BARRIERS TO THE UPTAKE OF CATARACT SURGICAL SERVICES IN MERTI DIVISION, ISIOLO, KENYA.

BY

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157/7514/2002

A THESIS SUBMITTED IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE AWARD OF THE DEGREE OF MASTER OF PUBLIC HEALTH AND EPIDEMIOLOGY IN THE SCHOOL OF PURE AND APPLIED SCIENCES, KENYATTA UNIVERSITY.
DECLARATION

I, Mr. LIBAN A. MOHAMED, do hereby declare that, "this thesis is my original work and has not been presented for a degree in any other university or any other award".

Signed ~----------------------------------- Date 14/09/05

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DEDICATION

To my beloved wife, SHOBA M. LIBAN and our sweet children SHEDHO of Strathmore University, ISSENE of Machakos Girls’ Secondary School, DARMI of Mary Leakey Secondary School and GOLICHA of Hekima Primary School, and also to my mum, JILLO LIBAN.
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<td>AAO</td>
<td>American Academy of Ophthalmology</td>
</tr>
<tr>
<td>AD</td>
<td>Anno Domini</td>
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<tr>
<td>BC</td>
<td>Before Christ</td>
</tr>
<tr>
<td>CES</td>
<td>Comprehensive Eye-care Services</td>
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<tr>
<td>CBS</td>
<td>Central Bureau of Statistics</td>
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<tr>
<td>CI</td>
<td>Confidence Interval</td>
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<tr>
<td>DALYs</td>
<td>Disability-Adjusted Life Years</td>
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<tr>
<td>DMOH</td>
<td>District Medical Officer of Health</td>
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<tr>
<td>ECCE</td>
<td>Extracapsular Cataract Extraction</td>
</tr>
<tr>
<td>HMIS</td>
<td>Health Management Information System</td>
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<tr>
<td>HND</td>
<td>Higher National Diploma</td>
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<tr>
<td>ICCE</td>
<td>Intracapsular Cataract Extraction</td>
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<tr>
<td>IEF</td>
<td>International Eye Foundation</td>
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<tr>
<td>IEU</td>
<td>Isiolo Eye Unit</td>
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<tr>
<td>IDH</td>
<td>Isiolo District Hospital</td>
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<tr>
<td>IOL</td>
<td>Intraocular Lens</td>
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<td>KOP</td>
<td>Kenya Ophthalmic Programme</td>
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<td>KSB</td>
<td>Kenya Society for the Blind</td>
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<td>Ksh</td>
<td>Kenya Shillings</td>
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<tr>
<td>MEU</td>
<td>Mobile Eye Unit</td>
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<tr>
<td>MoH</td>
<td>Ministry of Health</td>
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<tr>
<td>MPHE</td>
<td>Masters degree in Public Health and Epidemiology</td>
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<tr>
<td>Acronym</td>
<td>Description</td>
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<tr>
<td>NGOs</td>
<td>Non-Governmental Organizations</td>
</tr>
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<td>OCOCS</td>
<td>Ophthalmic Clinical Officer Cataract Surgeon</td>
</tr>
<tr>
<td>OA</td>
<td>Ophthalmic Assistant</td>
</tr>
<tr>
<td>PEC</td>
<td>Primary Eye-Care</td>
</tr>
<tr>
<td>PHC</td>
<td>Primary Health-Care</td>
</tr>
<tr>
<td>PMMA</td>
<td>Polymethylmethacrylate</td>
</tr>
<tr>
<td>ROK</td>
<td>Republic Of Kenya</td>
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<tr>
<td>SPSS</td>
<td>Software Package for Social Scientists</td>
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<tr>
<td>SVI</td>
<td>Severe Visual Impairment</td>
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<tr>
<td>USD</td>
<td>United States of America Dollar</td>
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<tr>
<td>VA</td>
<td>Visual Acuity</td>
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<td>VI</td>
<td>Visual Impairment</td>
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<td>WHO</td>
<td>World Health Organization</td>
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ABSTRACT

The immense burden of blindness is prevalent in rural communities of developing countries, which are characterized by a high backlog of unoperated cataract and increasing incidence of cataract due to the ageing population. The factors that hinder people from accessing such sight-restoring services remain a major challenge for all eye-care professionals with a public health perspective. A cross-sectional descriptive study was carried out in all the six locations of Merti Division in Isiolo District of Eastern Province of Kenya. This study was aimed at identifying the barriers to the uptake of cataract surgical services where neither general eye-care services nor the cataract surgical services are available. Out of the 717 eye patients examined at rural health facilities, 98 (14%) operable cataract cases (vision less than 6/60 in one or both eyes) were detected by the use of the Snellen's Chart-E and a torch. More females (63; 64.3%) than males (35; 35.7%) attended the clinics during the screening exercise although statistically there was no significant difference between the sexes of the patients in different locations ($\chi^2 = 4.643; df = 5; P = 0.461$). There was a significant number of the elderly (78; 80%) patients in attendance than the young adults ($\chi^2 = 160.041; df = 3; P < 0.001$). Most patients with cataract significantly ($\chi^2 = 268.735; df = 5; P < 0.001$) stayed at home for over two years (76; 78%) without seeking cataract surgical intervention. The number of cataract patients from Merti Division who received surgery at Isiolo Eye Unit within one month after booking were only 15 (15.3%) as compared to those who did not turn up for surgery (83; 84.7%). Out of the 15 who received surgery, 6 (40%) were males and 9 (60%) were females. This was made possible because of the support they got from the relatives (11; 11.2%) and the availability of funds to meet the cost (4; 4.1%). The respondents who did not turn up for cataract surgery when they were re-visited at their locations by the researcher gave the reasons as having nobody to take them to the hospital (23; 23.5%), generally unable to afford the cost of travel, meals and accommodation (22; 22.4%), nobody to leave behind to look after the homestead and property (6; 6.1%) and one patient did not get consent from the husband (1.0%). The other hindering factors were the lack of knowledge of existence and services at Isiolo Eye Unit (64; 65.3%) and the poor road network which was rough (33; 33.7%) and far (63; 64.3%). The burden of cataract blindness in Merti Division can be addressed through three-tier system where the full cost of surgery can be met by those who can afford; subsidized cost for the poor and free for the very poor. Effective cataract outreach programme is encouraged to enhance early detection, prompt referral and surgical intervention for the cataract patients. This effort requires intersectoral collaboration between all the stakeholders and the Ministry of Health. Cataract is not preventable, but sight restoration by surgery is the panacea to cataract blindness.
CHAPTER ONE: INTRODUCTION

1.1 BACKGROUND

1.1.1 THE NORMAL LENS

The lens is the adjustable part of the eye's optical system, which helps to focus an object's image on the retina. It is a transparent, biconvex structure whose functions are: to maintain its own clarity, to refract light and to provide accommodation. It is suspended in the eye between the aqueous humour and the vitreous body by the zonular ligaments (Fig.1). The aqueous humour is the source of nutrients for the lens and accepts its waste products, such as lactic acid. Light entering the eye passes through the cornea, aqueous humour, lens and vitreous body before reaching the light-sensitive retina. All the tissues in front of the retina must be transparent to visible light if good vision is to be maintained. The lens contents are held within a thin transparent basement membrane, the lens capsule; which controls its shape while allowing the passage of small molecules. Immediately behind the anterior capsule is a single layer of epithelial cells that divide and move towards the equator where they elongate to form fibre cells (Brown and Bron, 1987).

1.1.2 TRANSPARENCY

The ocular media from the cornea to the vitreous body are transparent. The aqueous humour is a little dilute solution of various salts and small molecules with few macromolecules to interfere with transparency. The vitreous body is also predominately watery (99%) but it does contain hyaluronic acid and collagen fibres, which cause it to
spread out and fill the space provided for the vitreous body. The collagen fibres are so few and so thin that they do not scatter light to any appreciable extent (Harding, 1991).

Figure 1.1 Diagrammatic section through the eye.

Figure 1.2 Diagrammatic section through the lens. From a drawing by J. Cronin.

Figure 1: The normal structure of the eye.
1.1.3 CATARACTOUS LENS

Cataract is defined as an opacification of the lens of the eye that obstructs the passage of light sufficient to impair vision. Its onset is gradual and affects both eyes, although in age-related cases, cataract matures faster in one eye than in the other. Clinically, the pupil of the eye becomes whitish (Fig. 2) if cataract is fully developed. The blindness sets in if both eyes are affected rendering the patient functionally disabled. At this stage, the patient becomes a social burden to the community in terms of carrying out his or her daily activities (WHO, 2000).

Figure 2: Cataractous lens

Age-related cataract is a very common cause of visual impairment in older adults. The pathogenesis of age-related cataracts is multifactorial and not completely understood. As the lens ages, it increases in weight and thickens and decreases in accommodative power. As new layers of cortical fibres are formed concentrically, the lens nucleus undergoes compression and hardening (nuclear sclerosis). Crystallins (lens proteins) are changed by
chemical modification and aggregation into higher molecular-weight protein. The resulting protein aggregates cause abrupt fluctuations in the refractive index of the lens, scatter light rays, and reduce transparency. Chemical modification of nuclear lens proteins also produces progressive pigmentation. Other age-related changes in the lens include decreased concentrations of glutathione and potassium, increased concentrations of sodium and calcium, and increased hydration (AAO, 2003).

