

Situation analysis of eye health care in Zambia

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List of abbreviations

CBM	Christian Blind Mission
CEW	Community Eye Worker
CHAZ	Church Health Association of Zambia
ICD-10	International statistical classification of diseases, injuries and causes of death, 10 th revision
NGO	Non-governmental organisation
OCO	Ophthalmic Clinical Officer
ON	Ophthalmic Nurse
RAAB	Rapid Assessment of Avoidable Blindness
SD	Standard Deviation
UNZA	University of Zambia
VAO	Vision Aid Overseas
WHO	World Health Organization

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Executive summary

Background

As in almost all African countries, access to eye health care services for 13 million Zambians is inadequate. The VISION 2020 strategy set up a number of objectives that countries should achieve in order to improve access and increase quality of eye care services. These include specific targets for trained personnel, capacities of eye care facilities, cataract surgery rates, among others. This study aims to systematically document eye health services in Zambia and assess the progress towards VISION 2020 targets.

Methods

Data were collected between February and June 2011. Health care facilities offering eye health services were provisionally identified from lists of providers supplied by the Ministry of Health, the Church Health Association of Zambia and the Health Institutions and Professionals Board. All facilities were contacted either by phone or in person. A representative from each facility (hospitals, clinic or optic shop) was interviewed about services provided, personnel and equipment available. A questionnaire adapted from IAPB standards was used.

Findings

A total of 76 facilities offer eye health services in Zambia. Thirty nine percent of these belong to the Zambian Government, 24% are owned by Non Governmental Organizations (NGOs), and 37% are private for-profit facilities. Eighteen of the 26 private for-profit facilities are optic shops offering refractive and diagnostic services, spectacles dispensing and referral services. Seven spectacles manufacturing workshops exist. The geographic positions of facilities and services are disproportionately favoring urban areas, especially in Lusaka and in the Copperbelt province.

In recent years, new training courses for ophthalmic clinical officers and ophthalmic nurses have been established in Zambia. There are currently 35 ophthalmic clinical officers and 33 ophthalmic nurses working in public and private eye care facilities. In the whole of Zambia there are currently only 18 ophthalmologists, eight cataract surgeons and 19 optometrists. This translates to one ophthalmologist for every 725,000 Zambians and one clinical officer for every 373,000 population. There is a wide disparity between provinces with regards to allocation of eye health personnel. While there are three human resources for eye health per 100,000 population in Lusaka, the figure is less than one (0.23) in Northern Province.

Conclusion

With the development of an eye health programme within the Zambian Ministry of Health since 2004 considerable progress has been made. Several additional eye health facilities have been established and new cadres of ophthalmic personnel are a much needed addition to an extremely limited workforce. However, the need for skilled human resources remains critical. The most imminent requirements are additional ophthalmologists and cataract surgeons. Three provinces (Western, Eastern and Luapula) have neither glasses manufacturing workshops nor private optic shops, so that procurement of prescription glasses is particularly difficult in these areas. The procurement and distribution of prescription glasses needs to be rapidly expanded for reaching the VISION 2020 goals.

1 Introduction

1.1 Background

In nearly all African countries, eye health services are immensely inadequate. While approximately 25% of the population suffers from eye diseases and visual impairment at any one time, only a small proportion has access to appropriate services [1]. As a result most patients on the African continent are living with their condition untreated, which often exacerbates symptoms and hinders optimal functioning of daily tasks. The economic loss to society from preventable and untreated eye diseases and visual impairment is substantial [2].

The shortage of skilled staff to provide eye care in Africa has remained a well-known problem for decades and there are still only few notable schemes in place to relieve the situation. The “VISION 2020—The right to sight” initiative was launched by the WHO and the International Agency for the Prevention of Blindness in 1997 with the goal of eliminating avoidable blindness caused by five major eye diseases: cataract, trachoma, onchocerciasis, childhood blindness and refractive error/low vision [3]. The Vision 2020 strategy outlines measurable targets, such as cataract prevalence reductions, and process indicators, for example the number of ophthalmologists in place per population. The Zambian government signed the VISION 2020 Global Declaration and launched its eye health programme in 2004. The Zambian 2006-2011 national strategic plan for the prevention of blindness gives priority to three key areas of activities [4]:

1. Control of diseases that cause avoidable blindness;
2. Development and deployment of human resources for eye health delivery; and
3. Development and strengthening of infrastructure and appropriate technology for eye health

Improvements have taken place in recent years in all three areas, as will be described further in this report.

1.2 Rationale for the study

This study is the first effort to systematically and comprehensively record eye health services in Zambia. While the Ministry of Health routinely works with the majority of providers, the total number of different facilities and their capacities has not been documented before. With the growing number of Non Governmental Organizations (NGOs) and private providers established within the field, there is a need for a comprehensive situational analysis, which can help to plan the current and future eye care services in the country.

1.3 Aims of the study

The aims of the situation analysis are to:

- Establish the number and geographical distribution of facilities providing eye health services
- Determine the ownership structure of eye health facilities
- Determine the number of health care staff working in eye health, according to qualifications
- Ascertain information on the ophthalmic equipment available within the country, including its reported state of repair
- Compare the reported operational capacity, availability of human resources and equipment across the nine provinces and between rural and urban areas
- Evaluate Zambia’s progress towards Vision 2020 process indicators

- Identify and discuss strengths and weaknesses of eye health services in Zambia
- Make recommendations on future needs and resource allocations

1.4 Structure of the report

Chapter 2 provides a brief overview of the Zambian health system, while the prevalence of eye diseases and visual impairment is described in Chapter 3. Chapter 4 outlines the methods used in the study and the results are covered in Chapters 5–8. Finally, Chapter 9 summarises the key findings and their implications and makes recommendations for policy and practice.

2 Overview of the Zambian health care system

The Zambian health system is characterised by three categories of service providers:

- Government providers, including hospitals run by the military
- Private not-for-profit organisations, such as mission or church facilities and local and international NGOs ; and
- Private for-profit health care providers

The delivery of government services is organized at five levels of care (Table 1).

The Zambian health care system is facing a human resource crisis, which negatively affects the quantity and quality of health service provision. High numbers of clinical personnel vacancies are a problem, particularly in rural areas where health facilities have relied for decades on expatriate and volunteer staff to meet demand [5]. The Human Resources for Health Strategic Plan 2006-2010 states a need for a 50% increase in overall staffing levels in order to meet the Millennium Development Goals for health targets [6].

Table 1: Levels of care within the Zambian public health system

Level of care	No. of facilities	Description
Tertiary hospitals	6	Catchment population of 800,000 and above. Sub-specialisations in internal medicine, surgery, paediatrics, obstetrics & gynaecology, intensive care, psychiatry, training and research.
Provincial/general hospitals	21	Catchment population between 200,000 and 800,000. Sub-specialisations in internal medicine, general surgery, paediatrics, obstetrics & gynaecology, dental, psychiatry and intensive care.
District hospitals/clinics	72	Catchment population between 80,000 and 200,000. Provide medical, surgical, obstetrical and diagnostic services in support of health centre referrals.
Health centres	1,294	Divided into urban (265 centres with catchment population between 30,000 and 50,000) and rural (1,029 centres with catchment population of 10,000). Provide diagnostic and basic curative services prior to referral.
Health posts	171	Catchment population of 3,500 in rural areas and 7,000 in urban settings. Built in communities far away from health centres, within a 5 km radius of sparsely populated areas. Provide basic first aid only.

Adapted from the Ministry of Health's Annual Health Statistics Bulletin, October 2009 [7]

3 Epidemiology of eye conditions in Zambia

The definitions used for eye conditions and visual impairment follow those given in the International statistical classification of diseases, 10th revision (ICD-10) [8].

Based on the latest WHO estimates, in 2011 approximately 39 million people worldwide were blind and 245 million had moderate or severe visual impairment [9]. The leading cause of blindness is cataract, while uncorrected refractive errors are the most important cause of visual impairment, comprising 43% of total cases.

The most recent figures on service usage in Zambia, released in 2008, show that eye infections are the seventh main cause of hospital visits, accounting for 31% of all out-patients registered at public facilities [10]. Data on the prevalence of eye conditions and on eye care outputs, such as the number of cataract surgeries per year are not routinely collected in the country. However, a Rapid Assessment of Avoidable Blindness (RAAB) survey was undertaken in Lusaka and Southern province in 2010 [11]. 3,629 people over the age of 50 were examined and it was estimated that the prevalence of blindness is 2.29% and the prevalence of visual impairment is 8.71% (Table 2). Untreated cataract represented the main cause of both blindness and visual impairment, followed by posterior segment disease, which includes glaucoma, corneal scarring and refractive errors (Table 3). The Zambia RAAB is comparable to the results of a similar survey conducted in Nakuru district, Kenya, in 2007. This study found that 2% of the population in the same age group was blind and 5.8% suffered from bilateral visual impairment, primarily due to cataract, refractive errors, trachoma and corneal scarring [12].

Table 2: Prevalence of visual loss in people above 50 years in Southern Zambia

Visual Acuity	Male (n=1,434)	Female (n=2,195)	Total (n=3,629)
Blind	2.93%	1.87%	2.29%
Severe visual impairment	2.02%	1.55%	1.74%
Visual impairment	6.07%	7.56%	6.97%
Total	11.02%	10.98%	11.00%

Source: Lindfield *et al.* [11]

Table 3: Degree and cause of visual loss in people above 50 years in Southern Zambia

	Blind	Severe visual impairment	Visual impairment	Total
Cataract	40%	59%	47%	47%
Posterior segment	35%	21%	13%	19%
Corneal scarring	15%	11%	9%	10%
Phthisis	6%	0%	0%	1%
Refractive error	2%	6%	29%	20%
Surgical complications	2%	3%	2%	2%
Total	100%	100%	100%	100%

Source: Lindfield *et al.* [11]

Cataract is a clouding of the lens of the eye that severely affects vision. This condition is particularly common in the elderly and can be treated through surgery and artificial lens implantation. The

surgical procedure has evolved greatly over the past decades and can now be undertaken relatively easily by a trained ophthalmologist or cataract surgeon. Access to the surgery is however severely limited in most low-income countries. The RAAB in Southern Zambia estimated the cataract surgical coverage to be 69% of the population above 50 years of age in the survey area [11].

Glaucoma is a chronic degenerative optic neuropathy leading to a loss of peripheral vision and, potentially, of all vision if untreated. In contrast to cataract, the visual impairment caused by glaucoma cannot be reversed and the management of this condition is more difficult than that of cataract. Early identification is vital in order to preserve the existing sight, although Zambia faces a major challenge in detecting glaucoma cases.

