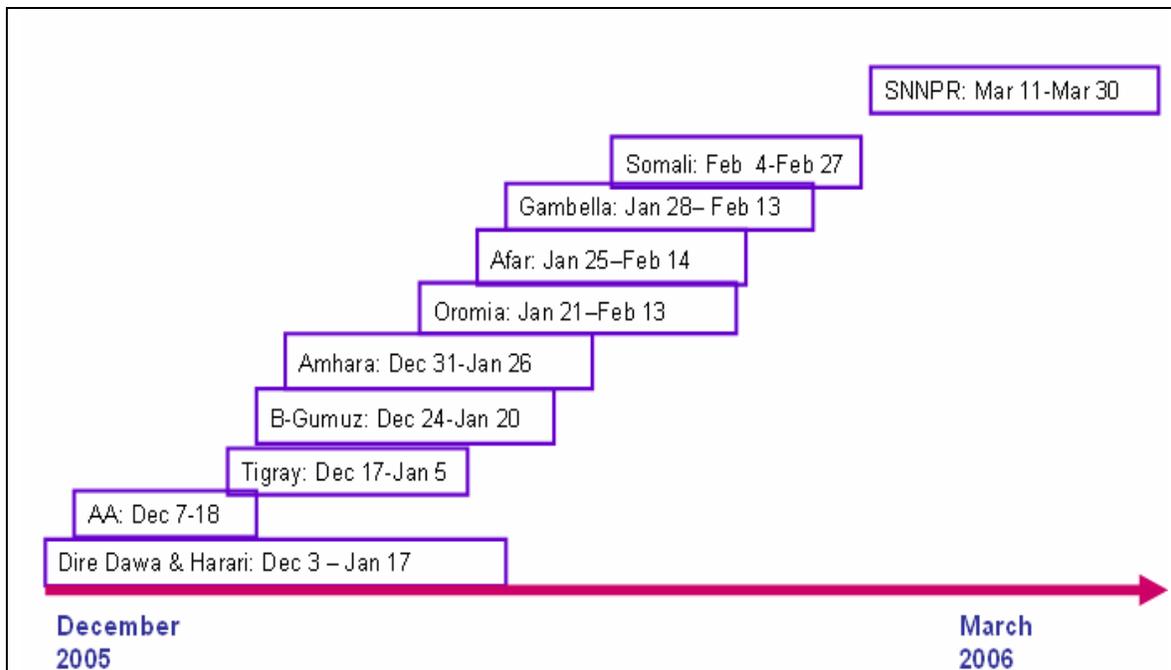
**Figure 4. Field Activity Timeline for the National Blindness and Low Vision Survey of Ethiopia 2005-6.**

Advance teams consisting of the woreda coordinator, the interviewer and the cluster guide visited each clusters before the actual day of the survey to accomplish the following tasks:

- To inform local kebele leaders and community representatives about the objectives of the survey and get permission;
- To identify the houses to be included in the survey as per the protocol, number them with chalk, and prepare the list of selected houses with the name of the head of household; and
- To sensitize the community for the survey and select a suitable day for the survey in consultation with the community members; and
- To record travel time and directions to the cluster.

On the day of the survey a team including ophthalmologist, three ophthalmic nurses/OMAs, one interviewer, one woreda coordinator and a driver arrived at the designated cluster early in the morning to the cluster. Survey team members were trained in two occasions; initially at a national level and then at regional level before the actual survey. A local guide recruited for the specific cluster joined the team on site. The ophthalmologist was the team leader and responsible for all activities in the field. The interviewer, local guide and two ophthalmic nurse/OMA started visiting each selected house as registered in the list. The interviewer read

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the consent form and completed the household questionnaire and record household members who are absent. The first two ophthalmic nurses/OMAs (labeled as ON/OMA I) completed the sections on background information of the individuals, performed visual examination and asked history of surgery. Then another ophthalmic nurse (labeled as ON II) performed basic eye examination, trachoma assessment, and assessment for vitamin A deficiency for each members of the household. All members of the household were then referred for visual acuity test. Those who scored 6/18 or greater in both eyes were thanked and released from the survey. Those who scored less than 6/18 in either eye were re-examined using a pin hole test. If their sight improves to above 6/18 they were recorded as needing glasses and were given a referral letter to the nearest eye care center. Those who do not improve to above 6/18 using the pinhole test were referred to the ophthalmologist for a more detailed eye examination to determine the cause of blindness or low vision. Figure 5 shows the flow of data collection and eye examination at a household level. Data were collected in a suitable location in or around the household compound.
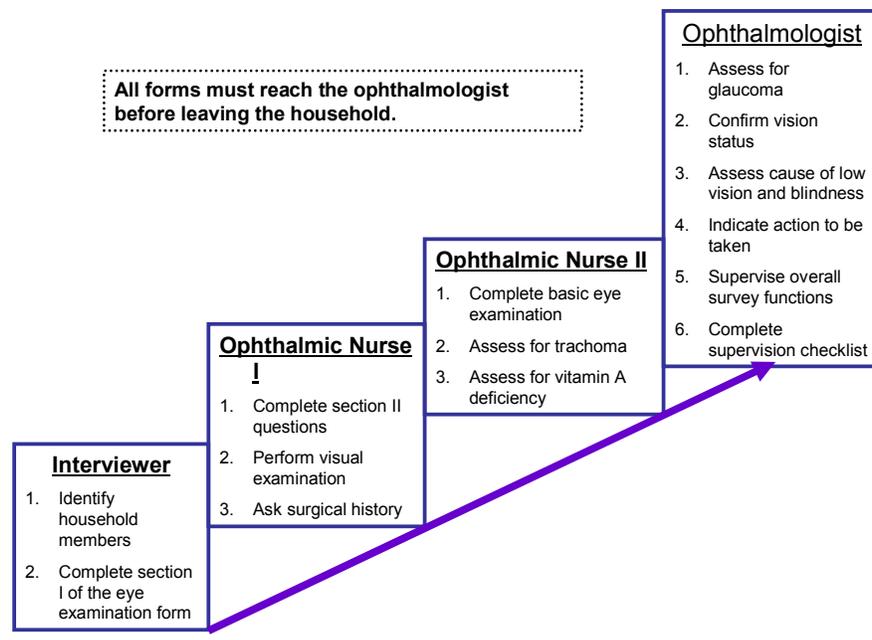


Figure 5. Data collection and Eye Examination Procedure for the National Blindness and Low Vision survey of Ethiopia, 2005-6.

## 3.6. Training

Training on survey methods, interviewing techniques and eye examination were given to all members of the survey team. Initially training was given in Addis Ababa for the purpose of sensitizing the regions and eye workers; orienting the need for the Blindness and low vision survey; orienting the objectives of the Blindness and low vision survey; and identifying and training potential survey team members. Accordingly 31 ophthalmologists and 77 ophthalmic nurses/ophthalmic medical assistants participated in the central level training. The training was concluded by conducting a pre-test of field procedures and standardization of eye examinations for trachoma in Butajira; in a primary school and in a community.

The pre-test revealed critical sampling, interview flow and eye examination weakness that needed immediate correction. The following changes were recommended based on the pre-test: changes from the originally proposed systematic sampling to a modified proximity sampling technique; changes in survey team composition necessitating an additional one nurse for each survey team compared to the original proposal; to re-adjust project resources according to needs; and changes in the proposed timetable in order to adopt flexible timetable based on availability of health workers and the security situation of the country. The lessons learned from the survey and recommendations are portrayed in Table 7.

## 3.7. Standardization

During the pre-test in Butajira inter- and intra-rater reliability test was done for trachoma grading using the WHO definition where each ophthalmic assistant and ophthalmologist was compared against a gold standard rating. The gold standards were four senior ophthalmologists with extensive experience in trachoma grading. Each ON/OMA examined 50 children that were rated by the gold standard ophthalmologist. Only ON/OMA that achieved at least 60% agreement level with the gold standard were assigned for trachoma grading; they were labeled 'ON/OMA II' in the survey team. The ON/OMA who did not achieve a 60% agreement level served only as 'ON/OMA I' in the survey team and they were responsible for interviewing, observation of facial cleanliness and visual acuity test.

Table 7. Summary of the Pre-test Findings and Recommendations. National Blindness and Low Vision Survey. Ethiopia, 2005-6.

| Lessons Learned | Recommendations |
|---|---|
| **On field procedure**<br>• Systematic sampling very difficult and time consuming<br>• Ethical concern arose due to passing needy villagers during the survey<br>• Completing a household can take from 15-60 minutes depending on the family size and experience of the survey team members<br>• Interviewers completed interviews at much faster pace than anticipated<br>• Some survey team members were not very familiar with field situation | **Field procedure**<br>– Change sampling to a modified EPI cluster methodology, i.e.; sequentially selection of 35 households on a straight direction<br>– Reduce the number of interviewers from two to one<br>– Increase the number of ophthalmic nurses (Ophthalmic medical assistants) from two to three |
| **On eye examination**<br>• Two ophthalmic nurses were not sufficient to complete a household within the allocated time; which was on average about 13 minutes<br>• Ophthalmologists were not very familiar with field survey procedures and lack supervisory skills<br>• Eye examination of children was very difficult; often language was a barrier to effective examination<br>• Standardization of eye examinations revealed agreement levels much lower than expected | **Eye examination**<br>– Limit eye examination for children to a maximum of 10 minutes; if not successful in ten minutes pass<br>– Avail interpreter for each team<br>– Select survey team based on their performance during standardization and provide additional training |
| **On forms**<br>• Form (questionnaire) lacks smooth flow and requires reformatting<br>• Some questions need to be reworded and some more relevant questions were suggested while in the field (for example: presence of fly on the face of child)<br>• Incomplete and wrongly filled forms observed, which indicated the need for closer supervision<br>• Some sections were not relevant and need to be removed- e.g.; confrontation test | **Forms**<br>– Reformat questionnaires and include relevant questions<br>– Developed a flow chart that show the direction of move - included in the field manual<br>– Delete irrelevant sections from the questionnaire |
| **On survey team Job division**<br>• Who should do what and in what order appeared to be confusing<br>• Completing household check list was the most confusing<br>• The flow of forms within the team not well understood | **Improving team performance**<br>– Retrain survey team using revised survey materials and following modified field procedures<br>– Develop a simplified field manual with clear flow charts<br>– Ophthalmic nurse two (those assessing trachoma) were those with Trachoma standardization agreement of 60% or more |

### 3.8. Survey instruments

Several forms were used to collect relevant information about the cluster, households and individuals involved in the survey (See Appendix). The cluster form collected information relevant at the cluster level including proximity to health facility, geographic accessibility of the cluster, and presence of active trachoma prevention program at the village level. The interviewer administered questionnaires were used to collect data on demographic and socio-economic variables and environmental risk factors for trachoma at the household level. The eye examination form was used to collect information pertaining to hygiene, visual acuity, eye medical history and trachoma status at individual level. A supervisor's checklist was used to ensure that all the necessary data are collected at each level from all participants. The forms were initially prepared in English. Forms and questions to be registered by the field interviewers were translated into Amharic (the national language) and then back translated to English by independent groups to confirm that the meaning is retained.

### 3.9. Eye examinations

Both eyes of each member of the household were examined by designated ON/OMA and ophthalmologist, as necessary (details of the eye examinations conducted during the survey are given in Table 8). The eye examination results were registered on the eye examination form by ON/OMA I and II and by the ophthalmologist as shown in the data flow chart. Eye examination was done in accordance to the WHO's methods of assessment of avoidable blindness.[16] Cleanliness of hands and sterility of eye examination instruments were maintained before each examination to reduce infection transmission.

Visual acuity was tested using the logMAR acuity chart. The logMAR chart consists of five letters per line, each letter being a tumbling E optotype. This chart has been well validated in population based surveys(15). Visual acuity measurement for younger children was identified to be very difficult during the pre-test. Thus, measurement of visual acuity was done starting from adult member of a household down to youngest at the end. This way the children easily get used to the eye examination procedure. Appropriate care was taken by the survey team to avoid memorization of the chart. Visual acuity testing was performed during daylight hours outdoors. The LogMar chart was placed at a higher position facing the sun in less than 10 degree angle to avoid excessive glazing and set at the eye level of the person to be tested. The distance between the person and the chart was 4 meters.