1.1.4 PREDISPOSING FACTORS TO CATARACT

In most countries of Africa and Asia, cataract accounts for at least half of all blindness and it is by far a major cause of blindness worldwide (WHO, 1997). It has different origins as occasionally some children can be born with the condition, and a cataract may develop after an eye injury. However, the majority of cases are related to the ageing process. Other predisposing factors to cataract are systemic diseases such as hypertension, diabetes, severe anaemia, severe diarrhoea, eclampsia, and malnutrition, ultraviolet rays, severe myopia and intraocular infections like uveitis and glaucoma. As people in the world live longer, the number of those with cataract keeps growing. The treatment of cataract involves an operation, which is very reliable in restoring sight (WHO, 1997).

1.1.5 THE GLOBAL PICTURE OF CATARACT

There are currently 50 million blind people and 135 million people with low vision globally and an additional 1-2 million persons go blind annually (WHO, 2000). This figure will rise to 75 million by the year 2020 if nothing is done to prevent blindness.
Globally, seventy percent of blindness occurs in Asia, 20% in Africa and 10% in America and Europe. Cataract accounts for 50% of the 50 million blind and a majority of them live in the poorest sections of the developing world. Sixty percent are treatable while 40% are preventable (WHO, 2000). Restoration of sight is one of the most cost-effective interventions in health care.

Cataract (with its sequelae), is responsible for 81% of the blindness in India (Mohan, 1990), over 72% of blindness in Nepal (Brilliant et al., 1985), 26% in China (Mao and Hu, 1982), 68% in Northern Transvaal, South Africa (Bucher and Ijsselmuiden, 1988), 59% in Tanzania (Foster, 1989), 51-58% in Tunisia (Daghfous et al., 1988), 55% in The Gambia (Faal et al., 1989), 38% in Kenya (Whitfield, 1987), 40% in Malawi (Chirambo and Schwab, 1989), 39% in rural Australian aborigines, 23% in rural Australian whites (Hollows et al., 1980), 12% in England (Anon, 1988), 10.4% in Scotland (Ghafoor et al., 1983), but only 5% in Iceland (Bjornsson, 1981). In Framingham, USA, 51% of those classed as blind (visual acuity worse than 20/200) had cataract (Leibowitz et al., 1980).

The low figure in Iceland may be due to an aggressive surgical policy. For instance, 35% of the population aged 83 and over have had cataract surgery; but even so, cataract was the most common cause of partial sight in Iceland (Jonasson and Thordarson, 1987). The rapid increase of cataract in the older population in many countries led Kupfer (1984) to predict that there will be 40 million cataract blind by the year 2025. In addition to this, increase in life expectancy and inadequate eye-care services in the poor areas of the world would increase the number of blind people.
1.1.6 CATARACT BLINDNESS IN KENYA

Kenya has a total land area of about 225,000 Square Miles and an estimated population of 28 million; seventy three percent of the population lives in the rural areas (ROK, 1999). The burden of diseases in Kenya has not been accurately quantified but according to the available hospital morbidity data, eye diseases are ranked seventh. Cataract contributes about 43% of all blindness in Kenya. Trachoma ranks second (19%) and glaucoma ranks third (9%). The prevalence of blindness among Kenyans has been estimated to be 0.7%. Over 80% of the blindness is due to avoidable causes (ROK, 2002).

In a study done by International Eye Foundation in 1981 in Kenya, the prevalence of blindness (VA < 3/60) in South Nyanza was 0.7%, Meru in Eastern Province was 1.9%, Nyeri in Central Province was 2.9%, Kwale in Coast Province was 0.9%, Kakamega in Western Province was 0.5% and 0.9% in rural Kenya. The prevalence of cataract was 42% in South Nyanza, 40% in Meru, 41% in Nyeri, 61% in Kwale and 25% in Kakamega (IEF, 1981). The finding of this study made the Kenya Government to realize that two-thirds of the blindness in Kenya is either preventable or curable, and that it instituted a Kenya-wide programme that focussed on blindness prevention and the elimination of avoidable blindness through the development of appropriate clinical and educational strategies.

The Kenya Ophthalmic programme began in 1956 after a small-scale survey on blindness in Kenya, which was carried out under the auspices of the Kenya Society for the Blind. Due to the great scarcity of trained ophthalmic manpower in the late 1950s, an intensive course for ophthalmic clinical officers was started with support from the Kenya Society for the Blind. Mobile eye units were started in the early 1960s. In 1966, the Prevention of
Blindness Committee was initiated by the Ministry of Health, as the policy making executive organ in all matters pertaining to eye-care services in Kenya. A master programme in ophthalmology was started at the University of Nairobi in 1978. The First Five-Year Development Plan was initiated in 1982. In 1993, the Ministry of Health recognized primary eye-care as an element of the primary health-care. Fred Hollows Foundation from Australia introduced the intraocular lens implant in Kenya in 1997 as an initiative to fight cataract blindness (ROK, 2002). The Ministry of Health took a bold step to train competent ophthalmic clinical officers in cataract surgery to combat high prevalence of cataract-related blindness.

Blindness has profound human and socio-economic consequences in all societies. The cost of lost productivity, rehabilitation and education of the blind, constitutes a significant economic burden, particularly in many developing countries. Furthermore, blindness is often associated with lower life expectancy in such settings; thus, the prevention and cure of blindness can provide enormous savings and facilitate societal developments (WHO, 2000).

1.2 STATEMENT OF THE PROBLEM
In spite of the public health campaigns by both the Ministry of Health and non-governmental agencies against blindness in Kenya, cataract remains a challenge to the public health programme. Cataract, which accounts for approximately 50% of the world's blind (WHO, 2000), remains the leading cause of blindness especially in the developing countries. For instance, in Kenya it accounts for 43% of all blindness. Cataract cannot be
prevented, but permanent loss of vision and complication of advanced cataract can be prevented by surgery. Blindness has gross socio-economic effects on individuals, families, communities and nations.

Primary eye-care education unit trains the general health workers and the community in order to recognise and treat minor eye ailments, and refer appropriately those who need surgery to the eye specialists. Cataract enhancement programme is one of the initiatives taken by the Ministry of Health in partnership with eye-care providers (e.g. NGOs) in combating blindness in Kenya.

Merti Division is situated in the northern part of Isiolo District. It has six rural health facilities which are evenly distributed within the division. The nearest health facility is 180 Km from Isiolo District Hospital where the only the eye unit is located, while the farthest is 280 Km away. In Merti Division, neither general eye-care services nor the cataract surgical services are available. Patients travel to Isiolo Eye Unit along rough roads which are impassable during rainy seasons for eye-care services. The majority of these needy patients may not access the eye-care services available at Isiolo Eye Unit because of the barriers associated with the uptake of cataract surgery or eye-care services in general.

It was therefore appropriate that this study was conducted in Merti Division of Isiolo District in Eastern Province, which has given an insight into the barriers to the uptake of cataract surgical services. This may lead to the formulation of new strategies for reduction of cataract blindness, particularly in the study area, and also facilitate effective and timely identification, referral and intervention measures in future.
1.3 RESEARCH QUESTIONS

a) What are the barriers to the uptake of cataract surgical services in Merti Division of Isiolo District in Eastern Province, Kenya?

b) What proportion of the population in Merti Division of Isiolo District was given cataract surgical intervention at Isiolo Eye Unit within one month after booking?

1.4 NULL HYPOTHESES

a) There are no barriers to the uptake of cataract surgical services in Merti Division of Isiolo District, Eastern Province, Kenya.

b) There was no difference in the proportion of the population in Merti Division given cataract surgical intervention at Isiolo Eye Unit within one month after booking.

1.5 OBJECTIVES OF THE STUDY

1.5.1 GENERAL OBJECTIVE

To determine the barriers to the uptake of cataract surgical services in Merti Division of Isiolo District in Eastern Province, Kenya.

1.5.2 SPECIFIC OBJECTIVES

a) To identify the barriers to the uptake of cataract surgical services in Merti Division of Isiolo District.

b) To determine the proportion of patients booked for cataract surgery that turned up within one month at Isiolo Eye Unit.
1.6 JUSTIFICATION

Isiolo District has one eye unit, located in the Central Division, which also doubles as a referral centre for other divisions. It has only one ophthalmic clinical officer cataract surgeon and three ophthalmic assistants. The infrastructure and communication networks in the district are very poor. There is low level of literacy and poor socio-economic status.

Data available in the eye unit show cataract as the leading cause of blindness in Isiolo District, and most patients with age-related hypermature cataract come from Merti Division. Most of these patients come late for surgery with advanced complications such as uveitis and glaucoma. Uveitis leads to posterior synechia resulting into glaucoma, while glaucoma results in optic nerve damage that leads to blindness. In this regard, proper statistical data on the factors responsible for the delay of patients to seek these vital medical services in Merti Division was important to consider. This is required for future planning and for public health interventions.

