

**More than Meets the Eye: Influencing factors in the access of cataract surgery in Ethiopia, Kenya, Rwanda and Tanzania.**

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A thesis submitted in partial fulfilment of the requirement for the degree of Master of Public Health  
by:

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Declaration:

Where other people's work has been used (either from a printed source, internet or any other source) this has been carefully acknowledged and referenced in accordance with departmental requirements. The thesis "More than Meets the Eye: Influencing factors in the access of cataract surgery in Ethiopia, Kenya, Rwanda and Tanzania."

is my own work.

Signature:.....

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## 1. ABSTRACT AND WORD COUNT

**Introduction:** Cataract is the greatest contributor to visual impairment and blindness in the region of East Africa, yet this region continues to rank last in terms of the Cataract Surgical Rate (CSR) index used to measure the rate of surgical intervention in restoring vision. The various enabling and disabling factors in four selected countries of East Africa (Ethiopia, Kenya, Rwanda and Tanzania) are identified and explored in this attempt to understand the current state of poor access to cataract surgery in this region.

**Methods:** A literature review was conducted using various websites and online databases and various qualitative and quantitative studies were interpreted with reference to the analytical framework of access to care provided by Levesque et al. Here, the five dimensions of access and their five corresponding patient-centred abilities were used to categorise the themes that emerged.

**Results:** A multitude of barriers were determined to be negatively impacting access to cataract surgery, namely: poor availability of human resources, poor health literacy and misconceptions, inequity in gender, cost (especially indirect) and a lack of adequate technical quality control mechanisms. Some enabling factors also emerged (as demonstrated by the success of some rural programmes) including increased eye education and outreach services, the provision of all-inclusive packages that cover indirect costs, and the mobilisation of social support and capital.

**Discussion:** Recommendations based on these findings can be made that generally act to increase the size and improve the equity of the distribution of the eye care workforce, address considerations of quality and training, improve health literacy of the populations in focus, and consider all issues relating to the affordability of cataract surgery. Higher quality research is called for regarding access in this region.

**Keywords:** cataract, surgery, access, East Africa.

**Word Count:** 12,152

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## Abbreviations

<b>AIDS</b>	Acquired Immune Deficiency Syndrome
<b>CSC</b>	Cataract Surgical Coverage
<b>CSR</b>	Cataract Surgical Rate
<b>DALY</b>	Disability Adjusted Life Years
<b>GAP</b>	Global Action Plan
<b>GDP</b>	Gross Domestic Product
<b>HIV</b>	Human Immunodeficiency Virus
<b>IAPB</b>	International Agency for the Prevention of Blindness
<b>IOL</b>	Intra-ocular Lens
<b>KOP</b>	Kenyan Ophthalmic Programme
<b>LIC</b>	Low Income Country
<b>LMIC</b>	Lower-Middle Income Country
<b>NGO</b>	Non-Government Organisations
<b>NPCS</b>	Non-Physician Cataract Surgeons
<b>PEC</b>	Primary Eye Care
<b>PHC</b>	Primary Health Care
<b>PPP</b>	Purchasing Power Parity (International Dollar)
<b>RAAB</b>	Rapid Assessment of Avoidable Blindness
<b>VHW</b>	Village Health Worker
<b>WHO</b>	World Health Organisation

### 3. INTRODUCTION

After completing a bachelor's degree in Optometry, at the University of New South Wales, Australia, in 2003, my passion for providing eye care to the most vulnerable was sparked by my first visit to a lower-middle income country in 2005. Living on the outskirts of Nairobi, Kenya, I implemented and taught a basic best-spherical refraction course for a group of 16 students of varying tertiary backgrounds: A most rewarding experience that, at the age of 23, left a lasting impression on me. For the next 12 years I would continue my clinical practice in Sydney, with frequent short-term clinical visits to remote aboriginal communities of New South Wales and the Northern Territory scattered in-between.

Over the years, I was fortunate enough to be involved in several projects in lower-middle income countries including Tuvalu, Myanmar and India (Himalayas), accompanying ophthalmologists from Australia and elsewhere. My role was mainly in screening outpatients, refraction and providing post-cataract surgical care. After working in a corporate optical franchise for a number of years, I took the decision to further my studies in public health, with an emphasis on global health, and so in 2017 I began my Masters in International Health at KIT, Amsterdam.

The global experience of the cataract patient, for me, encapsulates the reason I took this decision (and why I chose this topic for my thesis). At one end of the spectrum there is the Sydney patient, who elects to have early cataract surgery so as to not have to wear glasses, even though her vision is still acceptable to maintain a driver's licence. At the other end of the spectrum, there is the middle aged man from an outer island of Tuvalu, with dense cataracts in both eyes, rendering him blind, barely able to count fingers at one meter, and unable to attend to his small crop of papaya for the past two years. He has travelled 3 days by boat, accompanied by his daughter, to see the visiting ophthalmologist, and within days, his vision is restored to near-perfect with cataract surgery.

The reality is that access to cataract surgery is not uniform across the globe, and since this affliction is relatively easily fixed with surgery, it is a great tragedy that many people are unnecessarily blind because of this, in fact 700,000 of them right now in East Africa. This subregion has the lowest cataract surgical rate in the world. Why is this the case? Is it simply that the financial and human resources are not there? Hearing anecdotal stories from ophthalmologists who have worked in this region, having to pay scouts to go out and recruit patients, suggests that there are more reasons than meet the eye. Issues of access need to be explored. The factors that enable and disable access must be examined in this context, both from the service provider perspective and from the patient perspective, ensuring that issues relating to the general social determinants of health are not overlooked. The population in this region is growing fast, and whilst the demographic structure may be relatively young, an ageing population is only a couple of decades away. Action must be taken now to improve the access to cataract surgery and understanding the factors that influence access is a critical first step.

## 4. BACKGROUND

### A. General Demographics, Socioeconomics and Culture

The region of East Africa is composed of 20 nations (see table 1, below), with a total population of over 433 million, making it the most populous subregion of Africa(1,2). The population growth rate at 2.75%, is higher than the African average at 2.52% and much higher than the global average at 1.09%(3). The demographic profile is typical of Sub-Saharan Africa, with a relatively young population, as demonstrated in the median age (table 2, below). The region is vast, and covers more than 6.6 million square kilometres, with an average population density of 65 people per square kilometre. The proportion of people living in rural areas in East Africa is relatively high at 73%(3). The four nations of focus in this study, Ethiopia, Kenya, Rwanda and Tanzania have a combined population of 230 million, accounting for 53% of the total East African population. The rationale behind the selection of these four countries for this study will be explained in Chapter 7.

Country	Population
<b>Ethiopia</b>	<b>107,534,882</b>
<b>Tanzania</b>	<b>59,091,392</b>
<b>Kenya</b>	<b>50,950,879</b>
Uganda	44,270,563
Mozambique	30,528,673
Madagascar	26,262,810
Malawi	19,164,728
Zambia	17,609,178
Zimbabwe	16,913,261
Somalia	15,181,925
South Sudan	12,919,053
<b>Rwanda</b>	<b>12,501,156</b>
Burundi	11,216,450
Eritrea	5,187,948
Mauritius	1,268,315
Djibouti	971,408
Reunion	883,347
Comoros	832,347
Mayotte	259,682
Seychelles	95,235

Table 1: Countries of East Africa, by population, with the four selected nations highlighted (2018, Worldmeters)(1)

Key statistics of demography and socioeconomics are represented in table 2, below:

Statistics	Ethiopia	Kenya	Rwanda	Tanzania
Population*	107,534,882 million (2018)	50,950,879 million (2018)	12,501,156 million (2018)	59,091,392 million (2018)
Population Growth Rate (%)^	2.46 (2018)	2.52 (2018)	2.40 (2018)	3.11 (2018)
Median Age*	18.8 (2018)	19.2 (2018)	19.6 (2018)	17.4 (2018)
Gross National Income Per Capita (US \$)**	740 (2017)	1440 (2017)	720 (2017)	905 (2017)
Poverty Headcount Ratio at \$1.90 per Day (% of population)**	26.7 (2011)	36.1 (2011)	59.9 (2011)	49.0 (2011)
Agriculture, Forestry and Fishing (as % of the GDP)**	35 (2016)	32 (2016)	29 (2016)	29 (2016)
Adult Literacy Rate (%) ^^	39 (2007)	78 (2014)	68 (2012)	78 (2015)



Table 2: Comparison of key demographic and socioeconomic statistics of Ethiopia, Kenya, Rwanda and Tanzania  
 ^WHO Global Health Observatory(4); \*Source: Worldmeters (3); \*\*Source: The World Bank(5)

Ethiopia, Rwanda and Tanzania are classified as Low Income Countries (LIC) by The World Bank, having an average Gross National Income (GNI) per capita of less than US\$995 for the year of 2017. Kenya is classified as a Lower-Middle Income Country (LMIC) having a GNI per capita of between US\$996-3895 for the year of 2017 (see Table 2, above)(6,7). A large proportion of the population live below the poverty line (table 1.)(5). Since the significant majority of the population live in rural areas, agriculture is the primary livelihood in this region(5).

Literacy rates are relatively low by world standards, and this varies considerably between the four countries (see table 1.), with Ethiopia having the lowest literacy rate. Furthermore, gender inequality is reflected in all four nations, with this divide most evident in Ethiopia where 49% of men are literate compared with only 29% of women(2007)(8).

The ethnic composition of all four nations is diverse, for example, in Ethiopia, where there is a myriad of ethnicities and over 100 languages are spoken(9).

## B. Health

At a glance, all four countries have very similar life expectancies (see table 2, below) and health burden profiles, with communicable diseases the greatest contributor. The following (table 3) briefly compares key indicators:

Indicator	Ethiopia	Kenya	Rwanda	Tanzania
Life Expectancy at Birth Male/Female^	63/67 (2015)	64/69 (2016)	66/70 (2016)	62/66 (2016)
Expenditure on Health Per Capita (Intl. \$)^	73 (2014)	169 (2014)	125 (2014)	137 (2014)
Expenditure on Health as % of GDP^	4.9 (2014)	5.7 (2014)	7.5 (2014)	5.6 (2014)
Physician to population ratio (per 10,000 pop.)*	0.3 (2012)	1.8 (2012)	0.6 (2012)	0.1 (2012)

Table 3: Comparison of key health funding and performance indicators of Ethiopia, Kenya, Rwanda and Tanzania  
 ^World Health Organisation (WHO) Global Health Observatory(3); \*Atlas on African Health Statistics 2014(10)

## C. Health Systems and Financing

### Ethiopia

The health system is underdeveloped, with an estimated 50% of the population unable to access care. Issues of access are not just limited to physical availability, but also other issues of quality in terms of supplies and human resources. Furthermore, access is inequitable across the country, with a focus on urban-based curative services, at the expense of rural services and with little focus on preventative intervention(8). The physician to population ratio is very low, even for regional standards (see table 2). The annual health budget is heavily dependent on donor funds which contribute 42.5% of the total revenue, whilst the government contributes 55%, and user fees contributing minimally, at 2.1%(11).