Table 8: Types of eye testing done for the National Blindness and Low Vision Survey. Ethiopia, 2005-6.

| Test | Tool | Participants | Outcome |
|------|------|--------------|---------|
| Visual acuity testing | LogMAR Chart | >5 years | Prevalence blindness / low vision (WHO criteria[12]) |
| Refractive errors | Pinhole | all >5 years with low visual acuity | Prevalence blindness / low vision (WHO criteria[12]) |
| TF/TI* | Inversion and examination of eye lid using a binocular loupe | Children 1-9 years | Prevalence of TF/TI (WHO trachoma grading system[13]) |
| TT** | Visual observation | All > 1 year | Prevalence TT adults >15 (WHO trachoma grading system[13]) |
| Vitamin A Deficiency | Visual observation | 6 -71 months | Prevalence Vitamin A deficiency (WHO Vit A grading[14]) |
| Vitamin A Deficiency | Ask mother about night blindness | 24-71 months | Prevalence Vitamin A deficiency (WHO Vit A grading[14]) |
| Cataracts | Direct ophthalmoscope | All participants | Blindness/low vision caused by cataracts |
| Glaucoma | Schiotz tonometry with anesthetization of Cornea | Visual acuity <6/18 (who do not have corneal scarring) | Intra Ocular Pressure (IOP) |
| Examination of posterior segment for Glaucoma Macular degeneration Diabetic retinopathy | Direct ophthalmoscope with pupil dilation using short acting mydriatics. History for diabetes | Visual acuity <6/18 who are not at risk of closed angle glaucoma | Cup to disc ratio Signs of macular degeneration |

*TF-Trachomatous inflammation-follicular, TI-Trachomatous inflammation-intense, **TT-Trachomatous Trichiasis

All participants with a visual acuity of <6/18 were tested for refractive error. The presence of refractive error was confirmed when improvements in visual acuity is observed with pinhole examination. More sophisticated testing for refraction was not performed due to resource constraints.

Trachoma grading was done based on the WHO grading system(13,15). All individuals were examined for trichiasis, either for the presence of inturned eyelashes actually rubbing on the eye or previously removed lashes. In order to check for inturned eyelashes the upper lid is pushed upwards slightly to expose the lid margins. The cornea is then carefully examined for opacities. The inside of the upper eyelid, the tarsal conjunctiva of both eyes, were examined in children 1-9 years for follicles, intense inflammation and scarring.

Vitamin A deficiency was assessed in accordance to the WHO classification methods(14). Eye examination and questions about night blindness for children were asked. While serum retinol levels are the gold standard in the detection of Vitamin A deficiency – due to logistical difficulties and cost blood sample was not taken.

All individuals who scored less than 6/18 on the visual acuity test with pine hole were referred to the ophthalmologist. The ophthalmologist performed eye examination for all persons with low vision and blindness. The eye examination included anterior segment evaluation with SLM, and posterior segment evaluation to assess the cup/ disk ratio with the ophthalmoscope and the intra ocular pressure (IOP) measurement with schiotz tonometer to determine the cause of blindness and low vision with major emphasis on cataract, trachoma, glaucoma and refractive error. Any opacity of the lens visible with direct ophthalmoscope through an undilated pupil was classified as cataract. Glaucoma was diagnosed based on IOP measurements and cup to disc ratio. The pupil was not be dilated in individuals suspected to be at risk of closed angle glaucoma. Visual loss was attributed to trachoma in the simultaneous presence of corneal opacities and entropion / trichiasis or history of epilation or TT surgery.

### 3.10. Data quality control

Data quality assurance mechanisms were carefully developed and implemented at various stages of the survey. Data collection instruments were adapted from previous similar works by WHO and partner organizations. The instruments were repeatedly reviewed by the investigators, other experts and finally pre-tested during in the field before final endorsement. Recruitment of appropriate survey team members was done in consultation with regional health bureaus and partner organizations. Every effort was made to obtain the best people for the survey. Team members were trained at a national level with emphasis on familiarizing survey objectives and the methodology. They were again trained at the regional level just before the actual survey with emphasis on the details of the survey methodology and procedure. During the regional trainings the survey teams had a chance to do field practice and obtain feedback and further explanation. Investigators were also able to supervise almost all clusters in the first three regions and later a sample of clusters in the remaining regions. Thus, it was possible to establish field procedures according to protocol and also identify potential supervisors for the later part of the survey. To ensure consistency of procedures some survey teams were used repeatedly in several regions of the country. Some remote

areas were however very difficult to supervise due to lack of communication system. In areas where such problem was anticipated a team with previous experience was sent to those places in as far as possible. The only exception was the Somali region where the above strategies were not applicable. The data obtained from Somali region where no supervision was possible did show unexpected and unexplainable findings. The data sheets were also observed to have major inconsistencies during data processing. Thus, five clusters done by one team with the above deficiencies were excluded from the survey analysis.

## 3.11. Data entry

All forms completed at the field level were received at the survey coordination office and manually checked for completeness and then systematically filed by cluster. Data from the cluster form, household questionnaire, and the eye examination form were double-entered onto computer using Epi Info 2000 statistical software by trained and experienced data entry clerks. Skip patterns and error checking were integrated in the data entry forms. Regular back up system was created in order to ensure no loss of data at any point during the data entry process. Relevant variables that can link the eye examination form to household and cluster information were incorporated in each form. By linking the cluster number (three digits), household number (two digits), and individual code (English alphabet from A to P) a unique identification number for each individual in the survey was constructed to facilitate the data analysis. Extensive data processing and cleaning procedure were done in preparing the final data set including verification of the double entry files and cross validation of the computer data set with the actual data forms. Data entry was supervised routinely by an experienced data manger and regularly by a senior biostatistician.

## 3.12. Data analysis

The main outcomes of interest include prevalence rates for blindness, low vision, active trachoma (TF and TI) among children 1-9 years and trichiasis among adults over 15 years. National estimates and estimates for regions were calculated for each outcome measure. Appropriate weight is worked out to adjust various measures proportionate to the population size. The proportion of blindness and low vision due to the main causes are determined. Distribution of blindness and low vision by gender, age and place of residence are explored. Projections based on the current population size of the country are made to estimate the number of people requiring treatment for various ocular morbidities. All prevalence figures

given in this report are weighted. The following definitions were used for analysis of visual status:

- ***Presenting VA***: the visual acuity of the person as presented (without any correction by the survey team)
- ***Blindness***: Presenting VA < 3/60 in the better eye
- ***Low Vision***: Presenting VA <6/18 but $\geq$3/60 in the better eye

## 3.13. Survey participation and benefits

Informed verbal consent was obtained from all adult individuals who participated in the survey. For children parents or adult guardians provided consent. Individuals with active trachoma were treated with antibiotics. Individuals with trichiasis or cataracts were referred for surgery to the nearest eye care center. Children with signs of vitamin A deficiency were given vitamin A capsule provided that they have not received one in the previous 6 months. Overall the survey team provided information about eye health and suggested interventions where appropriate.

## 4. MAJOR FINDINGS OF THE SURVEY

Overall the survey was implemented according to the protocol mainly due to the determination and dedication of the survey team to implement the survey as proposed. Some villages were extremely remote and took more time than anticipated. A few modifications made due to force majeure are the following:

- Afar Region: in two remote clusters with very scattered settlement pattern sampling on a straight line direction as described in the sampling section was practically impossible. Thus, a proximity sampling strategy was used as there was no danger of clustering in a scattered settlement.

- Somali Region: three clusters selected from Degahabur, Warder and Korahe were not accessible thus another three clusters were selected from Jijiga, Afder and Liben zones based on their relative population size. As described in the data quality section five clusters were also excluded from the survey analysis due to uncertainty in data quality.

- Gambella Region: the clusters selected from Gog (Abebo) were excluded because of security problem and replaced by two clusters from Zone 1 and Zone 4 based on population size.

It is very important to note that the survey was not intended to provide zonal and woreda level estimates due to the huge sample size requirement that could not be entertained due to resources limitations. Thus, all estimates presented in this report are at national and regional levels. Regional estimates are self-weighted however all national estimates in this report are weighted for population size of regions. Presenting vision is emphasized in this report as one of the purposes of the survey was to determine needs. It is known that services to correct vision are not widely available in Ethiopia. This is a household survey and as such homeless people even those living in the survey clusters were not included.

## 4.1. General survey description

A total of 174 clusters, 6056 households and 30022 individuals were included in the survey in the eleven regions of the country. Of the total 30022 individuals 25650 (85.4%) were present and examined by the survey team; 4325 (14.4%) were absent and 47(0.2%) refused to participate in the survey. The average family size for the survey households was 4.9 persons. On average 4.2 persons per household were present during the survey. Major reasons for being absent include work (44.9%), school (14.3%), and visiting relatives (13.9%). Household respondents were asked about the visual status of the absentees. Accordingly, only 18 (0.4%) were believed to be blind and 95(2.2%) were believed to have low vision.

Table 9: Distribution of Clusters, Households, and Individuals by Region. National Blindness and Low Vision Survey in Ethiopia, 2005-6.

| | | | | | No of individuals included in the survey[*] | | | | | |
| | No of Clusters | | No of Households | | Present during the survey | | Absent during the survey | | Total No. of individuals | |
| Region | No | % | No | % | No | % | No | % | No | % |
|--------|-----|------|------|------|------|------|------|------|------|------|
| Tigray | 10 | 5.7 | 345 | 5.7 | 1431 | 5.6 | 298 | 6.8 | 1729 | 5.8 |
| Afar | 10 | 5.7 | 350 | 5.8 | 1184 | 4.6 | 215 | 4.9 | 1399 | 4.7 |
| Amhara | 33 | 19.0 | 1154 | 19.1 | 4609 | 18.0 | 999 | 22.8 | 5608 | 18.7 |
| Oromia | 33 | 19.0 | 1143 | 18.9 | 5305 | 20.7 | 621 | 14.2 | 5926 | 19.7 |
| Somali | 5 | 2.9 | 175 | 2.9 | 731 | 2.8 | 316 | 7.2 | 1047 | 3.5 |
| Ben/Gumz | 10 | 5.7 | 350 | 5.8 | 1652 | 6.4 | 70 | 1.6 | 1722 | 5.7 |
| SNNPRG | 33 | 19.0 | 1151 | 19.0 | 5415 | 21.1 | 475 | 10.9 | 5890 | 19.6 |
| Gambella | 10 | 5.7 | 350 | 5.8 | 1387 | 5.4 | 337 | 7.7 | 1724 | 5.7 |
| Harari | 10 | 5.7 | 350 | 5.8 | 1132 | 4.4 | 221 | 5.1 | 1353 | 4.5 |
| Addis Ababa | 10 | 5.7 | 338 | 5.6 | 1365 | 5.3 | 579 | 13.2 | 1944 | 6.5 |
| Dire Dawa | 10 | 5.7 | 350 | 5.8 | 1439 | 5.6 | 241 | 5.5 | 1680 | 5.6 |
| **Total** | **174** | **100** | **6056** | **100** | **25650** | **100** | **4372** | **100** | **30022** | **100** |

[*] 47 Individuals who were present during the survey but rejected eye examination are included in the absent column

The age and sex distribution of the survey population reflects what is expected in a typical household survey in Ethiopia. About 30% of the population was children in the age group 1-9 year. Elderly population constitutes only 5.8% of the total survey population (Table 10).

**Table 10: Age and sex distribution of the participants of the National Blindness and Low Vision Survey. Ethiopia, 2005-6.**

| Age group | Male | | Female | | Total | |
|---|---|---|---|---|---|---|
| | No | % | No | % | No | % |
| <1 Year | 324 | 2.3 | 322 | 2.1 | 646 | 2.2 |
| 1-9 Years | 4549 | 31.8 | 4515 | 28.8 | 9064 | 30.2 |
| 10-19 Years | 3410 | 23.8 | 3700 | 23.6 | 7110 | 23.7 |
| 20-29 Years | 1752 | 12.2 | 2542 | 16.2 | 4295 | 14.3 |
| 30-39 Years | 1501 | 10.5 | 1851 | 11.8 | 3353 | 11.2 |
| 40-49 Years | 1154 | 8.1 | 1205 | 7.7 | 2359 | 7.9 |
| 50-59 Years | 717 | 5.0 | 733 | 4.7 | 1450 | 4.8 |
| > 60 Years | 900 | 6.3 | 827 | 5.3 | 1727 | 5.8 |
| **Total** | **14307** | **47.7** | **15695** | **52.3** | **30004** | **100** |

## 4.2. Cluster information: health services availability and access

As shown in Table 11, clusters within ten kilometer radius of a health facility that stocks tetracycline were 54.7%; those within ten kilometer radius of a health facility that does TT surgery were 18.35; and those within ten kilometer radius of a health facility that does cataract surgery were 13.6%. Overall surgical facilities for eye care are not readily available. Trachoma prevention project/program has never been implemented in 67.1% of the clusters.

