Evaluating resource for cataract surgical services in Kebbi, Nigeria

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Abstract:

CONTEXT: Cataract is the most common cause of blindness worldwide. Meeting World Health Organization Vision 2020 cataract surgical rate target for Africa remains a dream. Inadequate resource to deliver quality cataract services is burdensome.

AIMS: The aim of the study was to evaluate the resource for cataract services in Kebbi, Nigeria.

SETTINGS AND DESIGN: A descriptive and analytic cross-sectional study using a quantitative questionnaire.

SUBJECTS AND METHODS: Four-year-period (2012–2015) information on, among others, available resources for cataract services was obtained from all the hospitals offering cataract surgical services in Kebbi.

STATISTICAL ANALYSIS USED: The data were double entered into Excel spread sheet and later exported onto and analyzed by STATA 14. The analysis was done using simple frequency proportions and is presented as tables, charts, and graphs.

RESULTS: Only 71 eye care workers were involved in the delivery of eye care services including cataract service in Kebbi with over 4 million people. The equipment required for effective services delivery was at the minimum.

CONCLUSIONS: There were inadequate, poorly mixed, and lopsided resources for cataract services delivery in Kebbi. The need to improving resource for quality cataract service delivery in Kebbi toward meeting Vision 2020 target underscored.

Keywords: Cataract services, Kebbi, resource for cataract service

Introduction

World Health Organization Prevention of Blindness and Deafness Programme study in 2010 globally estimated 285 million people to be visually impaired. Of this, 39 million were blind and 246 million having low vision.[1] While an expert group study as a part of the global burden of disease reported 223.4 million visual impairment globally of whom 32.4 million were blind and 191 million were moderate and severe visual impairment.[2] A 50-year-old and above accounted for 82% and 65% of global blindness and visual impairment, respectively.[1] Globally, uncorrected refractive error (43%) and cataract (33%) are the most common causes of visual impairment.[1] More than two-third of visual impairment population are in low- and middle-income countries, and 80% of causes of visual impairment are treatable/preventable.[1] More than 50% of the world’s visually impaired people live in Nigeria, India, Pakistan, Indonesia, and China.[3] However, cataract still remains the most common cause of blindness worldwide, accounting for half (51%) of all cases of blindness.[1]

In Africa, cataract accounts for an estimated 50% of the 7 million blind people.[3] It is the most common cause of blindness in Nigeria[4] and responsible for approximately 50% of all causes of blindness in individuals above 40 years of age.[4]
Human resources for eye care
The importance of an effective eye care human resources development as the central focus for the reduction in the global causes of the visual impairment was further emphasized by the Global Action plan for 2014–2019.[5] Vision 2020 recommended an ideal number of different level of eye cadre per million population, required to tackle the global causes of avoidable blindness [Table 1].[5] There are inadequate human resources for eye care in Africa compared to other parts of the world, which make it unrealistic for most of these African countries to achieve Vision 2020 target by the year 2020. The few eye care service providers in Africa are maldistributed. They are lopsided in the urban areas, leaving most of the rural population uncared for. Nigeria is no different, with most of the human resources for eye care mainly concentrated in the cities, in the western and in the oil-rich southern parts of the country. For the achievement of universal eye health coverage, emphasis needs to be on developing the human resources sector through effective planning.

Infrastructure for eye care
International Agency for the Prevention of Blindness (IAPB) developed a standard list of instrument/equipment and consumables needed for achieving a quality eye care service. However, most of the developing countries are yet to meet the standard requirement because of limited funds to purchase these equipment. Even where they are purchased, environmental factors, unstable electricity, and poor maintenance culture lead to their early wear out. According to the Vision 2020, infrastructure and instrument targets include “the achievement of not <95% availability, 90% accessibility, 90% utilization, and 90% coverage of services by 2020, as compared to 50%, 40%, 25%, and 25%, respectively, in 2000.”[6,7]

Study area
Kebbi State referred to as Kebbi in this article was created on August 17, 1991, from the old Sokoto state. It is located in the North-Western part of Nigeria and bordered by Sokoto State in the north and the east by Zamfara and Sokoto States, to the south by Niger State, and to the west by Benin and Niger Republics.[7] [Figure 1]. Kebbi State has a land mass of 36,229 square km, mainly Sudan and Sahel-Savanna vegetation. With an estimated population of 3,256,541 and four emirate councils, 225 wards, 3000 settlements, and 21 local government areas.[8] The inhabitants are mainly Hausa and Fulani. Agriculture is the main occupation of the people (grains production, fishing, and animal rearing). Islam and Christianity are dominant religion practice by the population.