### Kenya

The lack of universal health coverage in Kenya is estimated to be forcing one million Kenyans into poverty every year, due to catastrophic health expenses. In response to this, in 2017, the government announced the ambitious target of achieving 100% universal health care by 2022(12). The largest sources of funding for healthcare is private user fees, at 35.9%, followed by government funds and donors, both at 30% each(13).

### Rwanda

Rwanda has a universal health coverage system based on an insurance system known as Mutuelles de Santé. Memberships was sponsored by the government from 2012 and initially, less than 4% of the population was not covered(14). User fees were later introduced, resulting in a fall in memberships, and at

the close of the 2017 fiscal year, 84.3% of Rwandans were insured(15). In total, 45% of healthcare expenditure is funded by this community based-insurance scheme, but donor funds still contribute the majority of funding, at 53%(16).

### **Tanzania**

Similar to Kenya, a large bulk of the financing of the health care in Tanzania is derived from private user fees at 34.4%, over half of which comes from out-of-pocket expenses. Government contributions total 26% and donor funds make up 39.6% of the total revenue(17,18).

## 5. PROBLEM STATEMENT AND JUSTIFICATION

### A. Cataract, Its Impact and Treatment

Cataract is the progressive opacification of the originally-clear lens within the eye, causing visual impairment, and if untreated, blindness. Whilst cataract usually present in both eyes, cataract may not necessarily develop bilaterally at the same time or at the same rate. People with cataracts often complain of hazy or misty vision, difficulties with glare or bright lights, difficulties with reading, altered perception of colour and in advanced cases, difficulties with recognising faces, walking unaided, and performing simple daily tasks. The vast majority of cataracts occurs naturally with increasing age but can also be associated with other factors such as diabetes or previous eye trauma. Congenital and developmental cataract can also be seen in newborns and infants as well. The diagnosis of cataract is usually given by an eye care specialist through the measurement of visual acuity and ophthalmic examination under dilated pupils. The only treatment proven to be effective is surgery, whereby the opacified lens is removed, and nowadays, replaced with an artificial intra-ocular lens (IOL), restoring vision. The entire procedure usually takes between 30 and 45 minutes, and does not require a general anaesthetic(19).

Cataract surgery not only reverses blindness but may effectively prevent blindness or severe visual impairment from occurring in the first place, through early intervention. Blindness and visual impairment from cataract has been shown to negatively impact quality of life in individuals in a range of LMIC settings(20–23). Independence in undertaking basic daily tasks such as walking, bathing, cooking and eating can be lost, not to mention the ability to work and earn an income(24). The economic impact in such a household is often compounded by the need for another family member to abandon their work (or schooling) and to fill the role as full-time carer(25,26). This has obvious implications for the perpetuation of poverty. Globally, cataract contributed to 60 age-standardised disability adjusted life years (DALYs) per 100,000 population in 2015, with the region of Africa 50% above this average at 90(27).

The restoration of sight through surgery has been shown to be an economically sound investment, being rated as one of the most cost-effective public health interventions(28,29). Brown et al (2014) have shown that cataract surgery results in a 4500% return on investment, making it the most effective intervention worldwide(30). The cost per DALY saved has been rated in one of the lowest bands, at between \$USD15 and \$USD30(29).

### B. Blindness, Visual Impairment and Cataract Surgical Rates (CSR)

A recent systemic review by Flaxman et al (2017) reveal that in 2015 the global population with visual impairment was at 216 million (2.95% of the population) with a further 36 million (0.49% of the population) classified as blind(31). WHO defines visual impairment as having a reduced visual acuity of worse than 6/18 in the better eye, and blindness as having a visual acuity of worse than 3/60 in the better eye(32). Globally, visual impairment and blindness are slowly falling, with WHO estimating that in 2010 visual impairment was higher, at 285 million, and blindness at 39 million(32). Although global blindness and visual impairment appears to be relatively stable, assessment by causes and by region reveals a contrary trend. In 1990, cataract contributed to 36.67% of blindness in the worldwide population over the age of 50, and by 2015, this remained similar, at 35.15%. In the region of East Africa, over the same period of time, there was a significant increase in the contribution of cataract to blindness, from 38.88% to 44.68%(31). This equates to a prevalence of over 700,000 individuals that are blind due to cataract in this region alone and is the greatest contributor to blindness here(33). In contrast, the same affliction contributes to only 18% of blindness in North America(34).

More specifically, the four nations examined in this study, at latest estimates, indicate even higher relative rates of cataract blindness (see table 4.):

	Ethiopia**	Kenya*	Rwanda	Tanzania*
<b>Blindness caused by cataract</b>	50	42 (Nakuru) 43(Kericho)	57	52 (Kilimanjaro) 61 (Morogoro)

(% of total blindness)		43 (Embu)		67 (Zanzibar)
		59 (Kwale)		70 (Zingida)
Source of data	Berhane et al(35)	Rapid Assessment of Avoidable Blindness (RAAB) Repository(36)	Rapid Assessment of Avoidable Blindness (RAAB) Repository(36)	Rapid Assessment of Avoidable Blindness (RAAB) Repository(36)
Year	2008	2004-2013	2015	2007-2017

Table 4: Comparison of key health funding and performance indicators of Ethiopia, Kenya, Rwanda and Tanzania  
 ^World Health Organisation (WHO) Global Health Observatory(3); \*Atlas on African Health Statistics 2014(10); \*no national data available, only data in s in selected regions; \*\*no Rapid Assessment of Avoidable Blindness (RAAB) Repository data available

As global population trends point to an ageing population, including in East Africa, the prevalence of cataract is also expected to rise accordingly, since cataract is a disease correlated with age(3).

Multiple studies have looked at rates of cataract surgery in Easter African nations, and have identified a relative lag in this ophthalmic service compared to world standards(37–42). The International Agency for the Prevention of Blindness (IAPB), cites a useful index, the Cataract Surgical Rate (CSR), for measuring how a nation is performing in tackling blindness from cataract(43). CSR is the number of cataract operations performed in one year, per million population(44). Latest data as published by the IAPB show that the global median CSR was 1406, with the Sub-Saharan African Region faring the worst of all (Figure 1):

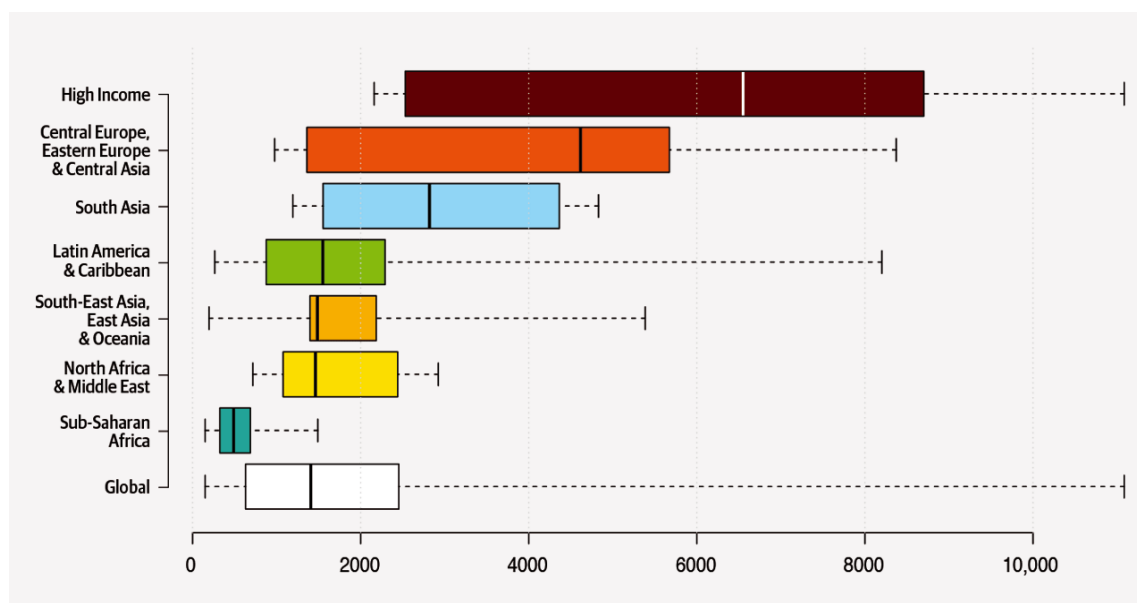


Figure 1: CSR for the 102 nations for which data is available, represented by region (2017) Source: IAPB Atlas(34)

More specifically, for the countries examined in this study, the following table represents the very low CSRs of all four nations (table 2.):

Country	Cataract Surgery Rate (CSR)	Ophthalmologists per million population	Allied Ophthalmic Personnel per million population
Ethiopia	434	2	4
Kenya	494	2	9
Rwanda	483	2	8
Tanzania	581	0.8	8

Table 5: CSR, ophthalmologist and allied ophthalmic personnel rates per million by Country, 2017 (Source AIPB Atlas)(45)

This data highlights the significant lag that exists when it comes to access of cataract surgery in these countries.

In 1999, a global initiative was launched by the WHO in conjunction with IAPB called “VISION 2020: The right to sight” with the goal of eliminating worldwide preventable blindness by 2020, of which cataract was, and still is, the greatest contributor. This was to be achieved through increasing human resources in eye care at every level, improve infrastructures and technologies, and to advocate for resources and commitment(33).

