

**COST AND PRODUCTIVITY OF CATARACT
SURGERY IN DIFFERENT EYE CARE DELIVERLY
SETTINGS IN KENYA**

MSc DISSERTATION

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Data collection form

Map of Kenya Eye Care service delivery points

Abbreviations

| | |
|-------------------|--|
| CBM : | Christoffel - Blinden Mission. |
| DALY : | Disability Adjusted Life Years. |
| “ECCE + PCIOL” : | Extra-capsular cataract extraction with posterior chamber intraocular lens implant. |
| GOK : | Government of Kenya, |
| “ICCE” | Intracapsular capsular cataract extraction. |
| “ICCE + SPECS ” : | Intracapsular capsular cataract extraction with aphakic spectacle correction. |
| IOL : | Intraocular lens. |
| KMTC: | Kenya Medical Training College |
| KNH : | Kenyatta National Hospital. |
| KOP: | Kenya Ophthalmic Programme. |
| KSB : | Kenya society for the blind. |
| NGDO : | Non-governmental Developmental Organisation. |
| UON : | University of Nairobi. |
| WHO : | World Health Organisation. |

Quote

“We do not have enough.

We will never have enough.

We have to economise.

At all costs.”

1. Abstract

Background

Cataract which is defined as an opacity of the crystalline lens of the eye is the leading cause of visual impairment and blindness in Kenya and in the whole world in general. The global backlog of people blind from cataract is expected to be about 25 million by the turn of the century. Majority of cataracts are age related. Surgical removal of the opaque lens and correction with an intraocular lens implant or aphakic spectacles is the only known treatment. There is no known drug treatment. The global burden of cataract blindness is on the increase as a result of the increase in life expectancy and a relative shortage of facilities for cataract surgery. The poor developing nations in Africa and Asia are most affected⁽⁹⁾. Resources allocated for the treatment of cataract in Kenya like in other developing nations, are not only scarce but have also been shrinking with time. Prioritisation during planning and resource allocation should be done for the benefit of the majority in the spirit of “ health for all by the year 2000 and beyond ”. This can only be possible if we are aware of the costs incurred in cataract surgery and the ways by which costs can be contained. Cost sharing is one of the means of financing health services in Kenya. When the costs of each individual health services e.g. cataract surgery is known, it is easy to estimate how much patients should be charged as hospital user charges. Overcharging lowers utilisation while undercharging threatens sustainability of the health services. The exact cost per unit service should thus be reviewed regularly.

Aim

The purpose of this cost analysis study was to describe the costs and productivity of cataract surgery in the different Eye Care delivery settings in Kenya.

Methods

Three Eye Units representing three unique Eye Care delivery settings in Kenya were selected for the study. Kikuyu Eye Unit represented the typical Kenyan NGDO setting, Lions Eye Unit a service club setting and Nakuru Eye Unit the Government Eye Care delivery setting. The productivity of cataract surgery was calculated from the information extracted from the Eye Units monthly returns and annual reports. The information was further counterchecked with the theatre registers and the data from the National Eye Health Information Office. The cost of each of the consumable items used for cataract surgery was calculated separately using the information gathered from hospital store records and from the surgeons and other theatre staff using the data collection form. The costs of all the items were finally summed up to get the unit cost of consumables used in a single cataract operation. The data were finally entered into summary tables and conclusions made. The productivity and costs of consumables for the three Eye Units were compared.

Results

Kikuyu performed 53%, Lions 9% and Nakuru 4% of all the 9495 cataract operations reported in the 1998 annual report of the Kenya Ophthalmic Programme.

Kikuyu Eye Unit theatre did 100, Lions 17 and Nakuru 7 cataract operations per week.

In one theatre day, Kikuyu operated on 20, Lions 9 and Nakuru 4 cataracts.

Cataract operations per surgeon per week was 13 at Kikuyu, 9 at Lions and 2 at

Nakuru. None of the three Eye Units in the study had a waiting list for cataract surgery.

The unit cost of consumable items used in a single cataract operation was US\$ 11.2 at Lions US\$ 14.6 at Kikuyu Eye Units and US\$ 23.5 at Nakuru.

The IOL and the corneal suture were the most expensive items. The two accounted for 40 %, 61 % and 63 % of the total cost of consumable items used in a single cataract operation at Lions, Kikuyu and Nakuru respectively.

Conclusions

None of the three Units had realised its full potential in productivity of cataract surgery. The IOL was the single most expensive consumable item used for cataract surgery at Kikuyu and Lions Eye Units. At Nakuru, it was the corneal suture.

Kikuyu Eye Unit which represented the typical Kenyan NGDO Eye Care delivery setting had the highest productivity of cataract surgery at the cost of US\$ 14.6 per one unit of consumable.

Lions Eye Unit which represented an NGDO Eye Care setting whereby the sponsoring NGDO also managed the day to day running of the unit it was sponsoring performed cataract operation at the lowest cost per unit of consumables (US\$ 11.2). The unit had low productivity of cataract surgery when compared to Kikuyu.

Nakuru Eye Unit represented the Government of Eye Care delivery setting. The unit had the lowest productivity of cataract surgery and the highest cost of a unit cost of consumables (US\$ 23.5).

Recommendations

It was recommended that: The three study Eye Units should increase the demands for their cataract surgical services through Social Marketing. The cost of consumable items used for cataract surgery should be monitored as part of the National Eye Health Information System management data and feedback passed over to the Eye Care sponsors and providers regularly. It should be confirmed whether the problems of transport and supply of consumable items facing Nakuru may also be affecting the other Government Eye Units with the aim of resolving them.

2. Introduction

2.1 Magnitude and prevention of blindness due to cataract

The WHO estimates that about 0.7 % of the world population is blind [Thylefors et al,1994] and projects that around 50 million people will be blind by the year 2000.

Cataract which is defined as an opacity of the crystalline lens of the eye is the leading cause of visual impairment and blindness in Kenya and in the whole world in general.

The global backlog of people blind from cataract is expected to be about 25 million by the turn of the century. Majority of cataracts are age related. Surgical removal of the opaque lens and correction with an intraocular lens implant or aphakic spectacles is the only known treatment. There is no known drug treatment. The global burden of cataract blindness is on the increase as a result of the increase in life expectancy and a relative shortage of facilities for cataract surgery. The poor developing nations in Africa and Asia are most affected⁽⁹⁾.

Despite cataract blindness being a big economic burden in developing nations, there is some consolation in that its treatment is one of the most cost effective public health intervention according to studies done in India, and Nepal⁽¹⁾⁽²⁾.

2.2 Kenya health and Eye Care management information (map on page 52).

Kenya is located on the East African coast astride the equator. The capital city is Nairobi. The following background information was gathered from the Kenya Health Policy Framework and the national Eye Health information office of the Kenya

Ophthalmic Programme:

Demographic

Total area of Kenya: 582,650 square kilometres.

Total population: 30 million.

| | |
|--|---|
| Life expectancy at birth: | 60 years. |
| Population under 15 years: | 47 %. |
| Population 50 years and above: | 10 %. |
| Population growth rate: | 2.7 %. |
| Sex ratio (M : F) : | 1 : 1. |
| Health sector | |
| Ministry of health per capita expenditure: | US\$ 3. |
| Hospital beds: population: | 1 : 500. |
| Doctor: population: | 1 : 5,000. |
| Human resources for eye care | |
| Ophthalmologists : population: | 1 : 1,000,000 (1 : 2,000,000 in rural Kenya). |
| Cataract surgeons: population: | 1 : 400,000. |
| Ophthalmic clinical officers : population: | 1 : 250,000. |
| Major causes of blindness | |
| Prevalence of blindness: | 0.7 %. |
| Blindness due to cataract: | 42 %. |
| Blindness due to trachoma: | 19 %. |
| Blindness due to glaucoma: | 9 %. |
| Eye care resource utilisation | |
| National average eye bed utilisation: | 23 %. |
| Average length of stay in eye ward: | 5.6 days. |
| Performance of the Eye Care Programme | |
| Total cataract operations per year: | 10,000. |

Cataract Surgical Rate: 330 operations /million / year.