The findings of this study, therefore, are a source of valuable information for policy makers both at national and district levels, implementers, researchers and other groups interested in the prevention of blindness and visual disability in Isiolo District.
CHAPTER TWO: REVIEW OF LITERATURE

2.1 HISTORICAL DEVELOPMENT OF CATARACT SURGERY

2.1.1 THEORY OF VISION

The ancient Greeks and Romans believed that the lens was the part of the eye responsible for the faculty of seeing. They theorized that the optic nerves were hollow channels through which "visual spirits" travelled from the brain to meet visual rays from the outside world at the lens, which they thought was located in the centre of the globe. The visual information would then flow back to the brain. This concept was known as the Emanation Theory of Vision. Celsus (25 BC–AD 50) drew the lens in the centre of the globe, with an empty space called the locus vacuus anterior to it, in AD30 (Gorin, 1982).

These erroneous ideas about lens position and functions persisted through the Middle Ages and into the Renaissance, as indicated by the Belgian anatomist Andreas Vesalius in 1543 (Feigenbaum, 1960). However, the true position of the crystalline lens was illustrated by the Italian anatomist Fabricius ab Aquapendente in 1600; and the Swiss physician Felix Plater (1536 – 1614) first postulated that the retina, and not the lens, was the part of the eye responsible for sight (Feigenbaum, 1960). Today, many areas of lens physiology and biochemistry are still the subject of active research. There is not yet any medical treatment that can prevent the formation or progression of cataract in the lens of the otherwise healthy adult eye, and theories about cataract formation and innovative forms of management continue to be controversial (AAO, 2003).
2.1.2 COUCHING

Couching is pushing the cataractous lens of the eye downwards and backwards, out of the line with the pupil.

Ancient surgeons did not recognize that the cataract was in fact the opacified crystalline lens. Rather, they considered it a "suffusion" that formed between the pupil and the lens. Early writings of Celsus (25 BC–AD 50) alluded to the fact that some practitioners (Philoxenes, 300 BC) surgically treated cataract, but any records and descriptions of their work have been lost. The term cataract was introduced by Constantinus Africanus (AD 1010–1087), a Carthaginian monk and oculist, who translated the Arabic term for suffusion into the Latin cataracta, meaning a "'water-fall' or "'blockage of flow'", such as the cataracts that impeded navigation of the Nile River (AAO, 2003). The surgical treatment of cataract is an ancient art that spans two millennia. Surgeons in ancient India practised couching as early as 800 BC (Duke-Elder, 1969). Ammar, an Iraqi oculist (AD 996-1020), described the suction of a soft cataract through a hollow needle. Syrians in the 12th and 13th centuries also tried this aspiration method, which flourished for a while but then fell into disregard. In the middle ages it was considered undignified and barbarous to practise surgery, and couchers were held in disrepute.

2.1.3 EARLY EXTRACAPSULAR EXTRACTION PROCEDURES

An advancement in the development of cataract surgery was extracting the cataract from the eye, rather than just displacing it by couching. Daviel (1696-1762), a Frenchman, published the first account of cataract extraction through the pupil and out of the eye through a limbal incision. Daviel’s extracapsular extraction was an innovation and an
improvement over couching. A German ophthalmologist, Albecht von Graefe (1828-1870), improved upon extracapsular technique with the development of a knife that created a better-apposed wound. This innovation decreased the rate of infection and uveal prolapse, and extracapsular extraction gained more acceptance (AAO, 2003).

2.1.4 EARLY INTRACAPSULAR EXTRACTION PROCEDURES
Samuel Sharp (1753), who expressed a cataractous lens, capsule intact, through a limbal incision using pressure of his thumb, was among the first to successfully perform intracapsular cataract extraction. Colonel Smith, an Englishman stationed in India, used external manipulation with a muscle hook to mechanically break the inferior attachments. Toothless forceps, developed by ophthalmologists such as Fredrick Verhoeff and Jean Baptiste Kalt, were used to grasp the lens capsule. Suction cup-like devices called erysiphakes devised by Stoewer and Ignacio Barraquer (1884-1965) were used to remove the lens with traction. Tadeusz Krwawicz (1961) in Poland first developed a cryoprobe. The enzyme alpha-chymotrypsin was first reported by Jaoquin Barraquer in 1957. Charles Kelman of New York developed phacoemulsification in 1967. The first reported intraocular lens implant occurred in 1795 when Casaamata, an ophthalmologist in Dresden, attempted to use an intraocular lens to correct aphakic vision (Kirby, 1950). The results were not reliable, and no further attempts were reported until 150 years later.
2.1.5 MODERN EXTRACAPSULAR TECHNIQUES

The development of the modern intraocular lens implant began in 1949. Harold Ridley, an English ophthalmologist, observed that polymethylmethacrylate (PMMA) fragments from airplane cockpit windshields were well tolerated in the anterior segment of the eyes of pilots. He placed a disk-shaped PMMA lens into the posterior chamber of a 45-year-old woman after performing an extracapsular cataract extraction (AAO, 2003).

A shift from Intracapsular Cataract Extraction to new methods of Extracapsular Cataract Extraction technique evolved in an effort to decrease the rate of potentially blinding complications and to facilitate the placement of intraocular lenses. By leaving the posterior capsule intact, the surgeon could reduce the risk of vitreous loss and the potentially blinding complications of retinal detachment, cystoid macular oedema and aphakic bullous keratopathy. Key to the development of modern Extracapsular Cataract Extraction technique was the growing use of operating microscopes for increased magnification and improved methods of cortical removal. Charles Kelman of New York developed phacoemulsification in 1967. This technique ultrasonically emulsified the lens nucleus, allowing the operation to be performed through a smaller incision (AAO, 2003).

Because surgery is the only treatment currently available for visually significant lenticular opacity, the growing need for surgical resources compounds the already significant socio-economic impact of cataracts, in particular, and blindness in general. The problem is especially critical in developing countries, where one blind individual takes two individuals out of work force, if the blind person requires the care of an able adult.
Cataract, which refers to a clouding of the crystalline lens of the eye, stands out as the major cause of blindness. It is not generally amenable to prevention, but currently available surgery can restore sight near to normal vision in a large proportion of the cataract blind. In poorer countries, financial and cultural barriers often exist to accessing surgical services even where available. In addition, the productivity in terms of surgical services is low (WHO, 2000).

The barriers that prevent women and men from receiving surgery are often different and vary locally. However, studies show that they can include: cost of surgery, inability to travel to a surgical facility, differences in the perceived value of surgery, lack of access to information and resources, and fear of a poor surgical outcome (Abou-Gareeb et al., 2001).

The issue of the barriers that keep general cataract patients from receiving surgery has gained increasing attention in the past few years. It has become apparent that many cataract patients do not take advantage of the services because of cost, distance to service, fear of surgery, fear of poor outcome, sex discrimination, and other factors (Fletcher et al., 1999; Courtright et al., 1995; Angra et al., 1997; Johnson et al., 1998).

2.1.6 ANAESTHESIA FOR CATARACT SURGERY

Historically, cataract surgery was performed without anaesthesia which was a very painful and fearful procedure. Karl Koller used topical cocaine anaesthesia of the limbus in the late 1800s. Herman Knapp, who injected 4% cocaine for ocular anaesthesia prior to enucleation surgery, first described Retrobulbar anaesthesia in 1884. The modern
technique of retrobulbar anaesthesia, described in 1945 by Walter Atkinson, remains a commonly used technique for intraocular surgery (AAO, 2003).

2.1.7 CATARACT BLINDNESS AS AN ECONOMIC BARRIER

In many developing countries, the cost of lost productivity, rehabilitation and education of the blind, constitute a significant economic burden in all societies. Moreover, it is often associated with low life expectancy. In its World Development Report in 1993, the World Bank developed the concept of “Disability-Adjusted Life Years” (DALYs), which is a composite measure of the time lived with the disability, together with the time lost due to premature mortality (WHO, 1997). The “DALY” measure allows for a comparative assessment of health-care interventions in terms of cost per DALY saved. As there are no known effective means of preventing the most common forms of cataract, all efforts have to be made to improve surgery to all those in need. Cataract surgery can be one of the most cost-effective of all health interventions, with a cost per DALY saved in the order of USD 20-40. In fact, good-quality, high-volume cataract surgery can be provided at less than USD 10 per DALY in some settings. Cataract interventions are thus as cost-effective as immunization and can have a very significant and rapid impact in reducing the burden of avoidable blindness in a population (WHO, 1997).

The economic impact of cataract surgery in the United States alone is estimated at more than D3 billion per year. In addition to the vast numbers of cataract operations performed each year in the United States, there are many more related office visits and tests that contribute to the financial impact of cataract surgery (AAO, 2003).
2.2 GENERAL FACTORS THAT PREVENT CATARACT SURGERY UPTAKE

2.2.1 COST OF SURGERY

The cost of cataract surgery varies widely; and may be more than poor people with little or no income, can afford. In addition to the surgery itself, there are other costs such as transportation to the hospital, loss of work for the patient or the carer accompanying the patient, and living expenses for the carer while the patient is in hospital. In India, reducing the cost of surgery and providing transportation expenses for the patient has significantly increased the acceptance of cataract surgery (Ellwein et al., 1991).