Later, in 2013, at the World Health Assembly, Resolution 66.4 Universal Eye Health: a Global Action Plan (GAP) 2014-2019 was adopted by all 194 WHO member states, with the more modest aim of reducing avoidable blindness globally (25% reduction by 2019)(45). This action plan recognises the significance of cataract and thus “is structured to particularly address the global trend towards an increasing incidence of chronic eye disease related to ageing”(45). Moreover, one of the three indicators selected to measure the progress of this plan is the CSR(42).

### **C. Posing the question: why are rates of cataract surgery so low in East Africa?**

Multiple studies from different settings in the four countries in question have attempted to examine various factors that impact access of cataract surgery. Some studies have pointed out that patient uptake rates (utilisation) are well below expected values even when cataract surgery is offered at no direct cost to the patient(40,42). Other studies have also identified inequities in access to cataract surgery, with the elderly, females and people of lower socioeconomic status all less likely to access cataract surgery(37–40). In a study from Rwanda, even the role of the gender of the health care provider has been implicated as an influencing factor, with patients much less likely to have cataract surgery if their contact was with a female health worker(41). This literature review reveals that most studies have tended to focus on one theme, for example gender, cost, or human resources, and thus may not have considered all possible dimensions of access.

Therefore, an in-depth examination of all of the various barriers and facilitators that may be contributing to the reality of the below-average rates cataract surgery is called for. Moreover, within this specific context of these countries in Eastern Africa, the perspective of patient and not just the provider must be examined, to truly understand the dynamics that exist at the interface of access. By including a patient-centric approach, wider social determinants can and should be considered.

## **6. OVERALL OBJECTIVE**

- 1. To identify and explore enabling and disabling factors that influence the access of cataract surgery in Ethiopia, Kenya, Rwanda and Tanzania, with the two sub-objectives of:**
  - a. To determine the most important factors that influence the access of cataract surgery.
  - b. To make appropriate recommendations that may result in improved access of cataract surgery in this region.

## 7. METHODOLOGY AND ANALYTICAL FRAMEWORK

### A. Methodology

A desk review of journal articles, reports, policies and other relevant documents was conducted to achieve an understanding of the objectives of this study. Initially, this study was to only concern Kenya, however, after preliminary searches yielded insufficient literature for the scope of this thesis, the addition of three other neighbouring countries was made: Ethiopia, Rwanda and Tanzania. This allowed for a greater pool of information to be accessed. Combined, these four countries account for over half of the total population of East Africa (230 million out of 432 million), and thus represents a sizeable sample of this region(3). Moreover, the different cultural contexts, health systems and programme approaches to eye care in each country provided a good opportunity to explore, compare and critically analyse and extract useful lessons learnt and to make recommendations accordingly.

### B. Search Strategy and Inclusion/Exclusion Criteria

The various phases of this literature search are summarised in the following table, as well as the inclusion and exclusion criteria applied:

Phase	Description and inclusion/exclusion criteria
1	<b>Country background:</b> Google was the primary search engine and results were manually scanned and screened for official information published by governments and other official sources such as WHO and the United Nations. Sources that contained the most recent statistical information were selected and older data was excluded.
2	<b>Blindness, visual impairment and cataract worldwide and within East Africa and the four countries:</b> Google, PubMed and Google Scholar were used, and data was included that was from official sources and/or from systemic reviews
3	<b>Cataract surgery rates worldwide and in the four nations:</b> Google, PubMed and Google Scholar were used, and data was included that was from official sources and/or from systemic reviews
4	<b>'Access of care' framework and access of cataract surgery in the four nations:</b> larger word combinations were used in Google Scholar as searches here yield results with less specificity, whilst smaller word combinations were used for PubMed, where specificity is higher. One-hundred-and-twenty-one potential articles were selected for further screening based on the manual scanning of the study title so as to include articles that contained any key terms (listed below). The abstracts of these studies were then read, and articles that were not relevant to the study objectives for the four nations were discarded. Some exceptions were made whereby studies concerning cataract surgery access outside of the four countries were still included, as they were from similar LMIC settings and had the potential to provide a comparative insight into access. Articles concerning access in high income settings were also excluded. Furthermore, snowballing was used routinely to find articles of relevance, often leading to documents that were not found with initial searches. In total, 23 articles (including research papers and reports) were included for within the four nations, five outside of the four nations, and five relating to access of care frameworks.

Table 6: Phases of search strategy and reference to inclusion criteria

The databases, search engines and websites used are detailed in the following table:

Data Bases, Websites, Search Engines
Google
Google Scholar
PubMed
World Health Organisation Website
World Health Organisation Afro Region Website
International Agency for the Prevention of Blindness (IAPB) Website

Table 7: Data bases, Search Engines and Websites used

The search terms and word combinations used are detailed in the following table, and are grouped according to what phase of searching they applied to:

Phase	Terms and Combinations Used
1	ethiopia, ethiopia+health+system, Kenya, kenya+health+system, Rwanda, rwanda+health+system, Tanzania, tanzania+health+system
2	blindness, visual Impairment, blindness+incidence+global , blindness+incidence+east+Africa, cataract, cataract+incidence+global, cataract+incidence+east+africa
3	cataract+surgery+rates+global, cataract+surgery+rates+Africa, cataract+surgery+rates+east+Africa, cataract+surgery+rates+Ethiopia, cataract+surgery+rates+Kenya, cataract+surgery+rates+rwanda, cataract+surgery+rates+tanzania
4	Access+to+care, access+of+care+framework access+cataract+surgery, access+cataract+surgery+africa, access+cataract+surgery+east+africa, access+cataract+surgery+ethiopia, access+cataract+surgery+kenya, access+cataract+surgery+Rwanda, access+cataract+surgery+tanzania, barriers+cataract+surgery, barriers+cataract+surgery+east+africa, barriers+cataract+surgery+ethiopia, barriers+cataract+surgery+kenya, barriers+cataract+surgery+rwanda, barriers+cataract+surgery+Tanzania, cataract+surgical+report+ethiopia, cataract+surgical+report+Kenya, cataract+surgical+report+Rwanda, cataract+surgical+report+tanzania

Table 8: Search terms and combinations used in each phase of search

### C. Search Delimitations

Given the relative scarcity of information on this topic in this region, no year restrictions were placed on the search of research papers relating to access to care (phase 4) so as to not limit an already minimal information pool. Moreover, all studies found without placing a year limit were found to be from the last 15 years or more recent. For more specific statistical data (e.g. cataract prevalence, surgical rates etc), the most recent published data was always cited, and this generally ranged from less than one year, to six years, based on availability. Articles published in any language other than English were excluded.

### D. Analysis Method

All reference material was added to the Mendeley referencing programme. A manual method of ‘coding’ was employed to analyse each research paper (and other documents), resulting in the formation of five main groups of themes, related directly to the five dimensions of access to care (explained below). This was done by colour-coded text highlighting within the Mendeley programme. When no information of relevance was found, the paper was discarded.

### E. Analytical Framework of Access to Care (Levesque et al)

The information found in this study is organised and interpreted with reference to the analytical framework of ‘Access to Care’ formulated by Levesque, Harris and Russell (See Figure 2)(46).



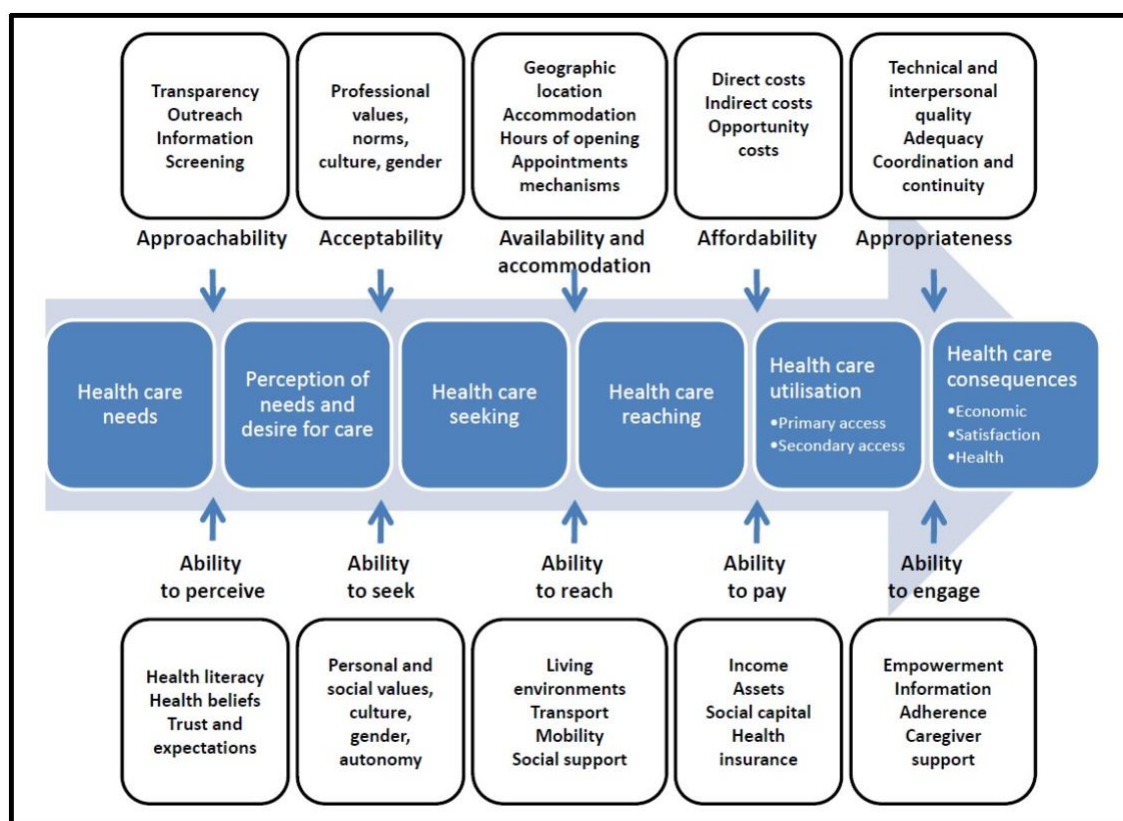


Figure 2: Conceptual Framework of Access to Care (Levesque et al 2013)

This framework was chosen for this study as it is based on a comprehensive review of the attempts by many authors to conceptualise the notion of access to health care. Here, Levesque et al have identified that access to health care is a complex notion and encompasses many “broad dimensions and determinants that integrate demand and supply-side-factors and enabling the operationalisation of access to health care all along the process of obtaining care and benefiting from the services”(46). As such, this framework recognises that access is not just related to the provision of health services, but just as importantly, all the environmental influences that an individual is part of(46).