About 64.1% of the clusters are accessible by car or are within one hour walking distance from end of road. Only about 10.6% of clusters require over six hours walking from end of road. Thus, the survey clearly included some remote areas of the country. In terms of altitude about half of the clusters were reported to be in the lowland area (Table 12).

**Table 11. Proximity of survey clusters to the nearest health facility and availability of active trachoma prevention program. National Survey for Blindness and Low vision of Ethiopia, 2005-6.**

| Proximity of clusters to the nearest health facility (hospital/ clinic) that stocks tetracycline (estimate for a round trip) | Number | Percent |
|---|---|---|
| < 10 Km | 93 | 54.7 |
| 10-20 Km | 46 | 27.1 |
| 21-50 Km | 24 | 14.1 |
| 51-100 Km | 5 | 2.9 |
| 101-200 Km | 2 | 1.2 |
| >200 Km | 0 | 0.0 |
| Total | 170 | 100 |
| Proximity of clusters to the nearest health facility (hospital/ clinic) that provides TT surgery (estimate for a round trip) | | |
| < 10 Km | 31 | 18.3 |
| 10-20 Km | 21 | 12.4 |
| 21-50 Km | 23 | 13.6 |
| 51-100 Km | 18 | 10.7 |
| 101-200 Km | 33 | 19.5 |
| >200 Km | 43 | 24.4 |
| Total | 169 | 100 |
| Proximity of clusters to the nearest health facility (hospital/ clinic) that provides cataract surgery (estimate for a round trip) | | |
| < 10 Km | 23 | 13.6 |
| 10-20 Km | 13 | 7.7 |
| 21-50 Km | 17 | 10.7 |
| 51-100 Km | 16 | 9.5 |
| 101-200 Km | 46 | 27.2 |
| >200 Km | 54 | 32.0 |
| Total | 169 | 100 |
| Trachoma prevention project/program | | |
| Education on facial cleanliness and environmental control only | 51 | 30.0 |
| Mass antibiotic distribution in last 12 months | 8 | 4.7 |
| Mass antibiotic distribution in last 3 years | 9 | 5.3 |
| Surgery program | 6 | 3.5 |
| No program | 114 | 67.1 |

Table 12. Cluster Geographic Information. National Blindness and Low Vision Survey in Ethiopia, 2005-6.

|  | Number | Percent |
|---|---|---|
| **Accessibility** | | |
| Accessible by car on unpaved road | 50 | 29.4 |
| <1 hours walk from end of road | 59 | 34.7 |
| <3 hours walk from the end of road | 19 | 11.2 |
| < 6 hours (half day) walk from the end of road | 24 | 14.1 |
| < 12 hours (1 day) walk from the end of road | 18 | 10.6 |
| >12 hours  (1 day) walk from the end of road | 0 | 0.0 |
| Total | 170 | 100 |
| **Reported Altitudinal  zone** | No | % |
| Highland | 17 | 10.7 |
| Lowland | 80 | 50.3 |
| Midland | 62 | 39.0 |
| Total | 159 | 100 |

## 4.3. Household information: literacy, water source and sanitation

As shown in Table 13 majority (70.8%) of the household heads are farmers.  The major religions of households were Orthodox Christian (42.3%) and Islam (35.7%). The majority (64.5%) of the household heads were illiterate. Only 9.6% had high school education or better.

Regarding main water source about 18.6% of the households obtain their water from either a protected well or spring; and 28.2% from pipe distribution. The remaining 53.2% obtain their water from unprotected sources. However, 85.5% of the households obtain their water either in the household compound or within one hour walking distance (Table 14).

Majority of the households (59.6%) keep animals within twenty meter radius; and 44.9% of them keep the animals separately from their living room both at night and during the day. The majority of the households (84.6%) dispose their garbage in the open field; and 60.3% of the households had no latrine (Table 15).

**Table 13. Summary of household head selected characteristics. National Blindness and Low Vision Survey in Ethiopia, 2005-6.**

|  | Number | Percent |
|---|---|---|
| **Occupation Of Head Of Household** | | |
| Farmer | 4236 | 70.8 |
| Daily laborer | 131 | 2.2 |
| Government employee | 344 | 5.7 |
| Merchant | 349 | 5.8 |
| House wife | 247 | 4.1 |
| Other | 679 | 11.3 |
| Total | 5986 | 100 |
| | | |
| **Religion of Head of Household** | | |
| Orthodox Christian | 2536 | 42.3 |
| Islam | 2144 | 35.7 |
| Catholic | 52 | 0.9 |
| Protestant | 1075 | 17.9 |
| Traditional religion | 170 | 2.8 |
| No religion | 13 | 0.2 |
| Other | 12 | 0.2 |
| Total | 6002 | 100 |
| | | |
| **Educational status of Head of Household** | | |
| Illiterate | 3852 | 64.5 |
| Can read and write | 516 | 8.6 |
| 1-4 grade completed | 427 | 7.1 |
| 5-8 completed | 609 | 10.2 |
| 9-12 completed | 297 | 5.0 |
| college education | 275 | 4.6 |
| Total | 5976 | 100 |

**Table14. Water Source for Survey Households. National Blindness and Low Vision Survey of Ethiopia, 2005-6.**

|  | Number | Percent |
|---|---|---|
| **Source of Water** | | |
| Protected well | 578 | 9.6 |
| Protected spring | 542 | 9.0 |
| Unprotected well | 389 | 6.5 |
| Unprotected spring | 906 | 15.1 |
| Pond / surface water | 354 | 5.9 |
| River | 1269 | 21.2 |
| Piped water | 1693 | 28.2 |
| Other | 265 | 4.4 |
| Total | 5996 | 100 |
| | | |
| **Distance to collect water for the household use (round trip)** | | |
| In compound | 620 | 10.3 |
| < 30 minutes | 3034 | 50.6 |
| 30- 59 minutes | 1475 | 24.6 |
| 60-89 minutes | 372 | 6.2 |
| 90-119 minutes | 129 | 2.2 |
| 2-4 hours | 226 | 3.8 |
| 5-6 hours | 58 | 1.0 |
| >6 hours | 79 | 1.3 |
| Total | 5993 | 100 |

**Table 15. Sanitation Status of the Survey Households.  National Blindness and Low Vision Survey of  Ethiopia, 2005-6.**

|  | Number | Percent |
|---|---|---|
| Animals (cattle, sheep, goats, camels) kept within 20 meters of the houses | | |
| No animal | 2393 | 40.4 |
| Yes, 1-3 | 1666 | 28.1 |
| Yes, 4-6 | 779 | 13.1 |
| Yes, 7 or more | 1094 | 18.5 |
| Total | 5928 | 100 |
| | | |
| Animals (cattle, sheep, goats, camels) kept in the house where household members are living | | |
| No, keep separately | 1567 | 44.9 |
| Yes, only at night | 1337 | 38.3 |
| Yes, only during the day | 19 | 0.5 |
| Yes, both at night and during the day | 566 | 16.2 |
| Total | 3489 | 100 |
| | | |
| Garbage disposal | | |
| In open field | 5053 | 84.6 |
| In covered pit | 85 | 1.4 |
| In uncovered pit | 519 | 8.7 |
| Other | 317 | 5.3 |
| Total | 5974 | 100 |
| | | |
| Access to a latrine | | |
| No, use the field | 3609 | 60.3 |
| Yes, covered pit latrine | 618 | 10.3 |
| Yes, uncovered pit latrine | 1658 | 27.7 |
| yes, water carriage system | 78 | 1.3 |
| yes, but not used currently | 22 | 0.4 |
| Total | 5985 | 100 |
| | | |
| Latrine use (who uses latrine in the household?) | | |
| Only adults | 428 | 18.6 |
| Only children | 4 | 0.2 |
| Both adults and children | 1829 | 79.3 |
| Not regularly /consistently used | 41 | 1.8 |
| Other | 3 | 0.1 |
| Total | 2305 | 100 |

## 4.4. Visual status

As shown in Table 16 the national prevalence of blindness is 1.6%. The national prevalence of low vision is 3.7% with considerable regional variations.The very high prevalence of blindness and low vision in Somali region could not be explained. The low prevalence in the B-Gumuz was attributed by the survey team to the presence of large number of healthy immigrants from the neighboring areas in the Sudan into the survey villages. Table 17 shows that there is statistically significant difference between the urban and rural prevalence of blindness (p-value < 0.03) and low vision (p-value < 0.001). The rural areas have higher prevalence of blindness and low vision. Females compared to males have higher prevalence of blindness (P-value < 0.001) and low vision (p-value < 0.001). As expected people above the age of sixty year have the highest prevalence of both blindness and low vision. It is also important to note the prevalence of childhood blindness is 0.1%, which accounts for over 6% of the total blindness burden nationwide.

**Table 16: National and Regional Prevalence of Blindness and Low Vision based on presenting visual acuity. National Blindness and Low Vision Survey 2005-6.**

| Region | Prevalence of Blindness (%) | Prevalence of Low Vision (%) |
|---|---|---|
| Tigray | 1.5 | 2.9 |
| Afar | 1.2 | 2.7 |
| Amhara | 1.4 | 4.9 |
| Oromiya | 1.6 | 3.1 |
| Somali | 5.4 | 9.7 |
| B-Gumz | 0.8 | 0.7 |
| SNNPR | 0.7 | 2.0 |
| Gambella | 1.7 | 3.4 |
| Harrari | 2.2 | 2.2 |
| Addis Ababa | 1.4 | 2.7 |
| Dire Dawa | 1.7 | 3.1 |
| **National (Weighted)** | **1.6** | **3.7** |

**Table 17: Weighted Prevalence of Blindness and Low Vision by area of Residency, Gender and Age. National Blindness and Low Vision Survey 2005-6.**

|  | Prevalence of Blindness (%) | Prevalence of Low vision (%) |
|---|---|---|
| **National** | **1.6** | **3.7** |
| **Residency** | | |
| Urban | 1.1 | 2.6 |
| Rural | 1.6 | 3.8 |
| **Sex** | | |
| Male | 1.2 | 3.1 |
| Female | 1.9 | 4.1 |
| **Age (Year)** | | |
| <16 | 0.1 | 0.5 |
| 16-59 | 0.7 | 2.9 |
| 60 + | 14.8 | 24.7 |

The three major causes of blindness are cataract (49.9%), trachomatous corneal opacity (11.5%), and refractive error (7.8%). The three major causes of low vision include cataract (42.3%), refractive error (33.4%), and trachomatous corneal opacity (7.7%). All these causes of blindness and low vision are either preventable or treatable (Figure 7 and 8).