Proportion of the patients seen with cataracts

who report back for surgery in a year: 30 %.

2.3 Sponsors of Eye Care Services

Both the Government and the NGDOs sponsor and render Eye Care services through a network of static and outreach Eye Units referred to as the Kenya Ophthalmic Programme (KOP).

The Kenya Ophthalmic Programme is jointly managed by the KSB and the Ministry of Health. It has about 60 static and 21 mobile eye units scattered all over the country.

The Kenya Society for The Blind is the main local NGDO involved in blindness prevention activities. It has been supporting the Kenya Ophthalmic Programme since 1956. Most international NGDOs fund the KOP through the KSB.

The main international NGDOs funding KOP activities are:

Sight Savers International (SSI),

Operation Eye Sight Universal (OEU),

Christoffel - Blinden Mission (CBM),

Fred Hollows Foundation (FHF),

Helen Keller International (HKI),

Edna McConnel Clark Foundation (EMCF),

Lions Clubs (International, Local, and German) and

Salus Oculi (DBHW).

2.4 Activities in the Kenya Ophthalmic Programme

Cataract surgical services are delivered at static and mobile eye units and at eye camps. Static eye units act as base stations for mobile outreach and eye camps.

The outreach teams usually take with them equipment and eye drops (mainly for cataract surgery) from the base eye units.

Some units occasionally render inreach services.

In Kenya, Eye care policy is in favour of “ECCE+PCIOL”.

The “ICCE+SPECS” method of surgery is being phased out.

The curriculum for training cataract surgeons is under review to accommodate the change in policy.

Between 1996 and 1998, the Fred Hollows Foundation conducted short conversion from “ICCE” to “ECCE+PCIOL” courses for all the ophthalmologists and cataract surgeons in Government Eye Units in Kenya. The foundation donated and also made available scanoptic microscopes, surgical sets and intraocular lenses to all the Kenya Ophthalmic Programme Eye Units implanting IOLs through the KSB at affordable prices. A revolving fund for the project has been put in place by the KSB.

The price of one intraocular lens to Kenyan patients in Government and NGDO Eye Units is about US\$ 10.

In Private hospitals in Kenya, the cost of cataract surgery with an IOL varies a lot but can be as high as US\$ 1,106.

Some sponsors of high surgical volume Eye Camps prefer “ICCE+SPECS” due to the high cost of “ECCE+PCIOL” in terms of equipment and time.

To my knowledge, no study has so far been done in Kenya to determine how cost effective cataract surgical services are.

3. Literature review

The WHO programme for the prevention of blindness puts emphasis on the importance of appropriate technology in cataract surgery in order to make the service affordable by the local populations especially in developing nations ⁽⁶⁾⁽⁷⁾⁽⁸⁾⁽¹⁶⁾.

Cataract surgery has been found to be among the most cost-effective public health interventions. In a study done in India in 1997 [Shamanna B R, Lalit Dandona and Gullapalli N Rao], it was found that India could save US\$ 1.1 billion per year by investing US\$ 0.15 billion in treating all her cataract blind⁽¹⁾. In a similar study done in 1996 Nepal, it was found that under best estimate scenario, cataract surgery had a cost of US\$ 5.06 per disability-adjusted life year (DALY), placing it among the most cost-effective of public health interventions [Marseille E]⁽²⁾. The DALY is an index which is commonly used in economics for estimating benefits from a health intervention. It allows the health impact on both life years and quality of life to be expressed in a single measure (World Bank, World Development Report, 1993). It weighs life years (saved or lost) by the quality of life experienced in those years. The DALY is therefore a better indicator of the importance of the disease than the prevalence and hence the impact on reducing blindness and disability that an effective measure would have. The cost of a single cataract operation varies a lot from one institution to the other depending on many factors among them the number of operations, method of surgery, techniques used, experience of the surgeon and the cost of consumable items. It can be calculated using following the following equation ⁽⁹⁾:

$$\text{Cost per cataract operation} = \frac{\text{fixed cost}}{\text{number of cataract operations}} + \text{cost of one unit of consumables.}$$

It has been estimated in several studies to be as follows:

| author | country | cost (US\$) |
|--------------------------------|---------|-------------------|
| Marseille ⁽²⁾ | Nepal | 5.06 per D.A.L.Y |
| Shamanna et al ⁽¹⁾ | India | 48.6 (ECCE+PCIOL) |
| | | 21.5 (ICCE+SPECS) |
| Murthy et al ⁽⁵⁾ | India | 23 (ICCE+SPECS) |
| Gillemot et al ⁽¹⁶⁾ | Bamako | 60 (ECCE+PCIOL) |
| | | 56 (ICCE+SPECS) |

The unit cost of fixed items could be minimised by increasing the number of operations done in an Eye Unit as shown by the above equation. Under such circumstances, the most important component of the equation would be the cost of consumables⁽⁸⁾⁽¹⁵⁾.

The cost of consumable items used for cataract surgery with an IOL implant also vary considerably depending on the technology used, the surgical techniques, the experience of the surgeon and the cost containment measures which have been put in place⁽¹⁰⁾.

In Africa, the cost of consumables has been estimated to be about £ 10 which is equivalent to about US\$ 15.8⁽¹⁹⁾. In London, it varies from £ 21.74 to £ 112.58 depending on the technique used and the experience of the surgeon. That is on average £ 51.67 (equivalent to US\$ 81.6) per unit of consumables used for a single cataract operation in London⁽¹⁰⁾.

Even though economic analysis is an important method of prioritising cataract surgical resource allocation, it should not be taken in isolation. The primary purpose of health care should be to improve the duration and quality of life of patients and not to make profits. High cost of services undermine utilisation of the available facilities.

The dilemma as to whether cataract surgical services should be rendered free or charged for at market value still persists. There are those who believe the cataract services should be marketed like any other goods/services in an open market economy

and others, especially religious NGOs and service club, who believe that the services should be rendered free to the poor⁽¹⁾⁽⁶⁾⁽¹⁵⁾.

Like many other Governments in developing nations, the Kenya Government is under intense pressure from the World Bank and the International Monetary Fund to implement a painful and unpopular structural adjustment programme which dictates that patients in public hospitals must bear an increasing proportion of the cost of medical care⁽¹⁹⁾.

It is traditionally believed that “ICCE+SPEC” cost less than “ECCE+PCIOL”.

Several authors however dispute this and insist that “ECCE+PCIOL” is actually cheaper if one takes into consideration the better visual outcome and satisfaction it gives to the patients. The cost of changing aphakic spectacles when the lenses get scratched or frames get broken can also be an economic burden to patients⁽¹¹⁾. In Kenya, Eye Care Policy has been changed in favour of “ECCE+PCIOL” method of surgery by the National Prevention of Blindness Committee.

The availability of cheap reasonably high quality intraocular lenses, cataract sets, and microscopes have reduced the cost of “ECCE+PCIOL”⁽¹³⁾⁽¹⁵⁾⁽¹⁷⁾⁽¹⁸⁾.

The cost of cataract surgery decreases with increase in surgical volume of a given eye unit with a “break even” point being reached at about 500 operations per year⁽⁶⁾⁽¹⁵⁾⁽¹⁷⁾.

In Aravind Eye Hospitals in India, it was estimated that one surgeon can perform 8-10 ICCE or 5 ECCE+PCIOL operations per hour “with proper infrastructure and utilisation of operating room” [Natchiar G, Robin A L, Thulasiraj R D et al]⁽⁸⁾.

In Africa, every cataract surgeon generally perform 200 cataract operations per year⁽⁶⁾.