Corneal opacities are also believed to contribute significantly to vision-related problems, as shown in the RAAB. The cornea is the transparent structure on the front of the eyeball and corneal opacity occurs when the cornea becomes scarred. This stops light from passing through the cornea to the retina and may cause the cornea to appear white or clouded, diminishing vision. Causes of corneal opacity include infection, injury, or inflammation of the eye. Risk factors include vitamin A deficiency, measles infection, eye injury, herpes simplex virus and other infections, including conjunctivitis. Treatment varies depending on the most likely cause and severity of the scarring, but it most often consists of eye drops containing antibiotics, steroids, or both, or oral medications. In some cases, scar tissue may be surgically removed.

Trachoma is a bacterial infection of the eye which is spread through direct contact with infected eye, nose, or throat secretions or by contact with contaminated objects, such as towels or clothes. Certain species of flies can also spread the bacteria. Antibiotics can prevent long-term complications if used early in the infection. If trachoma is not timely treated, the eyelids become severely irritated and may turn inwards and rub against the cornea. This can cause eye ulcers, additional scars, vision loss, and possibly, blindness. Eyelid surgery can be undertaken to prevent long-term scarring. Trachoma is not prevalent in the areas where the RAAB was conducted, but it is a major problem in other parts of Zambia. Trachoma prevalence surveys have been conducted in six out of 73 districts in the Northern and Western Provinces and prevalence above 10% was found in five of the districts, with a peak of 33% in Kaoma, Western province [13]. Four out of the five districts surveyed recorded high prevalence of active trachoma, thereby confirming the relevance of the disease as a public health concern. These findings have led to the development of the Zambia Trachoma Elimination Plan for 2010-15. The goal is to carry out prevalence surveys in the entire country and implement the full "SAFE" strategy, involving trachoma surgery (S), provision of antibiotics (A), promotion of facial cleanliness (F) and environmental improvement (E).

4 Study methods

A list of government and NGO health care facilities providing ophthalmic services was obtained from the Ministry of Health. The Church Health Association of Zambia (CHAZ) provided a directory of all faith-based and mission hospitals, and the Health Institutions and Professionals Board supplied a list of private eye clinics and optic centres. These three lists were supplemented by information gathered during informal conversations with key informants, such as eye care workers and staff at Sightsavers Zambia. A snowball approach was used to gather additional information on existing facilities until saturation was reached and we were confident that no providers had been missed.

Contact persons at the facilities were identified in one of three ways:

1. Upon indication from the key informants
2. By contacting the facilities using listed telephone numbers
3. By personally visiting the facilities

A questionnaire was either sent to the contact person via email for self-completion after a preliminary telephone call or administered during face-to-face interviews.

The questionnaire was adapted from the Vision 2020 situation analysis data collection tool and divided into three sections [14]:

1. General information
2. Equipment and services
3. Human resources

General information included location, main sources of funding, catchment area population size, number of beds, availability of outreach services and number of patients seen per year. For equipment, a list of a limited number of items considered essential for a functional eye unit was derived based on the guidance by the International Agency for the Prevention of Blindness. [15] The objective was to assess how many pieces of equipment were available and whether they were considered to be in optimal working conditions. Information on the types of eye health care services offered were collected, including refraction and spectacles dispensing, population screening, low vision services and surgery for cataract, trichiasis and glaucoma. In the last section of the questionnaire, participants were asked to list the number of human resources for eye health available by role, including information on their nationality, gender, place of training and years of practice. The questionnaire is included in Annex I.

Semi-structured interviews were conducted with a sample of ophthalmologists, administrators, government officials and other people working in eye health care to assess the current situation in Zambia. These 6 respondents, based in Lusaka, Southern province and the Copperbelt, purposefully selected on the basis of their extensive experience with the Zambian eye care sector, were asked about strengths and weaknesses of the system, policy suggestions and visions for the future. Data collection occurred between February and June 2011.

5 Eye health care providers and available services

5.1 Types of facilities

A total of 74 facilities offering eye health care services were identified in Zambia: 45 hospitals, 11 clinics and 18 optic centres. A complete list of the facilities, specifying their location and ownership, is provided in Annex II.

Ownership of the facilities is shown in Figure 1. Among government facilities, 14 general hospitals and 17 district hospitals/clinics offer eye health services. Ninety percent of Government eye care facilities receive support from international NGOs. Donations are mostly in support of human resources training, purchase of medical equipment and consumables, and infrastructure building and maintenance. The largest share of NGO contributions for eye care services to Government facilities comes from Sightsavers International (14 facilities), Vision Aid Overseas (VAO) (three facilities), Operation Eyesight (three facilities) and the Christian Blind Mission (two facilities).

Local or international NGOs and faith-based organizations own 14 hospitals, two rural health centres and one clinic providing eye health care services. These providers are sustained by donations, fees-for-service and fundraising initiatives. In addition, the medical and administrative personnel at these facilities are often public employees on the government payroll, with the NGOs supplementing with staff allowances and bonuses.

The private for-profit sector is represented by two hospitals, six eye clinics and 18 optic centres. The latter category is mainly shops providing refractive services, spectacles dispensing and diagnostic and referral services. The types of eye care services offered by different funding sources are summarized in Table 3.

Figure 1: Distribution of ownership of eye care facilities in Zambia

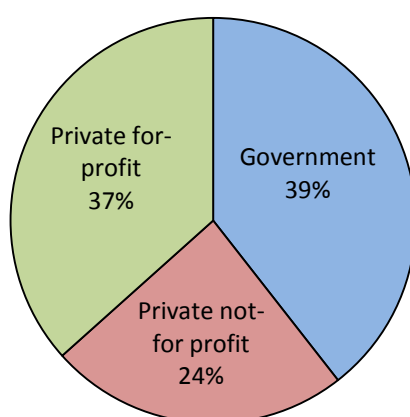


Table 3: Type of eye facility by sources of funding

Ownership	Total	Facility type	Total
Government and NGOs	48	Tertiary level eye care	3
		Mission hospital with secondary eye care	13
		Government hospital with secondary eye care	26
		Eye clinic (outpatient services only)	4
		Rural health centre with primary eye care	2
For profit	26	Hospital with secondary eye care services	2
		Eye clinic (outpatient services only)	6
		Optical services only	18
TOTAL	74		

5.2 Spectacle manufacturing workshops

Seven fully equipped glasses manufacturing workshops exist in the country, two of which are in Lusaka, one in Kitwe (Copperbelt), one in Chirundu (Southern), one in Kabwe (Central), one in Solwezi (North-Western) and a newly established workshop in Mansa (Northern). The workshops at Lusaka Eye Hospital, Solwezi and Chirundu are entirely funded and operated by NGOs, while the workshop at Kitwe Eye Ward is funded by Sightsavers in partnership with the government. At the University Teaching Hospital (UTH) in Lusaka and Mansa General Hospital, the manufacturing workshops were set up with funding and equipment from Vision Aid Overseas with the objective of making them financially and operationally independent within five years.

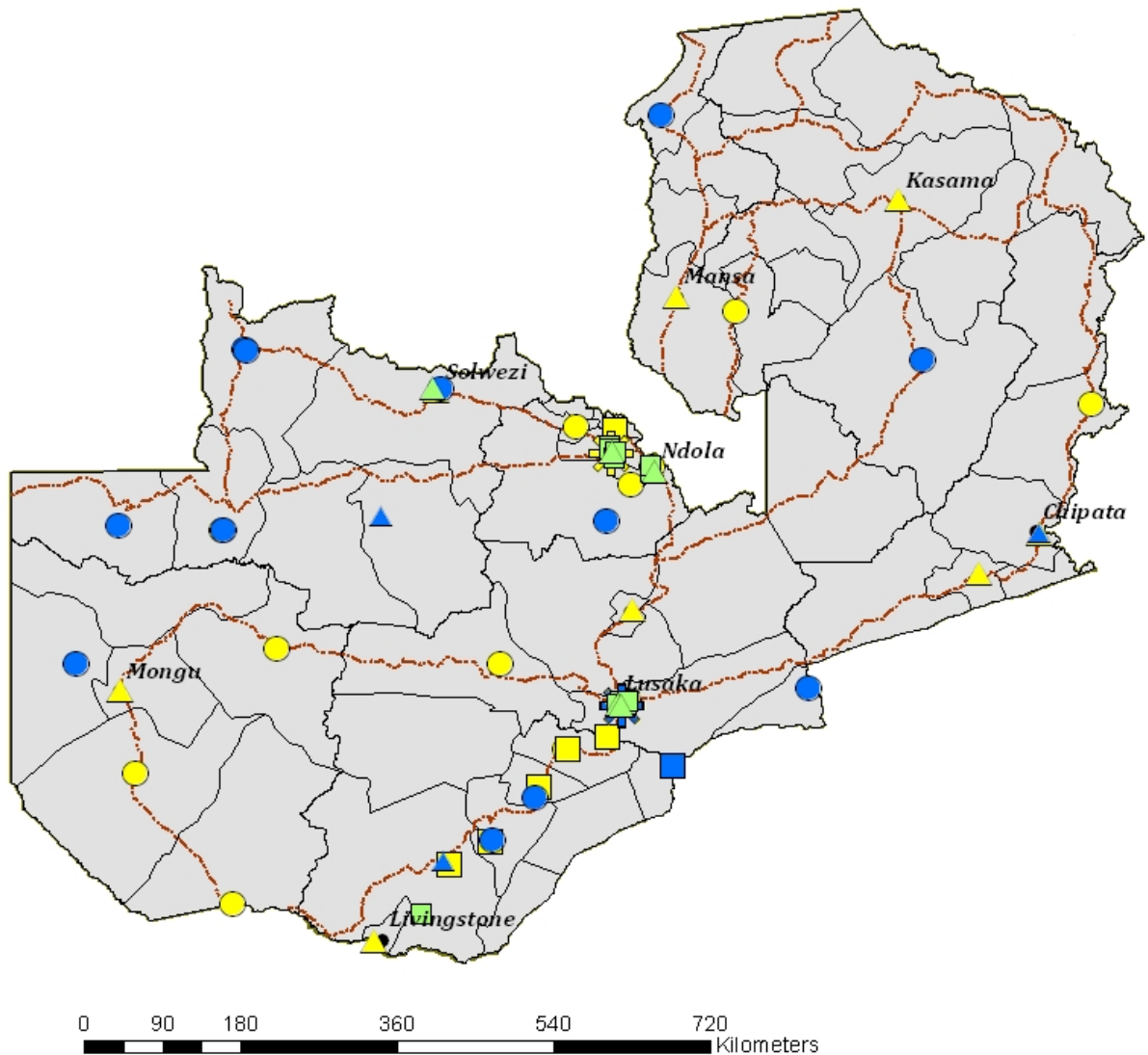
The monthly output of manufacturing workshops ranges from 100 made-to-order prescription glasses in urban areas to around 50 in rural provinces. NGO-subsidised spectacles production has a price advantage over private for-profit manufacturers. A pair of prescription glasses from the VAO workshops can cost as little as 10,000 ZMK (2 USD) to a maximum of 200,000 ZMK (40 USD), while the price range at optical shops is between 500,000 (100 USD) and 2,000,000 ZMK (400 USD). The affordability of the subsidized prescription glasses makes local workshops a valid alternative to the donation of recycled spectacles promoted by some not-for-profit and church-based organizations, but opposed by the MOH due to the damage to vision caused by incorrect prescriptions frequently handed out in such cases.