**Figure 6. Causes of Low Vision. National Blindness and Low Vision Survey of Ethiopia, 2005-6.**
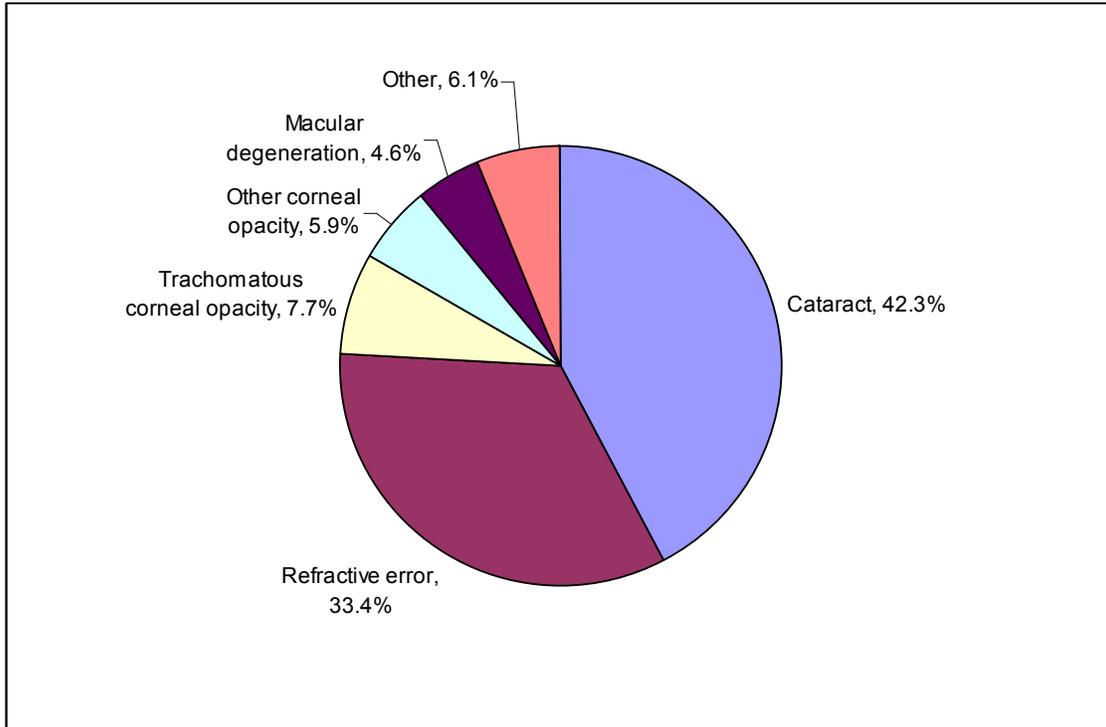


**Figure 7. Causes of Blindness. National Blindness and Low Vision Survey of Ethiopia, 2005-6.**
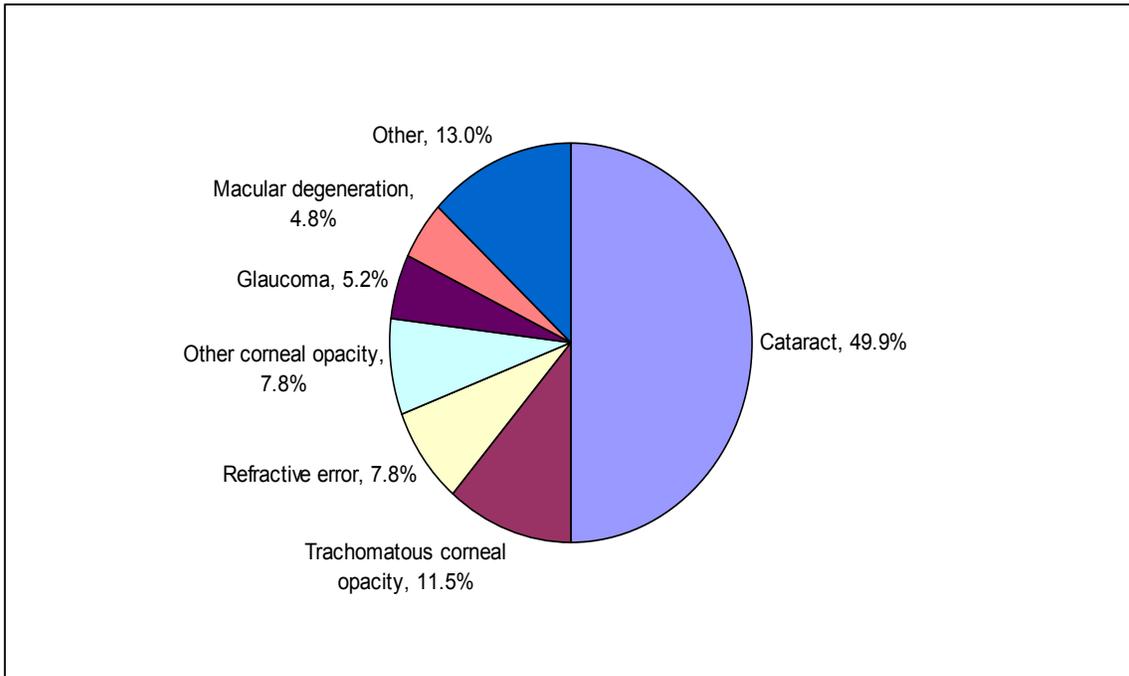
## 4.5. Trachoma

As shown in Figure 9 the national prevalence of active trachoma (either TF or TI) for children in the age group 1-9 year is 40.1%. This prevalence is very high and clearly indicates the burden of trachoma in a rapidly growing population. Moreover, the highest prevalence is registered in the big regional states of the country; namely, Amhara (62.6%), Oromia (41.3%), and SNNP (33.2%). In major towns where sanitation status and water supply is better the prevalence of active trachoma is very low. The prevalence of active trachoma is also low in the Afar regional state.

**Figure 9. Prevalence of Active Trachoma (AT) for Children 1-9 Year. National Blindness and Low Vision Survey of Ethiopia. 2005-6.**

| | Tigray | Afar | Amhara | Oromia | Somali | Bgumz | SNNP | Gambella | Harari | Addis Ababa | Dire Dawa | National (weighted) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| AT | 26.5 | 1.9 | 62.6 | 41.3 | 22.6 | 0.9 | 33.2 | 19.1 | 2.6 | 0.9 | 0.5 | 40.14 |
| TF | 20.8 | 1.9 | 39.1 | 24.5 | 16.7 | 0.9 | 26.4 | 14.6 | 2.6 | 0.5 | 0.5 | 26.2 |
| TI | 16 | 0.7 | 41.7 | 33.4 | 9.4 | 0.5 | 14.5 | 7.3 | 1.9 | 0.5 | 0 | 26.8 |
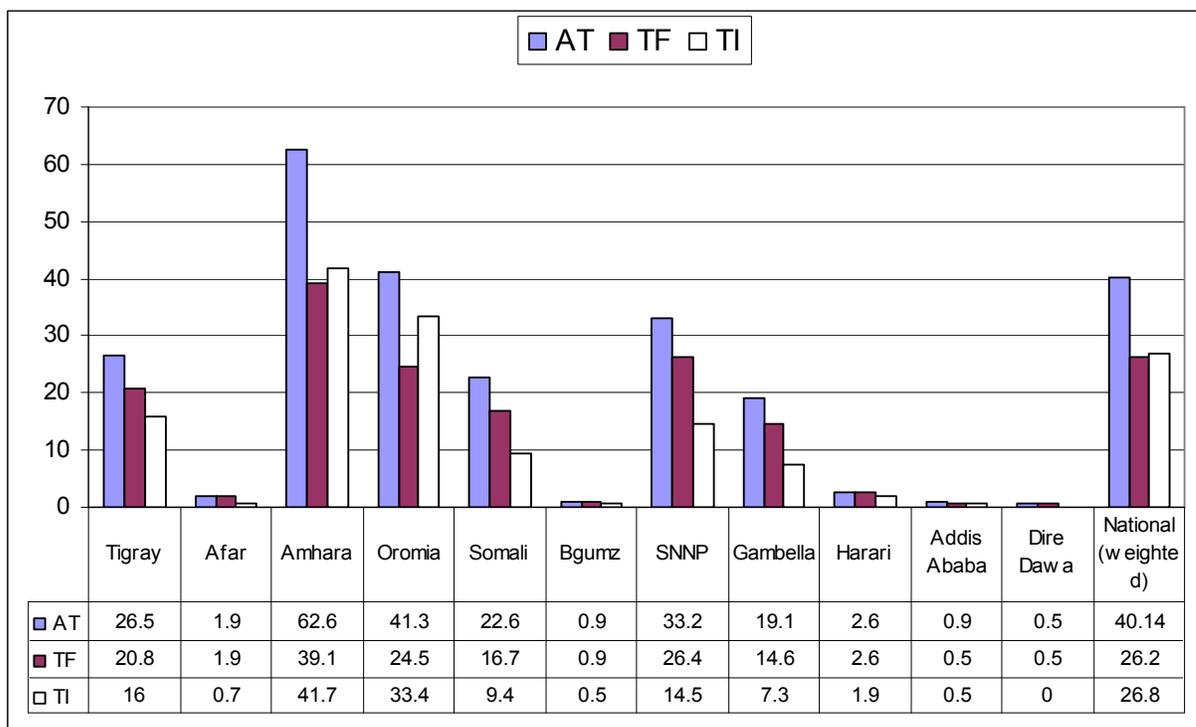
Figure 10 shows the prevalence of active trachoma by area of residency and gender. The prevalence of active trachoma is four-fold in the rural population compared to the urban (42.5% Vs 10.7%). This could be attributed as mentioned above due to the sanitation and water supply conditions. According to the Health Status Indicators published by the Federal Ministry of Health for the year 2004/5(16), safe water is available for 25.2% of the rural population and 91.7% of the urban population. Similarly, proper human waste disposal

coverage is about 80% for urban and 22% for rural population. There was no marked gender difference in the prevalence of active trachoma.

**Figure 10. Weighted prevalence of active trachoma for children 1-9 years stratified by residency and sex. National Blindness and low vision survey of Ethiopia. 2005-6.**



| | Urban | Rural | National | | Male | Female | National |
|---|---|---|---|---|---|---|---|
| ■ AT | 10.7 | 42.5 | 40.14 | | 40.5 | 39.8 | 40.14 |
| ▨ TF | 3.8 | 28 | 26.2 | | 26.8 | 25.5 | 26.2 |
| □ TI | 8.2 | 28.3 | 26.8 | | 26.2 | 27.4 | 26.8 |
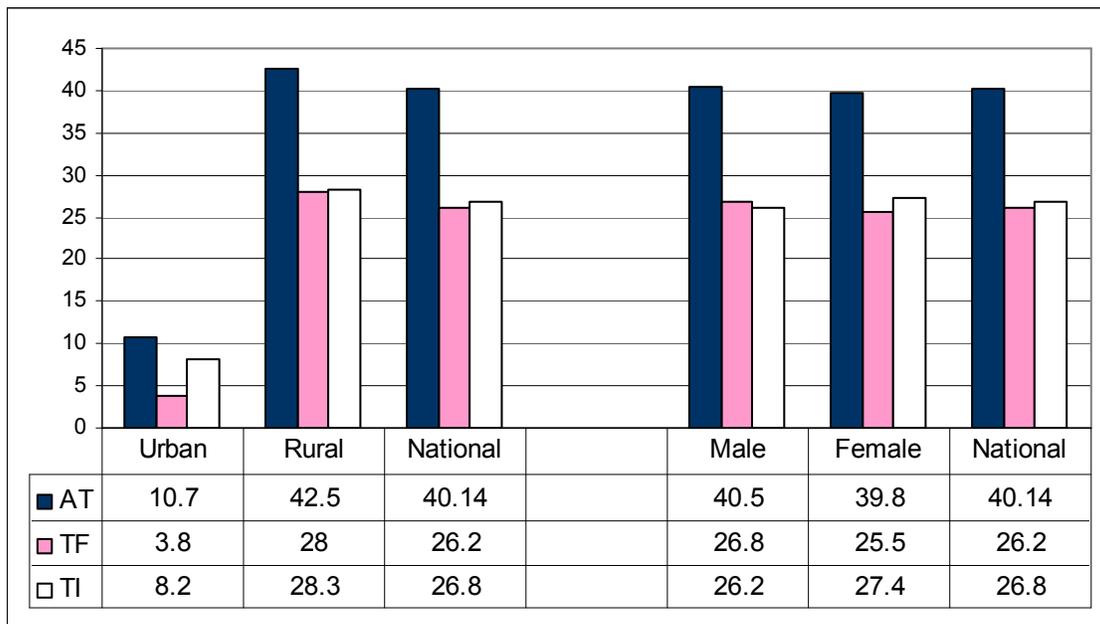
Considering the reported face washing habit and the facial cleanliness observations shown in Table 18 coupled with the general poor hygienic practices it is not perhaps surprising to see such high prevalence of trachoma. Effort to reduce the burden of trachoma must seriously consider improving hygienic practices.

The national prevalence of Trachomatous trichiasis (TT) for the age group 15 and above is 3.1% (Table 19). Figure 11 also shows a close to fourfold increase in prevalence in the rural population as compared to the urban (3.5% Vs 0.9%; statistically significant with p-value < 0.001). The prevalence among females is also over twofold compared to males (4.1% Vs 1.6%; statistically significant with p-value < 0.001). Thus, trachomatous trichiasis and ensuing blindness is much higher among women.

