



# Ministry of Health

General Secretary

# Mali Eye Health Systems Assessment Report

November 13, 2017



Sightsavers

## Acknowledgements

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## List of abbreviations and acronyms

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AITO	African Institute of Tropical Ophthalmology
AMO	Assistant Medical Ophthalmologist
CFA	West African Franc
ComHC	Community Health Centre
CHI	Compulsory Health Insurance
CSC	Cataract Surgical Coverage
CSR	Cataract Surgical Rate
DHIS2	Demographic Health Information System 2
DPO	Disabled Peoples' Organisation
EHSA	Eye Health Systems Assessment
EHT	Eye Health Technician
GAP	Global Action Plan
HDM	Health Development in Mali
HMIS	Health Management Information System
HREH	Human Resources for Eye Health
HRH	Human Resources for Health
IBD	Islamic Bank of Development
ICEH	International Centre for Eye Health
INFAA	National Institute of Health Services Training
INGO	International Non-Governmental Organisation
IMC	International Medical Corps
MoH	Ministry of Health
MUB	Malian Union of the Blind
NAAH	National Agency for the Assessment of Hospitals
NDS	National Department of Statistics
NECP	National Eye Care Programme
NEHP	National Eye Health Programme
NEML	National Essential Medicine List
NIHST	National Institute of Health Sciences Training
NPFB	National Programme for the Fight against Blindness
NTDs	Neglected Tropical Diseases
OPB	Organisation for the Prevention of Blindness
PMD	Pharmaceuticals and Medicines Direction
PPM	Popular Pharmacy of Mali
RAAB	Rapid Assessment for Avoidable Blindness
RefHC	Referral Health Centre
UNICEF	United Nations Children's Fund
USAID	United States Agency for International Development
USD	United States Dollars
VI	Visual Impairment
WHO	World Health Organisation

# Executive summary

## Background and Context

The economic and social burden of blindness and visual impairment (VI) cannot be over-emphasised. If untreated, visual impairment can result in long-term disability, low economic productivity and poor quality of life. It is estimated that 253 million people globally are visually impaired, including 36 million who are blind and 217 million who live with low vision<sup>1</sup>. Around 89% of VI is found in low – and middle-income countries, largely among older people aged 50 years and above. Around 75% of VI is either preventable or treatable<sup>1</sup>.

The World Health Organisation's (WHO) Universal Eye Health Global Action Plan (GAP) 2014-2019 calls for actions to reduce avoidable VI by 25% by 2019<sup>2</sup>. It recommends that all member states set up national plans and committees to ensure the effective delivery of eye health programmes and promote the integration of eye health into broader health systems.

Strengthening eye health systems requires a good understanding of how an eye health system functions within the broader context of the national health system. Given that health systems are complex and inter-related, there is a need for better monitoring of health system performance at different levels. Such monitoring helps to understand how eye health systems interact with the general health systems, and how they can be sustainably developed and improved.

Mali is a low-income country located in West Africa. The 2009 census estimated the population was 14,517,176 people, which is nearly double that of 20 years previously. Around 47.3% of the population is below 15 years of age, while around 4.2% are aged 60 years and above<sup>3</sup>.

Despite recent improvements in a number of health indicators, Mali's population's health

continues to be poor with high maternal and child mortality, chronic under-nutrition and a high prevalence of infectious diseases. The key priorities for the general health system include:

1. Improving geographical accessibility of health services.
2. Improving the quality of services.
3. Strengthening the logistics and management of pharmaceuticals and other commodities.
4. Training human resources, insuring their utilisation and motivation.
5. Improving financial access and capacity for population participation in health financing.

The most recent survey, using the Rapid Assessment for Avoidable Blindness (RAAB) methodology conducted in the Koulikoro region in 2011 with funding from Sightsavers, estimated that 7.1% of people aged 50 years and above were blind (adjusted prevalence VA<3/60 with available correction) and another 12.4% were severely or moderately visually impaired (VA<6/18). The prevalence was higher for women, particularly for blindness (8.1% vs 6.0%). Cataract was the main cause accounting for 58.4% of all cases of blindness. Other causes of blindness were posterior segment disease (16.7%), most of which was glaucoma (14.9%), trachoma (5%) and other corneal scarring (9%). The two main causes of severe and moderate VI were cataract (48.7%) and refractive error (35.5%).

Cataract coverage (for eyes) at VA<3/60 was 36.7% overall with significant differences between men (49.5%) and women (27.9%). The main reasons for not undergoing surgery were that patients were waiting for cataract maturity (27.7%), perception that the disease was God's will (21.6%) and an inability to pay for surgery (19.9%).

## Aims and methods of the assessment

The overall aim was to describe the eye health system in Mali, assess its relative strengths and weaknesses and explore its interconnections

with the general health system in order to make recommendations to inform the design of the new Eye Health Strategic Plan.

The assessment was based on the Eye Health Systems Assessment (EHSA) tool developed in 2012 by a consortium of health experts, coordinated by the International Centre for Eye Health (ICEH) at the London School of Hygiene and Tropical Medicine (LSHTM) with the funding from Sightsavers. The tool builds on the more general Health Systems Assessment (HSA) approach, previously developed and promoted by the United States Agency for International Development (USAID)<sup>4</sup>. The tool was previously used by Sightsavers to assess eye health systems in Ghana<sup>5</sup>, Sierra Leone<sup>6</sup>, Tanzania<sup>7</sup>, Kenya, Senegal and Mozambique.

The EHSA assessment in Mali was initiated at the end of 2015 by the Ministry of Health (MoH) in collaboration with Sightsavers and the African Institute of Tropical Ophthalmology (AITO).

The study used exploratory descriptive methods using a review of available documents and in-depth interviews, observations and focused discussions with stakeholders at different levels of the health system. Data was collected in March 2016.

The geographic scope was limited to the capital Bamako and two regions, Segou and Koulikoro. The choice of the regions was not meant to be representative, but to reflect a relatively poor and a relatively strong state of the eye health system. Purposive sampling was employed to enrol 70 stakeholders working directly or indirectly in eye health. The analysis was structured around the WHO health system building blocks framework.

## Results and conclusions

Overall, the study found a significant degree of synergy and integration between eye health services and the broader health system. The key strengths and weaknesses of the eye health

system identified in this assessment are summarised below.

## Governance for eye health

### Strengths

- There is a National Eye Health Programme (NEHP) established under the MoH and a post of National Eye Health Coordinator responsible for supervising, coordinating and monitoring eye health activities in the country.
- The eye health system complies with the same regulations, protocols, standards and certification procedures as the general health system.
- There are Disabled Peoples' Organisations (DPOs) and disease associations involved in advocacy, sensitisation and awareness-raising activities. There are community events focusing on the prevention of blindness and social inclusion, such as the World Sight Days and Months of Solidarity.
- The Malian Union of the Blind (MUB) has a strong presence in the country. It operates eye care units and special education activities, and has partnership agreements with both government agencies and international partners.

### Weaknesses

- There is no up-to-date National Eye Health Strategic Plan. The previous plan ceased to exist in 2010.
- There is no Global Action Plan (GAP) committee under the National Eye Health Programme.
- The MUB is thought to be insufficiently organised in its lobbying strategies leading to uninvited voice in response to government planning, budgeting and data.
- DPOs and disease associations are not directly involved in the supervision and certification of eye health.

## Health financing

### Strengths

- There are various sources of funding available for eye health in Mali, including government, mandatory health insurance, international donors and user fee contributions.
- The Malian government provides funding to support eye health infrastructure, salaries, utility bills and some consumables. The allocation of funding is decentralised through regional, district and hospital level funds.
- There is mandatory health insurance, which aims to cover up to 70% of healthcare expenditure for the majority of patients, including eye care services.
- Hospitals generate funds from user fees, which can be used for purchasing consumables and other expenditure. There is a general list of prices and a national level committee that regulates prices for facilities of different levels.
- International donors and international non-governmental organisation (INGO) partners provide funding and other support to specific regions and intervention areas. Nearly all Malian regions had at least one INGO partner at the time of the assessment.
- There is a policy of fee exemptions for vulnerable or indigent members of the population, including the elderly. INGO partners provide funding to cover patient co-payment costs, particularly for vulnerable groups.

### Weaknesses

There is no budget line specifically for eye health activities. Eye health has to compete with other health priorities in both regional/district and hospital allocations.

Out-of-pocket expenditure constitutes a significant proportion of the total health expenditure and continues to be a significant barrier to achieving universal health coverage.

Fees charged for patient eye health consultations, surgeries and spectacles are thought to be high and therefore unaffordable for a large number of patients.

The study could not obtain information on how the mandatory health insurance works to cover the costs of eye care services and therefore could not assess its effectiveness as a source of funding for eye health.

There was no detailed information on how the system of user fee exemption works in practice, or how co-payments from INGOs are coordinated with the lists of patients registered as vulnerable. Therefore, it was not possible to assess how INGO co-funding complements other sources of funding, nor to what extent it ensures access to services for the poor.

Price lists in hospitals and health centres were not available in accessible formats, such as Braille.

## Eye care service delivery

### Strengths

- 52 eye units operate at different levels of the system throughout the country.
- Eye care services are provided regularly with daily outpatient consultations and surgeries organised 2-3 times a week. There is a minimum of two cataract campaigns organised every year.
- Cataract Surgical Rate (CSR) is estimated at 1,343 per million, which is better than in many neighbouring countries.
- Quality standards in general healthcare are applied to eye health and followed by eye care workers. A national therapeutic guide provides information on all diseases, including common eye conditions and procedures.
- A national agency, established by the government, assesses the quality of service delivery, cost of care and patient satisfaction.



## Weaknesses

- There are gaps in some years of the reported numbers of cataract surgeries, which makes it difficult to accurately monitor the trends in cataract outputs.
- Data on cataract coverage is available from the Koulikoro region only.
- The current system of clinical supervision of hospitals and health centres does not include eye health. Supervision for eye health is designed as a cascaded system from the National Eye Health Programme (NEHP) down to the regions and districts. However, the system is not being implemented due to a lack of funding.
- The current Cataract Surgical Rate (CSR) is 1,343 per million, and the ratio of surgeries per surgeon is 324 per year. These are below the recommended levels of 2000 per million and 500 per year respectively.
- The study did not have any information on cataract surgical outcomes and it is unknown whether and how cataract quality is being monitored.