Long length of stay in hospital increases the cost of surgery. By reducing the length of hospitalisation of cataract patients, one can increase the number of operations done

within a fixed budget ⁽¹²⁾⁽²⁰⁾. Out patient cataract surgery is possible and can be safely done as long as the safety precautions are taken to minimise complications⁽⁴⁾.

Low utilisation of available surgical facilities indirectly increases the cost of surgery due to cost incurred through depreciation of fixed equipment and buildings ⁽¹⁴⁾.

4. Rationale

Resources allocated for the treatment of cataract in Kenya as in other developing nations, are not only scarce but have also been shrinking with time. Prioritisation during planning and resource allocation should be done for the benefit of the majority in the spirit of “health for all by the year 2000 and beyond”. This can only be possible if we are aware of the costs incurred in cataract surgery and the ways by which costs can be contained.

Cost sharing is one of the means of financing health services in Kenya. Knowing the costs of each of the individual health services e.g. cataract surgery, make it easy to project how much patients should be charged as hospital user charges. Overcharging lowers utilisation while undercharging threatens sustainability of the health services. The exact cost per unit service should thus be reviewed regularly.

The purpose of this cost analysis study was to describe the costs and the productivity of cataract surgery in three different Eye Care delivery settings in Kenya during a period of transition from the traditional “ICCE+SPECS” to the more modern “ECCE+PCIOL” method of cataract surgery and hopefully, act as a catalyst for future studies on the cost effectiveness of cataract surgical services in Kenya.

The goal of all the Eye Care settings was to maximise productivity of high quality cataract surgery while at the same time keeping the cost of surgery affordable to the common citizens. The strategies used to achieve the goal varied from one setting to the other since each of the settings (e.g. Government and NGDO) operated in its unique context in terms of policy and availability of resources.

When the cataract surgical output is high, as it was expected in the study eye units, the most important determinant of the cost of a single surgical procedure is the unit cost of

consumables. The unit cost of overheads per single surgical procedure can be minimised by operating on large numbers of patients⁽⁶⁾⁽⁹⁾⁽¹⁴⁾⁽¹⁵⁾⁽¹⁷⁾.

The productivity and costs of consumable items used for cataract surgery in Kenya was analysed. The comparison of how the two variables varied from one setting to the other was done.

The average length of stay in hospital was also calculated for each of the units since it directly affects productivity. The longer the patients are admitted for cataract surgery the higher the overall cost of surgery. By reducing the length of hospitalisation, one can increase the number of operations done within a fixed budget⁽⁹⁾⁽¹²⁾.

5. Aim and Objectives:

Aim:

To describe the costs and productivity of cataract surgery in different Eye Care delivery settings in Kenya.

Objectives :

- To estimate and compare the costs of consumables used in cataract surgery in different eye care settings.
- To estimate and compare the productivity of cataract surgery in different eye care settings.

6. Methodology

This cost analysis study was done in Kenya between 12th April and 10th June 1999.

The data were compiled using information for the year 1998. Consent to do the study was granted by the relevant authorities. Three of the best performing Eye Units (according to previous records) were selected from the 12 referral Eye Units in Kenya to represent three distinct Eye Care delivery settings in the Kenya Ophthalmic programme. It was assumed that the best performing Eye Units represented the ideal situation in each of the settings. Time and budgetary restrictions could not allow for more Units to be visited. The selected Eye Units were as described below:

6.1 Eye Care Settings

6.1.1 Kikuyu Eye Unit (NGDO Setting).

The best model Eye Unit for studying NGDO setting in Kenya.

Is located about 15 kilometres north of Nairobi city.

A Mission Hospital Eye Unit owned and managed by the Presbyterian Church of East Africa (PCEA) and sponsored mainly by the CBM (an NGDO).

Is the largest and the busiest Eye Clinic in the Eastern and Central African region.

Offers both static and outreach (road/air) services. Patients are treated free of charge at outreach clinics but do cost-share at the static unit.

Has modern facilities and serve as a referral Eye Unit for Kenya and the neighbouring countries.

Trains ophthalmic assistants and offers practical training facilities for clinical officers, cataract surgeons, and postgraduate students from the KMTC and the UON.

6.1.2 Lions Eye Unit (NGDO Service Club Setting)

A recently built modern Eye hospital opened in 1997. Located at Loresho, about ten kilometres north of Nairobi city.

Even though Lions Club falls under the NGDO sector like Kikuyu, this Eye Unit was selected for the study because it was functioning in a unique setting different from the typical Kenyan NGDO setting in the following ways:

First the Unit was built, managed and owned by the local Lions club assisted by Lions Sight First Programme. Most NGDOs financing Eye Care in Kenya neither render services directly to the neither public nor run the administration of the Eye Units which they sponsor. They usually finance Government or Mission health facilities rendering Eye Care services. There is no regulation in Kenya prohibiting NGDOs from rendering services the Lions way. Secondly, the Eye Unit was the only hospital offering most of its cataract surgical services through inreach instead of the traditional outreach services. Patients were collected from Kitui and Kirinyaga Districts, transported to the hospital for surgery and then back to their respective districts free of charge. Kitui is about 150 kilometres and Kirinyaga 100 kilometres from Lions Eye Unit. Patients attending the static clinic directly however did cost-share.

The Unit was gradually expanding its outreach services with the aim of covering most of the districts in country.

In the discussion, this Unit is discussed under NGDO setting.

6.1.3 Nakuru Eye Unit (Government Setting)

Typical model of a Government Eye Care delivery setting.

Located about 170 kilometres north of Nairobi city.

It is a department of the Nakuru Provincial General Hospital and the provincial and referral Eye Unit for the Rift Valley Province.

Funded mainly by the Kenya government.

Outreach services funded by SSI through the KSB.

All patients (including outreach) pay for services inline with the GOK cost-sharing policy.

Offers practical training facilities for Ophthalmic Clinical Officers, Cataract Surgeons, and postgraduate students from the KMTC and UON.

The data were gathered by the author from the three Eye Units records and from and discussions with the relevant members of staff like the eye surgeons, nursing officers, stores in charge and the hospital administrators using the study data collection form.

Data for each of the Eye Units were collected on separate data collection form.

The following information was recorded in the data collection form:

6.2 General information:

Name of the Eye Unit and date of reporting.

Number of theatres and theatre operation tables.

Operation days per week and average number of theatre hours per day.

Total number of eye operations done in 1998.

Total number of cataract operations done in 1998 and the methods of surgery.

Length of stay of a cataract patient in eye ward as per routine cataract treatment protocol used at the Eye Unit.

Personnel rendering cataract surgical services: ophthalmologists, cataract surgeons, nurses, and assistants.

From the above data, the productivity of each of the unit was calculated and recorded in tables as shown under results. One year was assumed to be equal to 50 weeks.

6.3 Costs of consumables

Only the consumable items used in theatre were costed.

The cost which was recorded for each item was its cost when purchased from the manufacturer without transport, duty and profit. Where the items could not be purchased directly from the manufacturer, then the cost from the main supplier was recorded. The 1998 exchange rate of Kenya shillings 65 to the US\$ was used.

The cost of each consumable the items used in a single operation was calculated by dividing the cost by the number of operations the item was used on. This made it possible to calculate the cost of each item separately and finally add them up to get the unit cost of consumables needed for cataract surgery.

The following list shows the items which were used for cataract surgery at the study Eye Units and were included as part of the cost:

1. PCIOL:

Aurolab (Kikuyu),

OMNI (Lions Eye Unit),

Fred Hollows (Nakuru).