**Table 18: Face Washing Habit and Facial Cleanliness of children 1-9 year. National Blindness and Low Vision Survey in Ethiopia, 2005-6.**

|  | **Number** | **Percent** |
|---|---|---|
| **Frequency of Face Washing** | | |
| Never | 54 | 0.6 |
| Once a day | 4954 | 58.3 |
| Twice a day | 3221 | 37.4 |
| Sometime: Once a week | 100 | 1.2 |
| Sometime: Once a month | 2 | 0.0 |
| Other | 164 | 1.9 |
| Total | 8495 | 100 |
| | | |
| **Facial observation** | | |
| Ocular discharge | 2713 | 29.3 |
| Nasal discharge | 3832 | 41.3 |
| Fly on the child's face | 3293 | 35.6 |
| Either ocular discharge or nasal discharge | 4338 | 46.8 |
| | | |
| Either ocular discharge, nasal discharge or fly on the child's face | 5114 | 55.5 |

**Table 19: Prevalence of Trachomatous trichiasis (TT) for the above 15 year population. National Blindness and Low Vision Survey 2005-6.**

| Region | TT Prevalence |
|---|---|
| Tigray | 2.3 |
| Afar | 1.0 |
| Amhara | 5.2 |
| Oromia | 2.8 |
| Somali | 4.2 |
| B-Gumz | 0.1 |
| SNNP | 2.0 |
| Gambella | 2.5 |
| Harari | 1.2 |
| Addis Ababa | 0.9 |
| Dire Dawa | 0.7 |
| **National (weighted)** | 3.1 |

**Figure 11: Weighted prevalence of TT and TS for above 15 years old. National Blindness and Low Vision Survey of Ethiopia. 2005-6.**



| | National | Rural | Urban | | National | Male | Female |
|---|---|---|---|---|---|---|---|
| □ TT | 3.1 | 3.5 | 0.9 | | 3.1 | 1.6 | 4.1 |
| ■ TS | 20.7 | 21.1 | 16.5 | | 20.7 | 17.3 | 23 |
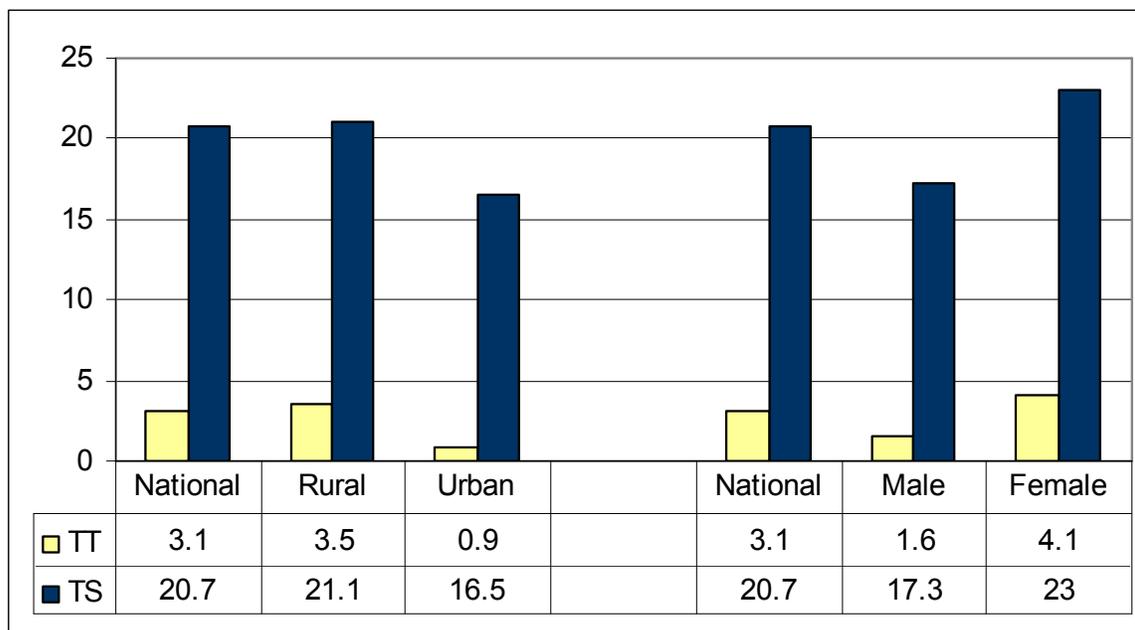
**4.6. Vitamin A deficiency (VAD) eye problems**

As shown in Table 20 for children under five year the national prevalence of reported night blindness is 0.1%, and the observed prevalence of conjuctival xerosis is 0.9%, and Bitot's spot is 0.7%.

**Table 20. Vitamin A Deficiency Eye Diseases. National Blindness and Low Vision Survey in Ethiopia, 2005-6. (Only for Under Five)**

| Vitamin A deficiency Eye Problems | Percent |
|---|---|
| Night Blindness | 0.1 |
| Conjuctival Xerosis | 0.9 |
| Bitot's spots | 0.7 |

## 5. CONCLUSIONS AND RECOMMENDATIONS

Overall the burden of eye problems in Ethiopia is huge. As shown in Table 21 about 1.2 million people are blind; 2.7 million people are living with low vision; over 9 million children are affected by trachoma; and over 1.2 million adults are suffering from Trachomatous trichiasis (TT).

**Table 21. Summary of the magnitude of Eye Health Problems in Ethiopia. National Blindness and Low Vision Survey of Ethiopia, 2005-6.**

| | |
|---|---|
| Number of Blind persons | 1 200 456 |
| Number of individuals having Low vision | 2 776 054 |
| Number of children having Active Trachoma | 9 034 931 |
| Number of individuals with Trachomatous trichiasis | 1 255 977 |
| Number of Blind persons due to avoidable causes | 1 049 198 |
| Number of Blind persons due to cataract | 600 228 |
| Number of individuals having Low vision due to cataract | 1 174 271 |
| Number of individuals having Low vision due to Refractive error (individuals needing spectacle) | 960 515 |

Amazingly large proportion of the causes of blindness and low vision are avoidable (i.e either preventable or treatable) with time proven interventions that are both feasible and reasonably affordable. About half of the blindness cases (600,000 persons) and 41 % of low vision cases (1.2 million persons) are due to cataract that can be corrected surgically. Trachoma also accounts for a significant proportion of blindness (11.5%) and low vision (7.7%). Over 1.2 million people unnecessarily suffer from the painful condition of trachomatous trichiasis and are in the immediate danger of becoming blind. There are effective prevention and curative technologies for avoiding eye problems due to trachoma.

It is also very important to note that elderly people, women, and rural residents are at a greater risk of low vision and blindness. Although age is a biological risk factor gender and residency reflect on the social inequalities in promoting health and accessing health services. Emphasis need to be given to minimize the gender differences.

Trachoma, both active Trachoma and Trachomatous trichiasis ( TT ), is concentrated in some regions of the country (Amhara, Oromia, SNNPR) that also account individually and collectively for the large proportion of the country's population. These regions have large rural population and environmental and hygienic conditions that favor trachoma transmission.

The above facts clearly indicate eye problems in Ethiopia are among the major public health problems of the country and pose huge economic and social impact for affected individuals and to the society and the nation at large. The burden of disease and the number of individuals affected also indicate the formidable demand on health services (resources) to tackle the backlog of cataract and trachomatous trichiasis (TT) surgery, and provide mass antibiotic treatment with Azithromycin (Zithromax®).

Thus, based on the findings of the survey and its implication on the affected individuals, communities, and to the nation at large the following recommendations are forwarded:

- The magnitude and severity of eye problems, particularly blindness and low vision, in Ethiopia need to be recognized as major public health challenge.

- The Federal Government of Ethiopia and the regional governments need to enhance their commitment to avoid unnecessary loss of sight by increasing resources allocation and improving organization capacity and capability at all levels to effectively and timely provide preventive and curative eye care services.

- Formulation of focused policy to alleviate and prevent major causes of blindness and low vision must be given due emphasis.

- Increase organizational resources for implementation of time tested and cost-effective strategies to prevent and treat major causes of blindness and low vision as described in VISION 2020 and the five-year strategic plan for prevention of blindness of the country (2006-2010).

- Support development of basic infrastructure and human capacity for prevention, treatment and rehabilitation services at all levels.

- Emphasis needs to be given for comprehensive and integrated prevention and treatment eye care programs in order to reduce the disease burden in the long term.

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**7. APPENDIXES**

**Appendix 1: Verbal Consent Form**

*Ask consent for all adults*
*For Children less than 15 years ask consent from parents or guardians*

I am informing you about the national blindness and low vision survey that is being conducted by the Ministry of Health. The survey is carried by qualified health workers under supervision of Dr. _____.

The survey team will assess visual acuity and perform eye examination for all members of the household. Based on the initial screening test if we find you to have a problem with your sight the eye doctor would perform further eye examinations to find out the reason for your eye problem. That means, the eye doctor will measure the pressure of your eye by first putting a drop in your eye so that you don't feel anything. Then, the back of your eye will be examined by the eye doctor by using another eye drop to dilate your pupil so that the inside of your eye can be examined using a light. There is a very slight risk to your eyes from these drops. Very rarely people experience pain and blurred vision, which, if not treated, can result in reduced vision. However, if the eye doctor thinks that you may be at risk he/she will not use the drops. If you do get any side-effects we have drugs that the eye doctor can use to reverse the problem. If the cause of your blindness can be treated with surgery we will give you a referral letter and register your name for the Regional Health Bureau. If you do not wish to have this examination you are free to say so. You may also stop the examination at any time. Your name will not be used when we tell people the results of this survey.

Do you have any questions? *(Please provide further information requested by the person)*

Do you agree to participate? *(Proceed with the survey only if the person or guardian agrees to participate)*

_____

*If the person wishes to obtain further information or has questions or wish to find out the results of this study give contact address for the local health authority in the study woreda or at the Regional Health Bureau.*

**APPENDIX 2 : Household registration form**

Cluster No |__|__|__|

Cluster Name: _____Woreda: _____Region:_____

| HH No. Write this number on the house/door | Name of Head of Household | Is the household informed when the survey team will come to the village? ☐ 1=Yes ☐ 2=No ☐ 3=Not available | Remark |
|---|---|---|---|
| 01 | | | |
| 02 | | | |
| 03 | | | |
| 04 | | | |
| 05 | | | |
| 06 | | | |
| 07 | | | |
| 08 | | | |
| 09 | | | |
| 10 | | | |
| 11 | | | |
| 12 | | | |
| 13 | | | |
| 14 | | | |
| 15 | | | |
| 16 | | | |
| 17 | | | |
| 18 | | | |
| 19 | | | |
| 20 | | | |
| 21 | | | |
| 22 | | | |
| 23 | | | |
| 24 | | | |
| 25 | | | |
| 26 | | | |
| 27 | | | |
| 28 | | | |
| 29 | | | |
| 30 | | | |
| 31 | | | |
| 32 | | | |
| 33 | | | |
| 34 | | | |
| 35 | | | |
| **Total** | | | |

Name & Signature of Interviewer: _____ Date: _____

Name & Signature of Woreda Coordinator: _____ Date: _____

_____

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### APPENDIX 3: Cluster Information Form

Name of the woreda coordinator _____

| 1. Region | 2. Zone | 3. Woreda | 4. Cluster (Kebele) | 5. Cluster number: | 6. Total number of households in the cluster: |
|-----------|---------|-----------|---------------------|--------------------|-----------------------------------------------|
|           |         |           |                     |                    |                                               |

---

**7. Urban/rural cluster**

☐ 1= Urban ☐ 2= Rural

---

**8. Proximity to nearest health facility (hospital or clinic) that stocks tetracycline (estimate for a round trip)**

☐ 1= < 10 Km ☐ 4= 51-100 Km
☐ 2= 10-20 Km ☐ 5= 101-200 Km
☐ 3= 21-50 Km ☐ 6= >200 Km ☐ 9= Unknown

---

**9. Proximity to nearest health facility (hospital / clinic) that provides TT surgery**

(estimate for a round trip)
☐ 1= < 10 Km ☐ 4= 51-100 Km
☐ 2= 10-20 Km ☐ 5= 101-200 Km
☐ 3= 21-50 Km ☐ 6= >200 Km ☐ 9= Unknown

---

**10. Proximity to nearest health facility (hospital / clinic) that provides cataract surgery**

(estimate for a round trip)
☐ 1= < 10 Km ☐ 4= 51-100 Km
☐ 2= 10-20 Km ☐ 5= 101-200 Km
☐ 3= 21-50 Km ☐ 6= >200 Km ☐ 9= Unknown

---

**11. Cluster accessibility**
☐ 1= Accessible by car on paved road ☐ 5= < 6 hours (half day) walk from the end of road
☐ 2= Accessible by car on unpaved road ☐ 6= < 12 hours (1 day) walk from the end of road
☐ 3= <1 hours walk from end of road ☐ 7= >12 hours (1 day) walk from the end of road
☐ 4= <3 hours walk from the end of road ☐ 9= Unknown