## Human resources for eye health

### Strengths

- There is a directorate for Human Resources for Health (HRH) under the MoH, which supervises and coordinates the recruitment and deployment of the health workforce, including eye health workers. The National Eye Health department and the Human Resource Directorate are jointly responsible for the appointment of eye care workers at different levels.
- There is a national HRH policy for the period 2009-2015 and an electronic system for collating information on HRH, including eye care cadres at the regional and district levels. Information on HRH needs is submitted to the MoH based on needs assessments carried out by hospitals and health centres annually.

- Two public institutions are responsible for training eye health workers: the African Institute of Tropical Ophthalmology (AITO) is responsible for training ophthalmologists and optometrists, and the National Institute of Health Sciences Training (NIHST) is responsible for mid-level personnel with campuses in Bamako, Kayes and Sikasso.
- These two training institutions have various partnerships with the government, other academic institutions, INGOs and private organisations. At AITO, there are quotas for training both Malian and overseas trainees.
- The number of eye care workers increased in recent years. The assessment identified 186 'active' eye care personnel working at different levels, including 52 ophthalmologists, 130 mid-level personnel and four optometrists/opticians. All regions except Kidal have ophthalmologists, and the majority of ophthalmologists are in the public sector.
- There is a system of in-service training for eye health workers, which is similar to the general health worker training. Both government and hospitals allocate funding for in-service training, which covers the salaries of trainees. There are various training opportunities supported by INGOs, including short-term and medium-term training programmes and workshops.
- AITO holds monthly seminars for ophthalmologists, which discuss new developments in the diagnostics and treatment of eye diseases.

### Weaknesses

- The ratio of ophthalmologists/surgeons (2.9 per million) and mid-level personnel (7.2 per million) to the population is below the recommended targets (four per million and 10 per million respectively).
- There is a limited budget and limited quota for both the training and deployment of eye care workers in Mali.

- The distribution of eye care workers is skewed towards the capital and other large cities with over 50% of both ophthalmologists and mid-level personnel located in Bamako, serving around 13% of the population.
- Optometrists are not deployed in the public sector. There are only three out of 25 trained optometrists currently working being deployed by either Sightsavers or AITO. Inability of the government to contract optometrists leads to their redundancy in the labour market.
- There are no regulations for the training and recruitment of cataract surgeons. There are limited opportunities for career progression for mid-level ophthalmic personnel.
- The HRH policy expired in 2015 and it was not clear in this assessment whether there were plans for its renewal.

## Medical products and pharmaceuticals for eye health

### Strengths

- A National Essential Medicine List (NEML) is updated collaboratively every two years and is aligned with the WHO recommended list. It includes 19 eye health medicines and products.
- A department under the government, the Pharmaceuticals and Medicines Directorate (PMD) is responsible for reviewing pharmaceutical products requested by the regions and districts and for regulating the prices of newly registered products. Eye care medicines and products included in the NEML are integrated in the requests submitted by the regional and district levels to the PMD.
- Eye health is included in an integrated distribution of medicine and supply process known as the Main Channel of Essential Medicines. An agency, the Popular Pharmacy of Mali (PPM), has a three-year contract with the government as the sole agent to store and distribute essential medicines and medical

devices for the public sector. The PPM has 16 sales points throughout the country and provides medicines to the National Eye Health Programme in line with the requests submitted to the PMD.

- Two private purchase and wholesale centres, LABOREX and COPHARMA, manage the distribution of pharmaceutical products for the private sector.
- There is a system available for collating monthly information on pharmaceutical products and their expiry dates from district level facilities to the regional level, and further to the central level. OSPSANTE software is used to assist in collecting data. The system includes medicines and products for eye health, with collated information analysed at all levels, then used for monitoring stocks and planning.
- International donors support purchasing pharmaceuticals and supplies, particularly for campaign activities for cataract and trichiasis surgeries.

### Weaknesses

- No specific budget allocations from the government are earmarked for eye health medicines, and there is no information on the funds spent on eye health medicines and products within the general health system.
- No manufacturing companies produce medicines for eye health in Mali.
- Pharmaceutical products procured for cataract and trichiasis campaigns using international donor funding and specific medicines ordered by specialist eye care institutions (e.g. AITO) do not follow the main distribution and supply channels.

## Eye health information system

### Strengths

- A tool called Health Development in Mali (HDM) collects health information at all levels, including eye health. HDM software is currently being replaced by the Demographic and Health Information System 2 (DHIS2), which will change data collection frequency from quarterly to monthly, and will have capacity for additional health indicators. The roll-out of DHIS2 is being supported by a number of international donors.
- The current reporting tool includes indicators for eye health. It collects data from Community Health Centres (ComHCs) and passes it to Referral Health Centres (RefHCs), regional authorities and the MoH. The tool includes information on trachoma, trichiasis, visual acuity and newborn conjunctivitis, and was last updated in December 2015 to include additional eye health indicators (eye trauma and glaucoma).
- Data collected from hospitals is sent directly to the central level. There are designated focal persons for health information in hospitals as well as focal persons for eye health information, mostly Neglected Tropical Diseases (NTDs). Secondary level facilities report data on trichiasis, cataract, glaucoma, refractive errors, low vision, trachoma and visual acuity.
- The National Eye Health Coordinator has a database for trachoma with periodic review meetings, which involve various partners. An M-Health project collecting data on trichiasis has been piloted by the MoH and Sightsavers, and there is a plan to scale-up the M-Health project to 20 districts across five regions.
- A national statistical yearbook produced by the National Statistical Department includes eye health information, and is perceived to be the most reliable source of eye health information centrally. There are also regional statistical yearbooks.

- National summary reports produced by the MoH include eye health information. These reports are used for planning, advocacy, budgeting and fundraising at different levels of the system.

### Weaknesses

- There is limited donor support for reporting eye health information, and limited opportunities for training and re-training health workers in reporting, particularly at lower levels of the system.
- There are different reporting templates and parallel systems of data collection, which undermine national Health Management Information System (HMIS).

# 1. Background

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The economic and social burden of blindness and visual impairment (VI) cannot be overemphasised. If untreated, visual impairment can result in long-term disability, low economic productivity and poor quality of life. It is estimated that 253 million people globally are visually impaired, including 36 million who are blind and 217 million who live with low vision<sup>1</sup>. Around 89% of VI is found in low – and middle-income countries, largely among older people aged 50 years and above. Around 75% of VI is either preventable or treatable<sup>1,8</sup>.

The World Health Organisation (WHO) Universal Eye Health: Global Action Plan (GAP) 2014-2019 call for actions to reduce avoidable VI by 25% by 2019<sup>2</sup>. It recommends that all member states set up national plans and committees to ensure the effective delivery of eye health programmes and promote the integration of eye health into broader health systems<sup>9</sup>. The plan calls for a strengthening of eye health delivery and referral systems under the leadership of the Ministry of Health (MoH)<sup>10,11</sup>.

Strengthening eye health systems requires a good understanding of how an eye health system functions within the broader context of the national health system. Given that health systems are complex and inter-related, there is a need for better monitoring of health system performance at different levels<sup>11</sup>. Such monitoring helps to understand how eye health systems interact with the general health system and how they can be sustainably developed and improved<sup>10</sup>.

Evidence from many low – and middle-income countries suggests that eye health systems are not fully integrated into national health systems. Eye health has traditionally operated as a stand-alone system often supported by international non-governmental organisations (INGOs)<sup>12</sup>. At the facility level, eye units are often isolated from the rest of the service delivery, which limits system capabilities in such settings<sup>10</sup>.

There are also challenges in accessing eye care services by communities in need. These are often due to the shortage of trained personnel, irregular outreach services and limited financial resources to provide free services at the point of use<sup>13</sup>. For example, a recent study funded by Sightsavers found that the average cataract surgical rate (CSR) in 21 African countries was only a quarter of the recommended target (2000 per million population per year); while the average number of surgeons (ophthalmologists and cataract surgeons) was 2.9 per million, well below the recommended target of four per million<sup>10</sup>.

Sightsavers' eye health strategy recommends an assessment of the national eye health system before an eye health project is initiated. This strategy specifically emphasises that:

*“Sightsavers is committed to supporting rigorous situational assessments of the health systems in the countries where we are operational to be able to analyse what systemic weaknesses affect the provision of quality eye health, and the strengths and opportunities that are available for eye health within the health systems”<sup>14</sup>.*

## 2. Context

The 2009 census estimated the population of Mali to be 14,517,176 people, which is nearly double compared to the population of over 20 years earlier (7,696,348 people in 1987). The country has a high rate of population growth, as the fertility rate remains high (6.1 births per woman) and modern contraceptive use is low (around 9.9%)<sup>15</sup>. Around 47.3% of the population is below the age of 15 years, while around 4.2% are aged 60 years and above<sup>3</sup>.

Despite recent improvements in a number of health indicators, Mali's population's health continues to be poor. Life expectancy at birth in Mali is 58 years for both men and women<sup>3</sup>. Maternal mortality ratio is estimated at 464 per 100,000 live births, infant mortality is 58 per 1,000 live births, and mortality of under-fives is 98 per 1,000 live births. Malnutrition is a major contributor to maternal and child death and disability, with an estimated 38% of children suffering from chronic under-nutrition<sup>15</sup>. Table 1 below represents some key indicators of Mali:

**Table 1: Some keys indicators of Mali**

Indicators	Year 2013
Gross national income per capita (in US dollars)	1540
Median age	16
Population under 15 years (%)	47.3
Population over 60 years old (%)	4.2
Fertility rate	6.1
Number of live births (thousands)	723.3
Number of deaths (thousands)	171.2
Infant mortality rate 0-12 months (per 1000 live births)	58
Mortality rate in children under five (per 1000 live births)	98
Maternal mortality rate (per 100,000 live births)	464
Death due to HIV/AIDS (per 100,000 inhabitants)	32.5
Death due to malaria (per 100,000 inhabitants)	86.8

Source: OMS<sup>3</sup>, USAID/Mali<sup>15</sup>

There have been improvements in access to safe drinking water for much of the population, but progress in sanitation lags behind, resulting in diarrhoea and other infectious diseases. Endemic malaria is the leading cause of morbidity and mortality with an estimated 52% of children carrying malaria parasites during the high transmission period<sup>15</sup>.

Mali's HIV prevalence is relatively low (estimated at 1.2%) compared to other sub-Saharan countries, with clusters of higher prevalence among population groups at high

risk of transmission (for example sex workers). The total number of HIV-positive people is estimated at 70,000, of whom approximately 29,260 receive anti-retroviral drugs<sup>15</sup>.