Cost, lack of information, ‘can see with other eye,’ and fear of operation are the main factors identified in most studies as the barriers to the uptake of cataract services. Studies by Johnson et al. (1998) in Gambia, Limburg and Kumar (1998) in Karnataka state of India, Snelligen et al. (1998) in Nepal, Limburg et al. (1996) in Maharashtra state of India, all reported similar barriers. As in most surveys on the barriers to the uptake of cataract services, the financial limitations of the people ranked first, constituting over 60% of responses as the reason for not having surgery. A study done in Northern Nigeria revealed that the issue of cost was the most frequently mentioned, although most respondents gave more than one reason (Rabiu, 2001).

2.2.2 DISTANCE TO HEALTH FACILITY

Most cataract blind live in rural areas while most ophthalmologists live in urban areas. The use of western medical services (including those for cataract) is related to proximity; people who live far from a hospital tend not to use its services. In Malawi, traditional
healers who live far from hospitals provide more ‘cataract treatment’ than those living near hospitals (Courtright, 1995). Various studies done in many non-leprosy rural populations in Korea showed that distance to the surgical facility is one barrier preventing patients from receiving surgery (Courtright et al., 1995; Angra et al., 1997).

2.2.3 GENDER AND BLINDNESS

There is an increasing amount of data demonstrating that women are significantly less likely to receive cataract surgery than men, in spite of the fact that cataract surgical rates in women are slightly higher than those in men. Women are more likely to be illiterate and may have less access to information about services. They may not have the necessary social support within the household or community to allow them to receive care. Women often do not have adequate control over household financial resources and they are generally less able to travel outside the village to seek services (Brilliant et al., 1985 and 1991; Courtright et al., 1995; McCauley, 1986).

2.2.4 FEAR OF SURGERY

While satisfied cataract patients can serve as excellent motivators for others to have surgery, those with poor results can have the opposite effect. Fear of a poor outcome may be a legitimate reason for patients to refuse cataract surgery. It has been shown that in India the conversion from aphakic spectacles to intraocular lenses led to a significant increase in cataract surgical coverage (Vaidyanathan et al., 1999).
2.2.5 CULTURAL PRACTICES

Traditional practices, beliefs, the patients’ fatalistic attitude towards blindness, lack of faith in the intervention and fear about the surgical procedures influence the behaviour of patients, leading to low levels of acceptance. Health education, individual counseling and the use of operated patients as motivators can help to overcome this problem. In a study in Southern India, it was seen that previous cataract patients had the greatest motivational impact in influencing other cataract patients to accept surgery (Brilliant et al., 1991).
CHAPTER THREE: MATERIALS AND METHODS

3.1 STUDY AREA

The study was conducted in Merti Division of Isiolo District in Eastern Province of Kenya. Isiolo is one of the thirteen districts of Eastern Province. It borders Marsabit to the North, Garissa to the Southeast, Wajir to the East, Tana River, Nyambene (Meru North) and Meru (Meru Central) Districts to the South, Laikipia and Samburu Districts to the West. It is located between longitude 36° 60' and 38° 50' East and latitude 0° 5' and 2° north (ROK, 2002).

Isiolo District covers an area of 25,605 Square Km. It is divided into six administrative divisions, namely Central, Garbatulla, Sericho, Merti, Oldonyiro and Kinna. There are twenty-two locations and forty-four sub-locations. Merti Division has six locations namely, Bisan Biliku, Bulesa, Merti, Korbesa, Malkagalla and Yamicha which were all purposively taken for the study (Appendix 2). The annual rainfall ranges between 150 and 250 mm, and the area is hot and dry most of the year. The mean annual temperature for Isiolo station at an altitude of 1, 104 m above sea level is 26.6 degrees centigarde while Merti, which is 300 m above sea level, has a mean annual temperature of 27 degrees centigarde (ROK, 2002).
3.2 STUDY PERIOD

The study was conducted from January 2004 to March 2004. This was done in three phases:- One, in January 2004 mobile outreach clinics were conducted in all the six locations of Merti Division after the letters were sent earlier from Isiolo District Medical Officer of Health to the In-charges of the rural health facilities to mobilize the patients with eye problems for screening. This was done in conjunction with the local leaders. Patients were seen at least 1-2 days in each location depending on the volume of the workload. Secondly, in February 2004 those patients identified with cataract and booked for surgery were seen at Isiolo Eye Unit for surgical intervention. Thirdly, in March 2004 those who did not come for surgery were traced back at their locations. The study was conducted by the researcher in conjunction with the team from Isiolo Eye Unit.

3.3 STUDY POPULATION

The study targeted cataract patients seeking eye-care services in rural health facilities during the mobile free eye clinics conducted in Merti Division of Isiolo District.

3.3.1 INCLUSION CRITERIA

a) Cataract patients with visual acuity worse than 6/60 (WHO standard of expressing Severe Visual Impairment) in one eye or both eyes.

b) Cataract patients who consented to the request to participate in the study.

c) A resident of Merti Division at least for three years.
3.3.2 EXCLUSION CRITERIA

a) Cataract patients with visual acuity equal to or better than 6/60.

b) Cataract patients from Merti Division who did not consent to the participation in the study.

c) Cataract patients from outside Merti Division of Isiolo District.

3.3.3 ETHICAL CONSIDERATION

Relevant ethical considerations were undertaken for the study from the concerned research authorization bodies: Kenyatta University (Appendix 4), the Provincial Administration, the Ministry of Education, Science and Technology and Isiolo District Medical Officer of Health. The information given by the respondents was kept in confidence by the researcher.

3.4 STUDY DESIGN

The study design was a population-based cross-sectional survey.

3.5 SAMPLING PROCEDURE AND SAMPLE SIZE

Merti Division was conveniently selected out of the six divisions of Isiolo District. It has a projected population of 18,859 (2004) based on the 1999 population census. Using the estimated 0.7% national prevalence of blindness, there are 132 blind people in Merti Division. If cataract accounts for 43% of all the blindness in Kenya (ROK, 2002), it is estimated that there are 57 people blind from cataract who needed urgent cataract surgical
intervention in Merti Division. Table 1 below shows the proportionate sampling technique used for each location in Merti Division to determine those who had cataract.

<table>
<thead>
<tr>
<th>Location</th>
<th>(a) Population (2004)</th>
<th>(c) Sampling =a/b x 57</th>
<th>Sample Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Bisan Biliku</td>
<td>1,872</td>
<td>1,872 / 18,859 x 57</td>
<td>6</td>
</tr>
<tr>
<td>2 Bulesa</td>
<td>2,434</td>
<td>2,434 / 18,859 x 57</td>
<td>7</td>
</tr>
<tr>
<td>3 Merti</td>
<td>6,232</td>
<td>6,232 / 18,859 x 57</td>
<td>19</td>
</tr>
<tr>
<td>4 Korbesa</td>
<td>2,936</td>
<td>2,936 / 18,859 x 57</td>
<td>9</td>
</tr>
<tr>
<td>5 Malkagalla</td>
<td>3,454</td>
<td>3,454 / 18,859 x 57</td>
<td>10</td>
</tr>
<tr>
<td>6 Yamicha</td>
<td>1,931</td>
<td>1,931 / 18,859 x 57</td>
<td>6</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>18,859 (b)</strong></td>
<td></td>
<td><strong>57 (c)</strong></td>
</tr>
</tbody>
</table>

Table 1: Proportionate sampling of each location in Merti Division.

3.6 DATA COLLECTION

The rural health workers and the community leaders conducted community social mobilizations for one month prior to the screening exercise through the existing establishment of the Ministry of Health. This was to ensure that all patients with eye problems would be examined and treated free of charge at rural health facilities.

The data were collected in three stages by the use of structured questionnaires. The first stage involved the registration of those patients with eye problems who turned up for screening at the rural health facilities during the mobile eye clinics (Figure 3). Their visual acuities were tested by the ophthalmic assistant using the Snellen’s Chart-E: whereby, 6/6-6/18 recorded as Normal, <6/18-6/60 as Visual Impairment, <6/60-3/60 as Severe Visual Impairment, and <3/60-No Perception of Light as Blind (Appendix 3).

Those whose visual performances were worse than 6/60 were examined for cataract by the ophthalmic clinical officer cataract surgeon using a torch and an ophthalmoscope.

Patients with severe visual impairment and blind from cataract were certified for the
study, interviewed and referred for cataract surgery to Isiolo Eye Unit. The questionnaires were not given to respondents to fill, but were filled in and kept by the researcher because most of the respondents were illiterate and could not see because of cataract.

The second stage involved those who turned up for surgery within one month of booking and the reasons for their return were recorded on the same questionnaire. One month was singled out from the other periods because of the convenience for the study. This period gave enough time for the cataract blind to reach Isiolo Eye Unit for sight restoration without delay.