2. Corneal suture:

10.0 /9.0

3. Medicines:

eye drops:

antibiotics

steroids

miotics

mydriatics

povidone iodine

injection:

local anaesthetics

antibiotics

steroids

IV fluids

adrenaline

4. Others :

cleansing materials

antiseptics / spirit

needles / syringes / tubing's

hyalase

viscoelastics

superior rectus suture (4.0/5.0/6.0)

dressing materials

disposable linen/drapes, caps and masks

gloves

surgical blades/knives

German swabs (sponcels)

A-scan paper

After collecting the above data , the author held general discussions with the key members of each Eye Unit team individually and in a group as situation allowed and noted their comments. This was done in order to enrich author's knowledge on the

three Eye Care delivery setting. The proceedings were noted. The discussions were centred on the following issues :

- Funding of cataract surgical services.
- Strategies for containing the cost of cataract surgery eg Appropriate Technology, Economical use (eg sutures), Bulk purchases / importation, Improvisation (eg air in place of viscoelastics), Donations etc.
- Major difficulties e.g. shortage of patients, training, lack of transport, hospital charges etc.
- Future plans on how to increase cataract surgical output and expand services.

The author finally visited the National Eye Care Coordination Office and familiarised himself with the 1998 KOP performance indicators.

Important documents like annual reports, budget proposals, personnel/financial reports etc from the Eye Units and KOP were handled confidentially.

The data from all the units were then entered into a summary sheet and used as shown below under results.

7. Results:

During the study period, the three study Eye Units were routinely performing “ECCE+PCIOL” method of cataract surgery under local anaesthetic.

General anaesthetics were rarely used and reserved for children.

In Nakuru, 28 lens washout without IOL implantation and 2 “ICCE” operations were performed on 28 patients who had traumatic cataracts and on 2 patients who had “ICCE+SPECS” done in first eye respectively.

Kikuyu performed 53%, Lions 9% and Nakuru 4% of all the 9495 cataract operations reported in the 1998 annual report of the Kenya Ophthalmic Programme.

None of the three Eye Units in the study had a waiting list for cataract surgery.

Nakuru operated half day theatre lists while the other two Eye Units theatres had whole day theatre lists.

Table 1

Theatre facilities and eye operations done in 1998 at the study Eye Units.

| Eye Unit | number of theatres | number of theatre tables | total cataract operations | | total operations |
|----------|--------------------|--------------------------|---------------------------|----|------------------|
| | | | number | #% | |
| Kikuyu | 1 | 4 | 5024 | 66 | 7618 |
| Lions | 1 | 3 | 857 | 75 | 1138 |
| Nakuru | 1 | 2 | 360 | 69 | 523 |

The percentages indicate the proportions of cataract surgery to the total eye operations done at each of the Units.

Figure 1

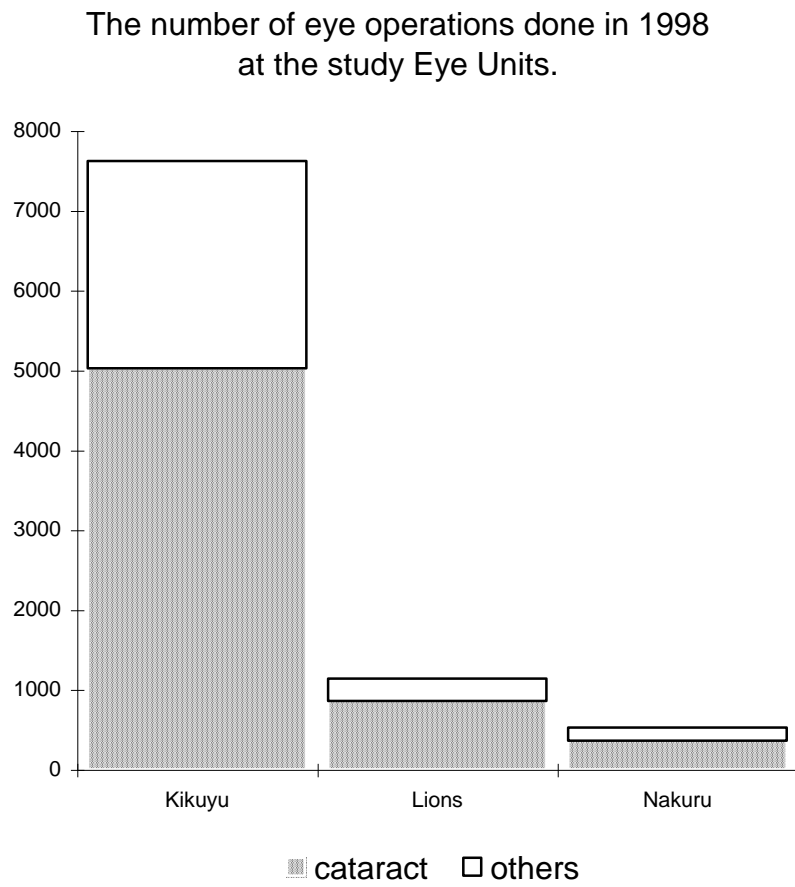


Table 2

Cataract operation team members.

2.a Surgeons doing cataract operations.

| Eye Unit | ophthalmologists | cataract surgeons |
|----------|------------------|-------------------|
| Kikuyu | 4 | 4 |
| Lions | 2 | 0 |
| Nakuru | 2 | 1 |

2.b Theatre staff assisting in cataract surgery.

| Eye Units | nurses | assistants |
|-----------|--------|------------|
| Kikuyu | 13 | 2 |
| Lions | 3 | 4 |
| Nakuru | 6 | 0 |

The ratios of surgeons (ophthalmologist/cataract surgeons) to assistants

(nurses/assistants) were as follows :

Kikuyu 8 : 15 , approximately 1 : 2

Lions 2 : 7 , approximately 1 : 3

Nakuru 3 : 6 , equal to 1 : 2

Table 3

Number of cataract operations per theatre and per surgeon (ophthalmologists plus cataract surgeons) assuming 1 year = 50 weeks. One week had 5 working days.

| Facilities and surgical output | Kikuyu | Lions | Nakuru |
|---|--------|-------|--------|
| Total number of surgeons | 8 | 2 | 3 |
| Total number of operation days per year | 250 | 100 | 100 |
| Total cataract operations per year | 5024 | 857 | 360 |
| Number of operations per week | 100 | 17 | 7 |
| Operations per surgeon per week | 13 | 9 | 2 |
| Operations per theatre per day | 20 | 9 | 4 |
| Operations per surgeon per theatre day | 3 | 5 | 1 |

Table 4

Length of stay of a cataract patient in eye ward in days as per the 1998 routine cataract treatment protocol.

| Eye Unit | days pre-op | days post-op | length of stay |
|----------|-------------|--------------|----------------|
| Kikuyu | 1 | 1 | 2 |
| Lions | 1 | 3 | 4 |
| Nakuru | 1 | 1 | 2 |

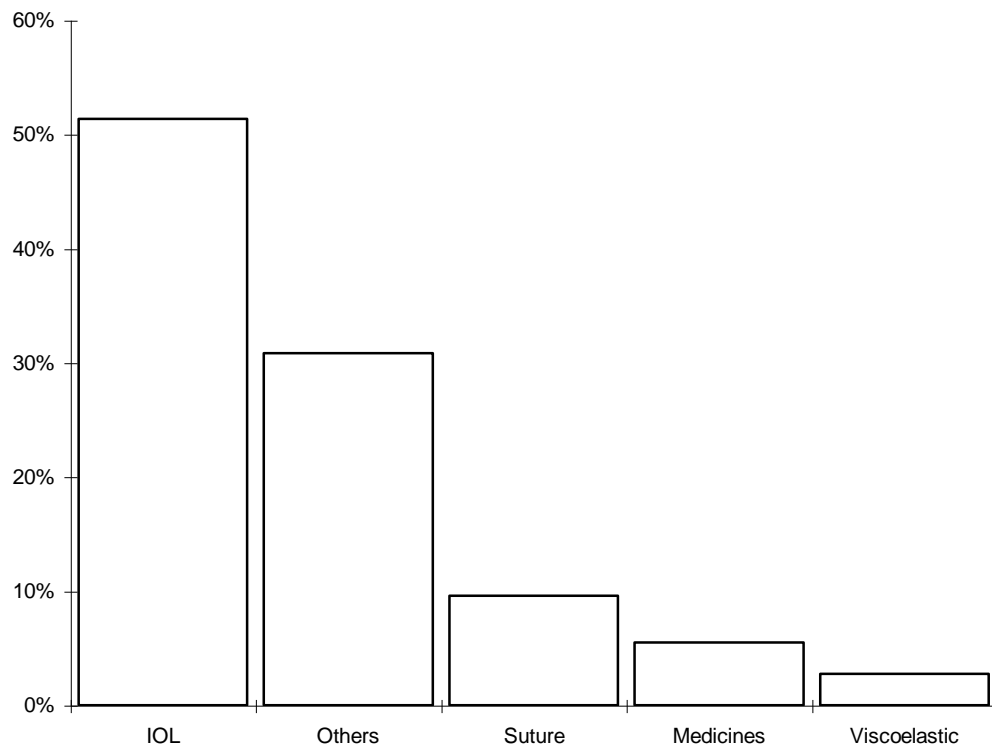
Table 5

Unit cost of consumables used for one cataract operation at the study Eye Units in US dollars and the proportions of the costs of each of the items out of the total costs.