The government health service delivery is structured as a pyramid with community health volunteers forming the largest cadre at the bottom, reporting to the community health centres (ComHCs) managed by community health associations above them. There is also a growing cadre of paid community health workers, but the numbers are not



sufficient to cover the need.

An external evaluation of the MoH's ten-year strategy conducted in 2011 identified several systemic weaknesses, namely:

1. Local health systems and interventions do not provide sufficient coverage of quality health services, and do not reach the populations living far from ComHCs.
2. National and local health systems are not able to provide all necessary inputs (commodities, human resources, etc) to support health service delivery at local level.
3. The Health Management Information System (HMIS) does not provide accurate and timely data for informed decision-making.

The government of Mali has in place a strategy framework for growth and poverty reduction (CSCR) 2012-2017, which includes the following priorities: maternal and child health, malaria, social development, nutrition, HIV/AIDS and WASH. All health sector activities in the country are governed by the MoH's 10-year health strategy and five-year implementation plan, called the Health and Social Development Plan (PDDSS) and Health Sector Development Programme (PRODESS), respectively. The most recent PDDSS/PRODESS is for the period 2013-2022. The strategy aims to address five key health system deficiencies:

1. Improving geographical accessibility of health services.
2. Improving the quality of services.
3. Strengthening the logistics and management of pharmaceuticals and other commodities.
4. Training human resources, and insuring their utilisation and motivation.
5. Improving financial access and capacity for population participation in health financing.

It is generally believed that the eye health system in Mali is not fully integrated into the broader health system, but there is limited evidence to support this. In response to the newly agreed Global Action Plan (GAP) target,

the MoH has committed to develop a new eye health strategic plan to ensure effective planning and implementation of eye health programmes. The new strategic plan will replace the previous plan for 2006-2010 and inform the design of eye health programmes and support from INGO partners in Mali.

### 3. Methods

The assessment was based on the Eye Health Systems Assessment (EHSA) tool developed in 2012 by a consortium of eye care and health experts, coordinated by the International Centre for Eye Health (ICEH) at the London School of Hygiene and Tropical Medicine (LSHTM), with funding from Sightsavers. The tool builds on the more general Health Systems Assessment (HSA) approach, previously developed and promoted by the United States Agency for International Development (USAID)<sup>4</sup>. The tool was piloted in Ghana<sup>5</sup> and Sierra Leone<sup>6</sup> in 2012 and 2013 respectively, and was also later used to conduct EHSA's funded by Sightsavers in Tanzania<sup>7</sup>, Kenya and Senegal.

The EHSA assessment in Mali was initiated at the end of 2015 by the MoH in collaboration with Sightsavers and the African Institute of Tropical Ophthalmology (AITO). The overall aim was to describe the eye health system in Mali, assess its relative strengths and weaknesses and explore its interconnections with the general health system in order to make recommendations to inform the design of the new Eye Health Strategic Plan.

We used exploratory descriptive methods for data collection using a review of available documents and primary data collection through in-depth interviews, observations and focused discussions with stakeholders at different levels of the health system. All data was collected in March 2016. The geographic scope was limited to the capital, where various ministries are located and in two regions, Segou and Koulikoro. The choice of the regions was not meant to be representative, but to reflect a

relatively poor and a relatively strong eye health system. Purposive sampling was employed to enrol 70 stakeholders working directly or indirectly in eye health in Mali. The analysis was structured around the WHO health system building blocks framework.

The EHSA methodology recommends that the assessment should prioritise local participation and capacity building. Both the national Eye Health Department and Sightsavers were responsible for all activities in this assessment.

The analysis was structured around the basic components of the health system according to the WHO, namely governance, health financing, services, human resources, medical and pharmaceutical products and the Health Information System.

### Study limit

The results of this study cannot be generalised to the entire country's health system. Geographic coverage was limited, and there is also the possibility of selection and information biases because the chosen participants were targeted

## 4. Results

### 4.1. Eye health profile

The main causes of blindness identified during the triangulation of hospital data and surveys before the late 1990s were cataract, glaucoma, trachoma, refractive error, low vision, childhood blindness and onchocerciasis<sup>16</sup>.

The most recent survey using the Rapid Assessment of Avoidable Blindness (RAAB) methodology conducted in the Koulikoro region in 2011, with funding from Sightsavers, estimated that 7.1% of people aged 50 years and above were blind (adjusted prevalence VA<3/60 with available correction) and another 12.4% were severely or moderately visually impaired (VA<6/18). The prevalence was higher for women, particularly for blindness (8.1% vs 6.0%).

Cataract was the main cause for 58.4% of all cases of blindness, accounting for 47.6% in men and 64.7% in women. Other causes of blindness were posterior segment disease (16.7%), most of which was glaucoma (14.9%), trachoma (5.0%) and other corneal scarring (9.0%). The two main causes of severe and moderate visual impairment were cataract (48.7%) and refractive error (35.5%)<sup>17</sup>.

Cataract coverage (for eyes) at VA<3/60 was 36.7% overall with significant differences between men (49.5%) and women (27.9%). The main reasons for not undergoing surgery were that patients were waiting for cataract maturity (27.7%), the perception that the disease was one's destiny or God's will (21.6%) and an inability to pay (19.9%). Around 11.5% of respondents said they were unaware of treatment or did not know how to get it, while 9.5% thought there were no services available. There were three main differences in the reasons given by men and women. Only women said they were unaware of treatment, and significantly more women believed that cataract was God's will (23.4% vs 16.2%). Men were more likely to report financial constraints as a barrier (29.7% vs 16.2%)<sup>17</sup>.

### 4.2. Eye health governance

#### 4.2.1. Policies and structures for eye health

The National Eye Health Programme (NEHP) was established in Mali in August 1994 under the Ministerial decree 94/8388/MSSPA-CAB. The NEHP reports directly to the National Directorate of Health and a post of National Eye Health Programme Coordinator was established by the MoH to supervise, coordinate and monitor the NEHP. The most recent Eye Health Strategic Plan was for the period 2006-2010.

Most regions developed regional strategic plans with support from INGO partners. In the Koulikoro region, an Eye Health Plan was developed in 2006 with support from

Sightsavers. The Sikasso and Kayes regions also received support from Sightsavers to develop their Eye Health Strategic Plans, but these plans were not implemented due to lack of funding. The Organisation for the Prevention of Blindness (OPB) supported the Mopti region and the Swiss Red Cross supported the Timbuktu region to develop their strategic plans.

There is also a National Tropical Diseases (NTD) strategic plan for the period 2012-2016.

There is no Global Action Plan (GAP) implementation committee under the NEHP. However, Vision 2020 committees are established in some regions.

The eye health system in Mali complies with the same regulations as the general health system. Protocols, standards, codes of conduct and certification procedures are not different from the general health system, and the same regulations apply to all training institutions in the country, including those for eye health.

#### **4.2.2. Donor mapping**

Different partners (Annex 1), including multilateral and bilateral donor agencies and INGOs, support eye health in Mali. INGOs provide direct support through funding or the provision of equipment and materials, while multilateral and bilateral donor agencies support the MoH in various ways, including direct funding or searching for other donors.

Partner agencies are often divided by regions and specific intervention areas, but the majority provide support across more than one region. For example, in the few years preceding this assessment, the Islamic Bank of Development (IBD) supported human resources for eye health (HREH) through funding training courses at the African Institute of Tropical Ophthalmology (AITO). Sightsavers supported eye health activities in the Koulikoro region. The Carter Centre, World Vision and Helen Keller International supported trachoma interventions, while the Organisation for the Prevention of Blindness (OPB) provided

support to primary eye care training in Kayes, Sikasso, Mopti and Segou. At the time of the assessment, all Malian regions except Kidal and Gao had at least one INGO partner, while Kidal and Gao received support from the national programme.

#### **4.2.3. Participation of civil society and disabled peoples' organisations in eye health**

Disability and specific disease associations participate in eye health activities through advocacy, sensitisation and awareness raising. The key associations identified in this study were the Malian Union of the Blind (MUB), various Disabled People's Organisations (DPOs), the Association of Glaucoma and the Diabetes Association.

The MUB – the leading DPO – was established in September 1972 as the Malian Association for the Social Protection of the Blind, then renamed the Malian Union of the Blind in 1984. It was established through the Yelen programme, which was part of the eye health programme, and its primary objective is to prevent and fight blindness

The MUB has technical and financial partnership agreements with both the Malian government and INGOs – for example, the directorate of preschool and special education under the Ministry of Education and Sightsavers has partnership agreements with the MUB. It also collaborates with the Ministry of Solidarity and Humanitarian Action, and is currently lobbying for direct partnership agreements with the Ministry of Education, Ministry of Health and Ministry of Social Development.

The MUB is currently implementing an inclusive education project in collaboration with the Malian government and Sightsavers. The project is providing support to 174 children with VI and 34 children with other disabilities, including hearing, intellectual and physical impairments. In 1983, the MUB established an optical workshop to provide access to spectacles at reduced prices. With the support



of the government and Sightsavers, the MUB also established an eye unit, which was inaugurated in October 2009 by the director of the Right Shore Academy; this eye unit has a permanent ophthalmic nurse post supported by the MoH. Consultations in the unit are free for children and members of the National Institute of the Blind.

Various DPOs contribute to raising awareness and sensitisation activities at different levels, by participating in the planning and organisation of the World Sight Days and Solidarity campaigns. The Albinos Association was part of the steering committee during the pilot of the Koulikoro Eye Care Programme supported by Sightsavers between 2007 and 2011. The Glaucoma and Diabetes Associations are involved in awareness raising and public education, while the Malian Society of Ophthalmologists is also involved through the organisation of Scientific Day and scientific congresses on eye health during World Sight Day.

DPO members also mentioned that they participated in annual eye health review meetings organised by the National Eye Health Coordinator and Sightsavers, where they were given an opportunity to comment on the budget.

Some informants, however, were critical of the activities of some organisations. For example, the MUB was perceived to be poorly organised in its lobbying strategies leading to ununited voice in response to government objectives, planning, budgeting and data. The Ophthalmologist Society was also thought to be too young and lacking the opportunity for lobbying the government. The disease associations were thought to be disengaged from the supervision and certification processes in the area of eye health.