---

**12. This cluster is in the following altitudinal zone**

☐ 1= Highland ☐ 8= Other Specify _____

☐ 2= Lowland ☐ 9= Unknown

☐ 3= Midland

---

**13. Altimeter reading |____|____|____|____|**

---

**14. Has there been trachoma prevention project in this cluster?**

☐ 1= Education on facial cleanliness and environmental control only

☐ 2= Mass antibiotic distribution in last 12 months

☐ 3= Mass antibiotic distribution in last 3 years ☐ 5= No program

☐ 4= Surgery program ☐ 9= Unknown

---

**15. Comments (Please document any problems or comments about this cluster)**

**APPENDIX 4: Household Information**

| 1. Region | 2. Zone | 3. Woreda | 4. Cluster (Kebele) | 5. Cluster number | 6. Name of head of household | 7. Household Number |
|---|---|---|---|---|---|---|
|  |  |  |  |  |  |  |

| Date: _ _ /_ _ /_ _  (Ethiopian Date: DD/MM/YY) | Interviewer Name: |
|---|---|

1. How many people live in this household? |__|__|

   *(Members of the household are persons who usually live in the household. Visitors are persons who do not usually live in the household. Do not include visitors.)*

1a. How many members of the household are here today? |__|__|

1b Complete the table below for all household members.

| .Completed | ID | Household Members (Initial) | 1b1 Age | 1b2 Sex 1= Male 2=Female | 1b3 Is this person present today? 1=Yes 2=No 3=Yes, but Refused eye examination | 1b4 Where is Missing Person 1= school 2=at work 3= at the market 4=at religious service 5=at clinic hospital 6=visiting relatives 7= other, specify___ 9=unknown | 1b5 Believed to be Blind 1=Yes 2=No 9=Don't know | 1b6 Believed to have low Vision 1=Yes 2=No 9=Don't know |
|---|---|---|---|---|---|---|---|---|
| 1=Yes 2=No | ID | For All Persons |  |  |  | ONLY For Missing | | |
|  | A |  |  | (M)  (F) |  |  |  |  |
|  | B |  |  | (M)  (F) |  |  |  |  |
|  | C |  |  | (M)  (F) |  |  |  |  |
|  | D |  |  | (M)  (F) |  |  |  |  |
|  | E |  |  | (M)  (F) |  |  |  |  |
|  | F |  |  | (M)  (F) |  |  |  |  |
|  | G |  |  | (M)  (F) |  |  |  |  |
|  | H |  |  | (M)  (F) |  |  |  |  |
|  | I |  |  | (M)  (F) |  |  |  |  |
|  | J |  |  | (M)  (F) |  |  |  |  |
|  | K |  |  | (M)  (F) |  |  |  |  |
|  | L |  |  | (M)  (F) |  |  |  |  |
|  | M |  |  | (M)  (F) |  |  |  |  |
|  | N |  |  | (M)  (F) |  |  |  |  |
|  | O |  |  | (M)  (F) |  |  |  |  |
|  | P |  |  | (M)  (F) |  |  |  |  |

_____
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2. Age of the head of the household (estimate)   |___|___| Year        □ 99= don't know

3. Sex of head of household:    □ 1 = Male          □ 2 = Female

4. What is the main occupation of the head of the household?
   □ 1 = Farmer               □ 3 = Government employee   □ 5 =  House wife
   □ 2 = Daily laborer          □ 4 = Merchant             □ 8 = Other, Specify _____

5. Religion of head of household
   □ 1 = Orthodox         □ 4 = Protestant
   □ 2 = Muslim            □ 5 = Traditional religion
   □ 3 = Catholic          □ 6 = No religion       □ 8 = Other.  Specify _____

6. Has the head of household had any formal education?
   □ 1 = Illiterate            □ 3 = 1-4 grade completed     □ 5 = 9-12 completed
   □ 2 = Can read and write   □ 4 = 5-8 completed           □ 6 = college education

7. What is your water source?
   □ 1 = Protected well        □ 4 = Unprotected spring
   □ 2 = Protected spring     □ 5 = Pond / surface water   □ 7 = Piped water
   □ 3 = Unprotected well     □ 6 = River               □ 8 = Other , Specify _____

8. How long does it take to collect water for the household use? (round trip)
   □ 1 = In compound         □ 4 = 60-89 minutes        □ 7 = 5-6 hours
   □ 2 = < 30 minutes         □ 5 = 90-119 minutes     □ 8 = >6 hours
   □ 3 = 30- 59 minutes      □ 6 = 2-4 hours

9. Are any animals (cattle, sheep, goats, camels) kept within 20 meters of your house? *(Interviewer to estimate distance)*
   □ 1 = No   (Go to Q # 11)     □ 3 = Yes, 4-6
   □ 2 = Yes, 1-3               □ 4 = Yes, 7 or more

10. Do you keep your animals (cattle, sheep, goats, camels) in the house you are living in?
   □ 1 = No, keep separately       □ 3 = Yes, only during the day
   □ 2 = Yes, only at night         □ 4 = Yes, both at night and during the day

11. Where do you dispose of your garbage? *(Interviewer needs to verify presence of pit)*
   □ 1 = In open field       □ 3 = in uncovered pit
   □ 2 = In covered pit      □ 8 = Other          Specify _____

12. Does your household have access to a latrine? *(Interviewer needs to verify presence of pit latrine)*
   □ 1= No, use the field       □ 4= yes, water carriage system
   □ 2= Yes, covered pit latrine   □ 5= yes, but not used currently
   □ 3= Yes, uncovered pit latrine

13. Who in the household is regularly using the latrine? (If have a latrine)
   □ 1 = Only adults      □ 3 = Both adults and children
   □ 2 = Only children    □ 4 = Not regularly /consistently used     □ 8 = Other , Specify _____

14. What is the main material of the roof of your house?
   □ 1 = Corrugated iron     □ 5 = Reed/bamboo
   □ 2 = Cement/concrete    □ 6 = Plastic sheets
   □ 3 = Wood and mud     □ 7 = Mobile roofs of nomads
   □ 4 = Thatch           □ 8 = Other

**THANK YOU FOR YOUR PARTICIPATION- NOW I WILL TRANSFER YOU TO THE HEALTH WORKERS WHO WILL EXAMINE YOUR EYES.**

**APPENDIX 5: Supervisors Checklist**

Cluster No |__|__|__|              Supervisor Name:_____

Cluster information sheet completed? Yes ☐ No ☐

| HH No | No. of HH members present today from HH question 1a | No. of persons in the household examined today | If there is discrepancy between W & X, what is the reason for discrepancy? | Are all questionnaires & eye exam form completed for all individuals in column X? |
|---|---|---|---|---|
| | **W** | **X** | **Y** | **Z** |
| 1 | | | | |
| 2 | | | | |
| 3 | | | | |
| 4 | | | | |
| 5 | | | | |
| 6 | | | | |
| 7 | | | | |
| 8 | | | | |
| 9 | | | | |
| 10 | | | | |
| 11 | | | | |
| 12 | | | | |
| 13 | | | | |
| 14 | | | | |
| 15 | | | | |
| 16 | | | | |
| 17 | | | | |
| 18 | | | | |
| 19 | | | | |
| 20 | | | | |
| 21 | | | | |
| 22 | | | | |
| 23 | | | | |
| 24 | | | | |
| 25 | | | | |
| 26 | | | | |
| 27 | | | | |
| 28 | | | | |
| 29 | | | | |
| 30 | | | | |
| 31 | | | | |
| 32 | | | | |
| 33 | | | | |
| 34 | | | | |
| 35 | | | | |
| **Total** | | | | |

**Totals in column W and X should be equal. If not a reason must be given. Supervisor must also check that all questions have been completed on HH questionnaire and eye exam form.**

**APPENDIX 6: Eye Examination Form** (Must be completed for each individual)

## Section I: To be completed by interviewer (Name: _____)

| 1. Region | 2. Zone | 3. Woreda | 4. Cluster (Kebele) | 5. Cluster number | 6. Name of head of house hold | 7. Household Number | 8. Date |
|---|---|---|---|---|---|---|---|
|  |  |  |  |  |  |  |  |

### Individual Information

| 9. Name of the person examined | 10. Age of the person examined | 11.Sex of the person examined | 12. How long does the person lived permanently in the present residence area? |
|---|---|---|---|
|  | /___/___/ years | ☐ 1=Male <br> ☐ 2= Female | /___/___/ years <br> ☐ =99 Since birth |

### For Children 1-9 years of age (ask the mother or permanent adult, > 15 years old, household member)

| 13. How often does this child wash his/her face? | 14. During the past 12 months have you noticed the child frequently squinting? | 15. During the past 12 months, have you noticed the child stopping playing or becoming very quiet when twilight comes? |
|---|---|---|
| ☐ 1 = Never <br> ☐ 2 = Once per day <br> ☐ 3 = Twice per day <br> ☐ 4 = Occasionally, like once a week <br> ☐ 5 = Occasionally, like once a month <br> ☐ 8 = Other, Specify _____ | ☐ 1=yes <br> ☐ 2=no | ☐ 1=yes <br> ☐ 2=no |

## Section II: To be completed by OPTHALMIC NURSE I (Name: _____)

| 16. Is there ocular discharge in the child face? | ☐ 1=Yes ☐ 2=No |
|---|---|
| 17. Is there a nasal discharge in the child's face? | ☐ 1=Yes ☐ 2=No |
| 18. Is there a fly on the child's face, within 3 seconds of observation? | ☐ 1=Yes ☐ 2=No |
| 19. Vision status | ☐ 1=Unaided ☐ 2=With glasses |

### Vision Examination Record

**Ophthalmic Nurse I**

| 20. Presenting Visual acuity | R | L | 21. Pinhole if less than 6/18 (corrected vision) | R | L | 22. VA Not Tested* | R | L |
|---|---|---|---|---|---|---|---|---|
| 6/18 or better | ☐=1 | ☐=1 | Improved to 6/18 | ☐=1 | ☐=1 | Believed Blind | ☐=1 | ☐=1 |
| 6/60 - < 6/18 | ☐=2 | ☐=2 | 6/60 - < 6/18 | ☐=2 | ☐=2 | Believed Not Blind | ☐=2 | ☐=2 |
| 3/60 - < 6/60 | ☐=3 | ☐=3 | 3/60 - < 6/60 | ☐=3 | ☐=3 | Not Determined | ☐=3 | ☐=3 |
| Cannot see 3/60 | ☐=4 | ☐=4 | Cannot see 3/60 | ☐=4 | ☐=4 |  |  |  |

**Section III: Ophthalmic Nurse II (Name:_____)**

| 23. Previous EYE SURGERY | R | L | 26. Cornea | R | L | 28. Trachoma | R | L |
|---|---|---|---|---|---|---|---|---|
| No evidence of surgery | ☐ | ☐ | Normal | ☐ | ☐ | No sign of trachoma | ☐ | ☐ |
| Eyelid/TT | ☐ | ☐ | Corneal opacity | ☐ | ☐ | TT | ☐ | ☐ |
| Cataract | ☐ | ☐ | Pterygium (corneal) | ☐ | ☐ | CO | ☐ | ☐ |
| Glaucoma | ☐ | ☐ | **27. Lens** | **R** | **L** | TF | ☐ | ☐ |
| Couching | ☐ | ☐ | Clear Lens | ☐ | ☐ | TI | ☐ | ☐ |
| Other | ☐ | ☐ | Obvious opacity | ☐ | ☐ | TS | ☐ | ☐ |
| **24. Eyelid** | **R** | **L** | Aphakia | ☐ | ☐ | Not examined | ☐ | ☐ |

| | | | | | | | 29. Xerophthalmia | R | L |
|---|---|---|---|---|---|---|---|---|---|
| Normal | □ | □ | Pseudophakia | □ | □ | | No sign | □ | □ |
| Inturned margin/ trichiasis | □ | □ | Other, specify: | □ | □ | | Night blindness | □ | □ |
| Defective closure | □ | □ | Not Examined | □ | □ | | Conjunctival Xerosis | □ | □ |
| **25. Conjunctiva** | **R** | **L** | | | | | Bitot's spots | □ | □ |
| Normal | □ | □ | | | | | Corneal xerosis | □ | □ |
| Vernal Conjunctivitis | □ | □ | | | | | Corneal ulcer | □ | □ |
| | | | | | | | Keratmalacia | □ | □ |
| | | | | | | | Not examined | □ | □ |

\* If VA not done assess whether the person is blind or not by history and light fixation.
(This is mainly for children under five year)