5.3 Geographical distribution of eye care facilities and services

The geographical position of health care facilities is shown in Figure 2. While government-run facilities are evenly distributed across the country, the private sector is exclusively operating in Lusaka and in the country's other four large urban areas in the Copperbelt (Ndola, Kitwe), North-Western (Solwezi) and Southern (Livingstone) provinces. In contrast, the mission/NGOs are mainly located in remote rural areas, such as the districts of Kalabo (Western Province), Mpika (Northern Province) and Nchelenge (Luapula Province), where they often represent the only source of eye health services for their large catchment populations.

Although the largest number of eye care facilities are located in provinces with the highest population density, their distribution does not cover a substantial proportion of the country's population. Overall, 30% and 22% of all eye care facilities are located in Lusaka and the Copperbelt provinces, which are home to 17% and 15% of Zambia's population, respectively (Table 4).

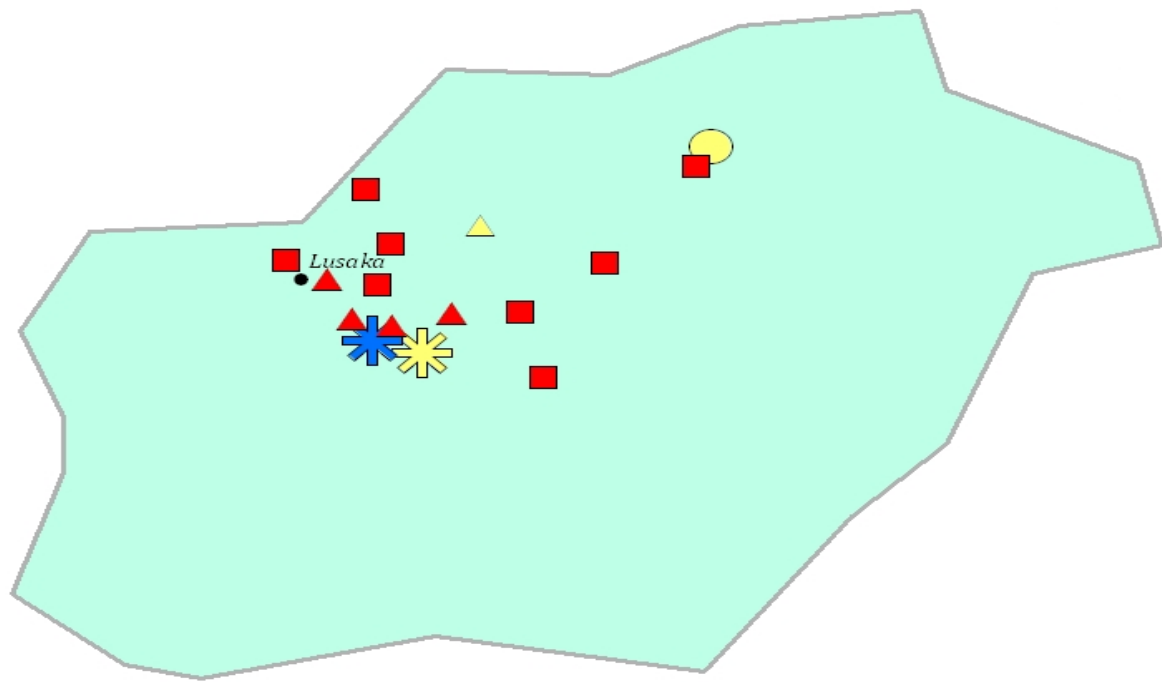
Figure 2: Geographical distribution of eye care facilities in Zambia according to ownership



Legend

Private Facilities	NGO Facilities	Government Facilities
Primary + Optical	Primary Care	Primary Care
Cataract Surgery	Primary + Optical	Primary + Optical
	Cataract Surgery	Cataract Surgery
	Tertiary Referral Hosp	Tertiary Referral Hosp

Figure 3: Distribution of eye care facilities in Lusaka Province by ownership



0 2.5 5 10 15 20 Kilometers

1:177,000



Further, while the proportion of facilities in the Southern and Western provinces reflects that of the population, the situation is highly unbalanced in other, mainly rural, parts of the country, such as Northern (3% of facilities, 14% of population) and Central (1% of facilities, 10% of population) provinces. The fact that private optical shops, the main manufacturers and importers of quality spectacles in Zambia, are absent outside of cities and large towns creates severe difficulties in procuring and dispensing spectacles in rural areas.

Table 4: Comparison of the proportion of eye care facilities to population size by province

	No. of facilities	Percent of total	Population size	Percent of total	Population density
Central	1	1.4%	1,267,803	9.7%	13.4
Copperbelt	16	22.5%	1,958,623	15.0%	62.5
Eastern	4	5.6%	1,707,731	13.1%	24.6
Luapula	3	2.8%	958,976	7.4%	19.0
Lusaka	21	29.6%	2,198,996	16.9%	100.4
Northern	2	2.8%	1,759,600	13.5%	11.9
North-Western	10	12.7%	706,462	5.4%	5.6
Southern	11	15.5%	1,606,793	12.3%	18.8
Western	6	7.1%	881,524	6.7%	7.0
Zambia	74	100%	13,046,508	100%	17.3

Source: Population data from the preliminary results of the 2010 Census of the Zambian population [16]

The distribution of eye health care providers in the Lusaka province is shown in Figure 3. Seventeen out of the 21 eye care facilities in the capital are privately owned and 15 of these are for-profit facilities, representing 58% of such providers in the country. These include 11 optic centres, two eye clinics and two hospitals. The not-for-profit sector is represented by one mission hospital and one NGO eye hospital. The government runs three clinics offering eye services and the University Teaching Hospital, the largest tertiary hospital in Zambia, which offers specialized services.

5.4 Available services

Availability of services in the different provinces is illustrated in Table 5. Although most facilities in rural areas report to offer refraction, cataract surgery, trichiasis surgery and glaucoma surgery, these services are not usually provided by resident staff with the facility's own equipment. In the majority of cases, these procedures are offered once every few months through visiting outreach teams from larger, usually urban, eye units.

Complex services, such as low vision, vitreo-retinal surgery and laser photo-coagulation, are uniquely offered at the University Teaching Hospital in Lusaka, at Lusaka Eye Hospital, at the Kitwe General Hospital Eye Ward and at Zimba Eye Clinic in Southern Province. All of these four facilities are characterised by a heavy presence of international partners. Zimba Eye Clinic, for instance, is entirely funded and operated by a team of Canadian and American ophthalmologists who visit the country once every three months.

Table 5: Number of facilities offering selected eye care services according to province

	Northern	Luapula	Eastern	Central	Copperbelt	North-western	Western	Southern	Lusaka	TOTAL
<i>Basic services:</i>										
Refraction	1	2	3	1	12	8	3	11	16	57
Cataract surgery	2	2	3	1	6	6	2	10	8	40
Low vision services	0	0	0	0	5	0	1	3	3	12
Spectacles dispensing	1	1	2	1	10	4	0	8	15	42
Glaucoma surgery	1	2	2	1	6	1	0	6	6	25
<i>Tertiary services:</i>										
Vitreo-retinal surgery	0	0	0	0	1	0	0	1	2	4
Laser photo-coagulation	0	0	0	0	1	0	0	1	4	6
<i>Provision for focal conditions:</i>										
Trichiasis surgery	2	2	3	0	5	4	2	9	6	33

6 Human resources for eye health

6.1 Training of eye health professionals

In recent years, coordinated efforts have been made by both the public and NGO sectors to train ophthalmologists, mid-level eye care personnel and front-line workers in primary eye care to meet Vision 2020 goals. A major step forward was made in 2006 with the creation of two-year diplomas in Clinical Ophthalmology and Ophthalmic Nursing at Chainama College of Health Sciences in Lusaka, which became the first educational institution to train ophthalmic clinical officers (OCOs) and ophthalmic nurses (ONs) in Zambia. These mid-level eye care professionals are qualified to provide consultations, referrals, minor surgeries and management tasks. Their coupling, ideally with the addition of a cataract surgeon, forms the basic team required for the running of a functional eye unit. A total of 14 OCOs and 13 ONs have graduated since the inception of the course in 2006, with a further six in each category scheduled to obtain their diplomas by the end of 2011. The ultimate target is to place at least one ophthalmic team in each of the country's 72 district hospitals. A diploma for optometrists has also been made available at the College since 2010, with an intake of 10 candidates per year, thus increasing the ranks of primary eye care workers qualified to offer refractive services, diagnose and refer patients.

A specialisation in ophthalmology, until recently unavailable in the country, has just been introduced at the University of Zambia (UNZA) Medical School, with one candidate enrolled for MMed Ophthalmology and another enrolled for the Doctorate of Philosophy in Ophthalmology for the 2011/12 academic year. These candidates will be pioneering a course whose infrastructure is still under construction at the University Teaching Hospital in Lusaka.

6.2 Socio-demographic characteristics of eye health cadres

A total of 191 human resources for eye health are currently working full time on eye care in Zambia (Table 6). In addition, approximately 150 Community Eye Workers (CEWs) have been recruited by NGOs and church-based organisations and trained in case finding and referral. These volunteers operate exclusively for NGOs with no government oversight.

Table 6: Socio-demographic characteristics of human resources for eye health in Zambia, 2011

Position	Number	Percent female	Percent Zambian	Average years of practice (SD)
Ophthalmologist	18	28%	72%	9.3 (7.7)
Ophthalmic clinical officer	35	23%	97%	7.2 (9.2)
Ophthalmic nurse	33	63%	97%	8.1 (8.8)
General nurse	47	49%	100%	5.5 (4.2)
Nursing aide	8	25%	100%	7.3 (5.7)
Cataract surgeon	8	0%	57%	9.1 (9.2)
Optometrist	19	0%	11%	10.6 (7.1)
Refractionist	4	50%	100%	4.3 (5.3)
Manager	11	55%	91%	5.6 (4.3)
Maintenance technician	8	0%	88%	7.6 (10.4)
TOTAL	191			

Although 72% of resident ophthalmologists are Zambian nationals, all of them were trained abroad, most commonly in Germany, Kenya, Malawi or the United Kingdom (Figure 5). The same applies to cataract surgeons. Until recently no OCO and ON training courses were available in the country. For this reason, despite the fact that OCOs and ONs in the workforce are mostly Zambian, they all completed their training in other countries such as Kenya, Malawi, Tanzania or the Gambia. However, this situation is now gradually changing with the introduction of diplomas at Chainama, which allowed 50% of these eye care workers to complete their specialisation in Zambia in 2010-11. The recent availability of training courses in optometry should also reverse the trend for this role to be predominantly filled by foreign nationals (89%). At present, 79% of optometrists in Zambia are from India, where they also received their training.