## 4.3. Health financing

### 4.3.1. Health expenditure and sources of funding

The per capita total expenditure on health in Mali is estimated at 53 USD with around 40% being government expenditure (approximately 21 USD per capita) and 60% being out-of-pocket expenditure. Government expenditure on health accounts for around 12% of total expenditure. External funding constitutes approximately 22% of the total health expenditure. The health donor community follows a sector-wide approach and aligns its priorities with the PRODESS<sup>15</sup>.

The main sources of funding of eye health in Mali are the government, health insurance fund, donor agencies and INGOs.

### 4.3.2. Government funding for eye health

There is no budget line for eye health within the MoH budget. The only institution that receives direct budget for eye health from the government is AITO through the central level (Board of Directors) and the Milagro programme supervised by the National Eye Care Programme.

Allocation of resources for the general health system in Mali is decentralised. At regional level, regional councils are responsible for managing government allocations for health activities in the regions. The budget is allocated to districts to support general health services, including eye health.

Hospitals in Mali are not entitled to benefit from this fund, although there are ongoing negotiations regarding such allocations. Hospitals receive decentralised budget allocations from the general Directorate of Hospitals, and these funds are allocated directly to hospitals based on their annual operational plans. The plans are approved by the Board of Directors, and the Treasury releases funds based on these plans. Study informants

mentioned that only one-third of the activities submitted by hospitals in their plans are usually funded due to limited resources available to the government. Government resources allocated to the general health system are released on a quarterly basis, with the schedule for the release of funds to support eye health however varying depending on the type of programme and source of funding.

At the hospital (secondary) level, which is autonomous, there are allocations from the central level, but they are not earmarked for eye health. Hospital management has an overall responsibility for the allocation of funds to each department at the hospital based on planned activities and priorities. Eye units receive funds for the salaries of eye care workers and consumables for eye health services. For example, the eye unit in the hospital visited in the Segou region received two transactions in 2015, which amounted to 14 million CFA (approximately 25,206 USD) for the purchase of consumables through the general hospital budget. Another source of funding of eye care activities at the hospital level is through the funds generated internally from user fees. Around 30% of funds generated by eye care units are used for purchasing consumables (e.g. surgical kits).

At the district level Reference Health Centres (RefHC) and Community Health Centres (ComHC), government supports eye health activities through infrastructure, payment of salaries, payment of utility bills and other logistics. The budget for the general health system at this level is co-managed by the “council of circle” together with the health management team. The president of the “council of circle” is a co-signatory on the Referral Health Centre (RefHC) accounts.

#### **4.3.3. International partner funding**

Financial support provided by international donors varies depending on the type of intervention. Some partners provide funding to the National Eye Health Programme (NEHP),

while others provide logistical support and help to search for external funders. Multilateral agencies like the WHO directly fund activities according to their purpose and also help to identify INGOs who could provide financial support. There are also private sector organisations, for example banks, that provide direct funding to AITO for cataract surgery.

There are two main approaches through which partners supporting eye health engage with the Ministry of Health. Some partners transfer funds directly to the MoH through the National Eye Care Programme (NECP), and others transfer funds directly to the regional level. In some districts, however, there is a request for funds or other partner support through the MoH and NEHP. The Ministry of Health is responsible for inviting partners, especially INGOs, in these areas. Partners can request the MoH Directorate of Finance to allocate certain percentages to specific regions, districts or community health centres. The directorate is guided by both the operational plans and requests from the partners.

Sightsavers, for example, has a partnership agreement with the National Eye Health Department and the Regional Directorate of Health in the Koulikoro region. Based on this agreement, the Regional Directorate submits an annual operational plan upon which funds are released monthly to support eye health interventions. Other partners, such as the Cater Centre, prefer to send funds directly to the Regional Directorate. The timeline and mechanisms for the release of funds are agreed at the operational plan stage.

#### **4.3.4. Health insurance**

A compulsory health insurance scheme called Mandatory Health Insurance (MHI) is used to finance healthcare for the majority of patients, including eye care services. The Assistant Medical Ophthalmologist covers 70% of all costs of services, while patients are expected to contribute 30% of costs for drugs purchase. With regard to eye health, the compulsory

health insurance does not cover costs of spectacles or associated services, but provides payments for other eye health services.

#### 4.3.5. User fees

Study stakeholders referred to a general price list for services provided in health facilities, including eye health. The price list is usually available at the ticket registration or finance office of health facilities. The prices for eye health services are also available in eye units. However, these are not available in an accessible format, for example Braille. Study informants also mentioned a committee that regulates prices charged by health facilities at different levels. At the hospital level, prices are regulated by the Board of Directors, while the “council of circle” regulates prices at the RefHC level in close collaboration with consumer associations.

Study informants noted that the prices for eye health services varied depending on the type of facility (public or private), level of care (primary/secondary/tertiary) and location. Tertiary level had the highest prices, followed by secondary and then primary level facilities. For example, the average price of consultation at the tertiary level was estimated at CFA 3,500 (6.3 USD); while the prices for consultation at the secondary and primary levels were estimated at CFA 1,000 (1.8 USD) and CFA 750 (1.4 USD) respectively. The prices charged for surgery also varied with around CFA 50,000 (90 USD) charged at the tertiary level and CFA 32,500 (59 USD) at the secondary level. In private facilities, located mostly in the capital, an eye care consultation at the secondary level cost approximately CFA 10,500 (19 USD) and the average price of cataract surgery was CFA 107,500 (193 USD).

Data available from the leading (tertiary level) facility in the country suggests that AITO generates 477,756,210 CFA (approximately 860,402 USD) from user fees annually, representing 23% of all income generated from eye health in the hospital. Further, the available price lists suggested that there were two types

of consultations at AITO a consultation with a pre-booked date, which cost CFA 5,000 (9 USD) and a consultation without a pre-booked date, at CFA 2,000 (3.6 USD).

Prices of spectacles also varied with the average price estimated at CFA 15,000 (27 USD). Spectacles with double frames and double frames and pictures cost patients CFA 32,000 (58 USD) and 42,000 CFA (76 USD) respectively. In the Koulikoro region, spectacles without frames (spherical lenses) cost CFA 7,500 (13.5 USD), while spectacles with frames cost CFA 10,000 (18 USD). Prices charged for spectacles in Kati were between 11,000 CFA (19.8 USD) and 15,000 CFA (27 USD) for spherical lenses, and 15,000 CFA (27 USD) for cylinder lenses.

User fees for consultations, surgeries and spectacles were thought to be high, given that Mali is one of the poorest countries in the world with the GDP per capita of 750 USD and a poverty headcount ratio of 43.6%<sup>18</sup>.

Study informants commented on the policy of fee exemptions for indigent or vulnerable populations, including the elderly. It was explained that patients seeking exemptions were required to provide cards or indigent certificates when they registered at the hospital or health centre. The registration office or insurance were responsible for determining the waiver for the vulnerable groups, and software is used at the registration office to keep records of clients who are classified as indigents.

INGO partners often provide funding to support co-payments for eye care services. The funding aims to subsidise the cost of patient contributions. Funding is 100% for patients classified as indigents. These services are managed by the Social Service Development unit.

## 4.4. Eye care service delivery

### 4.4.1. Availability and delivery of services

The study identified 52 (Annex 2) eye units operating at different levels of the eye health system. At the time of the assessment, 39 (75%) operated at primary level, 12 (23.1%) operated at secondary level and one (1.9%) was a tertiary level facility (AITO).

Informants noted that almost all eye health services were provided as outpatient services and that it was difficult to reserve beds specifically for eye health patients. The majority of hospitals and eye units had no reserved beds for eye care, with a few facilities having 2-3 beds for monitoring and patient follow-up. At AITO, for example, patients could request to be admitted to hospital for follow-up.

Most stakeholders agreed that the Malian eye care system was not vertical, with study informants pointing out that services were provided at different levels within the existing structures. Hospitals, for example, had scheduled dates for various activities, where consultations were run throughout the week, and surgeries were scheduled for specific days. It was further explained that regular eye care was provided five days a week, with an additional two days for emergency services. At the RefHC level, primary eye care services were provided daily, while cataract surgeries were arranged for specific dates depending on the number of cases identified (usually five cases). At this level, surgeries were performed two to three times a week.

Informants also noted that campaign activities were organised at least twice a year, usually in October and December. These campaigns are supervised by the National Eye Health Co-ordinator, who collates project documentation and ensures that campaign data contributes to the national statistics on cataract.

### 4.4.2. Cataract surgeries

Data obtained from hospitals, health centres and outreach campaigns suggests that around 11,413 cataract surgeries were conducted between 2008 and 2012. There was no data available nationally for the year 2013-2014. The Koulikoro region was the only region reporting surgeries in this period: 2,724 in 2013 and 2,448 in 2014.

In 2015, the number of cataract surgeries in Mali almost doubled compared to the previous seven years (23,923). This was mainly due to the cataract camps supported by Turkish and other INGO partners.

The most recent Cataract Surgical Rate (CSR, 2015) was estimated at 1,343 surgeries per million; this is higher than in many neighbouring countries but still below the recommended target for Africa of 2000 per million. There is no national data for Cataract Surgical Coverage (CSC), since there have been no national population-based surveys of visually-impaired people.

The RAAB study conducted in the Koulikoro Region in 2011 shows that only 36.7% of eyes (at VA<3/60) had been operated on with significantly lower coverage among women (27.9%) than men (49.5%). The CSR in the region was estimated at 824 per million, but there was no accurate data on the total number of surgeries from all eye units in the region for 2015. It was explained that cataract patients in the region were recruited through the hospital and outreach activities, but the accurate data for the proportion of patients coming from outreach was available from 2008 only (67%). Surgical performance ratio in 2015 in the Koulikoro region was 360 surgeries per surgeon, which is lower than the recommended target of 500 per surgeon.

### 4.4.3. Quality of care

Most informants agreed that the quality standards applied in general healthcare were applicable to eye health and followed by eye



care workers. The national policy for promoting quality in health was applied in eye units, for example in standards related to consultations, examinations and measuring visual acuity. Also, quality standards used in training institutions were applicable to the training of eye care workers. Quality standards for eye health were ensured through various tools, in-service training and monitoring and evaluation. There is also a national therapeutic guide, which provides information on all diseases including common eye conditions (e.g. red eye, adult conjunctivitis, newborn conjunctivitis, foreign body and trachoma) and procedures (e.g. eye examination and tetracycline treatment).