## Section IV: To be completed by ophthalmologist (Name: _____ )

| 30. CONFIRMATION | Presenting | Corrected | 31. Glaucoma | R | L |
|---|---|---|---|---|---|
| This person has low vision | □ 1=Yes □ 2=No | □ 1=Yes □ 2=No | Cup disk ratio | | |
| This person is blind | □ 1=Yes □ 2=No | □ 1=Yes □ 2=No | IOP in mm Hg (in case of medial corneal opacity) | | |
| | | | Not examined | □ 1=Yes □ 2=No | □ 1=Yes □ 2=No |

| 32. CAUSES of LOW VISION OR BLIDNESS (Corrected Vision) | Mark ONLY ONE principal cause for each eye and for the person | | | 34. CURRENT ACTION NEEDED Indicate clearly what actions can be taken to correct low vision or blindness? | | |
|---|---|---|---|---|---|---|
| | R | L | For the person[3] | | R | L |
| 1.Phthiscal/Disorganized/absent globe | □=1 | □=1 | □=1 | | | |
| 2.Refractive error | □=2 | □=2 | □=2 | 1.None | □=1 | □=1 |
| 3.Cataract | □=3 | □=3 | □=3 | 2.Cataract surgery | □=2 | □=2 |
| 4.Uncorrected Aphakia | □=4 | □=4 | □=4 | 3.Eyelid surgery | □=3 | □=3 |
| 5.Trachomatous corneal opacity | □=5 | □=5 | □=5 | 4.Glaucoma surgery | □=4 | □=4 |
| 6.Other corneal opacity | □=6 | □=6 | □=6 | 5.Spectacles | □=5 | □=5 |
| 7.Anterior Uveitis | □=7 | □=7 | □=7 | 6.Medication | □=6 | □=6 |
| 8.Glaucoma | □=8 | □=8 | □=8 | 7.Other (Specify) | □=7 | □=7 |
| 9.Optic Neuritis | □=9 | □=9 | □=9 | | | |
| 10.Optic Atrophy | □=10 | □=10 | □=10 | | | |
| 11.Vascular Retinopathy | □=11 | □=11 | □=11 | | | |
| 12.Chororetinitis | □=12 | □=12 | □=12 | | | |
| 13.Chororetinal scar | □=13 | □=13 | □=13 | | | |

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[3] For the person select only one principal cause that is the most preventable or treatable cause of blindness or low vision.

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| 14.Macular degeneration | □=14 | □=14 | □=14 |
|---|---|---|---|
| 15.Other, Specify | □=15 | □=15 | □=15 |
| 16.Not examined | □=16 | □=16 | □=16 |
| | | | |

| 33. UNDERLYING CAUSES | R | L | Person |
|---|---|---|---|
| 1.Trauma | □=1 | □=1 | □=1 |
| 2.Congential/Neonatal factor | □=2 | □=2 | □=2 |
| 3.Onchocerciasis | □=3 | □=3 | □=3 |
| 4.Measles/Vitamin A deficiency | □=4 | □=4 | □=4 |
| 5.Toxoplasmosis | □=5 | □=5 | □=5 |
| 6.Other infections | □=6 | □=6 | □=6 |
| 7.Surgical procedures | □=7 | □=7 | □=7 |
| 8.Couching | □=8 | □=8 | □=8 |
| 9.Harmful traditional practice | □=9 | □=9 | □=9 |
| 10.Other, Specify_____ | □=10 | □=10 | □=10 |
| 11.Unknown Aetiology | □=11 | □=11 | □=11 |

**Remarks**

_____

_____

_____

_____

_____

_____

_____

_____

_____

## APPENDIX 7: **Referral Slip**

| To | |
|---|---|
| Name of person referred | |
| Address of the person referred | |
| Reason for referral | |
| Treatment Given during the survey | |
| Referred by | |
| Signature | |

*This person is identified to have the above mentioned eye problem during a community survey conducted as part of the National Blindness and Low vision survey carried out by the Federal Ministry of Health. Your kind assistance to this person is very much appreciated.*

*The National Blindness and Low Vision Survey*
*Coordination Office*

# Member of the Survey Teams

Primary Investigators

1. Prof. Yemane Berhane (Principal Investigator, Epidemiologist)
2. Dr. Alemayehu Worku (Co-Investigator, Biostatistician)
3. Dr. Abebe Bejiga (Co-Investigator, Ophthalmologist)

Collaborating Investigators
4. Prof. Shiela West (El Maghraby Professor of Preventive Ophthalmology, Johns Hopkins Medical Institutions)
5. Dr. Emily West Gower (Johns Hopkins Medical Institutions)

National Blindness and Low Vision Survey Technical Committee

1. Dr. Wondu Alemayehu
2. Dr. Liknaw Adamu
3. Dr. Amir Bedri
4. Dr. Allehone Ayalew
5. Dr. Yilkal Adamu
6. Ato. Zegeye Haile
7. Ato. Teshome Gebre

National Survey Coordination Office Staff
1. Dr. Tewodros Dubale, Survey coordinator
2. Ato Frezer Asfaw, Data manager
3. Tigist Bekele , data entry clerk
4. Solomon Lemmesa , data entry clerk
5. Thomas W/Birhan , data entry clerk
6. Henok Yared , data entry clerk

# NATIONAL BLINDNESS AND LOW VISION SURVEY
## FIELD WORK PARTICIPANTS
## BY REGION

### I.  ADDIS ABABA
**Number of Teams:**     Four

| | Name | RESPONSIBILITY IN THE SURVEY |
|---|---|---|
| 1 | Dr. Fikru Melka | Ophthalmologist |
| 2 | Sr. Manalebish Areda | Ophthalmic Nurse II |
| 3 | Ato Nigatu Lemma | Ophthalmic Nurse I |
| 4 | Sr. Ehtemariam Kassaye | Ophthalmic Nurse I |
| 5 | W/ Samrawit Nigussie | Interviewer |
| 6 | Ato Ibrahim Geleto | Woreda Coordinator |

| | Name | RESPONSIBILITY IN THE SURVEY |
|---|---|---|
| 1 | Dr Allehone Ayalew | Ophthalmologist |
| 2 | Ato Gizachew Abebe | Ophthalmic Nurse II |
| 3 | Sr Meaza Gebre | Ophthalmic Nurse I |
| 4 | Sr Belaynesh Tesfaye | Ophthalmic Nurse I |
| 5 | Wz Woinshet Aman | Interviewer |
| 6 | Ato Sheleme Humnessa | Woreda Coordinator |

| | Name | RESPONSIBILITY IN THE SURVEY |
|---|---|---|
| 1 | Dr. Meriem Seraj | Ophthalmologist |
| 2 | Ato Tilaye Tessema | Ophthalmic Nurse II |
| 3 | Sr. Mulunesh Zewde | Ophthalmic Nurse I |
| 4 | Sr. Hirut Tamiru | Ophthalmic Nurse I |
| 5 | W/ Zewditu Mengistu | Interviewer |
| 6 | Ato Alazer Altaye | Woreda Coordinator |
| 7 | Ato Bezinaw Mulugeta | Woreda Coordinator |

| | NAME | RESPONSIBILITY IN THE SURVEY |
|---|---|---|
| 1 | Dr. Sophia Yoseph | Ophthalmologist |
| 2 | Ato Alemseged Solomon | Ophthalmic Nurse II |
| 3 | Sr. Almaz Agonafir | Ophthalmic Nurse I |
| 4 | Ato Hailu Mengesha | Ophthalmic Nurse I |
| 5 | W/ Beti Nigussie | Interviewer |
| 6 | Ato Asefa Demisse | Woreda Coordinator |
| 7 | Ato Tesfaye Aregahegne | Woreda Coordinator |
| 8 | Sr. Seblework Tadesse | Regional Coordinator |

### II.  DIRE DAWA
**Number of Team:** One

| | NAME | RESPONSIBILITY IN THE SURVEY |
|---|---|---|
| 1 | Dr. Tegene Gizaw | Ophthalmologist |
| 2 | Sr. Tsigie Kebu | Ophthalmic Nurse II |
| 3 | Ato Ephrem Zewedu | Ophthalmic Nurse I |
| 4 | Ato Girma Diro | Ophthalmic Nurse I |
| 5 | Ato Yohannes Ejigu | Interviewer |
| 6 | Ato Moges Negash | Woreda Coordinators |
| 7 | Dr. Tsigereda Kifle | Regional Coordinator |

## III. HARERI
**Number of Team:** One

| | NAME | RESPONSIBILITY IN THE SURVEY |
|---|---|---|
| 1 | Dr. Nuredin Abdi | Ophthalmologist |
| 2 | S/r Tewabech Terefe | Ophthalmic Nurse II |
| 3 | Sr. Tewabech Yigeremu | Ophthalmic Nurse I |
| 4 | Sr. Nebat Towfic | Ophthalmic Nurse I |
| 5 | Ato Ketema Ayele | Interviewers |
| 6 | Ato Lemma Bogale | Woreda Coordinator |
| 7 | Dr. Birna | Regional Coordinator |

## IV. TIGRAY
**Number of Teams:** Two

| | NAME | RESPONSIBILITY IN THE SURVEY |
|---|---|---|
| 1 | Dr. Amanuel Haile | Ophthalmologist |
| 2 | Sr. Gidey Abate | Ophthalmic Nurse II |
| 3 | Sr. Hansu Belay | Ophthalmic Nurse I |
| 4 | Ato Hagos Beyene | Ophthalmic Nurse I |
| 5 | Ato Wehabrebi Resequ | Interviewer |
| 6 | Ato Tesfaye Araya | Interviewer |
| 7 | Ato Solomon Abreha | Woreda Coordinators |
| 8 | Ato Biteweded Berhane | Woreda Coordinators |

| | NAME | RESPONSIBILITY IN THE SURVEY |
|---|---|---|
| 1 | Dr. Tilahun Kiros | Ophthalmologist |
| 2 | Sr.Gerges Michele | Ophthalmic Nurse II |
| 3 | Sr. Abeba Alemayehu | Ophthalmic Nurse I |
| 4 | Ato Kassa Alemu | Ophthalmic Nurse I |
| 5 | Ato Mulugeta Abay | Interviewer |
| 6 | W/ Mulu Hishe | Interviewer |
| 7 | Ato Firuy Kahsay | Woreda Coordinators |
| 8 | Ato Dagnachew Tarkegn | Woreda Coordinators |
| 9 | Sr. Aberash Belete | Regional Coordinator |

## V. BENISHANGUL GUMZ
**Number of Team:** one

| | NAME | RESPONSIBILITY IN THE SURVEY |
|---|---|---|
| 1 | Dr. Asfaw Wondimu | Ophthalmologist |
| 2 | Ato Gizachew Abebe | Ophthalmic Nurse II |
| 4 | Sr. Manalebish Areda | Ophthalmic Nurse I |
| 5 | Ato Asfaw Kejiella | Interviewer |
| 6 | Ato Habtamu Kidane | Interviewer |
| 7 | Ato Mohammed Juhar | Woreda Coordinator |
| 8 | AtoTolessa Wabulcho | Woreda Coordinator |
| 9 | Ato Jaleta Gemachu | Woreda Coordinator |
| 10 | Ato Endris Alhaji | Regional Coordinator |
| 11 | Dr. Assefa | Regional Coordinator |
| 12 | Ato Jirra Fillete | Regional Coordinator |