| consumable items | Kikuyu | | Lions | | Nakuru | |
|--------------------------|--------|-----|-------|-----|--------|-----|
| | US\$ | % | US\$ | % | US\$ | % |
| intraocular lens (PCIOL) | 7.5 | 51 | 3.0 | 27 | 7.0 | 30 |
| corneal suture | 1.4 | 10 | 1.4 | 13 | 7.7 | 33 |
| viscoelastics | 0.4 | 3 | 0.5 | 4 | 0.0 | 0 |
| medicines | 0.8 | 5 | 0.8 | 7 | 1.0 | 4 |
| others | 4.9 | 31 | 6.0 | 49 | 7.8 | 33 |
| Total cost | 14.6 | 100 | 11.2 | 100 | 23.5 | 100 |

Figure 2

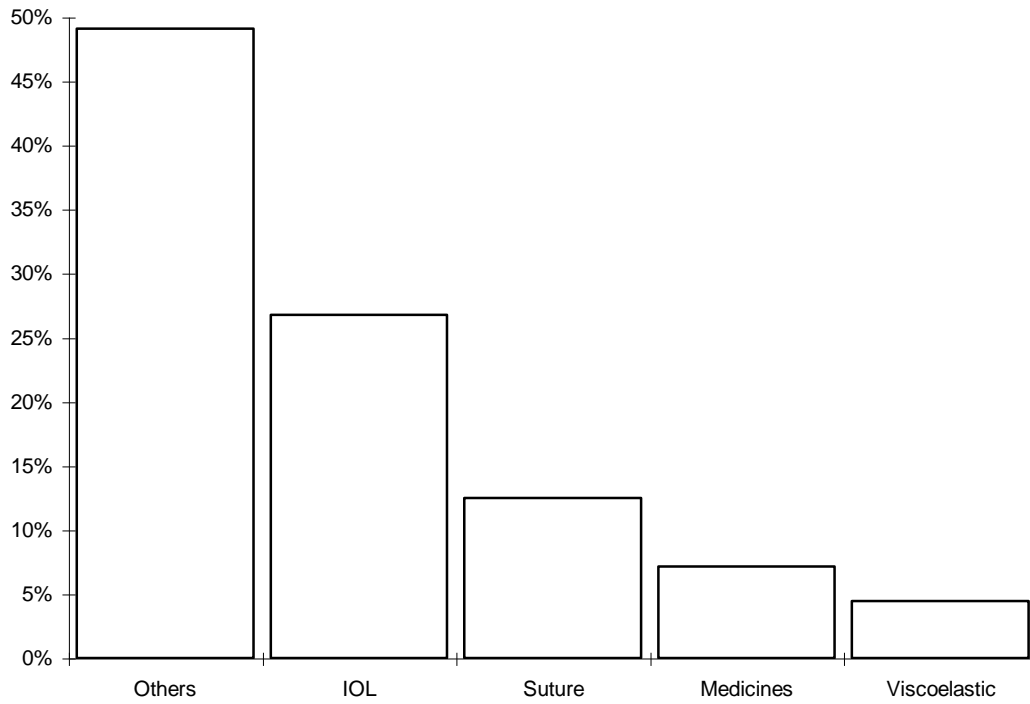
The proportions of the costs of the consumable items used in a single cataract operation at Kikuyu Eye Unit.



The total cost of consumables was US\$ 14.6.

Figure 3

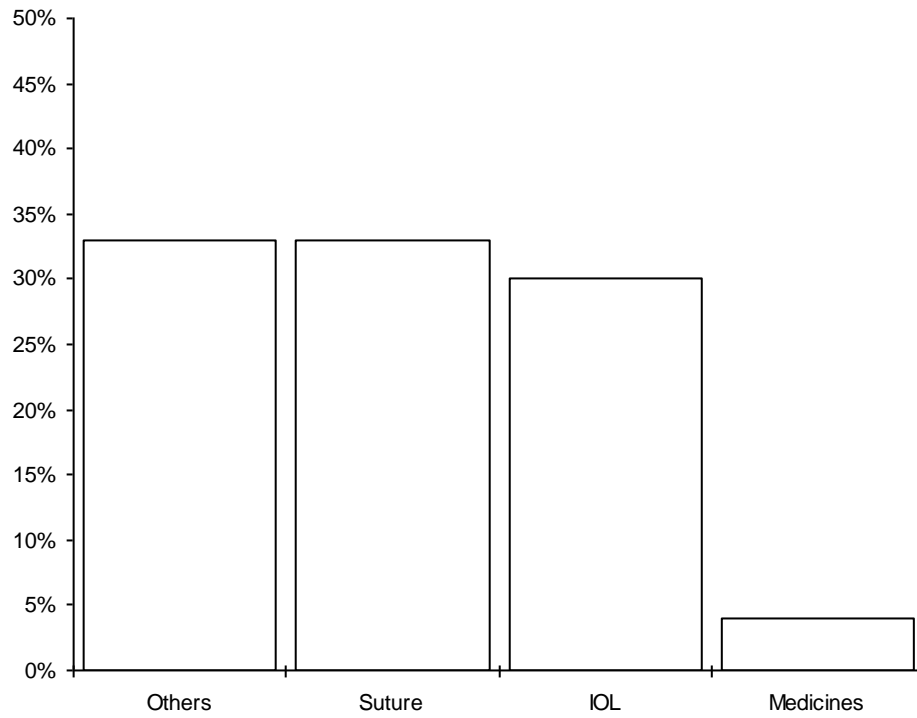
The proportions of the costs of the consumables items used in a single cataract operation at Lions Eye Unit.



The total cost of consumables was US\$ 11.2

Figure 4

The proportions of the costs of the consumable items used in a single cataract operation at Nakuru Eye Unit.



The total cost of consumables was US\$ 23.50

Figure 5

Summary of the total costs of consumable items used for a single cataract operation.