The third stage involved those patients who did not turn up for surgery, and were re-visited and interviewed on the failure or delay in having surgery. All information was recorded on the same questionnaire developed for the purpose of this survey.
Figure 3: A model for screening the study subjects

STAGE 1

VA measurement by OA

VA < 6/60

Examination by OCOCS

VA > 6/60

Treatment of eye diseases

Cataract identified

Referred to IEU for surgery after interview

Re-visited at their locations

Other ocular diseases

Treated or referred for further management

STAGE 2

Cataract patients who came for surgery at IEU

STAGE 3

Cataract patients who did not come for surgery
3.7 LIMITATIONS

Mobile outreach service is a worthwhile exercise for the rural communities in the developing world. It provides basic eye-care services and health-care in general, especially where accessibility to the health-care services are neither available nor adequate. On the other hand, mobile outreach service turns to be a very expensive exercise because a lot of resources are required for its implementation. The vastness of the area with scarce population limited the communication system. Those who were near the rural health facilities or in rural centres and even some who were far away were able to get access to the services because of community social mobilization to minimize population bias. For those patients who were totally blind from cataract usually require escorts or relatives to take them to the hospital. In this study, the community leaders or local health workers assisted those who had no escorts to the rural health facilities. The nomadic lifestyle of moving from one place to another for greener pasture limited the house-to-house survey. However, those who had turned up for the exercise were examined and treated freely, while those who came for surgery at Isiolo Eye Unit were operated on at government cost. The above limitations not withstanding, the study provides the baseline information for future studies on the barriers to the uptake of cataract surgical services in Merti Division of Isiolo District.
3.8 DATA MANAGEMENT, STORAGE AND ANALYSIS

The data collected by the use of a structured questionnaire from cataract blind were stored in confidence under the safe custody of the researcher. The responses obtained were converted into numerical codes before analysis using the computer Software Package for Social Scientists (SPSS), for example, Yes = 1, No = 2.

Analysis of the data was done using Pearson’s chi-square test to determine the significance of the patients observed and expected in each location of Merti Division of Isiolo District during the outreach programme. The data were presented using the frequency tables, bar charts, percentages and pie charts. The level of significance was fixed at 0.05 (p < 0.05) with a Confidence Interval of 95%.
CHAPTER FOUR: RESULTS

During the survey conducted in all the six locations of Merti Division, 717 eye patients seeking eye-care services were screened. Out of these, 301 (42%) were males and 416 (58%) were females. The high turn up of the patients for the exercise was due to the fact that the service was not available in the division and that it was now being given freely. The high number was related to the daily out patients' attendance in each location. Those patients who were identified with operable cataracts (vision less than 6/60 in one eye or both eyes) were 98 and were certified for the study.

4.1 DEMOGRAPHIC CHARACTERISTICS

Out of 717 patients screened in all the six locations of Merti Division, 98 (14%) patients were identified with cataract who needed surgery. Out of these, 35 (35.7%) were males and 63 (64.3%) were females. Those who participated in the study from Merti Location were 34 (34.7%), Bisan Biliku were 24 (24.5%), Bulesa were 17 (17.3%), Korbesa were 10 (10.2%), Yamicha were 7 (7.1%) and Malkagalla were 6 (6.1%). A total of 92 (93.9%) patients had never had any formal education, while 5 (5.1%) had primary level of education. Only 1 (1.0%) had reached secondary school and none had a college or university level of education. Muslims (89; 90.8%) were the majority followed by Christians (9; 9.2%) of the catholic faith. Eighty two (83.7%) of the respondents had either less than 100 cattle or 200 shoats, while the remaining (16; 16.3%) had more animals. This determines the level of wealth one has according to the Boran tradition, in that a person is seen as poor if he or she has less than 100 cattle or 200 shoats. Table 2 is the summary of the demographic characteristics of the study population.
Table 2: Demographic characteristics of study population

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Number (n)</th>
<th>Percentage (n/98)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>SEX</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>63</td>
<td>64.3</td>
</tr>
<tr>
<td>Male</td>
<td>35</td>
<td>35.7</td>
</tr>
<tr>
<td>TOTAL</td>
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<td>100</td>
</tr>
<tr>
<td><strong>AGE DISTRIBUTION</strong></td>
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<td></td>
</tr>
<tr>
<td>0 – 5 years</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>5 – 20 years</td>
<td>2</td>
<td>2.0</td>
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<tr>
<td>20 – 40 years</td>
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<td>3.1</td>
</tr>
<tr>
<td>40 – 60 years</td>
<td>15</td>
<td>15.3</td>
</tr>
<tr>
<td>Over 60 years</td>
<td>78</td>
<td>79.6</td>
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<td>TOTAL</td>
<td>98</td>
<td>100</td>
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<td><strong>MARITAL STATUS</strong></td>
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<tr>
<td>Married</td>
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<tr>
<td>Single</td>
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<tr>
<td>Divorcee</td>
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<td>1.0</td>
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<tr>
<td>Widow</td>
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<tr>
<td>Widower</td>
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<td>3.1</td>
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<tr>
<td>Polygamy</td>
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<td>2.0</td>
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<tr>
<td>TOTAL</td>
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<td>100</td>
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<tr>
<td><strong>EDUCATIONAL LEVEL</strong></td>
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<tr>
<td>None</td>
<td>92</td>
<td>93.9</td>
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<tr>
<td>Primary level</td>
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<tr>
<td>Secondary level</td>
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<tr>
<td>College / University</td>
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<td>0</td>
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<tr>
<td>TOTAL</td>
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<td>100</td>
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<tr>
<td><strong>RELIGION</strong></td>
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<td>Islam</td>
<td>89</td>
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<tr>
<td>Christian</td>
<td>9</td>
<td>9.2</td>
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<td>TOTAL</td>
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<td>100</td>
</tr>
<tr>
<td><strong>ECONOMIC STATUS</strong></td>
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<tr>
<td>Less than 100 cattle or 200 shoats</td>
<td>16</td>
<td>16.3</td>
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<tr>
<td>More than 100 cattle or 200 shoats</td>
<td>82</td>
<td>83.9</td>
</tr>
<tr>
<td>TOTAL</td>
<td>98</td>
<td>100</td>
</tr>
</tbody>
</table>
Table 3: Sex of patients in different Locations

<table>
<thead>
<tr>
<th>Location of patient</th>
<th>Sex</th>
<th>Bisan Biliku</th>
<th>Bulesa</th>
<th>Merti</th>
<th>Korbesa</th>
<th>Malkagalla</th>
<th>Yamicha</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>11</td>
<td>6</td>
<td>12</td>
<td>1</td>
<td>3</td>
<td>2</td>
<td></td>
<td>35</td>
</tr>
<tr>
<td>Female</td>
<td>13</td>
<td>11</td>
<td>22</td>
<td>9</td>
<td>3</td>
<td>5</td>
<td></td>
<td>63</td>
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<tr>
<td>Total</td>
<td>24</td>
<td>17</td>
<td>34</td>
<td>10</td>
<td>6</td>
<td>7</td>
<td></td>
<td>98</td>
</tr>
</tbody>
</table>

Table 3 shows the number of the cataract blind identified in each location of Merti Division of Isiolo District. More females (63; 64.3%) than males (35; 35.7%) attended the clinics during the screening exercise although statistically there was no significant difference between the sexes of the patients in different locations ($\chi^2 = 4.643; \text{df} = 5; P = 0.461$).
Out of the cataract patients identified, there was no child under five year (0%) who attended the screening exercise (Figure 4). There was significant number of the elderly (78; 80%) patients in attendance than the young adults (χ² = 160.041; df = 3; P<0.001).
Figure 5 shows that the patients who were able to attend the clinic for screening were mostly the widows (53; 54.1%) and the married people (37; 37.8%). On the other hand, the rest were significantly ($\chi^2 = 158.898; \ df = 5; \ P < 0.001$) least in attendance.
The economic status of the study population is defined traditionally by the number of the herds he has. A rich person is one who has more than 100 cattle or 200 shoats (sheep and goats). If one has less than this number, he is considered poor. This is according to Boran tradition that is pastoralistic in nature and they form the majority tribe in Merti Division. Thus, Figure 6 illustrates that the majority of the respondents were significantly ($\chi^2 = 44.449; \text{df} = 1; \text{P} < 0.001$) poor (82; 83.7%). The percentage of the rich was only 16.3% (16).
Figure 7 shows that most patients with cataracts stayed for over two years (76; 78%) duration, followed by 1-2 years (14; 14%). The greater minority (8, 8%) consulted for cataract intervention within 1-3 months. This was highly significant statistically ($\chi^2 = 268.735; \text{df} = 5; P < 0.001$).
4.2 PROPORTION OF CATARACT SURGERY RECIPIENTS

Table 4: Cataract surgery recipients

<table>
<thead>
<tr>
<th>Location</th>
<th>Cataract surgery recipients</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1st week</td>
<td>2nd week</td>
</tr>
<tr>
<td>Bisan Biliku</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>Bulesa</td>
<td>1</td>
<td>16</td>
</tr>
<tr>
<td>Merti</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Korbesa</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Malkagalla</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Yamicha</td>
<td>7</td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>1</strong></td>
<td><strong>4</strong></td>
</tr>
</tbody>
</table>

Table 4 shows that the proportion of cataract patients from Merti Division who received surgery within one month after booking were only 15 (15.3%) as compared to those who did not turn up for surgery (83; 84.7%). Out of the 15 who received surgery, 6 (40%) were males and 9 (60%) were females. Only 1 (6.7%) came from Merti Location in the first week. In the second week 4 (27.7%) came; one from each of the following locations: Bisan Biliku, Merti, Korbesa and Malkagalla, but none from Bulesa and Yamicha. In the third week only 2 (13.3%) came from Malkagalla and in the fourth week came 8 (53.3%), one each from Bulesa and Korbesa, and three each from Bisan Biliku and Merti Locations. This was statistically significant in that 85% did not show up for surgery within one month of booking as compared to only 15% who did come for surgical intervention ($\chi^2 = 39.863; \text{df} = 20; P < 0.05$). Of the 15 who received cataract surgery, 8 (53.3%) came in the fourth week, while the rest (7; 46.7%) came in the first three weeks.
Merti Location had brought the highest number of patients for surgical interventions (5; 33.3%) while none came from Yamicha Location (0; 0%). Merti Location is the divisional headquarters and therefore has more population than the other Locations. Only fifteen out of the 98 cataract patients turned up for surgery within one month. Moreover, only one patient showed up for surgery in the first week as compared to eight in the fourth week. This showed a significant difference between the number of those who came for surgery from the nearest locations (10; 67%) as compared to the number that came from the farthest (5; 33%) locations ($\chi^2 = 37.061; \text{df} = 5; P < 0.001$).