Eye care services in Kebbi
Eye care services in Kebbi State are provided in all the 25 general hospitals, 4 private hospitals, Federal Medical Centre (FMC), a tertiary hospital and Hafsat Eye Clinic (HEC), and a specialist hospital. However, only FMC, HEC, and Royal Balm Eye Clinic (REBC) (a private hospital) offer cataract surgical services. Hafsat Eye Center was established in 2004 by the Kebbi government in collaboration with Tulsi Chanrai Foundation (TCF), an India-based Non-Governmental Organization (NGO).[7] The FMC eye clinic was established in 2003, whereas REBC is a private clinic commenced cataract surgical services in March 2014.

Aim and objectives
Aim
The aim of the study was to evaluate the resource for cataract services in Kebbi, Nigeria.

Objectives
1. To assess the human resource for eye care and their usefulness in the provision of cataract surgical services
2. To document the infrastructure and equipment available for cataract service delivery
3. To make recommendations on how to improve the delivery of cataract services.

Subjects and Methods
This article form part of a study evaluating cataract surgical services in Kebbi. The rest part of the study is reported in a communication which is under consideration elsewhere.

Study design
This is a descriptive and analytic cross-sectional study conducted from June 18th to July 10th, 2016 in three hospitals including FMC, HEC, and REBC offering cataract surgical services in Kebbi.

Inclusion criteria
In each facility, four persons (a senior ophthalmologist, senior ophthalmic nurse, program manager/administrative officer, and the medical director/head

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Table 1: Vision 2020 human resources for eye health and cataract surgery minimum targets for Sub-Saharan Africa[6]

| Eye care personnel                     | Vision 2020 target per million population |
|----------------------------------------|------------------------------------------|
| Ophthalmologist                        | 4                                        |
| Cataract surgeon                       | 10                                       |
| Ophthalmic clinical officers           | 10                                       |
| Ophthalmic nurses                      | 10                                       |
| Optometrist                            | 20                                       |
| Mid-level refractionist                | 20                                       |
| CSR                                    | 2000                                    |
| Cataract surgeries per surgeon (surgical efficiency ratio) | 500                                      |

CSR= Cataract surgery rate
of the hospital) were interviewed using structured questionnaires.

Data collection
The data were collected using modified questionnaires used in a previous similar study. The questionnaires were administered to the selected key opinion leaders in the three hospitals asking about the number of human resources rendering cataract services in their facility, the availability, state of instruments/infrastructure, health information management, and pharmacy for cataract services. Access to the equipment and infrastructure was granted to the investigator, who personally cross-checked the condition of these equipment. The medical director/head of the hospital was also asked about decision-making and financing of the services. The 4-year records (2012–2015) of each hospital were examined to estimate the number of cataract surgeries performed. While this article considers resource for cataract services, other segments of the evaluation are the subject of another communication.

Pilot study
Pilot test for the study was done at Usmanu Danfodiyo University Teaching Hospital, Sokoto, a neighboring state where cataract surgical service is rendered. The problems noted during the pilot test were corrected.

Data management
The data were double entered into Excel spread sheet and later exported onto and analyzed by Stata 14. The analysis was done using simple frequency proportions and is presented as tables, charts, and graphs.

Ethical consideration
Ethical clearance for this study was obtained from London School of Hygiene and Tropical Medicine Ethical and Research committee. In addition, ethical approvals were obtained from Kebbi State Ministry of Health and FMC and Research and Ethical committee. Furthermore, written informed consent was obtained from the interviewee (eye care workers [ECWs]).

Results

Human resources working for cataract surgical services delivery in Kebbi
There were a total of 71 ECWs who are actively involved in the delivery of cataract services in all the facilities. Sixty-five (91.6%) were in tertiary and state hospitals. Table 2 summarizes ECWs distribution according to cadre.