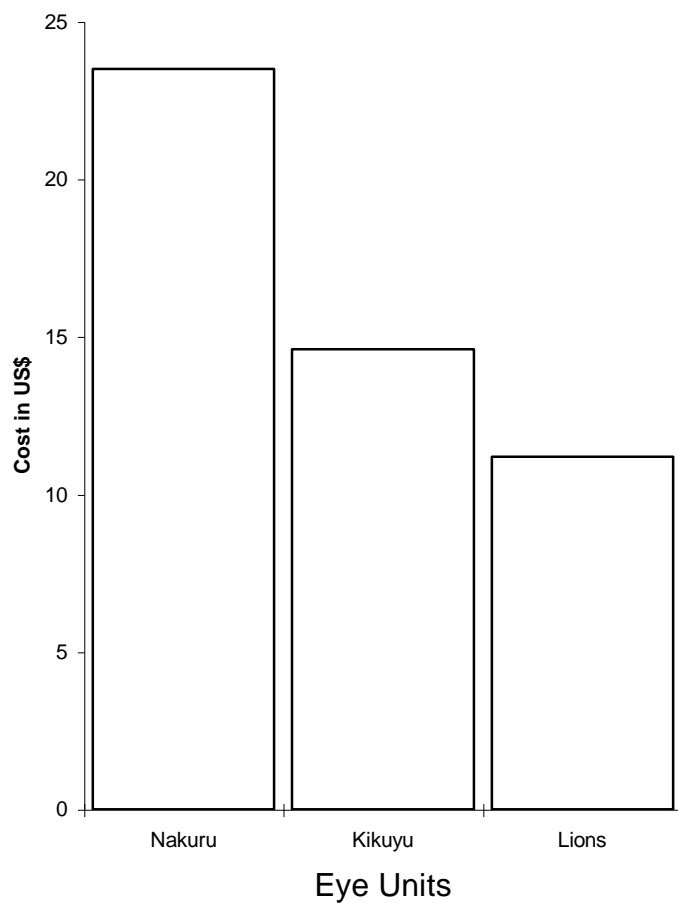


Table 6

Summary of the productivity of cataract surgery and length of stay.

| Eye Unit | cataract operations / week | cataract operations / surgeon / week | cataract operations / theatre day | length of stay in days |
|----------|----------------------------|--------------------------------------|-----------------------------------|------------------------|
| Kikuyu | 100 | 13 | 20 | 2 |
| Lions | 17 | 9 | 9 | 4 |
| Nakuru | 7 | 2 | 4 | 2 |

8. DISCUSSION

Cataract which is defined as an opacity of the crystalline lens of the eye is the leading cause of visual impairment and blindness in Kenya and in the whole world in general. Majority of cataracts are age related. Surgical removal of the opaque lens and correction with an intraocular lens implant or aphakic spectacles is the only known treatment. The global burden of cataract blindness is in on the increase as a result of the increase in life expectancy and a relative shortage of facilities for cataract surgery. The poor developing nations in Africa and Asia are most affected. The backlog of people blind from cataract is expected to be about 25 million by the turn of the century⁽⁹⁾. Cataract surgery has been found to be among the most cost-effective public health interventions . In a study done in India in 1997 [Shamanna B R, Lalit Dandona and Gullapalli N Rao], it was found that India could save US\$ 1.1 billion per year by investing US\$ 0.15 billion in treating all her cataract blind⁽¹⁾. In a similar study done in 1996 Nepal [Marseille E], it was found that under best estimate scenario, cataract surgery had a cost of US\$ 5.06 per disability-adjusted life year (DALY), placing it among the most cost-effective of public health interventions⁽²⁾. The DALY is an index which is commonly used in economics for estimating benefits from a health intervention. It allows the health impact on both life years and quality of life to be expressed in a single measure (World Bank, World Development Report, 1993). It weighs life years (saved or lost) by the quality of life experienced in those years. The years of healthy life are more desirable than years of poor health. The DALY is therefore a better indicator of the importance of the disease than the prevalence and hence the impact on reducing blindness and disability that an effective measure would have⁽⁹⁾.

In Kenya, about 0.7 % of the population is blind with cataract accounting for 42 % of the blind followed by glaucoma 19 % and trachoma 9 %.

The country has one ophthalmologist per million population and one Clinical Officer Cataract Surgeon per 400,000 Kenyans who operate on about 10,000 cataracts per year.

The Cataract Surgical Rate (CSR) of Kenya is 330 operations per million Kenyans per year.

Only 30 % of the patients seen with cataracts in the Kenya Ophthalmic Programme report back for surgery in a year.

Resources available for cataract surgical services are scarce and need to be economised and used without wastage. It is important to know the cost of cataract surgery in order to be able to budget appropriately. The most important items without which the surgery cannot be done and which markedly influence the cost of surgery should be identified and their costs minimised through various measures like appropriate technology, bulk purchasing etc. The costs of the less important “nice to have” items can be avoided or minimised. Improvisation of the item(s) can also be done as situation and budget dictates.

A country like Kenya which uses cost sharing as one of the methods of financing health care services need to know the exact cost per unit of service as a guide to the setting of the levels of hospital user charges. Regular updates of the cost of services helps in the adjustment of user charges as need arises.

Manpower and physical facilities for cataract surgical services should be fully utilised in order to contain the cost of surgery as explained below. At high productivity, the marginal cost is usually minimal⁽⁷⁾⁽¹⁵⁾.

The Kenya Ophthalmic Programme (KOP) was jointly started in 1956 by the GOK and the KSB . The two main Eye Care delivery settings existing in KOP at the time of this study were Government and the NGDO settings. The former operated under many problems mainly due to shortage of resources. The latter had better financial base and was better managed resulting in better staff motivation and higher productivity. The Government sector was undergoing reforms supervised by the World Bank and the International Monetary Fund. The main policy behind these reforms was that all patients attending Government hospitals should cost share⁽¹⁹⁾. The NGDOs were however not bound to follow that policy and rendered services free to all the patients they treated at outreach Eye Clinics and Eye Camps.

The purpose of this study was to describe the costs and productivity of cataract surgery in three distinct Eye Care delivery settings in Kenya during a period of transition from the traditional “ICCE+SPECS” to the more modern “ECCE+PCIOL” method of cataract surgery and hopefully, to act as a catalyst for future studies on the cost effectiveness of cataract surgical services in Kenya. The goals of all the Eye Care settings were the same : to maximise productivity of high quality cataract surgery while at the same time keeping the cost of surgery affordable to the common citizens.

The strategies used to achieve the goal varied from one setting to the other since each of the settings (e.g. Government and NGDO) operated in its unique context in terms of policy and availability of resources. The productivity and costs of consumable items used for cataract surgery in the different Eye Care delivery settings in Kenya were analysed and comparison on how the two variables vary from one setting to the other done. In order to show the ideal situation in each of the setting, the best performing Eye Unit from each of the settings was selected.

Kikuyu Eye Unit was selected to represent the NGDOs setting and Nakuru Eye Unit to represent the Government setting. Lions Club represented an NGDO service club Eye Care delivery setting. The full details of these settings are described above under methodology.

The study findings were discussed under the subheadings found below .

8.1 Limitations

The cost of one cataract operation includes the unit cost of fixed items plus the unit cost of consumables. In this study, only the unit cost of consumable items was analysed. It was assumed that, when the number of operations done in an Eye Unit are infinitely high, the most important determinant of the total cost of rendering cataract surgical services would be the unit cost of consumables as shown below⁽⁹⁾:

$$\text{Cost per cataract operation} = \frac{\text{fixed cost}}{\text{number of cataract operations}} + \text{cost of one unit of consumables.}$$

A convenient sample was selected from the Eye Units known to have been performing well. The author could not be able to visit Eye Units which were too far from Nairobi or study more than three Eye Units due to time and financial limitations. This made it difficult to generalise the results to the rest of the Eye Units in the country.

Despite the above limitations, the study results provided a starting point and hopefully acted as a catalyst for future studies on cost-effectiveness analysis of cataract surgical services in Kenya.

8.2 Facilities : Tables 1 and 2

The study Eye Units had one operating theatre each. The sizes of their theatres and the number of operation tables were different with Kikuyu having the largest theatre

with 4 operation tables, Lion Eye Unit second largest with 3 tables and then Nakuru with 2 tables.

In 1998, Kikuyu had eight surgeons operating on cataracts, Nakuru three and Lions two. The number of assistants (nurses/assistants) per surgeon were 2 at Kikuyu and Nakuru and 3 at Lions. In Nakuru, only qualified nurses worked in theatre. The roles of assistants and nurses in theatre were not clearly defined and overlapped. Both cadres could assist in surgery.

8.3 Performance : Tables 1 and 3 ; Figure 1

All the three Eye Units were performing “ECCE+IOL” method of cataract surgery under local anaesthetic. Operation under general anaesthesia was rarely done and was reserved mainly for children.