**Table 5: Reasons for cataract surgery acceptance**

<table>
<thead>
<tr>
<th>Reason</th>
<th>Frequency</th>
<th>Percent (%)</th>
<th>Cumulative Percent (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Have money</td>
<td>4</td>
<td>4.1</td>
<td>4.1</td>
</tr>
<tr>
<td>Taken to hospital by relative</td>
<td>11</td>
<td>11.2</td>
<td>15.3</td>
</tr>
<tr>
<td>Didn't come for booking</td>
<td>83</td>
<td>84.7</td>
<td>100.0</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>98</strong></td>
<td><strong>100.0</strong></td>
<td></td>
</tr>
</tbody>
</table>

The subjects who accepted to uptake the cataract surgery and turned up within one month of booking, gave their reasons as: availability of funds (4; 4.1%) and having a relative at home or in Isiolo Town (for those with unilateral cataract) to give escort to the hospital (11; 11.2%). The rest (83; 84.7%) did not turn up for the booking (Table 5). There was a high statistical significance in that very low number of eye patients turned up for cataract surgery ($\chi^2 = 108.301; \text{df} = 8; P < 0.001$).
Table 6: Reasons for failure to turn up for cataract surgery

<table>
<thead>
<tr>
<th>Reason</th>
<th>Frequency</th>
<th>Percent (%)</th>
<th>Cumulative Percent (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nobody to leave behind</td>
<td>6</td>
<td>6.1</td>
<td>6.1</td>
</tr>
<tr>
<td>Nobody to take me to hospital</td>
<td>23</td>
<td>23.5</td>
<td>29.6</td>
</tr>
<tr>
<td>Not given consent</td>
<td>1</td>
<td>1.0</td>
<td>30.6</td>
</tr>
<tr>
<td>Cannot afford</td>
<td>22</td>
<td>22.4</td>
<td>53.1</td>
</tr>
<tr>
<td>Not traced</td>
<td>10</td>
<td>10.2</td>
<td>63.3</td>
</tr>
<tr>
<td>Left with animals for pasture</td>
<td>20</td>
<td>20.4</td>
<td>83.7</td>
</tr>
<tr>
<td>Died</td>
<td>1</td>
<td>1.0</td>
<td>84.7</td>
</tr>
<tr>
<td>Came for surgery</td>
<td>15</td>
<td>15.3</td>
<td>100.0</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>98</strong></td>
<td><strong>100.0</strong></td>
<td></td>
</tr>
</tbody>
</table>

Table 6 shows the results given by the respondents who did not turn up for cataract surgery at Isiolo Eye Unit within one month of booking. When they were re-visited, the reasons given for their failure to turn up were:- having nobody to take them to hospital (23; 23.5%), generally unable to afford the cost of travel, meals and accommodation in Isiolo Town (22; 22.4%), nobody to leave behind to look after the homestead and property (6; 6.1%), one patient did not get consent from the husband (1.0%) and one patient died (1.0%). Ten (10.2%) respondents were not traced and 20 (20.4%) left with their animals for greener pastures during the time of re-visit. There was a significant proportion of cataract patients booked for surgery who did not turn up at all within one month ($\chi^2 = 98.000; df = 28; P < 0.001$).
4.3 BARRIERS TO UPTAKE CATARACT SURGICAL SERVICES

Figure 8: Fear of eye operation

The majority of the respondents (69, 70%) did not fear cataract operation while only 30% (29) had fear for the operation (Figure 8). This was statistically significant ($\chi^2 = 16.327; df = 1; P < 0.001$). One important reason given by those who did not fear the operation was that their primary objective was to have their sight restored after the operation (69; 70.4%), while the small percentage who feared anticipated a painful operation (20; 20.4%) and the possibility of becoming blind after surgery (9; 9.2%).
Figure 9 shows that only 47% (46) and 32% (31) of the respondents could afford to pay for cataract operation if the cost was less than Ksh 1,000 and between Ksh 1,000 – 3,000 respectively. It means that about 80% (77) could afford to pay below Ksh 3,000. Only 21% (21) of the respondents could afford to pay over Ksh 3,000 and this was found to be statistically highly significant ($\chi^2 = 37.102; df = 3; P < 0.001$).
Figure 10 shows that 65.31% (64) of the study subjects had never had any knowledge of existence and services at Isiolo Eye Unit, while only 34.69% (34) significantly ($\chi^2 = 9.184; \text{df} = 1; P < 0.05$) knew the existence and the services provided at the unit. Those who had visited the unit at least once in their life-time rated the service as excellent 8.2% (8), good 24.5% (24), and satisfactory 1% (1). The general health services in the rural health facilities (including eye-care services) were provided by the Ministry of Health (92; 93.9%) mainly rendered at dispensaries (52; 53.1%) and a health centre (32; 32.7%). Malkagalla Location has no rural health facility but depends on the nearest facility which is Korbesa. At least 14.3% (14) of the respondents did not use the facilities but stayed at their homes even when they were sick or sought help from spiritual healers.
Figure 11: Knowledge about road network system in the study area

Figure 11 shows that 99% (97) of the respondents knew that Isiolo town is connected to Merti Division by a rough road (33; 33.7%) and was far (63, 64.3%); making the users very tired and this discouraged them from travelling. This was found to be statistically highly significant ($\chi^2 = 94.041; df=1; P<0.001$).
CHAPTER FIVE: DISCUSSION

5.1 STUDY POPULATION

A total of 98 (14%) operable cataract cases were identified from the 717 eye patients examined at the six screening locations of Merti Division of Isiolo District. All identified cases had vision less than 6/60 either in one or both eyes. The percentage of males to females was 34.7% (35) and 64.3% (63) respectively. The successful turn up was due to the fact that the services were offered free to minimize population bias; hence, attracted a huge number of eye patients. Moreover, eye-care services not being available within the division gave all those with eye problems an opportunity to be examined and treated. The high number was related to the daily out patients’ attendance in each location.

More females (416; 58%) than males (301; 42%) were screened for eye problems. This may have been probably because men were out of the locational centres by the time the screening exercise was being conducted and being a pastoralist community, they may have gone with their animals for water and greener pastures as herding is the main occupation of men, while looking after the homesteads is the work of women. Some of the men who were in the wilderness with their animals were out of reach of the eye services provided freely. This was hampered by the long distance; hence, they were not able to reach the facilities in time. The information relayed to them during the mobilization period did not reach them in time either. This was as a result of the poor communication network system in the division because verbal communication was used to reach the respondents. However, there was no statistical significance in this analysis.
These findings concur with those obtained from two screening free eye camps in Kathmandu Valley, Nepal, where a total of 78 (11%) cataract cases were identified from 705 examined with vision less than 6/60 in one or both eyes. Thirty-six patients (46%) were males and 42 (54%) were females (Shrestha et al., 2004). This study showed that there was awareness of the availability of treatment and services within their reach, but people were not willing to pay for the surgery unlike in Merti Division where eye-care services are not available at all.

In a study done in Northern Nigeria, a total of 1461 eye patients examined during a population-based cross-sectional survey; 643 (44%) were males and 818 (56%) were females. The aim of the study was to determine the magnitude of cataract blindness and barriers to the uptake of cataract surgery in a rural community. The disparity in the figures was explained by the fact that the survey was conducted during the planting season, a period when the male adults in the villages (ages 20-50 years old) travel to the cities for temporary jobs leaving the females behind in the villages during the time of the survey (Rabiu, 2001).