The majority of human resources for eye health care are employed in the public sector (Figure 6). The exceptions to this are optometrists and refractionists, who are mostly employed in privately owned optical shops and NGO facilities. All of the OCOs, ONs, general nurses, cataract surgeons and ophthalmologists are on the government payroll. However, around 40% of these public employees are based at mission/NGO hospitals, or they also work as consultants in private practice. The few exceptions to the government payroll are foreign volunteers.

Figure 5: Place of training of eye health human resources

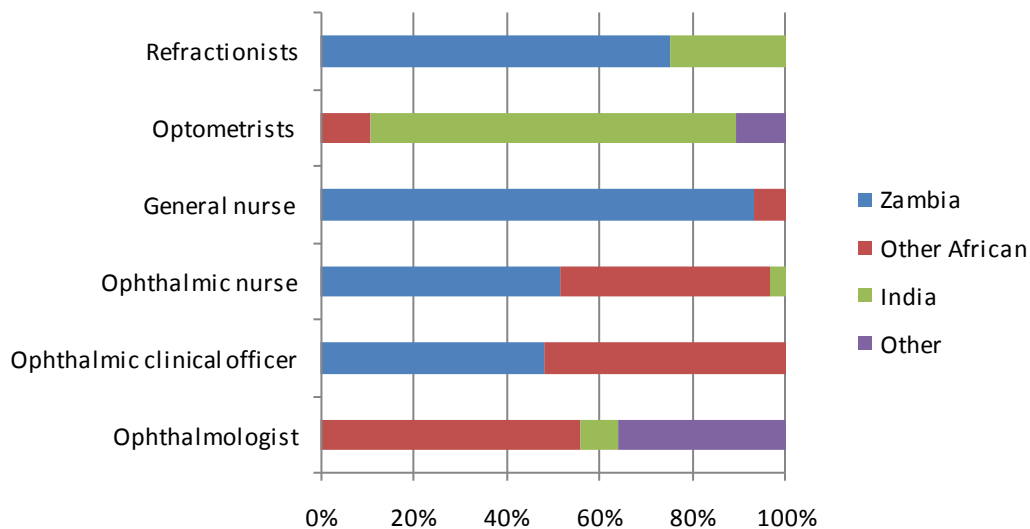
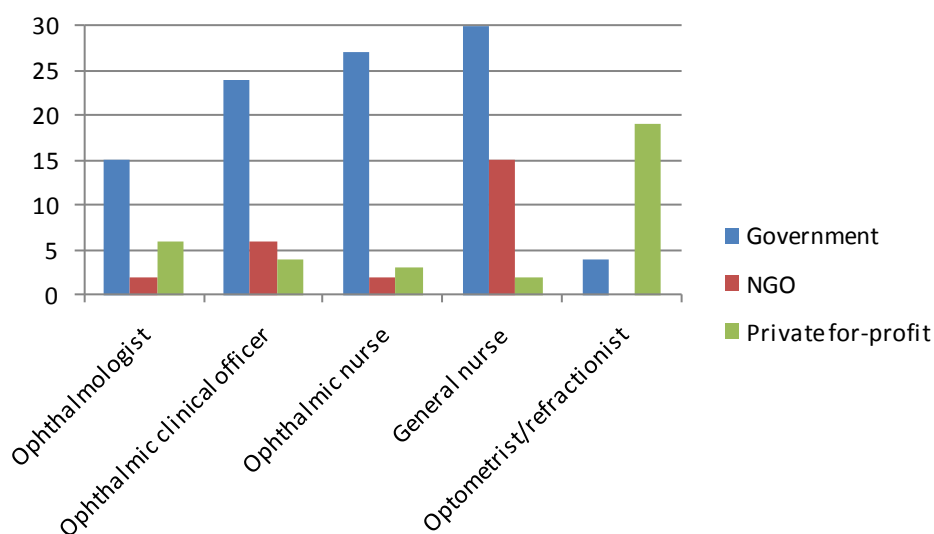


Figure 6: Number of human resources according to facility ownership



6.3 Geographical location

Of the 18 ophthalmologists currently active in the country, 22% are based in Lusaka, 28% in the Copperbelt and 11% operate in Southern Province (Table 7). The corresponding figures for OCOs are 20% in the Lusaka province, 23% in the Copperbelt and a further 20% in Southern province. The three provinces combined represent 44% of the total population, but they retain 79% of ONs, 62% of cataract surgeons, 95% of optometrists and 75% of refractionists. Figures 7 and 8 highlight how Northern and Central provinces are the most underserved in terms of human resources for eye health, with one ophthalmologist and one OCO serving more than one million people.

Figure 9 provides a comparison of the total human resources for eye care per head of population in Lusaka (three per 100,000 populations), the Copperbelt (2.1 per 100,000), Southern province (1.7 per 100,000) and the rest of Zambia (1.0 per 100,000). An international comparison, also featured in Figure 7, shows how the size of the eye health care workforce in Zambia is similar to that of neighbouring African countries, but far less than in the USA.

Table 7: Distribution of eye health human resources by province, 2011

Province	Northern	Luapula	Eastern	Central	Copperbelt	North-western	Western	Southern	Lusaka	TOTAL
Ophthalmologist	1	1	1	1	5	1	1	3	4	18
Ophthalmic clinical officer	1	2	3	1	8	2	4	7	7	35
Ophthalmic nurse	0	0	1	1	10	3	2	4	12	33
General nurse	2	3	5	2	7	13	0	8	7	47
Nursing aide	0	2	1	0	0	1	0	0	5	9
Cararact surgeon	0	0	1	0	1	1	0	0	4	7
Optemetrist	0	0	0	0	4	1	0	1	13	19
Refractionist	0	0	0	1	2	0	0	0	1	4
Manager	0	2	0	0	1	0	0	4	4	11
Maintenance technician	0	1	0	2	1	0	0	0	4	8
Total	4	11	12	8	39	22	7	27	61	191