Kikuyu Eye Unit which represented NGDO Eye Care delivery setting had the highest overall performance. The Unit did 53% of all the cataract operations done in the Kenya Ophthalmic Programme (KOP) in 1998. This implies that most of the cataract operations done in Kenya were being done by the NGDO Eye Units with Kikuyu doing the bulk of them.

The Unit had no waiting list for cataract. Lack of a theatre waiting list in simple terms imply that the supply of cataract services was higher than the demand. The Eye Unit administrator estimated that the Unit was operating at 70% efficiency with respect to cataract surgery and confirmed that there was room for more operations if more patients were to be available. All what this pointed to was that, despite the excellent performance, Kikuyu Eye Unit was in one way or the other experiencing barriers to uptake of cataract surgical services. In several countries the principles of social marketing are being employed trying to break these barriers⁽¹⁵⁾. Kikuyu Eye Unit was

preparing for a pilot Community Based Rehabilitation(CBR) Programme using the model of Aravind Eye Hospitals in India.

All patients seen at outreach clinics were treated free of charge but those attending the static Eye clinic at base hospital did cost-share. Despite the surgical services being free at outreach clinics, the cost of services could still be a barrier to the uptake of services due the expenses on transport by the patient and accompanying relatives⁽³⁾.

The dilemma on who to charge and how much to charge for cataract services in poor nations still persists. The World Bank and the International Monetary Fund insists that all patients should pay for medical services and argues that free services are not sustainable⁽¹⁹⁾. Religious NGDO and Service Clubs like Lions on the other hand puts service to the poor first and render services almost free to the poor patients⁽⁶⁾. In Kenya, the NGDO Eye Units are free to fix the charges for their services or even render free services. The policy is different in the Government setting in that the Eye Units get guidelines on charges from the Ministry of Health. Every patient including those seen at outreach clinics are expected to pay for services.

Lions Eye Unit was a newly built modern Eye Hospital opened in 1997 and sponsored by Lions Club. By the time this study was done, the Unit was still looking for and recruiting professional staff as it continued rendering services.

It was functioning mainly as a cataract inreach centre. Cataract patients were collected from Kirinyaga and Kitui districts, transported to the Unit for surgery and then back to their respective districts free of charge. Patients attending the static clinic at base hospital did cost-share.

There are those people who argue that operations should only be done in hospitals and not in makeshift Eye Camps due to increased rate of complications and others who

believe that community based eye camps are more cost effective⁽⁵⁾. The decision on which of the strategy to adopt was outside the scope of this study.

Despite the above shortcoming, the Unit managed to operate on 9% of all the cataract patients operated on in the KOP in 1998. It was also planning to extend outreach services to cover most of the districts in the country and to intensify Social Marketing activities in search of more cataracts.

Nakuru Eye Unit offered no outreach services in 1998 after the outreach vehicle was involved in a road traffic accident. That was a great drawback since the Unit relied on the Mobile Eye Unit to market services of the Static Clinic. The main hospital could not assist as it was facing similar transport problems. The patients who were seen at outreach clinic in the previous year continued to attend the static clinic.

The supply of IOLs was erratic. The hospital had no arrangements for IOLs and each surgeon had to make private arrangements with the help of the KSB. Bulk purchase of IOLs was not possible under the existing circumstances. The theatre operated for half day and closed in the afternoons due to shortage of patients. All patients attending both static and outreach clinics had to pay for services in line with the GOK policy on cost-sharing. This is part of the Health Sector Reforms directed by the World Bank and the International Monetary Fund in the Structural Adjustment Programmes⁽¹⁹⁾.

On top of the problems of transport, supplies and hospital charges, lack of incentives were mentioned as barriers to improvement of the situation.

Nakuru Eye Unit also did not have any cataract theatre waiting list but patients had on some occasions been instructed to keep on checking and be admitted as soon as IOLs were available.

All the above resulted to an unexpectedly low cataract surgical output in 1998. The Unit managed to operate on 4% of all the cataract operations done in the KOP.

8.4 Productivity of cataract surgery : Table 6

At Aravind Eye Hospitals in India, it was estimated that one surgeon can perform 8-10 ICCE or 5 ECCE+PCIOL operations per hour “with proper infrastructure and utilisation of operating room” [Natchiar, Robin, Thulasiraj et al]⁽⁸⁾.

In Africa, every cataract surgeon generally perform 200 cataract operations per year⁽⁶⁾.

The productivity of cataract surgery is a good indicator of how economical available resources are utilised and directly affects the cost of surgery. Idle facilities usually leads to an increase in the unit cost of fixed items. Consumable items may end up being wasted if productivity is low in situations where one unit of consumable e.g. a suture is used for several patients within the same theatre day. It should also be kept in mind that consumables are used for cleaning and disinfecting theatre. This is done depending on how often theatre is used irrespective of the number of operations done per theatre day.

Kikuyu Eye Unit theatre did 100, Lions 17 and Nakuru 7 cataract operations per week.

In one theatre day, Kikuyu operated on 20, Lions 9 and Nakuru 4 cataracts.

The number of cataract operations in a day at Kikuyu appeared relatively lower compared to operations per week due to the fact that Kikuyu operated for more days in a week.

Kikuyu operated for 5 full days, Lions 2 full days and Nakuru 2 half days in a week.

Cataract operations per surgeon per week was 13 at Kikuyu, 9 at Lions and 2 at Nakuru.

The above proves that the high number of operations done at Kikuyu was not only due to the relatively bigger surgical team but more so due to the surgeons being utilised more efficiently.

Training was said to lower productivity and quality of cataract surgical services at Kikuyu Eye Unit since it was not initially prepared to cope with a large number of students. The Unit offers practical training to the University of Nairobi degree and KMTC diploma in Ophthalmology students. It also trains Primary Eye Care workers (Ophthalmic Assistants). Plans were being put in place to expand the training facilities of the Unit.

The proportionately low number of operations done at Nakuru Eye Unit had nothing to do with manpower availability. As discussed above, the Unit was facing other problems like transport, supplies, finances and motivation of staff.

Lions Eye Unit was a new unit facing the expected teething problems like patients not being aware that such a facility existed. The productivity of the Unit was however lower than that of Kikuyu but higher than that of Nakuru.

It is important to remember that, apart from cataract surgery, the surgeons of all the above Eye Units had other types of operations to do plus other duties like running the clinics, ward rounds, emergencies, administration, etc.

8.5 Length of stay : table 4 , 6

Long stay in hospital increases the cost of surgery. By reducing the length of hospitalisation of cataract patients, one can increase the number of operations done within a fixed budget ⁽¹²⁾⁽²⁰⁾. Out patient cataract surgery is gaining popularity and there are studies suggesting that it is possible and can be safely done in the public sector as long as the safety precautions are taken to minimise complications⁽⁴⁾⁽⁷⁾.

Cataract patients were accommodated for 2 days at Kikuyu and Nakuru. At Lions Eye units, the patients were accommodated for 4 days due to the long distances they had to travel from Kitui (150 kilometres) and Kirinyaga (100 kilometres).

A limited number of patients attending static Eye Clinic at Lions Eye Hospital were offered outpatient cataract surgical services. This was however not routine and thus not be included under results.

8.6 Cost of consumables used for one cataract operation :

Table 5 ; Figures 2 , 3 , 4 and 5

Kikuyu and Lions Eye Units were able to purchase their consumable items in bulk directly from India. Nakuru Eye Unit was said not to be able to do the same due the complex Government tendering system.

The unit cost of consumables used for cataract surgery in 1998 at the study Eye Units were as follows : Lions Eye Unit US\$ 11.2, Kikuyu US\$ 14.6 and Nakuru US\$ 23.5.