Study informants also referred to the national agency established by the government to assess quality of care, costs and patient satisfaction. The team consists of health workers from national level representing different cadres. Participants also mentioned a service delivery performance contract signed between the government and service providers (i.e. hospitals), which helps the National Agency for the Assessment of Hospitals (NAAH) assess the performance and quality of services of service providers.

One of the weaknesses of the current system identified by study informants was the system of supervision of eye health activities at regional and district levels. It was noted that the current system of clinical supervision in hospitals and health centres did not include eye care services. The supervision organised by the NAAH at hospital level did not include eye health. The system of supervision at ComHC level was thought to be even more neglected, as eye health was not included in any of the existing processes, such as document reviews and assessing information and capacity of service providers.

It was explained that the eye health system was supposed to have a cascaded supervision, where the national level team led by the National Eye Health Coordinator would supervise the regions and the regional teams led

by ophthalmologists would supervise health districts (RefHC). However, this system did not work in practice due to the lack of funding, which was often provided by INGOs but was not sufficient to cover all the regions. For example, Sightsavers provided funding to the NEHP to carry out supervision, but only for the Koulikoro region. As a result, most supervision took place only during cataract campaigns.

## 4.5. Human resources for eye health (HREH)

### 4.5.1. Human resource policy and management

A human resources policy developed collaboratively and based on WHO regional guidance for the 2009-2015 period covers all health sector goals. The policy was limited to five years with opportunities for revision based on needs. The policy did not exclude any cadre within the health system and was relevant to eye health workers. However, some informants said that there had been limited consultations on the policy with the National Eye Health Coordinator and there were issues with estimating needs for human resources for eye health (HREH). Some informants also noted that the implementation of the overall human resources for health (HRH) policy experienced difficulties due to political crises and decisions of some international donors to withdraw their support.

Software is used by decentralised regional authorities for gathering information on HRH, which tracks information on all health workers, including eye health workers. Informants at regional level explained that there were two types of information collated in the HRH information system: nominative and funding source information. Hospitals gathered HRH information from various units and sent it to the human resource directorate at the MoH.

The key weaknesses of the HREH management system identified by study informants were unequal distribution of eye care workers in the country and the lack of career management

plans for eye care workers, particularly mid-level personnel. A particular issue mentioned by study stakeholders was the lack of regulations for cataract surgeons as an eye health cadre.

#### 4.5.2. Recruitment and deployment

There are two processes involved in the recruitment and salary-paying of civil servant workers deployed within the MoH structures. The process of formal recruitment of HREH is managed by the Directorate for Human Resources within the public sector employment; the deployment of eye care workers is managed jointly by the directorate and by the National Eye Health Department. Some regions are also responsible for planning and appointing HREH. The process is managed by decentralised local authorities including town halls, communities and regional councils responsible for local contracts, which fill in the gaps in the eye care workforce.

It was explained that eye care workers were deployed based on needs assessments carried out and submitted by hospitals or health centres annually. Study informants noted that there had been an increase in the eye care workforce in the past few years. For example, 11 ophthalmic nurses had been trained in the twelve months preceding the assessment. However, there were still significant gaps in the number of HREH due to limited budget allocations. It was pointed out that the government budget allocated for HRH had reduced from 1 billion CFA to 600 million CFA in 2015. This amount was sufficient to recruit only 258 new health workers, which included only five ophthalmologists.

It was also noted that the salaries of some eye care cadres, mainly optometrists, were paid by either INGOs (Sightsavers) or autonomous eye care institutions like AITO. This was different from other cadres, for example ophthalmologists. The Malian Union for the Blind, for example, was reported to be responsible for paying the salary of the ophthalmologist employed in their eye unit; this salary had been previously covered by

Sightsavers. The inability of government facilities to recruit optometrists led to their redundancy in the labour market.

It was also noted that the recruitment of ophthalmologists depended on the number of ophthalmology graduates, which was limited to 1-2 a year, as the Directorate for Human Resources was not responsible for funding the training of ophthalmologists. Participants at regional and district levels, in particular, mentioned limited quota for eye care workers and the lack of coordination in the appointment of eye care workers at various levels.

#### 4.5.3. Availability and distribution of eye care workers

This assessment identified a total of 186 'active' eye care workers working at different levels of the system. This workforce included 52 ophthalmologists, 130 ophthalmic nurses otherwise known as Medical Assistant in Ophthalmology (AMO) three optometrists and one optician. The study also found that although 25 optometrists had been trained to provide services in Mali, only three of them were employed at the time of the assessment (two by Sightsavers and one by AITO). The only optician was deployed by the Regional Council/ Assembly in the Koulikoro region.

Using the 2016 Malian population estimates (18,343,000 people), the ratio of surgeons to population was estimated at 2.9 per million, which falls below the recommended target (four per million). The ratio of ophthalmic nurses was 7.1 per million, which is also below the recommended target of 10 per million. The current ratio of optometrists/opticians is 0.2 per million, which is well below the target of 20 per million.

The distribution of eye care workers is skewed towards the capital, Bamako. For example, 53.6% of ophthalmologists and 55.5% of ophthalmic nurses are located in the capital serving around 13% of the country's population. This was largely explained by the availability of

infrastructure and equipment in the capital and other cities, with limited capacity available in rural areas. Despite this relative inequity being typical for many countries in Africa, nearly all regions in Mali except Kidal had at least one ophthalmologist at the time of the assessment. Also, the majority of eye care workers worked in public facilities. For example, 73.2% of ophthalmologists worked in the public sector compared to only 26.8% in the private sector. However, it was also noted that many eye care workers working in the public sector were also working in their private practices.

#### 4.5.4. Training institutions

There are two public institutions responsible for training eye health workers in Mali: the African Institute of Tropical Ophthalmology (AITO) and the National Institute of Health Sciences Training (NIHST), with various campuses in Bamako, Kayes and Sikasso. NIHST is responsible for training mid-level personnel (assistant medical ophthalmologists and technician ophthalmologists), while AITO is the leading eye care training institution responsible for training ophthalmologists and optometrists. AITO provides training for a diploma in ophthalmology, a Masters in public eye health, and short courses in eye health. NIHST is also a reference centre for all private training institutions for eye care workers, including opticians, ophthalmologists, optometrists and orthopticians.

Different admission criteria are used in these training institutions, and a team is established to supervise entrance examinations with representatives from the regional level. The admission for eye care programmes is based on merit alone, with no quotas set for regions or demographic characteristics of trainees. There is a written entrance examination at AITO, whereas the Eye Health Technician (EHT) programme has direct enrolment applications. There is a written entrance examination for EHT/AMO at NIHST.

In line with the national regulations and laws guiding the certification of training programmes

in Mali, the curricula of eye care training institutions are regularly updated (usually in least once every five years). AITO last updated its curriculum in 2014.

A range of partnerships also exists between these training institutions and other academic structures, INGOs and private institutions. For example, there is a partnership between AITO and the Faculty of Medicine, University of Science and Technology in Bamako. It was also explained that AITO provided training to both Malian citizens and students from overseas. The number of trainees from other countries was based on quotas, but a common view among study informants was that the number of scholarships available to Malian citizens was small compared to other countries.

#### 4.5.5. Professional development of human resources for eye health (HREH)

The study explored stakeholders' views on in-service training for eye health workers. It was generally believed that the system of in-service training for eye health workers was similar to that of general health workers, but there were differences between eye care cadre and the level of facility where they worked. It was further explained that all in-service training was to be approved by respective authorities; for example, all in-service training for eye care workers at RefHC was to be approved and channelled through the regional level.

Key sources of funding for in-service training included INGOs, self-finance, government and hospital funding. It was explained that the government allocated budgets to in-service training through the Directorate for Human Resources, including training of eye health workers. The government supported the salary of the trainees throughout the training period. Hospitals also allocated budgets for in-service training, including eye health workers based on their HRH development plans. Donor funding was available for occasional short-term training. Staff could be trained at AITO, but one participant mentioned that he had been sent

overseas to Morocco for six months with the funding from Sightsavers. Some participants also mentioned an optician training by two European specialists in the Koulikoro Region as well as training of 178 community health centre managers in primary eye care, funded by Sightsavers.

Participants further mentioned seminars and workshops organised for specific cadres. For example, there are seminars organised monthly for ophthalmologists at AITO, known as “post university teachings”, which bring together doctors – mainly ophthalmologists – to discuss new developments in diagnostics and the treatment of eye diseases.

## **4.6. Medical products and pharmaceuticals**

### **4.6.1. Policies and regulatory institutions**

There is a National Essential Medicine List (NEML) in Mali, which is updated every two years during a 3-4 day workshop and involves various policy, operational and academic stakeholders. Consultations involve DPOs and professional associations, particularly when new medicines are being imported. The national regulatory body is responsible for compiling a proposed list and for consultations with various stakeholders. Agreed medical products are compared with the WHO recommended list. They are also sent to the Cabinet for validation. The MoH is the final authority to authorise the list.

The Pharmaceuticals and Medicines Directorate (PMD) is a department under the government responsible for reviewing pharmaceutical products requested by regions and districts. Reviewed lists are submitted to the Directorate of Finance and Materials for purchasing. The process applies to all products and supplies, including those for eye health. The PMD is also responsible for regulating and verifying prices of newly registered medicines to conform to the standards required in Mali. There is also a body called Visa Commission, which is responsible for

negotiating and authorizing prices for all products on a quarterly basis. The PMD analyses the quantity of medicines and supplies requested, but not the prices charged for each pharmaceutical product.

The Popular Pharmacy of Mali (PPM) is an autonomous public institution whose primary role is to store and distribute essential medicines and medical devices. It has a three-year contract with the government as the sole agent to store and distribute essential medicines. The contract, which is renewable after the three-year period, mandates PPM to make essential medicines available to all suppliers (including public hospitals, ComHCs and RefHCs and private providers) at prices which can be purchased by the population.

The National Essential Medicine List (NEML) includes 19 eye health medicines and products organised by the type of medicines and pathology. Study informants pointed out that there were no specific government allocations for purchasing eye care pharmaceuticals and products. The main sources of funding of eye care supplies were the general health allocations and international partners. There was no information on the percentage of funds spent on eye care pharmaceuticals and products, with the exception of a few common products such as Tetracycline Pommade 1%, Gentamycine Collyre 0.3%, and Aureomycine Pommade 1%.

### **4.6.2. Manufacturing and distribution**

In Mali, no manufacturing companies produce medicines for the general health sector. Neither do any manufacturers in Mali produce medicines for eye health.