For the purposes of this study, the six individual elements of care (blue boxes shown in the centre of the framework in Figure 2) will not be addressed separately. The logic behind this is twofold: Firstly, the main objectives of this paper relate to the various barriers and facilitators of access to cataracts surgery, and not primarily the service of cataract surgery itself; and secondly, the in-depth analysis of all dimensions of access (service provider and patient-sided) naturally incorporates these elements throughout these discussions, without necessarily titling them as discrete sub-sections.

## F. Definition of Access of Care

The definition of access of care that Levesque et.al. have created is as follows :

“The possibility to identify healthcare needs, to seek healthcare services, to reach the healthcare resources, to obtain or use health care services, and to actually be offered services appropriate to the needs for care.” (46)

This definition of access presents a very broad conceptual model that considers all steps in the access process, from the patient’s perception of need of care, right through to the benefit obtained from a service. This is differentiated from “accessibility” which only considers the availability and nature of the services that allow for care, and thus is an analysis of realised access(47). The definition of access Levesque et al have incorporated into their model crucially considers the patient-centric factors that influence access (lower segment of the model presented in Figure 2), at every step of the way, and not just the provision of

services factors (upper segment of the model presented in Figure 2). Donobedian and Salkever have proposed alternate frameworks, however, these lack the user-sided dimension of access, and were thus unsuitable for this study(48,49). The chosen definition allows for greater insight into the transitions a patient will experience along the path of access, and hence has the ability to reveal more potential barriers, and ultimately yield solutions to these barriers.

In relation to the specific service in question in this paper, cataract surgery, many steps are involved along the path of access, often including a referral pathway from primary health care services, and thus it can be hypothesised that more opportunity exists for barriers to materialise. This analytical framework is robust and thorough and provides a firm structure that allows indicators to be inputted and interpreted. The complexity and multi-dimensionality of what access really means is critical in attempting to truly understand the nuances of the specifics of cataract surgery uptake in this particular region of the world.

A potential limitation of this framework is that it may be considered too broad for in-depth analysis. In response to this, one can argue that a broad approach must be taken in the first instance, so to, at the very least, map where the greatest barriers of access may exist, and therefore guide the focus of future investigations.

### G. Five Dimensions of Care

The dimensions are summarised in the table below (Table 9):

<b>Dimensions of Accessibility</b>	<b>Corresponding Patient Abilities</b>
Approachability	Ability to Perceive
Acceptability	Ability to Seek
Availability & Accommodation	Ability to Reach
Affordability	Ability to Pay
Appropriateness	Ability to Engage

Table 9: A Summary of the Five Dimensions of Accessibility and their Corresponding Patient Abilities (Levesque)(46)

These dimensions will be defined in chapter 8, and the relevant facilitators and barriers relating to each dimension will be explored using this framework.

## 8. FINDINGS

### A. APPROACHABILITY AND ABILITY TO PERCEIVE

Approachability, as defined by Levesque et al, is related to “the fact that people facing health needs can actually identify that some form of service exists, can be reached, and have an impact on the health of the individual”(46). Concepts that are related to this aspect of this dimension include the provision of information relating to the service, transparency and activities such as outreaches and screenings. These features, or lack of, have the potential to contribute to increasing or decreasing access. Here, the corresponding ability of the patient relates to their ability to actually perceive a need for care, and is determined by such elements as health literacy, health beliefs, trust and expectations. In relation to cataract surgery, this dimension can be seen as the crucial starting point along the path to successful vision-restoring surgery. The literature highlights examples of how such features of this concept can serve to boost access, whilst others continue to act as barriers.

#### Approachability

To begin with, it is crucial to examine the role of the services involved in providing cataract surgery. Since cataract surgery is a specialised service that usually requires referral, boosting the presence of primary eye care (PEC) in primary health care (PHC) has been one strategy adopted in Rwanda. In 2007 the Rwanda National Plan for the Prevention of Blindness was launched with the major objectives of increasing diagnoses of eye disease such as cataract, the provision of information and referrals, and the promotion of eye care(41). By training village health workers and nurses, patients were better informed about their eye conditions, and in addition, national campaigns have since been launched to inform the public of PEC being available in PHC(50). Courtright et al (2010) looked at the impact of this strategy in the Rubavu district of Rwanda and showed that by increasing information, awareness and by promoting the decentralisation of eyecare, inroads to achieving greater access to cataract surgery were achieved, with a significant initial increase in referrals for cataract surgery over a two-year period(51). However, this did not necessarily translate into the same proportionate increase in cataract surgeries(41,51).

Outreach is another critical element of approachability, and some studies have cited the importance of outreach eye health clinics in bridging the gap between community and hospitals that provide cataract surgery(52,53,54). Lewallen et al (2005) demonstrated how two rural programmes, one from Kwale district, Kenya, and the other from Kilimanjaro region, Tanzania, managed to significantly increase their CSR. In both cases, the provision of regular, fixed-site outreach clinics was a key feature that both programmes had implemented(52). In fact, the Kenyan Ophthalmic Programme (KOP), established by the Ministry of Health, had identified “deteriorating outreach services” as a major barrier to access of cataract surgery (2000)(53). Habtamu et al (2013) showed that in Southern Ethiopia, those eye units that engaged in community based screenings and outreach programmes experienced higher surgical productivity compared to those units that did not(54). However, Chibuga et al (2008) examined access to cataract surgery in 12 remote villages of Hai district of the Kilimanjaro region, Tanzania, and found that despite regular outreach services, uptake of cataract surgery for those that were offered it remained disappointingly low at only 25%(38).

The value of information and education must not be ignored and is often inextricably linked with outreach. For example, Lewallen et al (2005) showed that in Kilimanjaro, outreach programmes were always preceded by well-advertised promotion via local radio, posters and visits to key community leaders, whilst in Kwale, teams conducted periodic eye health education session in schools and other communities, raising awareness and gaining the trust of local communities(52). Similar awareness creation programmes in some eye care units in Southern Ethiopia were associated with increased rates of cataract surgery(54). Moreover, timely communication in the appropriate format was shown to be critical in Müller et al’s qualitative study from Rwanda (2010). Here, even when patients were successfully referred from a village health worker to a health centre, if the health workers did not have the tools of stories and pictures of successful cases at hand to inform the patient with, then they reported little likelihood of patients accepting advice and proceeding to undertake cataract surgery(41).

Since many languages are spoken within all four countries, eye health promotion material printed in an inappropriate language can act as a barrier, as shown by this quote from Habtamu et al's qualitative study from Southern Ethiopia (2013):

*"The eye care promotion messages are not reaching to the community in need of the service...they just do not understand what we are talking about...because health promotion materials and messages are delivered in Amharic...not in their local language"*

- Eye Care Manager, Southern Ethiopia(54).

Mehari et al lists a lack of information on the disease of cataract and its treatment as a barrier to access in central Ethiopia(55), and the KOP cites a lack of social marketing as having a negative impact on CSR(53).

### **Ability to Perceive**

Whilst it could be argued that the ability to perceive the need for care can be linked to the service provider's ability to communicate relevant information, there are, however, widely reported health beliefs entrenched within the community base that significantly impact cataract surgical rates on their own. The fear of cataract surgery being linked to adverse outcomes and even death, are deeply embedded in many rural settings, particularly in East Africa. A host of studies from Kenya, Tanzania, Ethiopia and Rwanda point out that misconceptions and rumours play a significant role in inhibiting the uptake of cataract surgery(37,41,42,55-57). For example, Briesen et al (2010) and Müller et al (2010) cite a common belief amongst patients in Kenya and Rwanda respectively, that cataract surgery entails the replacing of the eye with that of a sheep or a goat(41,42):

*"People say that 'when you go to surgery, they will take your eye out, put it on the table and put in a goat eye.'"*

- Village Health Worker, Rubavu, Rwanda(41).

Compounding such beliefs can be other factors, such as the ethnicity of the eye surgeon. For example, Briesen et al. (2010) reported that in Kwale, Kenya, when a non-local surgeon started working at the hospital, suspicions of the intention of the surgeon to blind his patients started circulating, as the surgeon was not of the same tribe(42).

The value placed on pain as an indicator of need should also not be discounted. Since cataracts are not associated with pain, many people dismiss their visual impairment as not worthy of any surgical intervention, and prioritise other health issues(37,56).

*"Yes, I stayed at home with cataract (for 11 years) because the eyes didn't have much pain and I could "see" someone and we could talk well."*

- Man, 81, Dodoma, Tanzania(56).

On the other hand, word-of-mouth can be a powerful tool in promoting positive outcomes of cataract surgery. Briesen et al (2010) points out the value of good social publicity in building trust in the community and showed that individuals that knew of someone who had benefited from cataract surgery were significantly more likely to uptake surgery if it was offered(42).

General health literacy also plays a part in facilitating or hindering access to cataract surgery. Mwede et al (2005) showed that in Tanzania, longer delays in presentation of children with congenital or developmental cataract were associated with lower levels of socioeducational status of their mothers (58,59). Also, children with at least one older sibling at home presented earlier than if no older children were at home(59). Here, the authors hypothesise that knowledge of normal childhood development is a function of community norms and previous experience gained in raising children, and hence apply this logic in explaining why children with older siblings present earlier.

## **B. ACCEPTABILITY AND ABILITY TO SEEK**

Acceptability relates to issues of culture, norms, professional values and gender(46). A patient's acceptance of a service can be influenced by any or all of these factors and is often unique to each particular context. From the perspective of the patient, their corresponding ability to seek services is greatly impacted by such relevant factors. The literature from East African settings begins to uncover a range of social and cultural issues, and significantly, issues relating to gender and autonomy appear to play a critical role in obstructing the access of cataract surgery.