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## VI. AMHARA
**Number of Teams:** Five

| | NAME | RESPONSIBILITY IN THE SURVEY |
|---|---|---|
| 1 | Dr. Fikru Melka | Ophthalmologist |
| 2 | Ato Atalel Terefe | Ophthalmic Nurse II |
| 3 | Ato Shawel Tesema | Ophthalmic Nurse I |
| 4 | Sr. Tsehaynesh Tiruneh | Ophthalmic Nurse I |
| 5 | Ato Baye Tamir | Woreda Coordinator |
| 6 | Ato Solomon Lemma | Interviewer |
| 7 | Ato Zenebe Wakere | Interviewer |

| | NAME | RESPONSIBILITY IN THE SURVEY |
|---|---|---|
| 1 | Allehone Ayalew (Dr.) | Ophthalmologist |
| 2 | Ato Wondwosen Kebede | Ophthalmic Nurse II |
| 3 | Sr. Aster Getnet | Ophthalmic Nurse I |
| 4 | Sr. Anegu Achenif | Ophthalmic Nurse I |
| 5 | Ato Eyayu Tadesse | Interviewer |
| 6 | Ato Geremew Mekonnen | Interviewer |
| 7 | Ato Abebe Ketsela | Woreda Coordinator |
| 8 | Ato Mitiku Derebe | Woreda Coordinator |

| | NAME | RESPONSIBILITY IN THE SURVEY |
|---|---|---|
| 1 | Dr. Yilkal Alemu | Ophthalmologist |
| 2 | Sr.Meseret Wale | Ophthalmic Nurse II |
| 3 | Sr.Berhan Guadie | Ophthalmic Nurse I |
| 4 | Sr. Selamawit Yihdego | Ophthalmic Nurse I |
| 5 | Ato Demsew Abeje | Woreda Coordinator |
| 6 | Ato Shiferaw Adane | Woreda Coordinator |
| 7 | Ato Gebru Kebede | Interviewer |
| 8 | Ato Yebergual Belayneh | Interviewer |

| | NAME | RESPONSIBILITY IN THE SURVEY |
|---|---|---|
| 1 | Dr.Mohammed Shafi | Ophthalmologist |
| 2 | Ato Kihishen W/gebrial | Ophthalmic Nurse |
| 3 | Ato Lakew Getachew | Woreda Coordinator |
| 4 | Ato Halie Abreha | Woreda Coordinator |
| 5 | Sr. Ayehu Ayalew | Ophthalmic Nurse |
| 6 | Ato Zewdu Fantahun | Ophthalmic Nurse |
| 7 | Ato Mengistu Zerihun | Interviewer |

| | NAME | RESPONSIBILITY IN THE SURVEY |
|---|---|---|
| 1 | Dr. Yazew Abegaz | Ophthalmologist |
| 2 | Ato Assefa Getachew | Ophthalmic Nurse II |
| 3 | Sr. Yemariam Work | Ophthalmic Nurse I |
| 4 | Ato Abraha Aregay | Ophthalmic Nurse I |
| 5 | Ato Seid Mohammed | Woreda Coordinator |
| 6 | Ato Ketema Amenti | Woreda Coordinator |
| 7 | Ato Asfaw Kebede | Interviewer |
| 8 | Ato Getnet Yazie | Interviewer |

| | NAME | RESPONSIBILITY IN THE SURVEY |
|---|---|---|
| 1 | Ato Kassa Tiruneh | Regional Coordinator |
| 2 | Ato Mulat Zerihun | Regional Coordinator |

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## VII. AFAR
**Number of Team:** One

| | NAME | RESPONSIBILITY IN THE SURVEY |
|---|---|---|
| 1 | Dr. Amanuel Haile | Ophthalmologist |
| 2 | Sr. Abeba Alemayehu | Ophthalmic Nurse II |
| 3 | Ato Kassa Alemu | Ophthalmic Nurse I |
| 4 | Sr. Gidey Abate | Ophthalmic Nurse I |
| 5 | Ato Wondwosen woldu | Woreda Coordinator |
| 6 | Ato Adowe Mohammed | Woreda Coordinator |
| 7 | Ato Ali Nur | Woreda Coordinator |
| 8 | Ato Mohammed Ali Hussein | Interviewer |
| 9 | Ato Mohammed Ali Ahmed | Interviewer |

## VIII. GAMBELLA
**Number of Team:** One

| | NAME | RESPONSIBILITY IN THE SURVEY |
|---|---|---|
| 1 | Dr. Fikru Melka | Ophthalmologist |
| 2 | Ato Ephrem Zemedu | Ophthalmic Nurse II |
| 3 | Ato Gizachew Abebe | Ophthalmic Nurse I |
| 4 | Ato Assefa Getachew | Ophthalmic Nurse I |
| 5 | Ato Teklu Gemeta | Woreda coordinator |
| 6 | Ato Panom Puok | Woreda coordinator |
| 7 | Ato Aberra Atibo | Woreda Coordinator |
| 8 | Ato Ochudo Ngwo | Interviewer |
| 9 | Ato Yonas Tekumisa | Interviewer |
| 10 | Ato Meseret Shami | Interviewer |

## IX. OROMIYA
**Number of Teams:** Five

| | NAME | RESPONSIBILITY IN THE SURVEY |
|---|---|---|
| 1 | Dr. Asfaw Wondimu | Ophthalmologist |
| 2 | Ato Abera Areru | Ophthalmic Nurse II |
| 3 | Sr. Tirfe Bulti | Ophthalmic Nurse I |
| 4 | Ato Wondwosen Kebede | Ophthalmic Nurse I |
| 5 | Ato Abose Wakweya | Woreda Coordinator |
| 6 | Ato Assefa Dinegde | Woreda Coordinator |
| 7 | Ato Mesfin Seifu | Woreda Coordinator |
| 8 | Ato Mohammed Haji | Interviewer |
| 9 | Ato Tamam Aman | Interviewer |

| | NAME | RESPONSIBILITY IN THE SURVEY |
|---|---|---|
| 1 | Dr. Elias Hailu | Ophthalmologist |
| 2 | Ato Atalel Terefe | Ophthalmic Nurse II |
| 3 | Sr. Ayehu Ayalew | Ophthalmic Nurse I |
| 4 | Sr. Sinidu Nigussie | Ophthalmic Nurse I |
| 5 | Sr. Abebayehu Tadesse | Ophthalmic Nurse I |
| 6 | Ato Arega Filate | Woreda Coordinator |
| 7 | Ato Fekadu Elefeta | Woreda Coordinator |
| 8 | Ato Abdissa Genem | Interviewer |
| 9 | Ato Idris Aman | Interviewer |

| | NAME | RESPONSIBILITY IN THE SURVEY |
|---|---|---|
| 1 | Dr. Meselech Yemane | Ophthalmologist |
| 2 | Sr. Ehtemariam Kassaye | Ophthalmic Nurse II |
| 3 | Sr. Almaz Yimam | Ophthalmic Nurse I |
| 4 | Ato Gana Bune | Ophthalmic Nurse I |
| 5 | Ato Oumer Abdulahi | Woreda Coordinator |
| 6 | Ato Ahmed Edeo | Woreda Coordinator |
| 7 | Ato Bacha Tafesse | Interviewer |
| 8 | Ato Tola Gemeda | Interviewer |

| | NAME | RESPONSIBILITY IN THE SURVEY |
|---|---|---|
| 1 | Dr Nigusu Jote | Ophthalmologist |
| 2 | Sr Tilaye Tessema | Ophthalmic Nurse II |
| 3 | Ato Ogato Godana | Ophthalmic Nurse I |
| 4 | Ato Hailu Mengesha | Ophthalmic Nurse I |
| 5 | Ato Eshetu Jarso | Woreda Coordinator |
| 6 | Ato Jemal Hussien | Woreda Coordinator |
| 7 | Ato Yassin Kedir | Interviewer |
| 8 | Ato Dejene Bati | Interviewer |

| | NAME | RESPONSIBILITY IN THE SURVEY |
|---|---|---|
| 1 | Dr Mohammed Shafi | Ophthalmologist |
| 2 | Sr Tsigie Kebu | Ophthalmic Nurse II |
| 3 | Ato Abraha Aregay | Ophthalmic Nurse I |
| 4 | Sr. Martha Yeshitla | Ophthalmic Nurse I |
| 5 | Ato H/Maskal Damtie | Woreda Coordinator |
| 6 | Ato Degife Hailu | Woreda Coordinator |
| 7 | Ato Wondirad Legesse | Woreda Coordinator |
| 8 | Ato Abrahim Usman | Interviewer |
| 9 | Ato Tesfaye Tefera | Interviewer |

| NO. | NAME | RESPONSIBILITY IN THE SURVEY |
|---|---|---|
| 1 | Dr. Taye Tolera | Regional Coordinator |

## X. SOMALI

**Number of Teams:** Two

| NO. | NAME | RESPONSIBILITY IN THE SURVEY |
|---|---|---|
| 1 | Dr. Abdulahi Mohammed | Ophthalmologist |
| 2 | Ato Kihishen W/gebreal | Ophthalmic Nurse II |
| 3 | Ato Feysel Mohammed | Ophthalmic Nurse I |
| 4 | Ato Abdi Ali | Ophthalmic Nurse I |
| 5 | Ato Abdi Omar | Woreda Coordinator |
| 6 | Ato Hassen Hussien | Woreda Coordinator |
| 7 | Ato Yussuf Mohamed | Woreda Coordinator |
| 8 | Ato Muktar Shiek Abdi | Interviewer |
| 9 | Ato Abdinasir Abdulahi | Interviewer |

| | NAME | RESPONSIBILITY IN THE SURVEY |
|---|---|---|
| 1 | Dr. Tegene Gizaw | Ophthalmologist |
| 2 | Ato Haileselassie Zerihun | Ophthalmic Nurse II |
| 3 | Ato Mohammed Arab | Ophthalmic Nurse I |
| 4 | Sr. Samiya Abdulahi | Ophthalmic Nurse I |
| 5 | Ato Abdusalaam Ahmed | Woreda Coordinator |

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| 6 | Ato Bashir shafi | Woreda Coordinator |
| 7 | Ato Ali Arab | Interviewer |
| 8 | Ato Mustefa Ahmed | Interviewer |

| | **NAME** | **RESPONSIBILITY IN THE SURVEY** |
|---|---|---|
| 1 | Dr. Musa Soyan Adur | Regional Coordinator |

## XI. SNNPR REGION
**Number of Teams:** Four

| | **NAME** | **RESPONSIBILITY IN THE SURVEY** |
|---|---|---|
| 1 | Dr. Mohammed Shaffi | Ophthalmologist |
| 2 | Ato Alemseged Solomon | Ophthalmic Nurse II |
| 3 | Ato Haileselassie Zerihun | Ophthalmic Nurse I |
| 4 | Ato Birhanu Adamu | Ophthalmic Nurse I |
| 5 | Ato Belay Maru | Woreda Coordinator |
| 6 | Ato Adane Demisse | Woreda Coordinator |
| 6 | Ato Emiru Diriba | Woreda Coordinator |
| 7 | Sr. Almaz Kebede | Interviewer |
| 8 | Ato Yirsaw Aberra | Interviewer |
| 9 | Ato Eshetu Tereda | Interviewer |

| | **NAME** | **RESPONSIBILITY IN THE SURVEY** |
|---|---|---|
| 1 | Dr Yoseph Worku | Ophthalmologist |
| 2 | Ato Atalel Terefe | Ophthalmic Nurse II |
| 3 | Sr. Almaz Agonafir | Ophthalmic Nurse I |
| 4 | Sr. Fetlework Tadesse | Ophthalmic Nurse I |
| 6 | Ato Tilahun Lenjiso | Woreda Coordinator |
| 7 | Ato Shiferaw Chmiburo | Woreda Coordinator |
| 7 | Wz Achamyelesh G/Tsadik | Woreda Coordinator |
| 8 | Ato Getachew Gedebo | Interviewer |
| 9 | Wz Elisa Luwegi | Interviewer |
| 10 | Ato Gebeyehu Gelgelo | Interviewer |
| 11 | Wz Genet Demisse | Interviewer |
| 12 | Nadaw Nana | Interviewer |

| | **NAME** | **RESPONSIBILITY IN THE SURVEY** |
|---|---|---|
| 1 | Dr Asfaw Wondimu | Ophthalmologist |
| 2 | Sr. Tilaye Tessema | Ophthalmic Nurse II |
| 3 | Sr. Wubnesh Melke | Ophthalmic Nurse I |
| 4 | Ato Zeleke Zewge | Ophthalmic Nurse I |
| 5 | Ato Tariku Malla | Woreda Coordinator |
| 6 | Ato Solomon Sorsa | Woreda Coordinator |
| 7 | Ato Beyene Mengistu | Interviewer |
| 8 | Sr Kayirtu Arebu | Interviewer |
| 8 | Ato Teshome Mekonen | Interviewer |

| | **NAME** | **RESPONSIBILITY IN THE SURVEY** |
|---|---|---|
| 1 | Dr. Abu Beyene | Ophthalmologist |
| 2 | Ato Gizachew Abebe | Ophthalmic Nurse II |
| 3 | Sr. Simret Desta | Ophthalmic Nurse I |
| 4 | Ato Kihishen W/gebrial | Ophthalmic Nurse I |
| 5 | Ato Yassin Dessie | Woreda Coordinator |
| 6 | Ato Girma Worku | Woreda Coordinator |
| 7 | Ato Alemayheu G/Michael | Woreda Coordinator |

| 8 | Ato Deneke Abebe | Interviewer |
| 9 | Ato Taye Gago | Interviewer |
| 10 | Ato Abreham Birhanu | Interviewer |
| 11 | Ato Getahun Negewo | Interviewer |

| | **NAME** | **RESPONSIBILITY IN THE SURVEY** |
| 1 | Ato Melkamsew Aschalew | Regional Coordinator |

Photo Gallery