Figure 7: Ratio of ophthalmologists to population

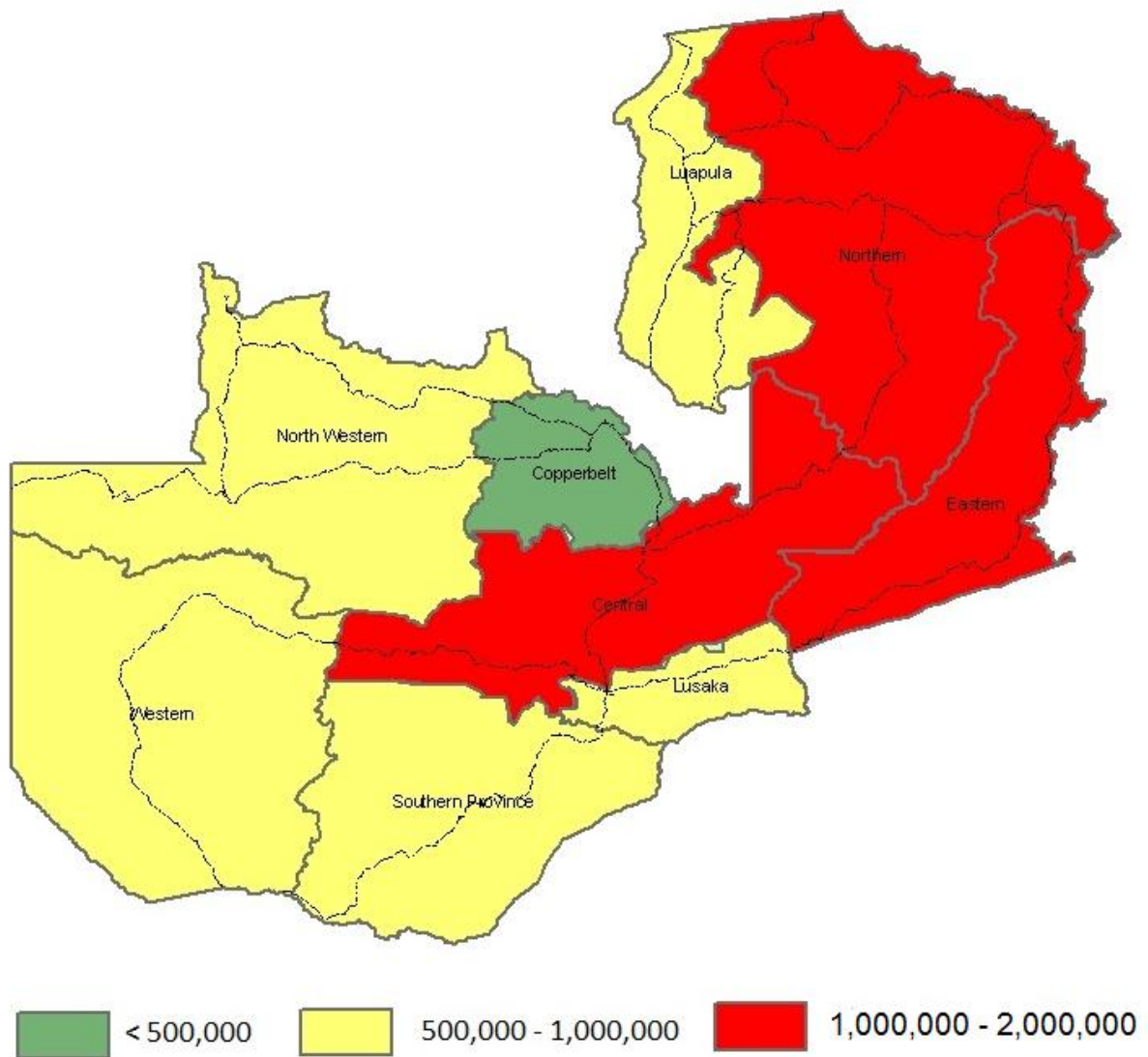


Figure 8: Ratio of Ophthalmic Clinical Officers to population

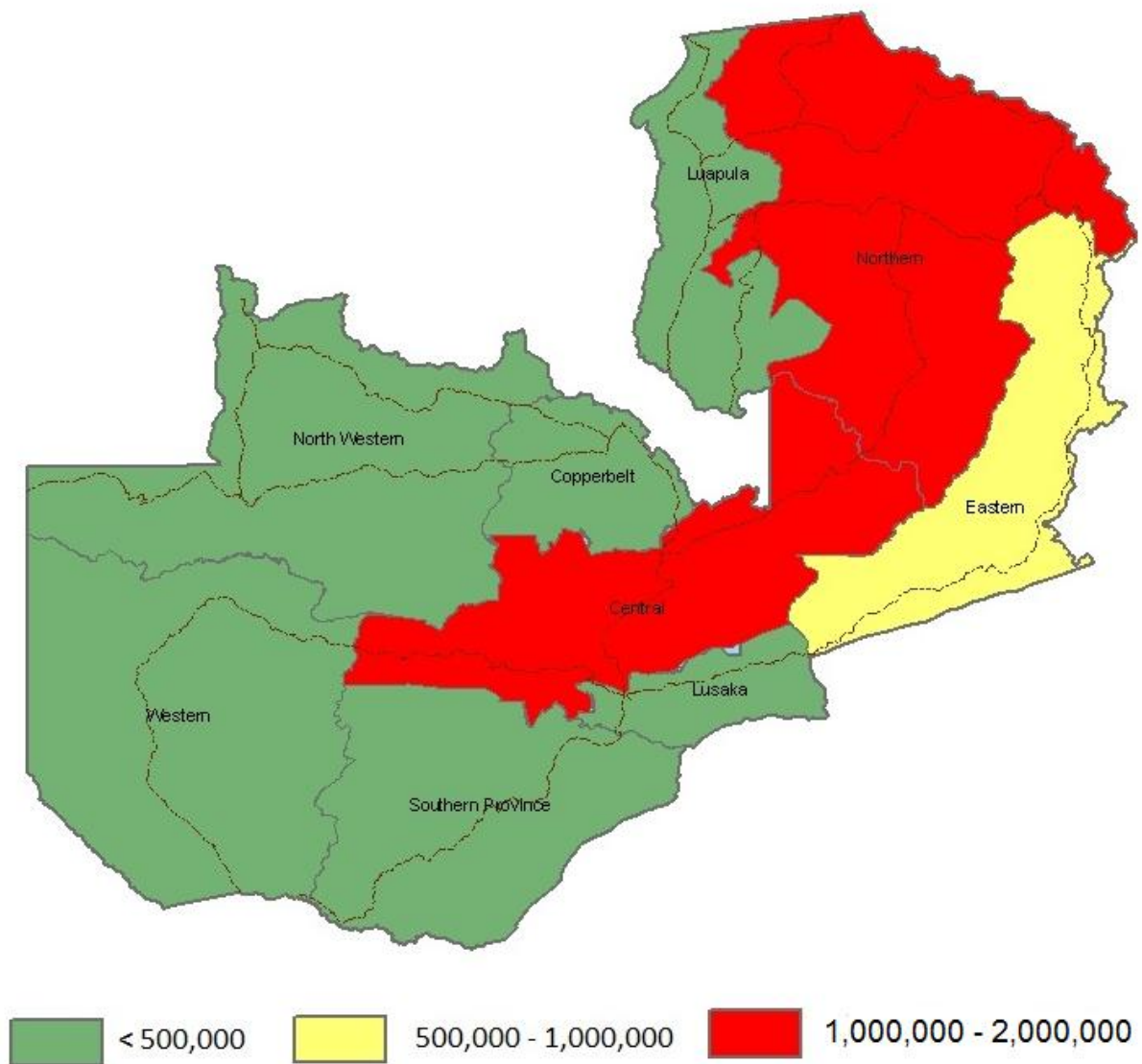
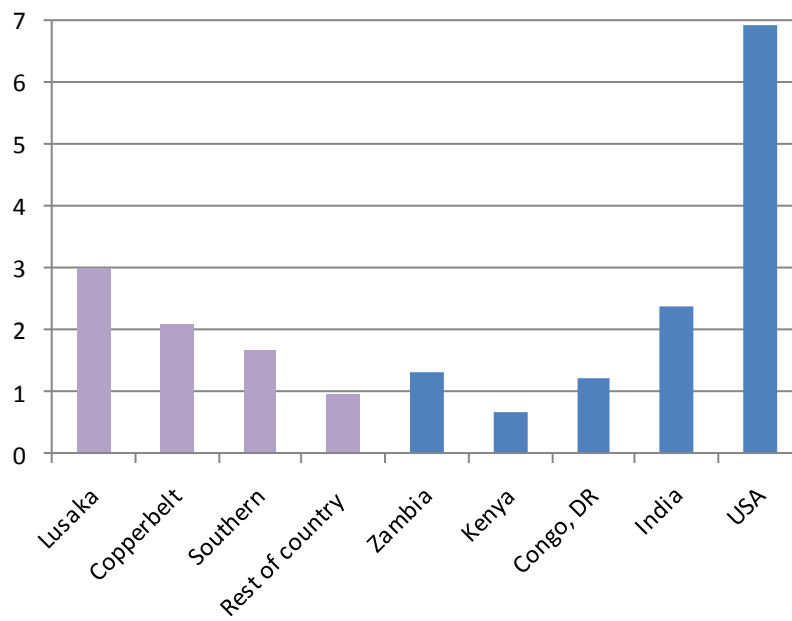


Figure 9: Eye health human resources per 100,000 population in Zambia and selected countries*



Source: Global Human Resource Development Assessment for Comprehensive Eye Health [17]

* Totals for Kenya and DR Congo include ophthalmologists, optometrists and nursing staff only.

The total for India includes ophthalmologists and nursing staff only.

The total for the USA includes ophthalmologists only.

7 Ophthalmic equipment

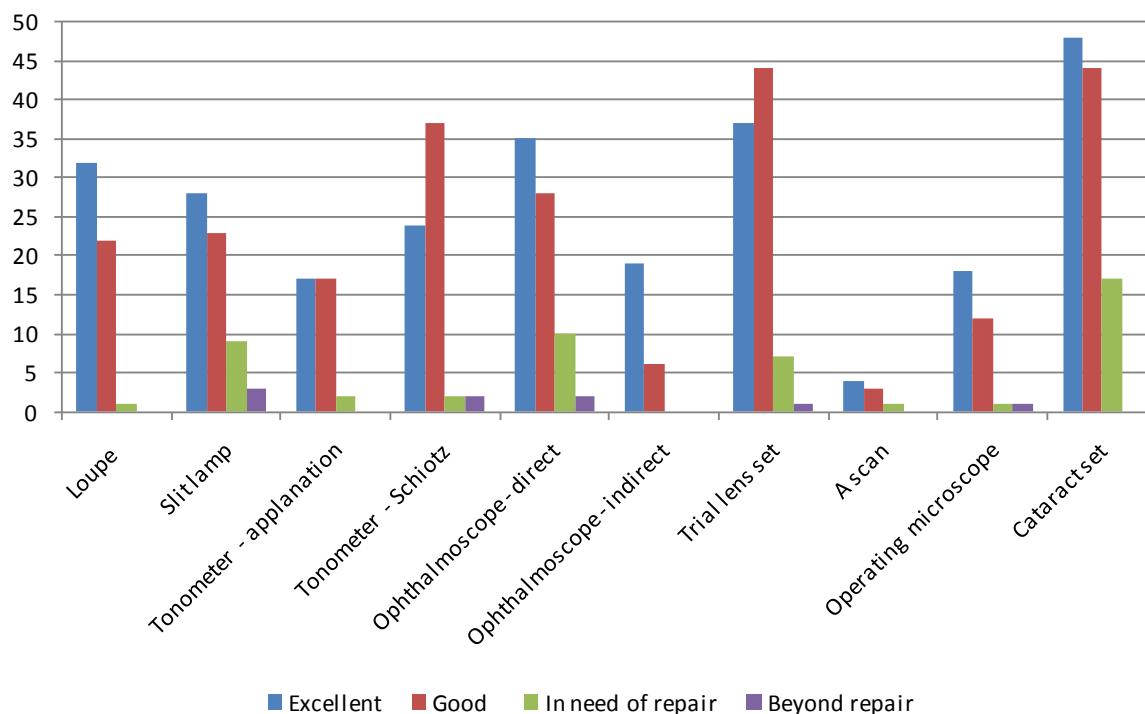
An overview of available equipment is presented in Annex III. All of the eye units and optical shops reported to have at least one functional instrument required to provide basic cataract surgery and follow-up (slit lamp, ophthalmoscope, retinoscope and operating microscope), or to be regularly visited by an outreach team carrying the necessary equipment. However, only 16% of facilities have a functioning A-scan for carrying out biometry, thus increasing the chance that patients might need refraction post-surgery, and 6% have no functioning tonometers to measure intra-ocular pressure in glaucoma patients.

7.1 Equipment maintenance and state of repair

Ten percent of the equipment is either in need of repair or beyond repair. The proportion is 6% in both Lusaka and the Copperbelt, 17% in Southern province and 13% in the rest of the country. As illustrated in Figure 10, the medical instruments most frequently reported to be in less than optimal conditions are direct ophthalmoscopes (19%), slit lamps (18%), cataract sets (15%) and trial lenses and frames (11%). Equipment in need of repair or replacement is more likely to be found in government facilities (50% of reported instruments) than in those supported by missions and NGOs (11%), whereas less than 1% of privately owned pieces of equipment are not functional.

The most common reasons for equipment being out of order are the absence of maintenance technicians and, especially in the case of donations, the absence of trained personnel able to assemble and operate it.