The estimated 2015 population of Kebbi State was 4.09 million with 5 surgeons (ophthalmologists and diplomate), 6 optometrists, and 26 ophthalmic nurses. The ratio of the cadre of ECW to the population in Kebbi State based on the estimated 2015 population is shown in Table 3. All the ECWs were living in the state capital. There were no orthoptist, cataract finder, and refractionist in all the facilities. There was a disparity between the human resources and equipment because two of the ophthalmologists work full term in a tertiary hospital (FMC) and also work as a part time in the private eye clinic. The entire eye surgeons (consultants and diplomate) are actively involved in the delivery of cataract services among other eye care services.

Equipment and instrument
All the three facilities had the minimum outpatient and eye theater equipment for the delivery of effective cataract services [Table 4]. However, there was no laser and auto refractometer in any of the hospitals. All the equipment was functional except 1 retinoscope and 2 direct ophthalmoscopes at the state hospital.

Financing
The cataract surgery is free in the state hospital, whereas patient paid for the services in the private and tertiary facilities. Eight-six percent of the staff received their monthly salary from both Federal and Kebbi State governments.

The cost of cataract surgery in the tertiary facility ranges from 20,000 to 28,000 naira (2015 exchange rate, one pound to about 400 naira) depending on whether cataract
The cost of cataract surgery is at a subsidized flat rate of 40,000 naira at the private facility. The tertiary facility budgeted (29–50 million naira) funds yearly to eye care compared to state and private facilities [Figure 2]. During the study period, cataract services were not covered under the National Health Insurance Scheme.

**Health information**

In all the facilities, there are patients’ files in the outpatient unit, and patients’ cataract surgery information were stored in both files and computer. Furthermore, all the surgeons have their surgical monitor recorded weekly/monthly/yearly. The hospitals remind patients about surgery/appointment through phone calls.

**Leadership/government**

The medical director of each facility took a decision on the cataract services delivery. However, the state and private hospital management committee decided the cadre of eye care staff employed. In all facilities, the medical director determines the cataract surgical materials needed for the hospitals.

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### Table 2: Human resources for cataract services in Kebbi

| Human resource cadre                  | Tertiary (FMC) | State (HEC) | Private (RBEC) | Total |
|---------------------------------------|----------------|-------------|----------------|-------|
| Consultant eye surgeon               | 3              | 1           | ~             | 4     |
| Diplomates                            | ~              | 1           | ~              | 1     |
| Resident doctors/medical officer      | 2              | ~           | ~              | 2     |
| Optometrists                          | 3              | 2           | 1              | 6     |
| Orthoptists                           | ~              | ~           | ~              | ~     |
| Refractionist                         | ~              | ~           | ~              | ~     |
| Opticians                             | 3              | 1           | ~              | 4     |
| Eye care managers                     | ~              | 1           | ~              | 1     |
| Ophthalmic nurses                     | 17             | 6           | 3              | 26    |
| General nurses                        | ~              | 11          | ~              | 11    |
| Record officers                       | 2              | 4           | 1              | 7     |
| Administrative staffs                 | 1              | 1           | 1              | 3     |
| Eye equipment technician              | 3              | ~           | ~              | 3     |
| Counsellors                           | ~              | 3           | ~              | 3     |
| **Total (%)**                          | 34 (47.9)      | 31 (43.7)   | 6 (8.4)        | 71 (100) |

*2 Consultants working at tertiary (FMC) also work part time at private hospital. FMC=Federal Medical Centre, HEC=Hafsat Eye Centre, REBC=Royal Balm Eye Clinic

### Table 3: The ratio of cadre of eye care worker to 2015 population in Kebbi

| Indices                  | Cadre                  | Ophthalmologist | Optometrist | Ophthalmic nurses |
|--------------------------|------------------------|-----------------|-------------|-------------------|
| Existing/million         | 1:818,000              | 1:682,000       | 1:157,000   |
| Recommended/million      | 1:250,000              | 1:250,000       | 1:250,000   |
| Deficit/million          | 1:818,000              | 1:682,000       | 1:157,000   |
| Current ratio            | 1:818,000              | 1:682,000       | 1:157,000   |
| Recommended ratio        | 1:250,000              | 1:250,000       | 1:250,000   |