Study participants explained that all imported drugs needed to be approved by the PMD, which was the only institution to issue an entrance certificate for imported products. All imported products in Mali require registration by the PMD, which reviews products before authorising their distribution



at the market. This involves testing products at the lab and verifying the documentation, price and acceptance by the Visa Commission. Pharmaceutical products not approved by the Visa Commission are considered illegal. Informants further explained that individuals dealing with the import of pharmaceutical products had to work within the health sector, preferably as pharmacists.

It was further explained that there was an integrated distribution of medicines, which followed a supply process known as the “main channel of essential medicines”. The process includes eye health medicines.

Study participants noted that there were two destinations for imported drugs within the public and private sectors. PPM is responsible for all imported pharmaceutical products within the public sector, while two private purchase and wholesale centres, LABOREX and COPHARMA, manage distribution for the private sector.

PPM represents the public sector supply channel. It has regional centres dealing with public pharmaceutical products at the regional level and sells products at the same price. PPM manages 16 sales points throughout the country where pharmaceutical products are stored; eight stock centres are located in Bamako and eight are located in the regions. The supply chain is the same with the RefHC level and hospitals purchasing from PPM and the RefHC level supplying the ComHC level. Within communes, there are sale stocks that purchase from the district distribution stocks and sell to clients.

Within the private sector, private wholesalers also manage regional centres who supply products to private pharmacies and private stocks.

#### **4.6.3. Managing pharmaceutical products and stocks**

It was explained that in September every year, the PMD estimates which pharmaceutical

products are required for the following year. Estimates are based on requests from regional and district level providers, and help in planning which medicines and pharmaceutical products are required in the country. The data also gave an overview of the consumption by hospitals, RefHCs and ComHCs.

Study participants noted sets of data collected on pharmaceuticals from the regional level in a monthly management report, which consisted of stock files on pharmaceutical products including eye care medicines used by RefHCs and ComHCs. This monthly report was submitted/channelled to the next level of the health system and contained information on stock situation, especially available products and expiry dates. An electronic version, the OSPANTE software, was also used to gather data on pharmaceutical products, which included eye health medicines. This data was accessible to everyone within the pharmaceutical sector at various levels. The software’s primary objective was to track pharmaceutical products available in stock. Analysis was performed at different levels to inform decision making and planning.

Managing stocks at regional level involved collecting data on monthly consumptions, logistics, unit price and quantity consumed. Informants further explained that RefHC level facilities had four months’ storage capacity, while ComHCs had two months storage capacity for pharmaceutical products. Orders for products were made based on the average monthly consumption and the facility storage capacity.

Informants further explained that the PMD conducted workshops on how to collect data for annual requests for pharmaceutical products at the regional level, which took into consideration the overall situation with medicines.

It was noted that eye care medicines included in the NEML were integrated in the requests submitted to the PMD. Hospitals and RefHCs could also request specific medicines for eye care. The requests were sent by eye units to the

regional and central levels and then submitted to the PPM by September 15th, who used this data to order pharmaceutical products for the entire country.

It was further explained that the PPM delivered pharmaceutical products to the NEHP in line with the purchase orders made by the programme; and there was a National Commission responsible for receiving the products, which included the MoH, PMD and the NEHP.

Informants also noted that eye health medicines or products for cataract and trichiasis surgeries, usually campaign activities, did not follow the distribution channel at the regional level. These products were usually funded by international partners and were directly delivered to the campaign teams. Specific medicines/ consumables ordered by eye care institutions (e.g. AITO) were also directly ordered or tendered surpassing the main supply channel.

## 4.7. Eye health information system

### 4.7.1. Health information and management system (HMIS) in Mali

Health information in Mali has been historically collected using the Health Development in Mali tool (HDM) developed in MS Access. There are designated focal persons responsible for compiling and submitting health information at various levels. The HDM tool has been used to calculate incidences of disease reported in health facilities and to submit health information reports to different decision-making levels. For example, the tool can use health information to calculate incidences of reported glaucoma for different age groups. In addition to the software, information is being collected in hard copies, which are updated regularly.

HDM software is currently being replaced by the Demographic Health Information System 2 (DHIS2). The DHIS2 software is at the implementation phase with ongoing configurations of the servers before it can be

disseminated across the system. It was argued that the introduction of the DHIS2 tool would change the reporting system from quarterly to monthly at various levels, but that the tool would maintain all existing indicators and would have capacity to include additional indicators, which are not captured at present.

There are various international partners supporting health information system in Mali, including USAID, UNICEF and the Global Fund. These partners support the country in various ways through the implementation of the DHIS2 transition. USAID emerged as the leading donor in the field supporting the assessment of the health information system, setting up the current software across the country and recruiting experts to support the system. There is no donor agency specifically supporting eye care information, although INGOs (eg. Sightsavers) support the National Eye Health Department with logistical arrangements (e.g. vehicles for monitoring information gathering on eye health).

The International Medical Corps (IMC) is piloting a project to collect epidemiological data, which is supplementary to the national routine data collection system. The IMC project is implemented in close collaboration with the MoH. This reporting system does not include information related to eye health. There are ongoing negotiations to adjust the reporting template to include data on eye related diseases.

### 4.7.2. Collecting and reporting data at various levels

Eye health information is included in the health information reporting system at all levels. There are various tables, templates and tools with codes assigned to consultations, morbidity and procedures like trichiasis surgeries. Eye health information is reported from the ComHC level to RefHCs, then to regional and finally to central level.

At the ComHC level, data is compiled monthly but submitted quarterly to the next level.

Quarterly reports at the RefHC level contain eye health information and are produced in two formats, three hard copies and electronically. Two hard copies are sent to the regional and national levels and one copy is kept at the RefHC. The regional level only produces health information using the HDM software, which includes eye health information.

Each level has a maximum of five days to compile and submit information to the next level; and it is expected that the central level receives information within 15 working days following the end of each quarter. Quarterly reports at the national level include information on trachoma, trichiasis, visual acuity and newborn conjunctivitis. The current data collection tool was last updated in December 2015, when additional eye health indicators such as trauma and glaucoma were included.

Data collected from hospitals is sent directly to the central level. Designated focal persons at hospitals collect health information from all units including eye units and submit it to the central level. Within the hospital structure, all units including eye health submit information monthly to the focal person for health information; the compiled information is sent to the National Department of Statistics (NDS) quarterly. Secondary level facilities report data on trichiasis, cataract, glaucoma, refractive errors, low vision, trachoma and visual acuity. There are also focal persons for eye health information, mostly assigned to Neglected Tropical Diseases (NTDs). Informants commented on a variety of data collected on NTDs, including various assessments, impact treatment surveys, mass drug administration (MDA) data and coverage surveys. During an annual review meeting, focal persons for eye health/NTDs from the regions present data for discussions and feedback. The information that is agreed is used by international partners and the MoH.

Within the health system, all 63 health districts report eye health information from public sector facilities, especially RefHCs and

ComHCs. Private sector facilities, however, are not regular in reporting data, including eye health. In most districts, only one private health centre known as Espoir (Hope) usually submits health reports for the first two quarters of the year. This information, however, does not include eye health. Some informants also argued that eye health information included in the health authority reports was limited and could not be used to assess the overall eye health situation in the country.

#### **4.7.3. Databases for eye health and M-Health project**

The National Eye Health Coordinator has set up a database for trachoma supplemented by periodic meetings among partners to review and organise the data coming from various sources. One INGO partner, HKI, recruited a consultant to develop a database for all NTDs in Mali.

There is also an ongoing M-Health project aimed at creating a central portal for eye health information in Mali. Eye health data will be available on a password-protected server. The M-Health project was initiated by Sightsavers and the MoH through the National Eye Health Coordinator and aims to set up electronic data collection using mobile devices. The project was funded by Conrad Hilton Foundation and piloted in the Koulikoro region, where 19 surgeons were trained to collect data on trichiasis and trachoma surgeries at the outreach camps. During the pilot phase, which ended in 2014, the project captured 13,324 screenings and 210 trichiasis surgeries<sup>19</sup>. The trichiasis data collected by the project is now available centrally and it is planned that in the next four years, electronic data collection will be scaled up in 20 districts covering five regions<sup>19</sup>. The project will aim to include other eye health indicators, such as cataract.

#### **4.7.4. Use of data**

National summary reports produced by the MoH include eye health information. Study informants explained that these summary

reports are used by the MoH to make requests for medicines on NTDs, specifically MDA. Information captured in the national summary reports is disaggregated by district, region, age and recently sex.

The national statistical yearbook, produced by the NDS, also includes eye health information and is regarded to be the most reliable source of data on eye health centrally. The yearbook is based on indicators captured at various levels. It is disseminated nationwide and is accessible to the majority of the population. There are also regional statistical yearbooks produced at regional level, which also include information on eye health.

Participants mentioned various ways in which the available data was used, mainly for planning and advocacy purposes. Health programmes, for example, developed plans known as PROCEPS, which included eye health. Trachoma and onchocerciasis programmes prepared operational plans for the following year. Technical and financial balance sheets for eye health workers were reviewed to adjust trachoma and onchocerciasis operational plans drawn by the MoH and INGOs.

Data was also used for budgeting and fundraising, and for international comparisons. Some informants argued that health authority reports helped to justify budgets and activities of the MoH. They also helped to assess the frequency of eye diseases, which was useful for future programme designs.

It was further explained that data within hospitals was used for unit level planning and for monitoring the delivery against unit objectives. At the RefHC level, information was used for early detection of disease outbreaks. Quarterly reports on eye health activities by the Malian Union for the Blind (MUB) were presented at seminars, annual eye health reviews and shared with various ministries.

#### 4.7.5. Health management information system (HMIS) challenges

Key informants identified a number of challenges affecting the HMIS in Mali, including limited partner support (especially for eye health information), different reporting templates at various levels and parallel systems of data collection, which weaken the national HMIS. For example, some participants explained that regions were expected to report information on eye health to the NEHP, and that INGOs needed the same information for their funding agencies. Often, the regions experienced difficulties in collating information and passing it to the national level, and that INGO gathered data themselves from the field and then shared it with the NEHP.

Some informants mentioned limited opportunities for the training and re-training of health workers in reporting, especially at the ComHC level. Participants also mentioned that there was limited time to compile and analyse health information, particularly at the RefHC level.

## Conclusions

The study examined the eye health system in Mali and explored the level of its integration into the general health system. It found a significant degree of synergy and inter-relationship between the two systems.