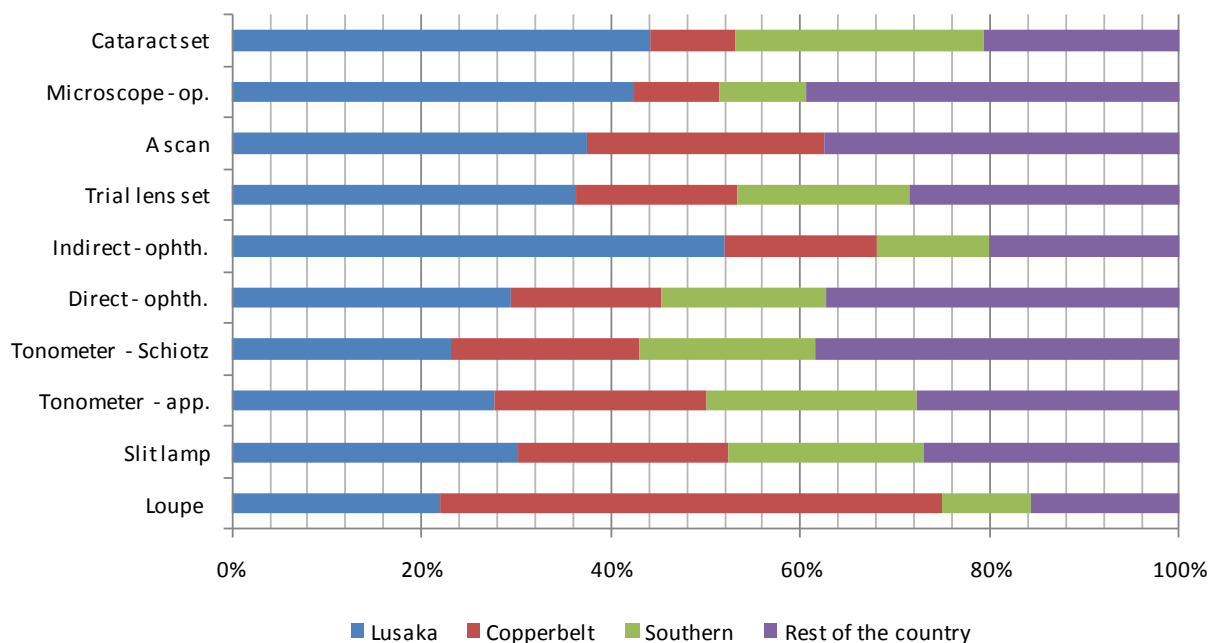
Figure 10: State of repair of medical equipment



7.2 Geographical comparison of operational capacity

The allocation of medical equipment was found to be skewed towards urban areas around Lusaka and the Copperbelt. Southern province, characterised by a sizeable presence of international NGOs, also has significant operational capacity in terms of available medical equipment, as detailed in Figure 11. These three provinces together command over 50% of the basic eye care equipment available in the country, such as cataract surgical sets, operating microscopes, ophthalmoscopes, tonometers, trial lens sets and frames. Central province is the most underserved, reporting a complete absence of applanation tonometers, surgical sets, loupes, operating microscopes and indirect ophthalmoscopes, while the single direct ophthalmoscope available is in need of repair.

Figure 11: Geographical comparison of medical equipment



8 VISION 2020 process indicators for Zambia

8.1 Operational capacity

According to the WHO VISION 2020 targets, every country should guarantee at least one eye bed per 20,000 population and one operating theatre and optical workshop per district [3]. A VISION 2020 “district” is defined as an area with a population of approximately one million people. However, since Zambian districts are considerably smaller than this, the globally set targets are not easily applied in this country. As was seen in Table 4, some Zambian Provinces have close to one million people, so in broad approach the targets can be evaluated for provinces instead.

In Zambia, a total of 1,941 beds are available for eye patients. 217 of these are specifically allocated to eye units while the rest are in general wards that can be used by eye patients when need arises. This translates to a national figure of approximately three beds per 20,000 populations, in line with the Vision 2020 goal. However, analysis of beds availability by province shows regional shortcomings (Table 8). In Central province, a single eye unit at Kabwe Central Hospital caters to a population of above 1.2 million, with an allocation of only two beds for eye care. A similar situation is found in the mainly rural province of Luapula where there are two facilities and 0.6 eye beds per 20,000 populations.

The distributional disadvantages of rural areas in terms of access to eye care services put an additional strain on urban facilities as these need to meet the demands of large portions of the country beyond their normal catchment areas. The four main eye facilities in the Copperbelt, namely Ndola Central Hospital, Arthur Davidson Children Hospital, Kitwe Eye Ward and Ronald Ross General Hospital, have a combined capacity of two beds per 20,000 population with their official catchment population, but this decreases to below one per 20,000 if the population of Northern, North-Western, Luapula and part of Central province, also covered by these facilities, is included. The University Teaching Hospital and Lusaka Eye Hospital, centres of excellence in Lusaka province, are under even greater pressure as their combined capacity of 80 beds is already below one per 20,000 population, without accounting for the fact that these facilities also act as referral centres for the Central, Western, Eastern and Southern provinces.

Another Vision 2020 goal is to have at least one operating theatre for eye surgery in every district. While each province in Zambia has at least one eye surgery theatre, only few of them are staffed with skilled personnel able to undertake surgery. Patients in need of eye surgery in underserved areas must therefore travel long distances, or wait for an outreach team from an urban facility to visit the nearest eye unit.

A gap in glasses provision is evident. A total of seven manufacturing workshops exist in the whole country against the Vision 2020 recommendation of one workshop per one million people. Spectacles dispensing is unavailable on a permanent basis in most rural areas. In these parts of the country, demand is mostly met through outreach services and donations from charities and NGOs.

Table 8: Vision 2020 operational capacity process indicators for Zambia

Province	Number of eye units	Eye beds per 20,000 pop.	Staffed eye surgery theatres	Spectacles workshops
Central	1	0.03	1	1
Copperbelt	10	2.45	5	1
Eastern	4	5.95	3	0
Luapula	3	0.63	2	0
Lusaka	11	0.79	6	2
Northern	2	2.73	1	1
North-Western	9	1.61	2	1
Southern	10	8.86	6	1
Western	6	1.47	2	0
TOTAL	56	2.98	25	7

8.2 Human resources

The Vision 2020 process indicators for human resources include a ratio of one ophthalmologist per 250,000 populations, one OCO and one ON per 200,000 populations and at least one refractionist per 100,000 population [3]. Moreover, 25% of secondary care facilities should have a full-time manager and an equipment technician [3]. The initiative also recommends that access to trained human resources should be equal for rural and urban populations and a retention system based on career structure and remuneration should be in place.

In Zambia in 2011, there were 0.34 ophthalmologists per 250,000 population; 0.54 OCO per 200,000 population and 0.51 ON per 200,000 population. The number of refractionists per 100,000 population is equally below the Vision 2020 target ratio of 1, with only four in the whole of Zambia (one in Lusaka, two in the Copperbelt and one in Central Province). Regional comparisons again highlight disparities between rural and urban areas. Although the ratios of ophthalmologists and OCOs to population are below the Vision 2020 targets in the whole country, they are higher in urban (0.64/250,000 and 0.82/200,000 in the Copperbelt, and 0.45/250,000 and 0.64/200,000 in Lusaka) than in rural provinces (0.14/250,000 and 0.11/200,000 in the Northern Province). The number of ONs per 200,000 populations is above one in both Lusaka (1.09) and the Copperbelt (1.02), but is equal to zero in Northern Province and Luapula.

The overall proportion of secondary eye facilities with a full-time manager is 14% (19% in Lusaka; 6% in the Copperbelt; none in Central, Eastern, Northern, North-western and Western provinces). The proportion is the highest in Southern province (36%) due to the large number of NGO-sponsored eye care programmes, which are implemented by facility-based managers. Maintenance technicians operate in only 11% of Zambia's facilities, again below the Vision 2020 goal of 25% in every province.

9 Conclusion and recommendations

Substantial progress has been made since the Zambia eye health programme was established within the Ministry of Health in 2004. New eye clinics have been established in a number of facilities and training programmes for OCOs and ONs are now in place. The findings of this report should be used to identify the most immediate gaps when further expanding provision of services.

The main obstacle for effective eye care delivery is the scarcity of trained human resources at all levels. The VISION 2020 goals for the number of ophthalmologists, OCOs, ONs and refractionists per share of population are not met either at the national or local level. Although the human resource situation is better in urban areas due to a sizeable presence of the private for-profit sector, a lack of central co-ordination and the relatively high fees charged at these facilities constitute a barrier to access for large portions of the population. The price of a new pair of glasses purchased from an optical shop, for instance, is on average 50% higher than at an NGO workshop.

Although the number of facilities and beds dedicated to eye care meet the VISION 2020 goals at the national level, their distribution is skewed towards the highly urbanised provinces of Lusaka and the Copperbelt. The distributional advantage of urban areas also extends to services offered, ophthalmic equipment available and the resident eye care workforce. The fact that large portions of the country must primarily rely on outreach teams from better equipped facilities severely affects the quality and quantity of cataract surgeries in both rural and urban areas because frequent movements and oversized catchment areas put a strain on scarce resources. This makes it increasingly difficult to tackle the cataract surgical backlog. A distribution of services that disproportionately favours the highly urbanised districts is not in line with the VISION 2020 recommendation about equality of access to trained human resources for rural and urban areas.

Spectacles provision is a basic service that is commonly inaccessible outside of the largest towns. Reportedly, a considerable proportion of prescription glasses in rural areas come from recycled donations from international and church-based NGOs. These, however, are reported to often end up on the black market, thus undermining the income of qualified workshops and ultimately harming the vision of end users. Findings from other low-income countries demonstrate how donated spectacles are frequently in less than optimal conditions and, even when they are physically intact, the chance of finding the right prescription for each patient is small and uptake is constrained when they are cosmetically inappropriate [17]. For this reason, the Ministry of Health opposes the practice and other sustainable alternatives for supplying glasses to underserved areas are urgently needed.

At present, a further hindrance is represented by the absence of a specific budget for eye units within government hospitals. Most existing eye units were created by NGOs, which also secured and trained the staff. This means that there is no routine provision of eye care personnel and infrastructure from the MOH to facilities without a pre-existing eye unit. While the Ministry of Health manages the eye care personnel at these facilities and pays their salaries, there is no specific career path for these staff. The absence of an official position for ophthalmologists and other eye care personnel in government hospitals hampers human resource development within the field.

NGOs are currently the largest provider of eye care services to rural areas. In order for Zambia to scale up capacity and meet Vision 2020 targets a close partnership and joint strategic planning between the Government, NGOs and the private for-profit sector is needed.