### **Acceptability**

From the service provision perspective, some recurrent themes emerge in the literature in relation to the access of cataract surgery, particularly in terms of barriers. Firstly, issues of gender within the eye care field, have been flagged in some studies, for example, Müller et al (2010) reported that male VHWs in Rubavu, Rwanda, accompanied over four times as many patients to the health centre as compared to female VHWs(41). This was regardless of the sex of the health centre nurse that they referred to. Interestingly, female VHWs would accompany over 50% of patients they referred when the health centre nurse was male, yet only 16% when the health centre nurse was female. The reason for this bias seems to be deeply entrenched, with focus group discussions in this study revealing that all VHWs preferred to report to male nurses over females(41). Further along the referral line, it was found that male nurses referred twice as many patients to the central eye unit as females, which resulted in CSRs being double in areas covered by male nurses compared to areas covered by female nurses(41). In this same study, patients interviewed (from all age groups) reported preferring to be seen by a male nurse, reasoning that they were more knowledgeable, skilled and respectful of confidentiality.

*“When a patient goes to the health centre, if he sees a male nurse, he thinks he will be treated correctly. With a woman, he is not sure if the treatment is correct.”*

- Nurse, Rubavu, Rwanda(41).

It seems clear that such attitudes towards gender are not only widespread amongst the general public, but also perpetuated within the health system. Courtright et al's (2011) review of the state of the existing eye care human resource sector in four East African countries from 2007 (including Tanzania and Kenya), revealed that female cataract surgeons were half as productive as males(60). It was noted that females were less likely to have the adequate nursing support and less likely to have two or more surgical sets to use, compared with their male counterparts. The reasons for this are not explained in this study.

Whilst a health system can be viewed as an entity on its own, the individuals that constitute the system bring with them their own values. The motivation of any health worker may vary depending on pay and working conditions, but even when these two variables are equal for all, variations in work output are seen. For instance, Müller et al also observes differences in personal work ethics amongst VHWs tasked with referring patients with eye complaints to the local health centre. In the absence of incentives, many workers did not accompany their patients, yet a minority did, citing their 'good conscience' as their motivation(41). This shows that the professional values of health workers can either positively or negatively impact access. In fact, the importance of poor staff motivation was listed as a key constraint in achieving better eye care access by the KOP(53).

### **Ability to Seek**

Even if a patient can successfully perceive the correct health service required to address their visual impairment, social and cultural values as well as attitudes towards age, gender and autonomy appear to play a role in accessing these services in East Africa. Once again, gender appears to be a highly significant barrier, not only in this region, in many regions throughout the lower-middle income world, with females significantly less likely to access cataract surgery(37,39,64,65,40,55,57-59,61-63), even though they represent two thirds of the global burden of blindness(61).

Evidence shows that even from a young age, societal values are skewed towards boys and men being favoured. For example, Mwendu et al (2005) showed that infant girls with cataracts were presented for assessment, on average, later than boys in Tanzania(59). Furthermore, boys outnumbered girls 2:1 when it came to cataract surgery cases (with no biological explanation for this), and boys were also more likely to be returned for follow-up care compared to girls(59). Women are more likely to decline surgery in East Africa for various reasons, mainly related to gender roles, education and autonomy. As younger adults, women with children often cannot leave their children unattended whilst they have cataract surgery, and thus by default their gender role acts as a direct barrier, as noted in Melese et al's study from Ethiopia(40).

A lack of autonomy amongst women within the family is also a critical barrier to access. Bronsard et al (2009) report that mothers of children with cataract often did not have the power to make decision on their children's health and were restricted by the final say of their husband (58). When questioned, the majority of these women revealed that if it were up to them, they would treat all their children equally, regardless of gender(58). Furthermore, higher levels of education amongst mothers was associated with earlier presentation of their children, and greater decision-making power when it came to their children's health, implicating the role of education as a facilitator of greater access(58). Another example of the lack of autonomy that some women face can be seen in Genau et al's research from Kilimanjaro (2005), where some women indicated that they first needed to seek the permission of their husband before proceeding with cataract surgery(37).

Societal views on gender roles continue to disadvantage women into older age. Briesen et al (2010) and Genau et al (2005) revealed that women in Kenya and Tanzania, respectively, regard visual impairment as an embarrassment and something to be ashamed of, and often don't voice their diagnosis of cataract to family members, for fear of the surgery creating a burden, yet ironically become more impaired and more dependent in the meantime(37,39). In contrast, it has been shown in several studies that older men are more likely to voice their symptoms, and adapt the role of patient(37,63,66). In Kenya, Briesen et al (2010), showed that men were still more likely to accept surgery, despite the complete service and transportation being offered free for both men and women(39). Genau et al (2005) looked at the family dynamics in relation to cataract surgery in Tanzania and uncovered the common perception that older men need to "see" more than older women, as they are still influential members of the greater community and require independence, whilst women are constrained to "smaller" social and physical worlds(37). Since the majority of elderly patients rely on financial support for direct and indirect costs associated with cataract surgery, the difficulty in asking for money from family and friends is made all the more difficult for women, given this social context.

Finally, regardless of gender, studies reveal that older patients in East Africa are less likely to access cataract surgery compared to younger patients(37-39,55,63,66). Syed et al's multicentre study from Kenya, The Philippines and Bangladesh (2013) cites independence and autonomy as facilitating factors in younger patients' ability to access cataract surgery in all three sites(63). It can be reasoned, that since younger patients are more likely to be employed they are more likely to have the financial resources to pay for surgery. Moreover, the threat that visual impairment poses to their livelihood may be a significant motivator in accessing curative surgery. Genau et al (2008) also demonstrated that the perceived need for cataract surgery goes down with age, and that elderly patients are more likely to tolerate poor vision(56).

*"When I lit a fire for cooking I do recognize it by its heat, I hear the sound when water starts boiling. Then I put flour and the food gets ready. I put the food on the plate and family members serve themselves."*

- Woman, over 75 years old, Dodoma, Tanzania(56)

Whilst being elderly appears to be a barrier in itself, Chibuga et al (2008) argues that the opportunity exists for younger recipients of sight-restoring cataract surgery to become ambassadors of the procedure, and thus regarded as long-term facilitators of access(38).

### C. AVAILABILITY & ACCOMMODATION AND ABILITY TO REACH

As a dimension of access, Levesque defines availability and accommodation as relating to the fact that health services can be physically access, and that this access is within a timely manner(46). Health services can refer to both physical places and the human resources that operate within the relevant area(s) of care. Not only does this relate to physical facility characteristics (e.g. distribution, density, ability to accommodate) but also the characteristics of the service provider (e.g. qualifications) and the mode and method of contact provision (e.g. appointment mechanism and contact ability). From the patient perspective, the ability to reach is related to factors such as mobility, transportation, living environments, and importantly, in the case of the visually impaired, social support. Since a large majority of this population are rural dwellers (see table 10), may of the issues pertaining to this dimension are of particular relevance.

Country	Population Living in Rural Areas (%)
Ethiopia	80
Kenya	74
Rwanda	69
Tanzania	67

Table 10: Rural proportion of populations of four East African countries (Source: World Bank, 2017)(67)

#### Availability & Accommodation

The unavailability of services, particularly in terms of human resources appears to be a significant barrier in many parts of East Africa. In Ethiopia, for example, several studies have flagged the fact that there is a shortage of ophthalmic surgeons and non-physician cataract surgeons (NPCS, explained below) and an uneven distribution of their services(54,55,67). Habtuma et al (2013) revealed a staggering disparity in distribution of surgeons in Southern Ethiopia (both ophthalmic and NPCS), with a surgeon-to-population ratio of 1:70,000 in the regional capital, and zero surgeons covering rural zones totalling seven million people(54). This equates to almost half of the population of Southern Ethiopia being without access to services(54). Deressa et al (2012) examined attitudes of medical students from Addis Ababa University and less than 30% of undergraduate students intended on practicing in rural areas(67). Also of concern was the fact that 50% of all students wished to emigrate upon graduation all-together(67).

Nevertheless, the general shortage of ophthalmic surgeons in East Africa and their inequitable distribution has led to a task-shifting movement that started informally in the 1980s. Nowadays, many African nations, including those in East Africa, have developed programmes designed to train nurses, assistants and officers in performing cataract surgery, in an attempt to fill the gaps(68). These surgeons are known as 'Cataract Surgeons' or 'Non-Physician Cataract Surgeons' (NPCS) and receive formal training in Kenya, Tanzania and up until recently, Ethiopia(69). Whilst this task-shifting appears, on the surface, to be an obvious facilitator of access, Habtuma et al (2013) and Elish et al (2014) have revealed that the inequitable distribution of NPCSS has followed the same path as ophthalmic surgeons, with a concentration of providers gravitating to major urban centres(54,69).

*"Cataract surgeons were trained to address the need of rural communities in responses to shortage of ophthalmologists, but only few were happy to work in the secondary eye units, and most relocate to the major towns"*

- Eye Care Manager, Southern Ethiopia(54).

The geographical location of services is important. It stands to reason that the further a service is away, the more difficult it is for an individual to access, especially if the individual is elderly and/or visually impaired. The fact that a large majority of the population in question live in rural settings, it is little wonder that distance from an eye care facility is linked to reduced access, as shown in several studies(55,59,63). Amongst children requiring surgery for cataracts in Tanzania, Mwendu et al (2005) showed that increasing distance from the hospital was directly linked to increasing delays in presentation(59). Mehari et al (2013) also demonstrated this phenomenon in adults in central Ethiopia(55).

The literature, however, holds some examples of well-thought out strategies that have been shown to minimise some of the barriers of availability. For instance, Lewallen et al (2005) describes two separate

community-based programmes in the Kwale district of Kenya and the Kilimanjaro of Tanzania, and in both cases, the chosen locations of outreach centres were based on population centres and densities (informed by the Ministry of Health in the case of Kilimanjaro). As such, a maximum number of patients were screened with the resources available(52). In both Kilimanjaro and Kwale, the outreach personnel were trained to make clinical decisions on site regarding the possibility of cataract surgery and if surgery was advised, patients would be transported to the hospital on the same day and transported back 1-2 days later. This streamlining of the referral process (both in terms of distance travelling and time) greatly increased the uptake of cataract surgery in both programmes(52). Furthermore, appointment management was also considered, for example, in Kilimanjaro, where a computerised registration system was implemented in the hospital, allowing for efficient management of appointments, resulting in larger numbers of patients being admitted and the facilitation of the “after hours” visit(52).

Finally, issues of accommodation must also not be forgotten, given that cataract surgery is generally an in-patient service. This includes beds and the space for beds. A novel solution one programme came up with in Kilimanjaro was the commissioning of local workers to build camp-style beds, allowing for more beds to occupy a smaller area, requiring less nursing maintenance and increasing efficiency(52).