Eye health is governed by the policies, regulations and norms applied in the general health system. A post of National Eye Health Coordinator is established within the MoH. Treatment protocols, codes of practice and training institutions' standards are not different from those used by the broader health system.

User fees applied in eye health units are integrated in general price lists and regulated by general price regulating bodies. Salaries of eye health workers are paid by the government in line with the general remuneration policies and standards. Allocation of resources to health



facilities at different levels includes provisions for eye health infrastructure, utility bills and some consumables. Mandatory health insurance includes eye health.

The human resource policy and human resource development plan include eye health workers. The funding available for in-service training can be used by the eye health workforce. A total of 19 eye health medicines and products are integrated into the National Essential Medicine List and the same procurement and supply chain structures are applicable to eye health and the broader health system. Eye health information is integrated into the general health information reporting system at all levels.

The study also identified a number of strengths and weaknesses of the eye health system, which are summarised below following the WHO health system building blocks framework.

## Governance for eye health

### Strengths

- There is a National Eye Health Programme (NEHP) established under the Ministry of Health (MoH) and a post of the National Eye Health Coordinator responsible for supervising, coordinating and monitoring eye health activities in the country.
- The eye health system complies with the same regulations, protocols, standards and certification procedures as the general health system.
- There are Disabled Peoples' Organisations (DPOs) and disease associations involved in advocacy, sensitisation and awareness-raising activities. There are community events focusing on prevention of blindness and social inclusion, such as the World Sight Days and Months of Solidarity.
- The Malian Union of the Blind (MUB) as a strong presence in the country. It operates eye care units and special education activities, and has partnership agreements with government agencies and international partners.

### Weaknesses

- There is no up-to-date National Eye Health Strategic Plan. The previous plan ceased to exist in 2010.
- There is no Global Action Plan (GAP) committee under the NEHP.
- The MUB is thought to be insufficiently organised in its lobbying strategies leading to an ununited voice in response to government planning, budgeting and data.
- DPOs and disease associations are not directly involved in supervision and certification for eye health.

## Health financing

### Strengths

- There are various sources of funding available for eye health in Mali, including government, mandatory health insurance, international donors and user fee contributions.
- The government provides funding to support eye health infrastructure, salaries, utility bills and some consumables. The allocation of funding is decentralised through regional, district and hospital level funds.
- There is mandatory health insurance, which aims to cover up to 70% of healthcare expenditure for the majority of patients, including eye care services.
- Hospitals generate funds from user fees, which can be used to purchase consumables and other expenditure. There is a general list of prices and a national level committee that regulates prices for facilities of different levels.
- International donors and International Non-Governmental Organisation (INGO) partners provide funding and other support to specific regions and intervention areas. Nearly all Malian regions had at least one INGO partner at the time of the assessment.
- There is a policy of fee exemptions for indigent/vulnerable populations, including the elderly. INGO partners provide funding to

cover patient co-payment costs, particularly for indigent/vulnerable groups.

## Weaknesses

- There is no budget line specifically for eye health activities. Eye health has to compete with other health priorities in both regional/district and hospital allocations.
- Out-of-pocket expenditure constitutes a significant proportion of the total health expenditure and continues to be a significant barrier to achieving universal health coverage. Fees charged for patient eye health consultations, surgeries and spectacles are thought to be high and therefore unaffordable for a large number of patients.
- The study could not obtain information on how the mandatory health insurance works to cover the costs of eye care services and therefore could not assess its effectiveness as a source of funding for eye health.
- There was no detailed information on how the system of user fee exemptions works in practice or how co-payments from INGOs are coordinated with the lists of patients registered as indigents. Therefore, it was not possible to assess how INGO co-funding complements other sources of funding and to what extent it ensures access to services for the poor.
- Price lists in hospitals and health centres were not available in accessible formats such as Braille.

## Eye care service delivery

### Strengths

- There are 52 eye units operating at different levels of the system throughout the country.
- Eye care services are provided regularly with daily outpatient consultations and surgeries organised 2-3 times a week. There is a minimum of two cataract campaigns organised every year.

- Cataract Surgical Rate (CSR) is estimated at 1,343 per million, which is better than in many neighbouring countries.
- Quality standards in general healthcare are applied to eye health and followed by eye care workers. There is a national therapeutic guide providing information on all diseases, including common eye conditions and procedures.
- There is a national agency established by the government to assess the quality of service delivery, cost of care and patient satisfaction.

### Weaknesses

- There are gaps in the reported numbers of cataract surgeries in some years, which makes it difficult to monitor accurately the trends in cataract outputs.
- Data on cataract coverage is available from Koulikoro region only.
- The current system of clinical supervision of hospitals and health centres does not include eye health. Supervision for eye health is designed as a cascaded system from the NEHP down to the regions and districts. However, the system is not being implemented due to the lack of funding.
- The current CSR (1,343 per million) and ratio of surgeries per surgeon (324 per year) are below the recommended levels of 2000 per million and 500 per year respectively.
- The study did not contain any information on cataract surgical outcomes and therefore it is unknown whether and how cataract quality is being monitored.

## Human resources for eye health

### Strengths

- There is a directorate for Human Resources for Health (HRH) under the MoH, which supervises and coordinates the recruitment and deployment of the health workforce, including eye health workers. The National Eye Health Department and the Human

Resources Directorate are jointly responsible for the appointment of eye care workers at different levels.

- There is a national HRH policy for the period 2009-2015 and an electronic system for collating information on HRH, including eye care cadres at the regional and district levels. Information on HRH needs is submitted to the MoH based on needs assessments carried out annually by hospitals and health centres.
- There are two public institutions responsible for training eye health workers: the African Institute of Tropical Ophthalmology (AITO) is responsible for training ophthalmologists and optometrists, and the National Institute of Health Sciences Training (INFSS) is responsible for mid-level personnel with campuses in Bamako, Kayes and Sikasso.
- The two training institutions have various partnerships with the government, other academic institutions, INGOs and private organisations. There are quotas for training both Malian and overseas trainees at AITO.
- The number of eye care workers increased in recent years. The assessment identified 186 'active' eye care personnel working at different levels, including 52 ophthalmologists, 130 mid-level personnel and four optometrists/opticians. All regions except Kidal have ophthalmologists, and the majority of ophthalmologists are in the public sector.
- There is a system of in-service training for eye health workers, which is similar to the general health worker training. The government and hospitals allocate funding for in-service training, which covers the salaries of trainees. There are various training opportunities supported by INGOs, including short-term and medium-term training programmes and workshops.
- There are monthly seminars for ophthalmologists at AITO, which discuss new developments in the diagnostics and treatment of eye diseases.

## Weaknesses

- The ratio of ophthalmologist/surgeons (2.9 per million) and mid-level personnel (7.2 per million) to population is below the recommended targets (four per million and 10 per million respectively).
- There is a limited budget and limited quota for both the training and deployment of eye care workers in Mali.
- The distribution of eye care workers is skewed towards the capital and other large cities with over 50% of both ophthalmologists and mid-level personnel located in Bamako, serving around 13% of the population.
- Optometrists are not deployed in the public sector. There are only three out of 25 trained optometrists currently working being deployed by either Sightsavers or AITO. Inability of the government to contract optometrists leads to their redundancy in the labour market.
- There are no regulations for the training and recruitment of cataract surgeons, and there are limited opportunities for career progression for mid-level ophthalmic personnel.
- The HRH policy expired in 2015 and it was not clear in this assessment whether there were plans for its renewal.

## Medical products and pharmaceuticals for eye health

### Strengths

- A National Essential Medicine List (NEML) is updated collaboratively every two years and aligned with the WHO recommended list. Nineteen eye health medicines and products are included in the NEML.
- There is a department called Pharmaceuticals and Medicines Directorate (PMD) under the government which is responsible for reviewing pharmaceutical products requested by the regions and districts, and for

regulating prices of newly registered products. Eye care medicines and products included in the NEML are integrated in the requests submitted by the regional and district levels to PMD.

- There is an integrated distribution of the medicine and supply process known as the “main channel of essential medicines,” which includes eye health. An agency called Popular Pharmacy of Mali (PPM) has a three-year contract with the government as the sole agent to store and distribute essential medicines and medical devices for the public sector. PPM has 16 sales points throughout the country and provides medicines to the NEHP in line with the requests submitted to PMD.
- There are also two private purchase and wholesale centres, LABOREX and COPHARMA, which manage the distribution of pharmaceutical products for the private sector.
- There is a system for collating monthly information on the pharmaceutical products available and their expiry dates from district level facilities to the regional level, and further to the central level. There is also an OSPSANTE software used to assist in collecting data. The system includes medicines and products for eye health. Information collated is analysed at all levels and is used for monitoring stocks and planning.
- International donors support the purchase of pharmaceuticals and supplies, particularly for campaign activities for cataract and trichiasis surgeries.

### Weaknesses

- There are no specific government budget allocations earmarked for eye health medicines, and no information on the funds spent on eye health medicines and products within the general health system.
- There are no manufacturing companies producing medicines for eye health in Mali.
- Pharmaceutical products procured for

cataract and trichiasis campaigns using international donor funding and specific medicines ordered by specialist eye care institutions (e.g. AITO) do not follow the main distribution and supply channels.

## Eye health information system

### Strengths

- A tool called Health Development in Mali (HDM) collects health information at all levels, which includes eye health. The HDM software is currently being replaced by the Demographic Health Information System 2 (DHIS2), which will change data collection frequency from quarterly to monthly and will have capacity for additional health indicators. A number of international donors are supporting the roll-out of DHIS2.
- The current reporting tool includes indicators for eye health. This tool collects data from Community Health Centres (ComHCs) and passes it to Referral Health Centres (RefHCs), regional authorities and the MoH. The tool includes information on trachoma, trichiasis, visual acuity and newborn conjunctivitis. It was last updated in December 2015 with additional eye health indicators (eye trauma and glaucoma) included.
- Data collected from hospitals is sent directly to the central level. There are designated focal persons for health information in hospitals, as well as focal persons for eye health information, mostly NTDs. Secondary level facilities report data on trichiasis, cataract, glaucoma, refractive errors, low vision, trachoma and visual acuity.
- The National Eye Health Coordinator has a database for trachoma with periodic review meetings, which involve various partners. An M-Health project collecting data on trichiasis has been piloted by the MoH and Sightsavers. There is a plan to scale-up the M-Health project to 20 districts across five regions.
- A national statistical yearbook is produced by



the National Department of Statistics (NDS) and includes eye health information. It is perceived to be the most reliable source of eye health information centrally. There are also regional statistical yearbooks.