Annex I - Facility questionnaire

A) General information

NAME OF FACILITY: _____
 Region: _____
 Province: _____

Address: _____ City: _____
 Telephone: _____ Fax: _____
 Name of contact person: _____ Email: _____

Support/affiliation:

Gov		Gov/NGO	
Mission/NGO		Private	

Main sources of funding:

1 _____ 3 _____
 2 _____ 4 _____

Facility type:

Hospital
 Clinic
 Optic centre
 Other: _____

For hospital/clinics only:

Level of care Primary Secondary Tertiary

Inpatient services? Yes No

No. Beds

Est. Year: _____

Outreach services? Yes No

Patient population:

Catchment area: _____

Estimated number of patients per year: Facility Outreach

B) Equipment

Equipment:

Please indicate availability of the following:

Item	Functional status					Comments
	Total	Excellent	Good	Needing repair	Beyond rep	
Loupe						
Slit lamp (microscope)						
Tonometer - Applanation						
Tonometer - Schiotz						
Ophthalmoscope - Direct						
Ophthalmoscope - Indirect						
Trial Lens Set						
Trial Frame						
Cross Cylinder						
A Scan Ultrasound						
B Scan Ultrasound						
AB Scan Ultrasound						
Operating Microscope						
Cataract Sets						

C) Services:

Please indicate availability of the following:

Service	Availability		Comments
	Yes	No	
Screening (e.g. schools)			
Refractive services			
Low vision services			
Specs dispensing			
Cataract surgery			
Trichiasis surgery			
Glaucoma surgery			
Vitreo-retinal surgery			
Laser photo-coagulation			
Exenteration / enucleation / evisceration			
Other activities:			

D) Human Resources

<i>Role description*</i>	<i>Nationality</i>	<i>Gender</i>	<i>Place of training</i>	<i>Years of practice</i>	<i>Salary payer (e.g. govt, donors)</i>

* Insert code for role description

Code	NON-OPHTHALMOLOGISTS	Code	OPHTHALMOLOGISTS
01	Cataract Surgeon	12	Ophthalmologist
02	Opht. Clinical Officer	13	Intraocular lens surgeon
03	General Nurse	14	Proficient in SICS (Small Incision Cataract Surgery)
04	Nursing Aid	15	Proficient in Phako-emulsification Surgery
05	Orthoptist	16	Glaucoma surgeon
06	Optometrist	17	Vitreo-Retinal surgeon
07	Refractionist	18	Corneal surgeon
08	Low Vision Technician	19	Strabismus surgeon
09	Manager	20	Proficient in Retinal Lasers
10	Maintenance Technician	21	Excimer Laser Proficient
11	Community Eye Worker	22	Proficient in ROP (Retinopathy Of Prematurity)

Annex II – Directory of eye health care facilities in Zambia 2011

Facility Name	District	Province	Town	Facility Type	Catchment pop.	Inpatient services	No. beds for eye unit	Outreach services
Government facilities								
Kabwe General Hospital	Kabwe	Central	Kabwe	Tertiary	300,000	X	2	X
Arthur Davidson Children Hospital	Ndola	Copperbelt	Ndola	Secondary	N/A	X	50	X
Kitwe General Hospital	Kitwe	Copperbelt	Kitwe	Tertiary	522,092	X	50	X
Nchanga South Hospital	Chingola	Copperbelt	Chingola	Secondary	210,073		N/A	
Ndola Central Hospital	Ndola	Copperbelt	Ndola	Tertiary	455,194	X	100	X
Roan Hospital	Luanshya	Copperbelt	Luanshya	Secondary	N/A		0	
Ronald Ross General Hospital	Mufulira	Copperbelt	Mufulira	Tertiary	230,948	X	30	X
Chipata General Hospital	Chipata	Eastern	Chipata	Tertiary	600,000	X	463	X
Lundazi District Hospital	Lundazi	Eastern	Lundazi	Tertiary	314,281		0	
St Francis Hospital	Katete	Eastern	Katete	Secondary	240,818	X	12	X
Mansa General Hospital	Mansa	Luapula	Mansa	Tertiary	1,000,000	X	0	X
Samfya District Hospital	Samfya	Luapula	Samfya	Secondary	N/A		N/A	
Chelstone Clinic	Lusaka	Lusaka	Lusaka	Secondary	90,000		0	
Kafue District Hospital	Lusaka	Lusaka	Kafue	Secondary	292,365		0	X
University Teaching Hospital	Lusaka	Lusaka	Lusaka	Tertiary	5,000,000	X	40	X
UNZA Medical Clinic	Lusaka	Lusaka	Lusaka	Secondary	6,000		0	X
Kasama General Hospital	Kasama	Northern	Kasama	Tertiary	17,650	X	10	X
Kabompo District Hospital	Kabompo	North-Western	Kabompo	Secondary	91,160		0	
Mufumbwe District Hospital	Mufumbwe	North-Western	Mufumbwe	Secondary	N/A		N/A	
Solwezi General Hospital	Solwezi	North-Western	Solwezi	Tertiary	239,051	X	30	X
Chikankata Hospital	Mazabuka	Southern	Mazabuka	Secondary	94,327	X	200	X
Choma General Hospital	Choma	Southern	Choma	Tertiary	255,559	X	208	X
Livingstone General Hospital	Livingstone	Southern	Livingstone	Tertiary	300,000	X	46	X
Mazabuka General Hospital	Mazabuka	Southern	Mazabuka	Tertiary	261,268	X	0	X

Facility Name	District	Province	Town	Facility Type	Catchment pop.	Inpatient services	No. beds for eye unit	Outreach services
Monze District Health Management	Monze	Southern	Monze	Secondary	195,921		0	X
Mwaya Urban Clinic	Kalomo	Southern	Kalomo	Secondary	10,851	X	10	X
Kaoma District Hospital	Kaoma	Western	Kaoma	Secondary	N/A		N/A	
Lewanika General Hospital	Mongu	Western	Mongu	Tertiary	178,454	X	0	
Mumbwa District Hospital	Mumbwa	Western	Mumbwa	Secondary	212,328	X	0	X
Senanga District Hospital	Senanga	Western	Senanga	Secondary	126,974	X	0	X
Yeta District Hospital	Sesheke	Western	Sesheke	Secondary	90,000	X	50	X
NGO facilities								
Ibenga Mission Hospital	Mpongwe	Copperbelt	Luanshya	Secondary	153,117		0	
Mwami Mission Hospital	Chipata	Eastern	Chipata	Secondary	84,934	X	33	X
St Paul's Mission Hospital - Kashikishi	Nchelenge	Luapula	Nchelenge	Secondary	660,197	X	30	X
Katondwe Mission Hospital	Luangwa	Lusaka	Katondwe	Secondary	25,294		0	
Lusaka Eye Hospital	Lusaka	Lusaka	Lusaka	Secondary	N/A	X	40	X
Chilonga Mission Hospital	Mpika	Northern	Mpika	Secondary	68,828	X	230	
Chitokoloki Mission Hospital	Zambezi	North-Western	Chitokoloki	Secondary	50,000	X	0	
Kalene Mission Hospital	Mwinilunga	North-Western	Ikelenge	Secondary	50,000	X	0	
Loloma Mission Hospital	Kabompo	North-Western	Kabompo	Secondary	N/A		0	
Lwawu Rural Health Centre	Mwinilunga	North-Western	Lwawu	Secondary	N/A		0	
Mukinge Mission Hospital	Kasempa	North-Western	Kasempa	Secondary	75,760	X	10	X
St Francis Rural Health Centre	Solwezi	North-Western	Solwezi	Secondary	N/A	X	17	
Macha Mission Hospital	Choma	Southern	Choma	Secondary	158,543	X	208	X
Monze Mission Hospital	Monze	Southern	Monze	Secondary	200,000	X	0	X
Mtendere Mission Hospital	Siavonga	Southern	Chirundu	Secondary	60,000	X	40	X
Zimba Eye Clinic	Kalomo	Southern	Zimba	Clinic	50,000		0	X
Yuka Mission Hospital	Kalabo	Western	Kalabo	Secondary	132,968	X	15	X

Facility Name	District	Province	Town	Facility Type	Catchment pop.	Inpatient services	No. beds for eye unit	Outreach services
Private for-profit facilities								
Beverly Eye Clinic	Ndola	Copperbelt	Ndola	Clinic	N/A		0	X
Buteko Opticians	Ndola	Copperbelt	Ndola	Optic centre	N/A		0	X
Indafro Ltd. Opticians	Kitwe	Copperbelt	Kitwe	Optic centre	N/A		0	X
Optical Centre Ltd.	Ndola	Copperbelt	Ndola	Optic centre	N/A		0	X
Sinozam Friendship Clinic	Kitwe	Copperbelt	Kitwe	Clinic	N/A		0	
Springs of Life Medical Centre	Kitwe	Copperbelt	Kitwe	Clinic	250,000	X	10	
Sunbird Opticians	Ndola	Copperbelt	Ndola	Optic centre	N/A		0	
Sunbird Opticians	Kitwe	Copperbelt	Kitwe	Optic centre	N/A		0	
Vision Care Centre	Kitwe	Copperbelt	Kitwe	Optic centre	N/A		0	
Capital Eye Centre	Lusaka	Lusaka	Lusaka	Clinic	N/A		0	
Care For Business Hospital	Lusaka	Lusaka	Lusaka	Hospital	N/A	X	0	
Double Six Opticians	Lusaka	Lusaka	Lusaka	Optic centre	6,000		0	
Eye Max Opticians	Lusaka	Lusaka	Lusaka	Optic centre	N/A		0	
L.J. Eye Clinic	Lusaka	Lusaka	Lusaka	Clinic	1,500		0	
Lusaka Opticians	Lusaka	Lusaka	Lusaka	Optic centre	N/A		0	
Medicare Opticians	Lusaka	Lusaka	Lusaka	Optic centre	N/A		0	
Medicare Opticians	Lusaka	Lusaka	Lusaka	Optic centre	N/A		0	
MHS Opticians	Lusaka	Lusaka	Lusaka	Optic centre	N/A		0	
Phil Opticians Ltd.	Lusaka	Lusaka	Lusaka	Optic centre	N/A		0	
Phil Opticians Ltd.	Lusaka	Lusaka	Lusaka	Optic centre	N/A		0	
Phil Opticians Ltd.	Lusaka	Lusaka	Lusaka	Optic centre	N/A		0	
Sunbird Eye Clinic	Lusaka	Lusaka	Lusaka	Clinic	N/A		0	
Tokyo Opticians	Lusaka	Lusaka	Lusaka	Optic centre	N/A		0	
Vision Care Appasamy Eye Hospital	Lusaka	Lusaka	Lusaka	Hospital	1,300,000	X	7	X
Sunbird Opticians	Solwezi	North-Western	Solwezi	Optic centre	N/A		0	
Sunbird Opticians	Livingstone	Southern	Livingstone	Optic centre	N/A		0	

Annex III – Directory of human resources for eye health in Zambia (2011)

	Province	Ophthalmic							Refractionist	Main-tenance technician	Manager	Total
		Ophthalmologist	clinical officer	Ophthalmic nurse	General nurse	Nursing aide	Cataract surgeon	Optometrist				
Government facilities:												
Kabwe General Hospital	Central	1	1	1	2				1	2		8
Arthur Davidson Children Hospital	Copperbelt		1		1							2
Kitwe General Hospital	Copperbelt	3	1	5	6				1	1		17
Nchanga South Hospital	Copperbelt											0
Ndola Central Hospital	Copperbelt		1	2			1					4
Roan Hospital	Copperbelt		1									1
Ronald Ross General Hospital	Copperbelt		1	3							1	5
Chipata General Hospital	Eastern		1	1			1					3
Lundazi District Hospital	Eastern		1									1
St Francis Hospital	Eastern	1			3							4
Mansa General Hospital	Luapula	1	1		2					1	1	6
Samfya District Hospital	Luapula											0
Chelstone Clinic	Lusaka			1								1
Kafue District Hospital	Lusaka		1	1								2
University Teaching Hospital	Lusaka	3	1	6	1		1					12
UNZA Medical Clinic	Lusaka		1		1		1				1	4
Kasama General Hospital	Northern	1	1		1							3
Kabompo District Hospital	North-Western			1								1
Mufumbwe District Hospital	North-Western											0
Solwezi General Hospital	North-Western		1	1	2		1					5
Chikankata Hospital	Southern			1								1
Choma General Hospital	Southern			1	2							3
Livingstone General Hospital	Southern	2	1	1							2	6
Mazabuka General Hospital	Southern		1		1							2
Monze DHMT	Southern		1		2							3
Mwaya Urban Clinic	Southern		2		1							3
Lewanika General Hospital	Western	1	1									2
Kaoma District Hospital	Western											0
Mumbwa District Hospital	Western		1									1