Of the 98 cataract cases identified in Merti Division, 80% (78) were over 60 years, 15% (15) were between 40-60 years, 5% (5) were between 5-40 years and none (0) below 5 years. Cataracts identified in the younger age groups (less than 40 years) were mainly due to injuries (7; 5%) while in the older subjects (over 40 years), age-related cataracts (93; 95%) were the main factor. This is because pastoralists are subjected to eye injuries while looking after their livestock in the bushes where medical service in general is not available. The frequent ultraviolet rays from the sun directly transmitted to the eyes, may
have effect on the lens. In this study, cataract cases seem to increase with age. This shows statistical significance with the elderly patients being screened most as compared to younger adults ($\chi^2 = 160.041; \text{df} = 3; P < 0.001$). There were no cases of under fives in attendance during the screening exercise, and therefore no congenital cataracts were seen. This requires further disability research.

In her study results from West Africa, South India and Chile, Gilbert et al. (1993) documented that congenital cataract, although uncommon, accounts for about 10% of childhood blindness. About 50% of bilateral cases have a genetic basis. Congenital cataract is both clinically and genetically heterogeneous; it is usually inherited as an autosomal dominant trait although autosomal recessive and X-linked inheritance are seen less commonly (Francis et al., 2000).

The Andra Pradesh eye disease study and Baltimore eye survey documented an increase in cataract as the cause of visual impairment in people 60 years of age and older (Dandona et al., 2002; Rahmani et al., 1996). The visual impairment project in Melbourne documented an increase in people 70 years of age and older (Weih et al., 2000). These findings directly relate to this study in that people over 60 years (78; 80%) had severe visual impairment due to cataract (Figure 4).

There was a statistical significance between widows (53; 54.1%) and married people (37; 37.8%) with cataract in that both were screened most as compared to the singles, the widowers and the polygamous ($\chi^2 = 158.898; \text{df} = 5; P < 0.001$). It may seem possible that since widows, to a large extent lack the basic social and economic support, they are appearing the most vulnerable group in any society. Hence, in the event of an eye
ailment, the condition is likely to worsen; deteriorating into surgical cases like cataract. This is also true in terms of seeking medical care in general, which is inaccessible and unaffordable to them, unless it is given freely or made accessible. In Merti Division, most of these women lost their husbands and property through the frequent banditry attacks which were prevalent between 1998 and 2000. This also contributed significantly to the high level of poverty (82; 83.7%) among the vulnerable groups ($\chi^2 = 44.449; df = 1; P < 0.001$).

Age-related cataract gradually affects both eyes. Once it gets fully mature or ripe, the patient becomes blind. Staying for a long period without seeking surgical intervention may lead to complications. In this study, most patients stayed blind for a period of over two years (76; 78%) as compared to 1-2 years (14; 14%), 6-12 months (1%), 3-6 months (2%), 1-3 months (3%) and less than one month (2%). The delay to uptake cataract surgical services in Merti Division was statistically significant ($\chi^2 = 268.735; df = 5; P < 0.001$) (Figure 7).

### 5.2 PROPORTION OF CATARACT SURGERY RECIPIENTS

The number of cataract patients who received surgery at Isiolo Eye Unit within one month of booking was only 15 (15.3%), of which 6 (40%) were males and 9 (60%) were females. On the other hand, 83 (84.7%) patients did not show up for surgical intervention (Table 4). There was statistically significant number of women operated for cataract than men because there were more females identified with cataract during the time of the survey (35 males, 65 females), although a significant number of patients did not turn up for the surgical intervention ($\chi^2 = 39.863; df = 20; P < 0.05$). From this study, it appears
that women were the most available than men to uptake the cataract surgical services. Thus, they wanted their sight restored in order to carry out their domestic chores, while the men were probably busy grazing their herds in the wilderness.

The total number of cataract patients who received surgery in the first week was one (6.7%), in the second week 4 (26.7%), in the third week 2 (13.3%) and in the fourth week 8 (53.%). There was a significant increase in the number of cataract patients who received surgery in the fourth week as compared to the first three weeks ($\chi^2 = 257.816; df = 4; p < 0.001$).

Bisan Biliku which is 170 Km away from Isiolo Eye Unit had one (6.7%) patient in the second week and 3 (20%) in the fourth week, totalling to 4 (26.7%). Bulesa (180 Km away) brought only one (6.7%) in the fourth week. Merti (210 Km away) which is a divisional headquarters, brought one (6.7%) each in the first and second weeks, 3 (20%) in the fourth week adding up to 5 (33.3%). Korbesa (240 Km away) brought one (6.7%) each in the second and third weeks totalling to 2 (13.3%). Malkagalla (260 Km away), which had no rural health facility, brought one (6.7%) and 2 (13.3%) in the second and third week respectively adding up to 3 (20%). Yamicha (280 Km away) brought no patients (0%) for surgical intervention. The only patient who came in the first week from Merti Location had a traumatic cataract in the right eye and had a relative in Isiolo Town. The nearest locations (Bisan Biliku, Bulesa and Merti) brought more patients (10, 66.7%) as compared to the farthest locations (Korbesa, Malkagalla and Yamicha) with 5 (33.3%). Those from nearest locations travel shorter distance to Isiolo Eye Unit in relation to those who were from the farthest locations having in mind the poor status of the road. The fear of the bad roads and long distances hinder the accessibility of the facility and also the
willingness to uptake the cataract surgical services. There was a statistical significance between the distance and the uptake of cataract surgical services ($\chi^2 = 37.061; \text{df} = 5; P < 0.001$).

The reasons attributed to the acceptance of cataract surgery were: availability of funds (4; 4.1%) and having a relative at home or in Isiolo Town to give escort to the hospital (11; 11.2%) (Table 5). Those who did not turn up for surgery (83; 84.7%) when re-visited after one month, gave the reasons as having nobody to take them to the hospital (23; 23.5%), generally unable to afford the cost of travel, meals and accommodation in Isiolo Town (22; 22.4%), nobody to leave behind to look after the homestead while away (6; 6.1%) and no consent given (1.0%). Ten (10.2%) were untraceable and 20 (20.4%) left with their animals for pastures as the visual acuity in the other eye was better. One (1%) client died (Table 6).

A study in Kathmandu Valley, Nepal, documented that poverty (44.4%) was the main barrier for the unwillingness to pay for cataract surgery. Other reasons were lack of family support (28.9%), lack of knowledge of surgery and belief that it was an unnecessary procedure (15.6%), and waiting for a free surgical service (11.1%) (Shrestha et al., 2004).
53 BARRIERS TO UPTAKE CATARACT SURGICAL SERVICES

According to the findings of this study, the majority (69; 70%) of the respondents were not afraid of surgery, as their aim was to have their sight restored. Some of them, however (29; 30%) expressed fear for pain during surgery and possible irreversible blindness after the operation (Figure 8). A similar study in Nepal showed that the most frequent reasons given for not accepting surgery were economic (48%) and logistical (44.8%) constraints followed by the fear of surgery (33.3%) and lack of time (18.8%) (Snellingen et al., 1998). In both studies, the fear for eye operation was not a major barrier to the uptake of cataract surgical services.

The average cost of cataract surgery in government hospitals in Kenya is rated at Ksh 3,000 per eye per visit with an intraocular lens implant. This study looked at those who could afford less than Ksh 1,000 (46; 47%), Ksh 1,000-3,000 (31; 32%), Ksh 3,000-5,000 (8; 8%) and more than Ksh 5,000 (13; 13%) (Figure 9). Most patients with cataract who were identified during the outreach programme were elderly (78; 80%), poor (82; 83.7%), widowed (53; 54.1%), illiterate (92; 93.9%), and therefore could not afford to pay for their cataract operation at the standardized government rate at either provincial or district hospitals. Although they did not fear the operation (70%), the cost of cataract surgery was a barrier to the uptake of cataract surgical services in Merti Division. The study in Nepal also revealed that, 48.5% of people under study were willing to pay less than D13 (Ksh 1,014) and 51.5% were willing to pay more than D13. Patients with bilateral cataract were more willing to pay than unilateral cases (Shrestha et al., 2004). This was similar to the foregoing study where 47% (46) were willing to pay less than Ksh
1,000 and bilateral cases were willing to have surgery because they needed their sight restored, while unilateral cases were busy with their animals instead of opting for surgery.