### **Ability to Reach**

The link between visual impairment and decreased mobility is well-known(70), and the largest contributor of visual impairment in East Africa, is cataract(31,32). Thus, by default, patients that are in most need of cataract surgery are the most vulnerable to limited mobility. Therefore, this represents an inherent barrier to cataract surgery that must be addressed by other means such as transportation and social support. Hence potential exists for such elements to represent further barriers, or, indeed to facilitate access.

Limited availability and/or affordability of transportation has been cited in several studies as a barrier to accessing eye care services(51,55,63). Providing free transportation to and from hospital has the potential to greatly increase acceptance of cataract surgery, as demonstrated in Lewallen et al’s study (2005) from Kwale and Kilimanjaro(52). The way free transportation is arranged has also shown to have an effect, as highlighted by Syed et al’s multicentre study (2013), where even though the net cost of transportation was free, patients still had to pay for the transportation in the first instance and were later reimbursed. This system resulted in patients declining surgery, as they did not have immediate access to the minimal funds needed to pay for the transportation(63). Whilst this may be seen as a matter of affordability, its inclusion in this section is also justified as it clearly relates to availability of transportation.

Closely linked to transportation is the living environment of the patient. Even if transportation is available, if vehicles cannot gain physical access to a particular location (for example due to no roads existing), then transportation is redundant. Mehari et al (2013) showed that in central Ethiopia, over 30% of patients interviewed had cited the fact that their village was not linked to a main road as a reason for declining or delaying cataract surgery(55).

Finally, a lack of social support, especially in the form of an escort, has been shown to present a barrier to access of cataract surgery in several East African settings(40,55,63). Syed et al (2013) showed that not having social support results in lower attendance rates at eye care facilities, linking this to the statistic that married individuals are more likely to seek health care for visual impairment than singles(63). Müller et al’s study from Rwanda (2010) showed that patients referred to the local health centre for further eye examinations were more likely to attend if they were chaperoned by the referring village health worker(41). Moreover, Lewallen et al (2005) points out that free transportation offered in conjunction with an escort yielded increased rates of cataract surgery in Kilimanjaro and Kwale(52).



#### D. AFFORDABILITY AND ABILITY TO PAY

Put simply, affordability relates to the economic ability of people to spend financial resources and time in order to access services. Factors that generally impact affordability are related to the direct costs of a service, the related costs involved in accessing that service (indirect costs) and the opportunity costs (e.g. being away from work)(46). Ability to pay is a concept that has been in use for some time, and refers to the capacity for an individual to generate funds to pay for health services(71,72). This ability is related to such factors as income, assets, social capital and health insurance, and thus issues of poverty or social isolation are of significance here. This dimension is particularly relevant in this study, as the countries examined all have significant rates of poverty, with large proportions of each population living below the poverty line, for example 59% in Rwanda and 49% in Tanzania(73). It stands to reason that affordability and ability to pay will therefore play a significant role in impacting the access of cataract surgery.

##### **Affordability**

The direct cost of cataract surgery has been widely reported as a major barrier in East Africa(37,41,42,51,55,56,63,66,74). Due to the relatively low rates of cataract surgeries in this region of the world, many fixed costs associated with the provision of surgery cannot be offset by higher volumes of surgery (and thus unable to create economies of scale)(75). As a result, the average real cost price per surgery is higher here than it is in other parts of the world, such as in India(76). Despite this reality, the cost that patients are charged is often well below the actual cost of delivering the service. In fact, Habtuma et al (2013) showed that patients in government hospitals in Southern Ethiopia are charged less than one-fifth of the actual cost of cataract surgery(54). Lewallen et al (2006) examined the “willingness to pay” of patients in rural Tanzania when it came to cataract surgery, and this amount was significantly lower than the actual cost of the service delivery(66). Even with such low payments required, the cost of cataract surgery is still a major barrier in all four countries examined here. Briesen et al (2010) revealed that in Kwale, Kenya, the majority of patients wanted free cataract surgery(42). Since this service will almost always require some type of referral pathway (some more streamlined than others), medical costs are also accrued before surgical intervention is even offered. For example, Müller et al (2010) revealed in Rwanda, patients were reluctant to pay 35 cents (USD) for an eye consultation by the health centre nurse, and so would be at risk of deferring the seeking of care(41). In Tanzania, Kessy et al (2007) showed that 79% of patients who declined surgery cited cost as the reason(74). The authors do point out, that many patients (almost half, in fact) initially may have cited the cost as the reason, but when interviewed later, at home, admitted other reasons for declining. Furthermore, when offered a fee waiver, one quarter of patients still declined surgery(74). This has also been shown by Mehari et al (2013) where in central Ethiopia, 92% of patients listed cost as the single biggest barrier for declining or delaying cataract surgery(55).

Instinctively, one would assume that a no-fee approach would remove cost as a barrier and lead to greater access of cataracts surgery, however, this may not be so straight-forward. A study in Kenya by Briesen et al (2010) showed that 25% of patients interviewed believed that paying for cataract surgery would result in a better quality outcome compared to if they receive it for free(42). One such proponent of this sentiment states:

*“Anything given free is not good, it’s better to pay for the costs so that you get good services”*

- Man, 66, Kwale Kenya, refused surgery(42).

Indirect costs associated with cataract surgery also represent a significant barrier, particularly those costs surrounding transportation, food, accommodation and medication(40,51,52,55). Whilst most studies looking at barriers to cataract surgery tend to lump direct and indirect costs together as one, some studies have teased out the exact components of cost. For example, Mesele et al (2004) showed in central Ethiopia that for those patients who had not yet sought eye care, the most significant reason was indirect costs, including transportation, food and accommodation for themselves and their chaperone (35%), whereas the actual cost of the surgery was only mentioned by 25% of those surveyed(40). Genau et al (2005) point out that paying for transportation and food was also a concern for patients in Kilimanjaro, Tanzania (37). Mesele et al (2004) also showed that patients who were granted “poverty certificates” in Ethiopia could access free cataract surgery, however, very few patients took advantage of this, citing the inability to afford public transportation(40). A striking example of the impact of the cost of medication is illustrated by

Courtright et al (2010), where in Rubavu, Rwanda, cataract referrals dropped off sharply in early 2008, coinciding with changes to the medicines insurance scheme meaning that the full list of eye drops required for cataract surgery was cut down to just two, resulting in an out-of-pocket expense for the extra medications needed by the patient. As a result, cataract surgeries fell dramatically(51).

Some programmes have implemented strategies designed to reduce uncertainty surrounding cataract surgery cost and indirect expenses. Lewallen et al (2005) reports on two community based programmes in Kenya and Tanzania that promoted an “all-in-one” fee that covered the surgery, transportation to and from hospital, food, accommodation and medications(52). This approach was reportedly well-accepted by patients, and contributed to great increases in rates of cataract surgery(52). Regardless of the price, the ‘packaging’ of costs is a consideration that may well act to facilitate access, whereas uncertainty has been shown to hinder access. Genau et al’s (2008) qualitative research from Tanzania showed that not knowing the exact cost of potential cataract surgery created anxiety amongst patients, so much so as to make them defer cataract surgery altogether(56). An area earmarked for improvement in the KOP was the disharmony of hospital fees, whereby some NGOs are providing free cataract surgery whilst government programmes are obliged to charge a fee(53).

### **Ability to Pay**

The ability to pay, is a result of multiple influences, of which income is just one. It is little wonder that low income has been associated with lower rates of ability to pay for cataract surgery, as demonstrated in studies from Tanzania, by Lewallen et al (2006) and Kessy et al (2007) (66,74). However, it is not just the absolute value of the income that can impact access, but also the seasonality of it. Given that the majority of the population in discussion here are rural dwellers, it is reasonable to assume that the income people receive is often crop or livestock-dependent. As such, income may be subject to annual and more long-term climatic cyclical variations based on the sales of agricultural produce(55). The timing of access to cataract surgery is therefore critical. Detailed, published results of cataract programmes by the relevant ministries of health appear few and far between in this region, however, one comprehensive report from an outreach programme in Litein, Kenya was published by the University of Nairobi, in 2001. Monthly cataract surgical cases dropped off between July and September (38 and 22 cases respectively), but then shot up sharply in November (103 cases)(77). Whilst no reasons for the sudden increase were given in this report, exploring data outside of the health system may provide some insight: A study by Maina et al (2016) examining seasonality and food security in Kajiado region, Kenya, reveals that the wet seasons provide the greatest average monthly incomes for a household, and in this case, peaking during the long rains season of November and December(78). Whilst this link may be tenuous, and is by no means conclusive, it does reveal the great inconsistencies in income that many East African farmers are subject to, and thus may have implications when it comes to access of care.

Another relevant observation that has been made is the vicious cycle of poverty that progressive visual impairment (such as that from cataract) may create. A multicentre study by Kuper et al (2008) involving Kenya postulates that visual impairment reduces employment opportunities and therefore reduces income, and increases poverty(79). The authors point out that there is also a reverse argument for poverty increasing visual impairment via the financial restriction of access of care(79). Either way, this clearly has implications for the timeliness of surgical intervention.

Also, of great importance in this context is asset ownership. Lewallen et al (2006) demonstrates the strong relationship between wealth in terms of assets and ability to pay for cataract surgery(66). Here, patients who owned just one item (the definition of what constituted an ‘item’ was not provided) were more than five times more likely to be willing to pay something for cataract surgery compared to those who did not own anything. This factor increased to 10 times more likely for people who owned two or more items, compared to those who owned less than two(66). Incidentally, this study also highlights the gender gap, with men almost six times more likely to own an item compared to women(66). Increased asset ownership was also correlated with less cataract prevalence in Kenya, as shown by Kuper et al (2008), again leading to the proposition that wealth may be facilitating cataract surgery, or indeed visual impairment may be perpetuating poverty (or both)(79).

Intertwined with income and asset ownership is the concept of social capital, whereby individuals may access benefits and solutions to problems by virtue of their membership within a social network(80). The

direct and associated costs of cataract surgery for the majority of individuals in this context requires the pooling or borrowing of resources, often from several sources within a family and/or network of friends. This has been shown in several studies, where social capital is a vital facilitator for the elderly, in particular, who are generally poorer, and depend on family(37,55,56,63,74). Genau et al (2008) illustrates this in Tanzania where of the 35 interviewed individuals who underwent cataract surgery, 31 had to borrow money from relatives or friends(56).