The cost of IOL was the single most important cost at Kikuyu and Lions Eye Units while at Nakuru Eye Unit, it was the suture shown below:

Proportions of the unit cost of consumables as in figures 2, 3 and 4.

| Eye Unit | IOL | Suture | IOL+Suture |
|----------|------|--------|------------|
| Lions | 27 % | 13 % | 40 % |
| Kikuyu | 51 % | 10 % | 61 % |
| Nakuru | 30 % | 33 % | 63 % |

The above figures show that the cost of IOL plus that of the suture accounted for over 60 % of the total cost of consumables used for cataract surgery at Kikuyu and Nakuru Eye Units. The proportion was much lower at Lions Eye Unit (40 %) because the Unit managed to procure IOLs at the most competitive price.

Assessing the quality of the supplies used by the Units for cataract surgery was not an objective in this study.

Lions Eye Unit had the lowest overall cost of consumables since it purchased IOLs from OMNI in India at 3 US\$ which was US\$ 4 and US\$ 4.5 cheaper than Nakuru and Kikuyu respectively.

Nakuru Eye Unit was acquiring IOLs from the KSB purchased at the cost of 7 US\$ from Fred Hollows laboratory in Eritrea.

Kikuyu Eye Unit got its supply of IOLs from Aurolab at the cost of 7.5 US\$.

The cost of corneal suture was 1.4 US\$ at Kikuyu and at Lions.

Nakuru spent 7.7 US\$ per patient on corneal suture alone which was five and a half times more than the other study Eye Units.

Kikuyu used one single armed corneal suture on three patients while Lions used one double armed on four patients. Nakuru used one double armed suture on two patients. Kikuyu preserved the suture in iodine in between operations while Lions preserved it in cidex. Surgeons at Nakuru did not use the same suture needle on more than one patient for fear of transmitting HIV.

In a similar study done at Bamako Mali in 1994 [Guillemot De Liniers F, Resnikoff S, Huguet P et al], the suture was found to be the most expensive consumable item in cataract surgery with IOL implant⁽¹⁶⁾.

The high cost of suture at Nakuru was even more pronounced when cost of the superior rectus retraction suture was considered. The Unit used one 5.0 suture worth US\$ 1.3 per operation which was about ten times the cost at Lions and Kikuyu.

Unlike the other two units, Nakuru was using one suture per patient.

The total cost of corneal suture and superior rectus retraction suture at Nakuru was US\$ 9 per operation which was equivalent to 80 % of the cost of all the consumable items used for the same type of operation at Lions Eye Unit.

Lions Eye Unit was sterilising all sutures after every operation and reusing them.

Kikuyu Eye Unit was sterilising corneal suture only. The unit managed to keep the cost of superior rectus suture low by buying cheap rolls of sterile 5.0 sutures and separate cheap suture needles.

The decision as to whether sutures and needles can be reused could not be made from the results of this study. The only thing which was made clear was that it was economical and effective in bringing down the cost of cataract surgery.

Kikuyu and Lions Eye Units used cheap viscoelastics (methylcellulose) from India. One 5 mls vial of viscoelastic was used for 5 to 8 patients which came to about US\$ 0.5 per patient. The cost of viscoelastic was over a half the total cost of medicines despite the cost containment measures.

Nakuru Eye Unit could not afford viscoelastic. Air was being used instead (except in children).

The cost of viscoelastic used in one cataract operation in London was reported to be about £ 46.2 (US\$ 73) [Filer J, Roberts-Harry, Jagger J D et al]⁽¹⁰⁾.

Cheap locally produced eye drops were used by all the three Eye Units. The higher cost of medicines at Nakuru was due to the Unit using an expensive, locally purchased brand of mydriatic eye drops (Mydriacyl).

There were many other activities aimed at containing the cost of consumables going on in the theatres of the above Eye Units ranging from the use of pieces of razor blades in place of surgical blades, “passing over” drips for irrigation fluids from one patient to the other, changing only gloves and not scrubbing for every operation, sharing of injectable medicines to the use of disposable drapes, caps and masks etc. to mention but a few.

9. Conclusions

9.1

None of the three Eye Units had realised its full potential in productivity of cataract surgery.

9.2

The IOL was the single most expensive consumable item used for cataract surgery at Kikuyu and Lions Eye Units. At Nakuru, it was the corneal suture.

9.3

Kikuyu Eye Unit which represented the typical Kenyan NGDO Eye Care delivery setting had the highest productivity of cataract surgery at the cost of US\$ 14.6 per unit of consumables.

9.4

Lions Eye Unit which represented an NGDO Eye Care delivery setting whereby the sponsoring NGDO also managed the day to day running of the Unit it was sponsoring performed cataract operation at the lowest cost per unit of consumables (US\$ 11.2).

The Unit had low productivity of cataract surgery when compared to Kikuyu.

9.5

Nakuru Eye Unit represented the Government of Eye Care delivery setting. The Unit had the lowest productivity of cataract surgery and the highest cost per unit of consumables (US\$ 23.5).

10. Recommendations

10.1

It was recommended that all the three Eye Units needed to create more demand for their cataract surgical services, preferably by using the principles of Social Marketing. The problems of transport and supply of consumables at Nakuru Eye Unit should be sorted out first in order to make its services as marketable as those at the other two study Eye Units.

10.2

The costs of consumable items used for cataract surgery at all Eye Units in Kenya should be monitored regularly through the Eye Health Information System of the Kenya Ophthalmic Programme and the feedback passed over to the Eye Care sponsors and providers on regular bases; preferably annually . The aim should be to make them (Eye Care sponsors and providers) aware of the costs and consequences of their precious activities so that they can actively participate in putting in place cost containment measures.

10.3

The supply of consumables especially the sutures and IOLs in Government Eye Units should be reviewed in order to determine how far the problems facing the Nakuru Eye Unit could be affecting the performance of the rest of the Government Eye Units. Centralised bulk purchasing for Sutures and IOLs is advisable. Savings from sutures could be used to purchase other consumables which may be lacking like viscoelastics.

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12. APPENDICES

COST OF CATARACT SURGERY DATA COLLECTION FORM

Name of eye unit _____

Code |__|__|

Date |__|__|__|__|__|__|

Facilities

Number of eye surgical theatres |__|

Number of operation tables |__|

Number of theatre days per week |__|

Number of theatre hours per operation day |__|__|

Number of theatre staff :

ophthalmologists |__|__|

cataract surgeons |__|__|

nurses |__|__|

assistants |__|__|

Number of operations done in 1998:

total eye operations |__|__|__|__|__|

total cataract operations |__|__|__|__|__|

total "ICCE+SPECS" |__|__|__|__|__|

total "ECCE+PCIOL" |__|__|__|__|__|

Length of stay of cataract patients in eye ward as per routine treatment

protocol :

| operation | days pre-op | days post-op |
|---------------|-------------|--------------|
| “ECCE+PCIOL ” | □ | □ |
| “ICCE+SPECS” | □ | □ |

Cost of consumable items used for cataract surgery

| item | number of theatre days one unit last | number of patients per unit | Cost per patient |
|----------------------------------|---|--------------------------------|------------------|
| cleansing materials | _____ | _____ | _____ |
| antiseptics / spirit | _____ | _____ | _____ |
| dressings materials | _____ | _____ | _____ |
| needles / syringes | _____ | _____ | _____ |
| local anaesthetics | _____ | _____ | _____ |
| general anaesthetics | _____ | _____ | _____ |
| I.V fluids | _____ | _____ | _____ |
| adrenaline | _____ | _____ | _____ |
| hyalase | _____ | _____ | _____ |
| viscoelastics | _____ | _____ | _____ |
| sutures : | | | |
| 10.0 / 9.0 (corneal) | _____ | _____ | _____ |
| 5.0/4.0/6.0 (superior rectus) | _____ | _____ | _____ |
| eye drops: | | | |
| antibiotics | _____ | _____ | _____ |

steroids _____

miotics _____

mydriatics _____

injections

antibiotics _____

steroids _____

others (specify) _____

Cost of PCIOL _____

Cost of aphakic spectacles _____

comments _____