- National summary reports produced by the MoH include eye health information. The reports are used for the purpose of planning, advocacy, budgeting and fundraising at different levels of the system.

## **Weaknesses**

- There is limited donor support for reporting eye health information and limited opportunities for training and re-training health workers in reporting, particularly at lower levels of the system.
- There are different reporting templates and parallel systems of data collection, which undermine national HMIS.

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## Annex 1: Partners involved in eye health in Mali

Region	Donor	Activities
All regions	<ul style="list-style-type: none"> <li>i. Orange Foundation</li> <li>ii. Lions Club</li> <li>iii. FMED (Malian Foundation for Maintaining Aid and Solidarity)</li> <li>iv. AMAR (Muslim Agency of Africa)</li> <li>v. Turkish</li> <li>vi. Albazar International</li> <li>vii. World Vision</li> <li>viii. Helen Keller</li> </ul>	<ul style="list-style-type: none"> <li>i. All regions</li> <li>ii. All regions</li> <li>iii. All regions</li> <li>iv. All regions</li> <li>v. All regions</li> <li>vi. All regions</li> <li>vii. All regions</li> <li>viii. Trachoma and micronutrients</li> </ul>
Bamako	<ul style="list-style-type: none"> <li>i. BID (Islamic Bank for Development)</li> </ul>	<ul style="list-style-type: none"> <li>i. Provide support to AITO for training of eye care workers</li> </ul>
Koulikoro	<ul style="list-style-type: none"> <li>i. Sightsavers</li> <li>ii. BADEA (Arab Bank for Development for Africa)</li> </ul>	<ul style="list-style-type: none"> <li>i. Eye health project</li> </ul>
Kayes	<ul style="list-style-type: none"> <li>i. Helen Keller</li> <li>ii. OPC</li> </ul>	<ul style="list-style-type: none"> <li>i. Trachoma and all other regions for micronutrients, trachoma and micronutrients</li> </ul>
Sikasso	<ul style="list-style-type: none"> <li>i. Carter Centre</li> <li>ii. World Vision</li> <li>iii. OPC</li> </ul>	<ul style="list-style-type: none"> <li>i. Trachoma</li> <li>ii. Trachoma</li> </ul>
Segou	<ul style="list-style-type: none"> <li>i. Carter Centre</li> <li>ii. OPC</li> </ul>	<ul style="list-style-type: none"> <li>i. Trachoma</li> </ul>
Mopti	<ul style="list-style-type: none"> <li>i. Carter Centre</li> <li>ii. Eye for the World</li> <li>iii. Islamic Relief</li> <li>iv. World Vision</li> <li>v. Association Mati Mali</li> <li>vi. Albazar International</li> <li>vii. OPC</li> </ul>	<ul style="list-style-type: none"> <li>i. Trachoma</li> <li>ii. Mpoti (Bankers district)</li> <li>iii. Campaign activities</li> <li>iv. Trachoma</li> </ul>
Tombouctou	<ul style="list-style-type: none"> <li>i. Malian Red Cross</li> <li>ii. Health Mali Roneah</li> </ul>	-
Gao	-	-
Kidal	-	-

## Annex 2: Eye units operating at different levels

Region	Name of facility	Levels	Type of facility	Ophthalmologist		AMO	Cataract surgeons	Optometrist
				Pu	Pr.			
<b>Bamako</b>								
	INPS	P	Pu	0	0	1	0	0
	PNSO	P	Pu	1	0	6	1	0
	AITO	T	Pu	15	0	33	0	5
	Commune 1	P	Pu	1	0	3	0	0
	Cabinet Privé Tourela	P	Pr	0	1	1	0	0
	Commune 2	P	Pu	1	0	2	0	0
	Commune 3	P	Pu	1	0	3	0	0
	Hop PG	T	Pu	0	0	1	0	0
	Cabinet Privé Togola	P	Pr	0	1	1	0	0
	Commune 4	P	Pu	1	0	4	0	0
	Vision Santé	P	Pr	0	1	0	0	0
	Yeleen	P	Pr	0	0	0	0	0
	INFSS		Pu	0	0	1	0	0
	Base Aeriene	P	Pu	1	0	2	0	0
	Milagro	P	Pu	1	0	3	0	0
	Commune 5	P	Pu	1	0	7	0	0
	Cab BA Sidi Yaya	P	Pr	0	1	0	0	0
	Cab Hawa Ali	P	Pr	0	1	0	0	0
	Commune 6	P	Pu	1	0	3	0	0
	Cab Moussa Ag	P	Pr	0	1	0	0	0
	<b>Sub-total</b>	<b>20</b>		<b>24</b>	<b>6</b>	<b>71</b>	<b>1</b>	<b>5</b>
<b>Koulikoro</b>								
	CSRef de Koulikoro	P	Pu	0	0	1	0	0
	CSRef de Kangaba	P	Pu	0	0	1	0	0
	CSRef de Kati	P	Pu	1	0	1	0	1
	CSRef de Banamba	P	Pu	0	0	1	0	0
	CSRef d'Oulessebougou	P	Pu	1	0	1	0	0
	CSRef de Fana	P	Pu	1	0	1	0	0
	CSRef de Dioila	P	Pu	1	0	1	0	0
	CSRef de Kolokani	P	Pu	1	0	1	0	0

	CSRef de Nara	P	Pu	2	0	0	0	0
	CSRef Kalaban Coro	P	Pu	0	0	3	0	0
	<b>Sub-total</b>	<b>10</b>		<b>7</b>	<b>0</b>	<b>11</b>	<b>0</b>	<b>1</b>
<b>Kayes</b>								
	CSRef Kayes	P	Pu	1	0	0	0	0
	CSRef Nioro	P	Pu	0	0	1	0	0
	CSRef Kenieba	P	Pu	0	0	1	0	0
	Yelimané Dioncoulane (Confessionnel)			0	0	0	0	0
	CSRef de Yélimané	P	Pu	0	0	1	0	0
	CSRef Bafoulabe	P	Pu	0	0	2	0	0
	CSRef Kita	P	Pu	1	0	1	0	0
	CSRef Diema	P	Pu	0	0	1	0	0
	CSref Oussoubidjandjan	P	Pu	0	0	0	0	0
	Hopital Fousseni Dao	S	Pu	0	0	6	0	0
	<b>Sub-total</b>			<b>2</b>	<b>0</b>	<b>13</b>	<b>0</b>	<b>0</b>
<b>Sikasso</b>								
	CSRef Sikasso	P	Pu	0	0	2	0	0
	CSRef Bougouni	P	Pu	1	0	1	0	0
	CSRef Yanfolila	P	Pu	0	0	1	0	0
	CSRef Selingue	P	Pu	0	0	1	0	0
	CSRef Kolondieba	P	Pu	0	0	1	0	0
	CSRef Kadiolo	P	Pu	0	0	1	0	0
	CSRef Koutiala	P	Pu	1	0	1	0	0
	CSRef Yorosso	P	Pu	0	0	0	0	0
	CSRef Kignan	P	Pu	0	0	1	0	0
	CSRef Nienan	P	Pu	0	0	1	0	0
	Hopital Régional	S	Pu	1	0	4	0	0
	<b>Sub-total</b>	<b>11</b>		<b>3</b>	<b>0</b>	<b>14</b>	<b>0</b>	<b>0</b>
<b>Segou</b>								
	Nianomkoro Fomba, Segou	S	Pu	1	0	3	0	0
	CSRef Bla	P	Pu	0	0	1	0	0
	CSRef San	P	Pu	0	0	1	0	0
	CSRef Macina	P	Pu	0	0	1	0	0
	CSRef Baroueli	P	Pu	0	0	0	0	0
	CSRef Niono	P	Pu	0	0	1	0	0
	CSRef Tominian	P	Pu	0	0	1	0	0
	CSRef Markala	P	Pu	0	0	1	0	0
	<b>Sub-total</b>	<b>8</b>		<b>1</b>	<b>0</b>	<b>9</b>	<b>0</b>	<b>0</b>
<b>Mopti</b>								
	CSRef Mopti	P	Pu	0	0	0	0	0

	Centre Catholique Privé Severe		Pr	0	0	3	0	0
	CSRef Bankass	P	Pu	1	2	0	0	0
	CSRef Bandiagara	P	Pu	0	1	0	0	0
	CSRef Koro	P	Pu	0	1	0	0	0
	CSRef Djenne	P	Pu	0	1	0	0	0
	CSRef Douentza	P	Pu	0	1	0	0	0
	CSRef Tenenkou	P	Pu	0	1	0	0	0
	CSRef Youwarou	P	Pu	0	0	0	0	0
	Hôpital Régional	S	Pu	1	2	3	0	0
	<b>Sub-total</b>	<b>10</b>		<b>2</b>	<b>9</b>	<b>6</b>	<b>0</b>	<b>0</b>
<b>Tombouctou</b>								
	CSRef Tombouctou	P	Pu	0	0	0	0	0
	CSRef Dire	P	Pu	0	0	1	0	0
	CSRef Goundam	P	Pu	0	0	1	0	0
	CSRef Gourma-Rharous	P	Pu	0	0	0	0	0
	CSRef Niafunke	P	Pu	0	0	0	0	0
	Hôpital Régional	S	Pu	1	0	1	0	0
	<b>Sub-total</b>	<b>6</b>		<b>1</b>	<b>0</b>	<b>3</b>	<b>0</b>	<b>0</b>
<b>Gao</b>								
	Gao	S	Pu	1	0	1	0	0
	Ansongo	P	Pu	0	0	0	0	0
	Bourem	P	Pu	0	0	0	0	0
	Menaka	S	Pu	0	0	0	0	0
	<b>Sub-total</b>	<b>6</b>	<b>Pu</b>	<b>1</b>	<b>0</b>	<b>1</b>	<b>0</b>	<b>0</b>
<b>Kidal</b>								
	Kidal	S	Pu	0	0	0	0	0
	Abeibara	S	Pu	0	0	0	0	0
	Tessalit	S	Pu	0	0	0	0	0
	Tin-Essako	P	Pu	0	0	0	0	0
	<b>Sub-total</b>	<b>5</b>		<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>
<b>Grand Total</b>		<b>85</b>		<b>41</b>	<b>15</b>	<b>128</b>	<b>1</b>	<b>6</b>



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