With the exception of Rwanda at 84% (2017)(15), health insurance coverage is low to extremely low, at 20% in Kenya(2017)(81), 7% in Tanzania (2010)(82), and in Ethiopia, a new community based insurance scheme has only been piloted in recent years(83). So far, it appears that the higher rate of insurance coverage in Rwanda has not translated to a significant difference in CSR when compared to its other neighbours with very little health insurance coverage(44). In fact, Tanzania has the highest CSR of all four countries, despite having such a low insurance uptake(44). On the other hand, not having health insurance was listed as a reason for not proceeding with cataract surgery in Rubavu, Rwanda, and when the insurance scheme altered to no longer cover relevant eye medications needed for cataract surgery, rates of surgery dropped sharply(41,51).

## **E. APPROPRIATENESS AND ABILITY TO ENGAGE**

Appropriateness refers to the match between the needs of a patient and the service that they receive(46). Included in this are considerations of timeliness, interpersonal and technical quality, and the amount of contact time between patient and service provider(84). Adequacy of these services relates to how appropriate they are and of what quality they are, as well as how integrated and continuous their nature is(84). Therefore, in this sense, it is not enough to say that access is achieved when the service is sub-standard, and that the provision of poor quality services should be seen as a restriction of access(46). From the patient perspective, the ability to engage relates to the patient's ability and willingness to participate and make decisions relating to the health service and treatment options(46). Determinants of this are closely linked to empowerment via health literacy, information, self-management and adherence, and appropriate support from caregivers. In the context of East Africa, this dimension of access is perhaps the least reported on, yet is extremely relevant. Unlike most higher income settings, cataract surgeries are carried out by not only ophthalmic surgeons, but NPCS (including trained nurses, officers and assistants), as well as a small number of general practitioners(60,69). Therefore, questions of appropriateness are certainly in need of exploring, given the range of professional backgrounds that exist and the relative lack of regulation(68).

### **Appropriateness**

Before cataract surgery itself can be examined, the appropriateness of referral sources that feed into the surgery pool should be explored. Traditionally, referrals by health centre nurses or other health workers are based on visual acuity, or the technical measure of an individual's ability to see at a set distance, using a letter chart. Several studies (from Kenya, Rwanda and Tanzania) have pointed out the potential disservice health workers are doing for their patients by not on-referring patients that present with visual problems, based on the fact that they still can see well enough on the letter chart(38,39,51). In Kenya, Briesen et al (2010) showed that that an individual's perception of their visual impairment was a stronger predictor for acceptance of cataract surgery than their visual acuity measured objectively(39). This study, as well as studies by Chibuga et al (2008) and Courtright et al (2010) recommend that using visual acuity cut-offs as the main criteria for referral may be excluding the majority of the patients willing to accept cataract surgery(38,51). Furthermore, in some settings, such as in health centres in Rubavu, Rwanda, great inconsistencies were reported in visual acuity criteria for referral between health centre workers(51). Recognising this need, the Rwandan government created a permanent curriculum for primary eye care nurses, with particular emphasis on referral guidance(50).

When it comes to cataract surgery, the quality and technical attributes obviously have a significant bearing on the visual outcome and patient satisfaction. The introduction of the NPCS has helped to increase the CSR, but assessments of outcome of quality are lacking(68). Lewallen et al (2012) examined the NPCS of Sub Saharan Africa and identified critical deficiencies in continuing professional development programmes and management training, as well as the absence of minimum surgical equipment lists and chronic insufficiencies in support staff(68). Similarly, Habtamu et al (2013) identified a similar lack of professional support and insufficient training for both NPCS and ophthalmic surgeons as issues of significance(54).

Furthermore, a lack of monitoring and evaluation measures are cited as significant barriers to achieving acceptable visual outcomes and realising the potential of NPCS(54,68). The importance of good visual outcomes (or bad) has lasting effects on other aspects of access such as approachability, as poor outcomes create a negative reputation of cataract surgery within the community. This was demonstrated in Ethiopia by Melese et al (2004), where of the 17 patients who had previously undergone cataract surgery, 15 had extracapsular surgery with no replacement intraocular lens implant, essentially leaving them blind without heavy glasses (of which eight patients did not have, nor were they ever offered)(40). Being left still significantly visually impaired is hardly an advertisement for others to accept cataract surgery. Thankfully, techniques have improved in recent decades, however this demonstrated the paramount need for regular monitoring and evaluation mechanisms.

Timeliness has also been flagged as an issue affecting access. In Addis Ababa, the wait list for public cataract surgery at Menilik II is around two years, and it is noted that many patients cannot afford to make another trip to return for this surgery(40). Mwendu et al's (2005) study showed that when children with cataracts first present (often already very late), the time between initial presentation and surgery is also too long,

delaying the critical surgical intervention that is very much needed in a timely manner in young children, in order to quickly establish neurological development of vision(59). Timeliness, or lack thereof, is therefore a potential barrier to access.

On the other hand, some programmes have demonstrated the great enabling power of a swift referral chain, such as those discussed by Lewallen et al (2005) in Kenya and Tanzania(52). The success of these two programmes seems to have been based around good organisational measures resulting in good coordination and continuity. For example, employing managerial staff to organise and direct teams, ensuring greater efficiency and quality of services. Moreover, the facilitation of a rapid and efficient referral pathway from screening through to surgery, via the adequate diagnostic training of screening nurses in Kwale, and the use of ophthalmologists and surgical residents in Kilimanjaro, well-organised transportation and thoughtful accommodation planning. In addition, aftercare visits were provided by field workers and district eye coordinators in both cases(52).

### **Ability to Engage**

For the patient, the ability to engage is strongly linked to education and communication, giving the patient the knowledge and power to be able to make their own informed decision-making regarding care. In the context of vision impairment, it has been shown in several studies (see above) that an objective examination and visual acuity measurement may not be the best determinant of cataract surgery candidacy, but rather how the visual impairment is impacting the individual's life. Therefore, this would require the patient to engage in a discussion about their needs, and studies by Chibuga et al (2008) and Briesen et al (2010) have suggested the incorporation of a counsellor to take on this role of facilitating patient engagement in decision-making regarding their own sight and treatment options(38,39). In fact, the two programmes mentioned above, from Kenya and Tanzania both employed a dedicated counsellor, for not only the patients to ask question, but for family members to also participate. Furthermore, since the role of the counsellor is non-medical, patients may feel less threatened to ask questions.(52).

Briesen et al (2010) flags the importance of the role that the patient can play in increasing access, through their ability to engage. The authors advocate the implementation of eye disease education programmes (including treatment options) amongst the general public, in the hope to stimulate active engagement of patients in their own interactions with eye care services(42). Another facilitator of access as promoted in this study is the encouragement of caregiver support, particularly for the elderly and for women, who are often more likely to decline surgery. The engagement of religious groups or other community-based groups may act to facilitate greater support, and thus the increased likelihood of proactive engagement with eye care services(42).

## 9. DISCUSSION

The literature from East Africa regarding access to cataract surgery is generally in short supply. From the four nations covered in this review, six quantitative studies were found(40,51,55,63,79,85), three of which were part of a larger multicentre study (involving Kenya as one of the three countries used), six other studies were qualitative (37,39,41,42,56,66,74), and a further three were both quantitative and qualitative(38,54,58). These studies have generally looked at cohorts or case studies within the East African context, with only one study using a case-control approach to examine the relationship between poverty and visual impairment(79). One could argue, therefore, that there still lacks an adequate body of scientifically-robust quantitative evidence on this important health issue. On the other hand, the findings of this paper indicate that the complex nature of access to cataract surgery may indeed be best explored through in-depth qualitative studies. Issues of approachability and acceptability, for example, have deep roots in social and cultural norms, and thus qualitative studies have proven to be invaluable in teasing out some recurrent themes surrounding gender, age and autonomy.

What can be concluded with confidence is that being female is universally reported as being a major disabling factor in accessing cataract surgery, from birth right through to old age(37,38,40–42,57,58,62,64). This gender inequity is compounded by the same culture that exists within the service provision itself, as shown in Rwanda, Tanzania, and Kenya(41,52). The preference for the elderly to accept their blindness rather than be perceived as an ill patient in need of financial support is another common notion that this evidence has shown(37). Important enabling factors also emerge, with provision of appropriate information and education seen as factors necessary for improving rates of cataract surgery(52,54). Whilst higher levels of access have been linked to greater access to cataract surgery (39,59), such studies cannot conclusively state that educational level by itself is responsible, since education brings with it confounders such as higher income, and in women, greater decision-making abilities.

Lessons concerning outreach services suggest that considerations regarding the regularity of timing and location of services are important characteristics that improve the acceptance of surgery and should be heeded in planning of similar services in East Africa. It should be noted that in this region, no case-controlled studies have been undertaken to give a true weighting to the value of outreach on its own.

Misconceptions and fears surrounding cataract surgery are undoubtedly universal in all settings examined, highlighting the need for educational intervention (37,41,42,55–57). The Rubavu example of Rwanda's attempt to introduce primary eye care into primary health care services offers the promise of better eye knowledge, information and access to referral pathways for patients, and did, at least initially, lead to greater cataract surgery rates(41,50). The sudden impact of changes to medicine insurance coverage resulted in a drop off of cataract surgery, and thus highlights the importance of coordination and communication within and between all relevant actors.

The poor availability of human resources in eye care is arguably the most detrimental factor related to access of cataract surgery in this region, as illustrated by the low overall number of cataract surgeons (NPCS and ophthalmic) and by their maldistribution and high concentration in urban areas. Deressa et al's examination of medical students' attitude to shunning work in rural areas adds some weight to this concern, however it must be reinforced that this study looked at general medical students, and not eye care practitioners specifically. Other authors point out the severe lack of governmental funding that is provided for eye care, for example, Habtuma et al (2013), where in Ethiopia, cataract surgery is funded almost entirely by NGOs(54). Moreover, the critical lack of technical and professional support offered by governments and within working environments is certainly of a concern, especially for female surgeons who routinely receive less nursing support and training(60,68,69). The lack of data regarding the quality of surgical outcomes amongst NPCS and ophthalmic surgeons raises questions of appropriateness and adequacy, a crucial aspect of access that should not be overlooked. A situational analysis of not just coverage but also quality of cataract surgery is needed. In this author's opinion, the situation is best summarised by Lewallen et al (2012): given the regulatory environment, lack of supervision and support (following training) and the lack of universal acceptance, simply training more NPCS alone may not solve the problem of poor access of cataract surgery in Sub Saharan Africa(68).