Isiolo Eye Unit is the only centre providing comprehensive eye-care services (CES) in the entire district and is the referral centre for all the divisions in Isiolo District. Just like any other public institutions in the country, the unit is faced with a lot of challenges such as shortages of manpower, consumables, equipment, inadequate infrastructure and lack of financial resources. Sixty four (65.31%) of the respondents had no knowledge on the where-about of Isiolo Eye Unit and only 34.69% (34) had knowledge about it (Figure 10). In spite of these, those who had visited the unit at any one time in their life-time rated its services as excellent (8; 8.2%) and good (24; 24.5%). Sixty five (66.3%) did not know about the existence of the eye services at Isiolo Eye Unit. Not knowing where to seek eye-care health services in terms of need, some patients resorted to getting help from the traditional herbalists and also from the spiritual healers as availability of alternatives. Seventy six (78%) of the respondents stayed blind for over two years before seeking help because the service was not available in the division and some just stayed at home without any help. A study conducted in 2003 in Kibera, Nairobi (Ndegwa, unpublished) documented that the reasons for the barriers to utilization of eye-care services were lack of money to pay for their consultations and drugs (24.8%) and for this reason they turned to other methods of treatment like washing their eyes with strong tea, buying cheap drugs and consulting the traditional medicine men. Some did not know where to seek help for their eye problems (9.3%), while 6.2% did not bother since the eye problems did not cause any pain.
The nearest health facility in Merti Division to Isiolo Eye Unit is 180 Km away (i.e. Bisan Biliku), while the furthest is 280 Km (i.e. Yamicha). All the six locations in the division are served by earth roads, which are impassable during the rainy seasons. The division gets rain from February to April for long rains, and October to December for short rains. All (100%) respondents knew that the mode of transport to Isiolo Town is by vehicle because the road passes through each location. Ninety seven (99%) commented that the road is problematic in that it is rough (33, 33.9%) and they do travel for a long distance without breaking on the way (63, 64.3%) (Figure 11). Although the division was highly insecure due to banditry from 1998 to 2000, it appeared that insecurity (1%) was not a big issue to the community as a barrier to the uptake of cataract surgical services. Inaccessibility to a surgical facility due to bad roads hinders the uptake of cataract surgical services.
CHAPTER SIX: CONCLUSIONS AND RECOMMENDATIONS

6.1 CONCLUSIONS

The following conclusions were made from the study:

A) There was non-availability of cataract surgical services in Merti Division of Isiolo District which was coupled with the inability of the residents to afford surgical treatment at Isiolo Eye Unit.

B) The Ministry of Health is the only health-care provider in Merti Division with non-skilled rural health workers rendering eye-care services alongside with the general health-care services.

C) Lack of family support for the blind, illiteracy, poverty, lack of eye-care services, lack of awareness about existing services and poor road network in Merti Division were among the barriers to uptake cataract surgical services.
6.2 RECOMMENDATIONS

A) There is need to set up cataract surgical services in Merti Division alongside with the other eye-care services through establishment of mobile outreach programme which are available and avoidable to the rural people.

B) There is need to create general public awareness on existing eye-care services at Isiolo Eye Unit and educate the general rural health workers on basic primary eye-care so as to recognize cataracts and refer the patients appropriately to service delivery point.

C) There is need for intersectoral collaboration between the Ministry of Health and the stakeholders in order to minimize the barriers to the uptake of cataract surgical services in Merti Division.

6.3 SUGGESTIONS FOR FURTHER RESEARCH

A) There is need to carry out similar research in other (Arid and Semi-Arid) areas in Kenya to determine the barriers to the uptake of cataract surgery.

B) There is need to carry out research on congenital cataract among pastoralist communities in Kenya.
REFERENCES


APPENDICES

APPENDIX 1: QUESTIONNAIRE

My name is Liban A. Mohamed, a student from Kenyatta University, researching on the barriers to the uptake of cataract surgical services in Merti Division of Isiolo District, Eastern Province, Kenya. This questionnaire will be used by the researcher to interview the cataract blind during the mobile clinics and the information given by the respondents will be kept in confidence. Only one answer with be required for each question.

STAGE ONE

The data will be collected from the cataract patients during the mobile clinics in Merti Division.

Patient’s name: Age: Case number:
1) Age: 1) under 5 years 2) 5-20 3) 20-40 4) 40-60 5) Over 60 yrs
2) Sex: 1) Male 2) Female
3) Location: 1) Bisan Biliku 2) Bulesa 3) Merti 4) Korbesa 5) Malkagalla 6) Yamicha
4) Religion: 1) Islam 2) Catholic 3) Protestant 4) others (specify)
6) Eye(s) with cataract: 1) Right eye 2) Left eye 3) Both eyes
7) Economic Status: 1) Rich (over 100 cattle, over 200 shoats, over 10 camels) 2) Poor (< 100 cattle, <200 shoats, <10 camels)
8) Educational level:  1) None  2) Nursery  3) Primary  4) Secondary
                       5) College  6) University  7) others (specify)

9) Distance from referral hospital:
   1) 170 km  2) 180 Km  3) 210 Km  4) 240 km  5) 280 Km

10) Do you know where the Isiolo Eye Unit is?  1) Yes  2) No

11) Where do you go for your eye problem?  1) Local dispensary
                      2) Health centre  3) Herbalist
                      4) Traditional healer
                      5) Spiritual healer  6) Stay at home

12) Are they competent to handle eye conditions?  1) Yes  2) No  3) Don’t know

13) Give one reason for 12:  1) Knowledgeable
                      2) No eye services available
                      3) Well equipped with drugs 4) Don’t know
                      5) No eye specialist

14) Why don’t you go to Isiolo Eye Unit for your eye problems?
   1) Expensive  2) Distance  3) No good services  4) No guide
   5) No permission  6) Nobody to leave behind  7) Security  8) Don’t know
   9) Waiting for vision to become worse

15) How do you reach Isiolo town?  1) By vehicle  2) Walking
                      3) By donkey  4) Other means (specify)
16) Is it expensive to go to Isiolo town? 1) Yes 2) No

17) Give one reason for 16: 1) Travel cost 2) Meals and accommodation 3) Cost of surgery 4) Can't afford 5) can afford to travel

18) Is the road network to Isiolo a major problem? 1) Yes 2) No

19) If Yes, give one reason: 1) Rough 2) Long distance 3) Insecure 4) Impassable during rainy season 5) Bushy and may cause eye injury 6) Other reasons

20) How is the eye care service at Isiolo Eye Unit? 1) Poor 2) Satisfactory 3) Good 4) Excellent 5) Don’t know

21) If poor, what is the reason for it? 1) Poor staff motivation 2) No inpatient facility 3) Not equipped 4) Bad surgery 5) No drugs 6) Expensive 7) No idea

22) Suggest one reason on how services can be improved. 1) Reduce cost of surgery and admission 2) Motivate staff 3) Establish in patient facility 4) Avail drugs and consumables 5) Establish outreach programme 6) Create community awareness
23) How much can you afford to pay for your cataract surgery?
1) < Ksh 1,000  2) Ksh 1,000-3,000  3) Ksh 3,000-5,000  4) >Ksh 5,000

24) Who are your eye care providers?
1) Ministry of Health  2) NGO (specify)  3) Private (specify)  4) None

25) Do you fear eye operation?
1) Yes  2) No

26) Give reasons for 25:
1) Painful  2) Fear of becoming blind after surgery  3) No confidence with surgeon  4) Don’t like intra-ocular lens implant  5) Want to see.

27) How do you want us to improve eye care services in this area?
1) Train eye care health workers  2) Visiting eye specialist during outreach programme  3) Avail eye drugs in rural health facilities  4) Improve road network system  5) Improve security  6) Open centre for eye operation

28) How long did you stay blind?
1) < 1 month  2) 1-3 months  3) 3-6 months  4) 6-12 months  5) 1-2 years  6) >2 years
STAGE TWO

The data will be collected from the cataract patients who will visit Isiolo Eye Unit for surgical intervention within one month after booking by the researcher.

29) Date seen after booking at Isiolo Eye Unit  1) Week 1  2) Week 2
   3) Week 3  4) Week 4  5) Didn’t show up

30) Reasons for turning up for surgery as booked.
   1) Have money
   2) Taken to hospital by relative
   3) Consent given
   4) Transport available
   5) Somebody to leave at home
   6) Did not come for booking
STAGE THREE

The data will be collected from the cataract patients who will not show up for surgery at Isiolo Eye Unit after one month of booking.

31) Reasons for not turning up for surgery after one month. (Re-visit to the locations)

1) Nobody to leave my cattle, children, husband, wife or house with

2) Nobody to take me to hospital

3) Son/husband etc have not given consent

4) Cannot afford

5) Road not secure

6) Came for booking

7) Not traced

8) Left with animals for pasture

9) Died
APPENDIX 2: LOCATION OF ISIOLO DISTRICT IN KENYA

Source: Central Bureau of Statistics, Nairobi, 1999
APPENDIX 3: THREE METRES SNELLEN'S CHART-E
APPENDIX 4: RESEARCH PERMIT

KENYATT A UNIVERSITY
BOARD OF POSTGRADUATE STUDIES
P.O. Box 43844,
NAIROBI
Tel. No. 81090119 Ext. 57530
E-mail: kahbps@yahoo.com

Our Ref: 157/7514/02
Your Ref:

Date: 28th October, 2003

The Permanent Secretary,
Ministry of Education, Science & Technology,
P.O.Box 30040
NAIROBI.

Dear Sir/Madam,

RE: RESEARCH AUTHORIZATION:

I write to introduce Mr. Liban A. Mohamed who is a Postgraduate Student of this University. He is registered for a Masters of Public Health & Epidemiology (M.P.H.E) degree programme in the Department of Zoology.

Mr. Mohamed intends to conduct research for a project entitled, "Barriers to Uptake of Cataract Surgical Services in Merti Division of Isiolo District, Eastern Province, Kenya," as a partial fulfillment of the requirement of his degree programme.

Any assistance given to him will be highly appreciated.

Yours faithfully,

J.K. LANGAT
FOR DIRECTOR, BOARD OF POSTGRADUATE STUDIES
C.C.: Registrar (Academic)
Director, BPS - to see on file
Dean, School of Pure & Applied Sciences.
Chairman, Zoology Dept.

JKL:ss