		Ophthalmic							Main-		Total	
	Province	Ophthalmologist	clinical officer	Ophthalmic nurse	General nurse	Nursing aide	Cataract surgeon	Optometrist	Refractionist	tenance technician	Manager	Total
Senanga District Hospital	Western		1									1
Yeta District Hospital	Western		1	1								2
Subtotal		13	23	26	25	0	5	0	2	4	5	103
NGO facilities:												
Ibenga Mission Hospital	Copperbelt		1									1
Katondwe Mission Hospital	Eastern											0
Mwami Mission Hospital	Eastern		1		2	1	1					5
St Paul's Mission Hospital – Kashikishi	Luapula		1		1	2					1	5
Lusaka Eye Hospital	Lusaka	2	2	1	3	3				1	1	13
Chilonga Mission Hospital	Northern				1							1
Chitokoloki Mission Hospital	North-Western				3							3
Kalene Mission Hospital	North-Western				3							3
Loloma Mission Hospital	North-Western			1								1
Lwawu RHC	North-Western		1									1
Mukinge Mission Hospital	North-Western	1	1		5							7
St Francis RHC	North-Western					1						1
Macha Mission Hospital	Southern	1	1									2
Monze Mission Hospital	Southern				2							2
Mtendere Mission Hospital	Southern		1									1
Zimba Eye Clinic	Southern			1							2	3
Yuka Mission Hospital	Western			1								1
Subtotal		4	9	4	20	7	1	0	0	1	4	50
Private for-profit facilities:												
Beverly Eye Clinic	Copperbelt	1										1
Buteko opticians	Copperbelt		1									1
Indafro Ltd.	Copperbelt							1				1
Optical Centre Ltd.	Copperbelt								1			1
Sinozam Friendship Clinic	Copperbelt											0
Springs of Life Medical Centre	Copperbelt	1	1									2
Sun Bird Eye Opticians Kitwe	Copperbelt							1				1
Sun Bird Eye Opticians Ndola	Copperbelt							1				1

		Ophthalmic							Main-			
	Province	Ophthalmologist	clinical officer	Ophthalmic nurse	General nurse	Nursing aide	Cataract surgeon	Optometrist	Refractionist	tenance technician	Manager	Total
Vision Care Centre	Copperbelt							1				1
Capital Eye Centre	Lusaka	1										1
Care For Business Hospital	Lusaka	1										1
Double Six Opticians	Lusaka			1				1				2
Eye Max Opticians	Lusaka							1				1
L.J. Eye Clinic	Lusaka				1		1	1				3
Lusaka Opticians	Lusaka		1							1	1	3
MHS opticians	Lusaka		1									1
Phil Opticians Ltd. Crossroads	Lusaka							1				1
Phil Opticians Ltd. Cairo Road	Lusaka							1				1
Phil Opticians Ltd. Arcades	Lusaka							1				1
Medicare Opticians Cairo Road	Lusaka	1						1				2
Medicare Opticians Manda Hill	Lusaka							1				1
Tokyo Opticians	Lusaka											0
Sun Bird Eye Clinic	Lusaka	1			1			1				3
Vision Care Appasamy Eye Hospital	Lusaka			2		1	2	3		2	2	12
Sun Bird Opticians Solwezi	North-Western							1				1
Sun Bird Opticians Livingstone	Southern							1				1
Subtotal		6	4	3	2	1	3	18	1	3	3	44
TOTAL		23	36	33	47	8	9	18	3	8	12	197

Note: The totals in this table differ from the data on total human resources in chapter 6. This is because some staff works in more than one facility.

Annex IV – Directory of ophthalmic equipment in Zambia (2011)

Facility Name	Province	Loupe	Slit lamp	Tonometer Applanation	Tonometer - Schiotz	Ophthal-moscope - Direct	Ophthal-moscope - Indirect	Trial lens set	Trial frame	Cross cylinder	A/AB scan	Operating Micro-scope	Cataract set
Government facilities:													
Arthur Davidson Children Hospital	Copperbelt	1		1	3	3		2*	2				1
Chelstone Clinic	Lusaka												
Chikankata Hospital	Southern	2	1		3	2*		1	1				2*
Chipata General Hospital	Eastern		1		2	1		1†					
Choma General Hospital	Southern		1	1	2	1		2	2*				
Kabompo District Hospital	North-Western				1	1		1	1				
Kabwe General Hospital	Central		1		1*	2		3	3	1			
Kafue District Hospital	Lusaka	1*			1		1	2	2	2			
Kaoma District Hospital	Western												
Kasama General Hospital	Northern	1	2†	1	2	2	1	2	2*			1	2*
Kitwe General Hospital	Copperbelt	10	5	5*	1†		2	3	3	1	1	1	6*
Lewanika General Hospital	Western	1	1	1		1		1	1	2		1	2
Livingstone General Hospital	Southern		2	2	1	2	1	4	4			1	6*
Lundazi District Hospital	Eastern												
Mansa General Hospital	Luapula		2	2	1	1†	1	2	2		1	2	2*
Mazabuka General Hospital	Southern	1	1	1	1	1		1	1*				
Monze DHMT	Southern	1	1	1	1	1		1*	1				
Mufumbwe District Hospital	North-Western												
Mumbwa District Hospital	Western												
Mwaya Urban Clinic	Southern		1										
Nchanga South Hospital	Copperbelt												
Ndola Central Hospital	Copperbelt	1	2†		1	2	1	2*	2*		1	1	2
Roan Hospital	Copperbelt												
Ronald Ross General Hospital	Copperbelt	20	1	1	4	2		2	8	2		1	1
Samfya District Hospital	Luapula												
Senanga District Hospital	Western												
Solwezi General Hospital	North-Western	3*	2	1	3	3		2	2			1†	2

Facility Name	Province	Loupe	Slit lamp	Tonometer Applanation	Tonometer - Schiotz	Ophthalmoscope - Direct	Ophthalmoscope - Indirect	Trial lens set	Trial frame	Cross cylinder	A/AB scan	Operating Microscope	Cataract set
St Francis Hospital	Eastern	1	2*	2	2	2	1	2	6*	2		3*	6
University Teaching Hospital	Lusaka	2	3	2	3	6**	2	5	5	2	2	3	10*
UNZA Medical Clinic	Lusaka	1	1	1	1 ⁺	1		1	1 ⁺	1		1	20
Yeta District Hospital	Western		1*		1*	1		1	2*				
Subtotal		42	23	17	31	26	10	35	35	13	5	12	34
NGO facilities:													
Chilonga Mission Hospital	Northern							1	1			1	1
Chitokoloki Mission Hospital	North-Western		1									1	1
Ibenga Mission Hospital	Copperbelt												
Kalene Mission Hospital	North-Western		1				1	1	1			1	1
Katondwe Mission Hospital	Eastern												
Loloma Mission Hospital	North-Western				1	1		1	1				
Lusaka Eye Hospital	Lusaka	7	7	6	2	2	1	2	2	1	1	5	10
Lwawu RHC	North-Western												
Macha Mission Hospital	Southern	1	2*	1	2	2*		2*	2			1	1*
Monze Mission Hospital	Southern	1	1	1*	1	2	2	2	2				
Mtendere Mission Hospital	Southern												
Mukinge Mission Hospital	North-Western	1	1	1	2	3		1	1*	1	1*	2	3
Mwami Mission Hospital	Eastern	2	1*	1	5	4	1	4*	4*			2	3
St Francis RHC	North-Western				1	1		1	1				
St Paul's Mission Hospital – Kashikishi	Luapula		1	1	1	3	1	2	2		2	1	3
Yuka Mission Hospital	Western		1*		2	2*		2	2*	2			
Zimba Eye Clinic	Southern		3*	1	1	1		2	2	1		1	20
Subtotal		12	12	11	18	17	6	15	14	5	3	14	41
Private for-profit facilities:													
Beverly Eye Clinic	Copperbelt	1	1	1	1	1	1	1	1	1	1	1	1
Buteko opticians	Copperbelt		1					1	1				
Capital Eye Centre	Lusaka												
Care For Business Hospital	Lusaka												
Double Six Opticians	Lusaka		1				2	3	4	1			

Facility Name	Province	Loupe	Slit lamp	Tonometer Applanation	Tonometer - Schiotz	Ophthalmoscope - Direct	Ophthalmoscope - Indirect	Trial lens set	Trial frame	Cross cylinder	A/AB scan	Operating Microscope	Cataract set
Eye Max Opticians	Lusaka												
Indafro Ltd.	Copperbelt	1	1		1	1		1	1	1			
L.J. Eye Clinic	Lusaka	1	2		2	3	1	2	6			3	2
Lusaka Opticians	Lusaka		1*	1	1	1		1	2	2			
Medicare Opticians Cairo Road	Lusaka					1	1	1	1	1			1
Medicare Opticians Manda Hill	Lusaka					1	1	1	1	1		1	
MHS opticians	Lusaka		1*		1	1		1	1	1			
Optical Centre Ltd.	Copperbelt		1					1	1	2			
Phil Opticians Ltd. Crossroads	Lusaka					1	1	1	1	1			
Phil Opticians Ltd. Cairo Road	Lusaka					1	1	1	1	1			
Phil Opticians Ltd. Arcades	Lusaka					1	1	1	1	1			
Sinozam Friendship Clinic	Copperbelt												
Springs of Life Medical Centre	Copperbelt												
Sun Bird Eye Clinic	Lusaka	1	1		1	1		1	1	1			
Sun Bird Opticians Solwezi	North-Western	1	1		1	1		1	1	1			
Sun Bird Opticians Ndola	Copperbelt		1		1	1		1	1				
Sun Bird Opticians Kitwe	Copperbelt		1		1	1		1	1	1			
Sun Bird Opticians Livingstone	Southern					1*		1	1				
Tokyo Opticians	Lusaka												
Vision Care Appasamy Eye Hospital	Lusaka	1	2		3	2	1	9	6	4	2	1	6
Vision Care Centre	Copperbelt		1			1		1	1	1			
Subtotal		6	14	2	13	19	10	31	34	21	3	6	10
TOTAL		60	49	30	62	62	26	81	83	39	11	32	85

* One or more items in need of repair

* One or more items beyond repair

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