Also, what has clearly emerged are issues relating to the remoteness and living environment of rural populations, making distance a physical barrier, especially when the context of visual impairment is overlaid as an inhibitor of mobility(52,60,66). The consideration of affordable transportation must be an integral part of any outreach programme, as demonstrated by Lewallen et al (2005) and in this author's opinion, represent an example of the power of well-thought out planning that anticipates and negates potential barriers across this domain of access(52).

When it comes to affordability, there are many complex issues that impact access that can be gathered from the literature, often paradoxical in nature. Whilst free surgery is regarded as desirable by most patients, Briesen et al (2010) showed that a significant proportion (25%) perceive this as potentially surgery of poor quality, highlighting issues of trust(42). If free surgery is often still rejected, one would have to consider how this is 'marketed', the transparency surrounding the process and the quality of the service as being integral to 'free' surgery. Direct and indirect cost have certainly been demonstrated as extremely influential factors, and ability to pay is often tightly linked to other issues of social support, personal values, and gender(37-40,55,56,66,68,74). It should be noted that the majority of the literature found fails to explicitly quantify the exact contribution of direct costs compared to indirect, and thus the true weighting of both factors. Moreover, examples of all-in-one price packaging have proven to reduce anxiety for patients surrounding uncertainty of indirect costs, and increase uptake of cataract surgery(52). One could conclude that, through intelligent management and coordination, such programmes can benefit from placing the emotions of the patient at the centre of all activities. The seasonality of income is another factor that does not seem to have been considered in any programmes yet may be worth giving attention when it comes to the timing of future outreach plans.

The current general criteria for referring on patients for cataract surgery relates to visual acuity cut-off values. It has been shown that younger patients are more likely to accept cataract surgery, and since younger patients are likely to have less-dense cataracts, their visual acuity is more likely to be 'too good' and disqualify them from referral for surgery. In this author's opinion, this clearly has implications for policy changes regarding referral criteria, and authors such as Chibuga et al (2008), Bressen et al (2010) and Courtright et al (2010) have already voiced this need for a deviation away from solely visual acuity-based criteria(38,39,51).

In assessing the strengths and limitations of this study, several issues must be considered. Firstly, concerning the literature search, this was not a systemic review, and thus completeness of all information pertaining to access to cataract surgery in these four nations of East Africa cannot be guaranteed. Furthermore, as mentioned above, a relatively small number of research papers and primary data sources could be found, reflecting the need for more research in this region. Also, whilst the overwhelming body of evidence gathered relates to rural settings, results cannot be generalised to truly reflect the entirety of all four countries, including their urban areas.

Another possible limitation of this study is the choice of statistical indicator used to assess access to cataract surgery in the first place. CSR, as defined in the problem statement, indicates the number of cataract surgeries performed annually per million population. However, there is an increasing push towards a more precise indicator of access, that is, the Cataract Surgical Coverage (CSC) rate, which indicates the proportion of the visually impaired population with bilateral cataract who were eligible for surgery and received it(45,62). This indicator effectively takes into consideration the demographics of a population, whereas the CSR does not. For example, comparing CSRs of relatively young populations (such as those of East Africa) with CSRs of ageing populations (for example in Europe) may not be completely comparable, as a relatively smaller proportion of a younger population would require surgery. Only 34 countries currently have sufficient data to submit meaningful CSCs to the WHO, and thus, this indicator was not available as an effective gauge of comparison at this point in time(45).

It could be reasoned that selecting four countries for analysis could be overambitious for one thesis, as each country comes with its own unique background, context and challenges that contribute to access of care. In response to this, the total pool of published information is still relatively small, even with the search criteria widened to four countries. Furthermore, it could be argued that choosing four different nations has provide greater diversity of contexts and greater opportunity for critical comparison and analysis. None-the-less, findings in specific contexts must be interpreted with caution, and not necessarily made general for the entire East African region.

Regarding the use of the modified analytical framework derived from Levesque, this structured proved useful in categorising and coding themes of access from both the provider and patient perspective. The model modification by removal of the six central blocks of access outcome allowed for the focus to be on contributors to access. The lack of measurability of many of the dimensions of access provides a source of frustration, and some concepts of access overlap, and cannot be easily placed into one category. For example, according to this framework outreach services are an element of approachability, yet clearly can impact a patient's ability to reach a service. This is reflective of the complexity of analysing access. Moreover, this framework does not address issues of sustainability or transferability. For example, the twin success cases presented by Lewallen et al (2005) from Kenya and Tanzania provided a multitude of enabling factors that can easily be placed into this framework of access, however, sustainability is not scrutinised. In this example, the question of whether employing highly trained ophthalmologists in screening roles is a wise use of resources (and therefore sustainable and replicable) must be asked but is not considered in this model. One may argue that the objectives of this thesis do not mention sustainability, however, in formulating appropriate recommendations, this consideration is vital.



## 10. CONCLUSION AND RECOMMENDATIONS

### A. CONCLUSION

In identifying and exploring the various enabling and disabling factors in access to cataract surgery in East Africa, it is evident, despite the relatively small amount of published data, that the concept of access in this context is a complex culmination of many factors, both service provider-sided and patient-sided. Given the fact that the four countries of focus in this study have some of the lowest CSRs in the world, it is little wonder that many disabling factors can be identified as barriers to cataract surgery. This region presents challenges that have been reported in other regions of the world, such as gender inequity, but also relatively unique challenges, such as the prevalence of rumours and fears of macabre eye replacement experiments. At the same time, factors that act to facilitate access have been pointed out in the literature, with the most important being: the provision of regular and consistent outreach and eye educational services; affordable and all-inclusive services, including the availability of accompanied transportation; and the mobilisation of social support.

Whilst the literature presents a litany of disabling factors, there is a handful that recur time and time again, and with significant magnitude. These most important barriers can be identified as: poor health literacy and a lack of appropriate education regarding eye care; gender issues both in terms of acceptability (within and towards service providers) and ability for patients to seek care; low availability of services based on the identified lack of eye care workers and their inequitable distribution, especially NPCS and ophthalmologists as well as their lack of governmental and professional support; affordability, particularly in relation to indirect costs, including that of transportation; a lack of technical and professional quality assurance, monitoring and evaluation procedures, and published measures of these; and, inappropriate cataract surgery referral criteria, in need of revision.

The following table is a summary of the most important enabling and disabling factors relating to the access of cataract surgery in East Africa, ranked in order of estimated significance:

Enabling Factors	Rank	Disabling Factors
Outreach and educational services	1	Inadequate and inequitable distribution of human resources and support
Affordable, all-inclusive services (including transportation)	2	Poor health literacy and a lack of eye education
Mobilisation of social support	3	Gender issue (service and patient-sided)
	4	Affordability (including indirect costs)
	5	Lack of quality assurance and regulation
	6	Inappropriate surgical referral criteria

Table 11: A summary of the most important enabling and disabling factors associated with access to cataract surgery, listed by rank of significance.

### B. RECOMMENDATIONS

General recommendations based on the above findings are detailed below and are grouped based on what area they apply to (i.e. policy, intervention or research). These recommendations are listed in the following tables in order of priority of implementation, and ideally all three areas of recommendations should be initiated concurrently.

Order of implementation	Policy (ministries of health, policy makers)
1	Immediate attention needs to be given to the inequitable distribution of eye surgeons, with high concentrations in urban areas and low concentrations in rural areas. The implementation of financial rewards for rural placements could be

	considered, or perhaps the introduction of a minimum period of rural placement for new graduates. Alternatively, a compulsory, annual, rural rotation for all cadres of eye care professionals could be introduced. Incentives for females to train as NPCSS or ophthalmologists via the issuing of scholarships should also be considered as a long-term strategy aimed at normalising the presence and acceptance of female surgeons.
2	Greater recognition of the importance of cataract surgery by governments and greater funding and support, with improved coordination with NGOs. The economic case for preventing or reversing blindness is strong and ophthalmologist and NPCSS associations should actively lobby their governments for this cause.
3	Review and/or implementation of post-training support and continuing education programmes for eye surgeons, with particular attention paid to gender inequities, to address the apparent low productivity of female surgeons compared to males.
4	Consideration of revision of referral criteria from purely visual acuity-based cut-offs to more quality of life-based, with greater emphasis on patient empowerment and autonomy in eye health-related decision-making. Discussion amongst all eye care worker representatives should be undertaken with informed, open discussion regarding this topic, and a consensus should be met.

Table 12: Policy recommendations in order of implementation

Order of implementation	Intervention (eye care programmes)
1	Implementation of more regular outreach programs in consistent locations, with extra consideration and investment given to the provision of transportation. This should be incorporated into the annual outreach plans that each hospital eye care department make in advance.
2	Implementation of community-based educational sessions, particularly in remote areas, that utilise real-life examples, pictures, and language-appropriate information, in order to create awareness of earlier intervention, apprehending the poverty-blindness/blindness-poverty cycle and acting to demystifying the rumours surrounding cataract surgery. This could be done by eye care nurses, accompanied by real-life patients, and conducted within community groups such as, religious groups and women's associations.
3	The implementation of an all-inclusive package of care, that covers all direct and indirect costs, issues of social support, transportation, counselling and aftercare. The removal of the uncertainty regarding cost should be the aim of this packaging and should involve careful coordination with all parties involved in providing the direct and indirect services, via the employment of a managerial team.

Table 13: Intervention recommendations in order of implementation

Order of implementation	Research
1	Greater high-quality studies should be undertaken looking at not just factors affecting access of care, but how sustainability can be considered, in this region. Ideally case-controlled studies isolating various factors of access would provide more definitive data on the precise contribution of each facilitator or barrier examined. Special attention should be given to: <ul style="list-style-type: none"> <li>a) quantifying exact costs (direct and indirect) that patients are likely to face, and;</li> <li>b) measuring the effectiveness of traditional acuity-based referral criteria verses the incorporation of quality of life considerations in achieving greater uptake of cataract surgery</li> </ul>

Table 14: Research recommendations

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