### Table 4: Available functional instrument/infrastructure and their number in the three facilities

| Instrument/infrastructure | Tertiary | State | Private | Total |
|---------------------------|----------|-------|---------|-------|
| Theatre                   |          |       |         |       |
| Operating microscope      | 1        | 2     | 1       | 4     |
| Operating table           | 1        | 2     | 1       | 4     |
| Cataract surgical set     | 4        | 20    | 2       | 26    |
| Vitrector                 | 1        | 1     | -       | 2     |
| Cautery machine           | 1        | 2     | 1       | 4     |
| Hospital outpatients      |          |       |         |       |
| Slit-lamp microscope      | 2        | 2     | 1       | 5     |
| Direct ophthalmoscope     | 3        | 4     | 1       | 8     |
| Indirect ophthalmoscope   | 4        | 4     | 1       | 9     |
| Streak retinoscope        | 3        | 2     | 1       | 6     |
| Keratometer               | 1        | 1     | 1       | 3     |
| A scan                    | 1        | 1     | 1       | 3     |
| Visual field analyzer     | 1        | -     | -       | 1     |
| Schiotz tonometer         | 1        | 3     | -       | 4     |
| Goldmann applanation      | 2        | 2     | 1       | 5     |
| tonometer                 |          |       |         |       |
| Ophthalmic working table  | 1        | 1     | -       | 2     |
| Refraction facility       | 2        | 1     | 1       | 4     |
| Optical shop              | 1        | 1     | -       | 2     |
| Pen-touch                 | 6        | 8     | 2       | 16    |
| Pharmacy                  | 1        | 1     | 1       | 3     |
| Number of vehicles        | -        | 1     | -       | 1     |
There are enough ocular and systemic medicines for the provision of cataract services, all the facilities visited.

Discussion

There was an inadequate number of ECW in the delivery of cataract services to the population of Kebbi State. The reason might be because of instability and security challenges in the northern part of Nigeria during the 4-year study period which has discouraged eye care professionals from taking up appointment in the state. This highlights the common challenge facing most of the developing countries from achieving the Vision 2020 target. However, the few ECW that are available at tertiary facility are underutilized.

The combined three surgeons of tertiary and private hospitals were only able to perform 278 cataract surgeries within 2014–2015 compared to 2940 operated at the state hospital by two surgeons.

The difference might be the high cost of cataract surgery and poor visual outcome at these 2 centers which prevented the uptake of the services, whereas cost free to the patient services at the state hospital resulted in the increase of the service uptake. There is the need for a further study to look at the reason at these two centers so as to improve productivity, which is a major factor needed to achieve Vision 2020 target.

There was also maldistribution of ECW and cataract surgical services in Kebbi State. All the surgical centers are located in the state capital, Birnin Kebbi with 3% of the total Kebbi State population. Furthermore, all the ECWs are also living in the state capital leaving the rest of the 97% of the state population with none. Similar maldistribution pattern of health care workers was reported by Odusote,[9] Dussault et al.,[10] Ummuro,[11] and Nguyen et al.[12]

It has also been established by previous studies[9,13,14] that availability of social amenities, hope of career progression, security of lives, and properties are important factors responsible for migration of health workers.

There were inadequate staff mixed ratio of surgeons to ophthalmic nurses at tertiary hospital with 3 surgeons to 17 ophthalmic nurses compared to 2 surgeons to 3 ophthalmic nurses at the state facility. However, the cataract output is more in the state hospital. The reason might be because of the effective use of other ECWs (general nurses, counselors, etc.,) in the service delivery. The uses of non-eye care training health care workers in the delivery of cataract services have been proven to be effective by Rao[19] and Courtright et al.[16]

There are enough cataract equipment/instruments for the cataract service delivery in Kebbi State based on the IAPB recommendation list for 1000 cataract surgeries per year.[17] The state hospital accounted for 53% of all the equipment. The reason was because of the support from TCF, an India-based NGO. The provision of a higher number of equipment at the state hospital commensurate with the high cataract output at this center. The importance of human resources and availability of right equipment in the provision of cataract services was well documented by Aravind et al.[18] The presence of nonfunctional two indirect microscopes and a retinoscope at the state hospital may be due to the absence of eye equipment technician at this center.

The motivated staff, surgeon surgical skill, and provision of adequate instrument play an important role in the cataract service delivery.

Conclusion

There were inadequate and lopsided resources, and disproportionate ECW mixes for cataract services delivery in Kebbi. Employment of more surgeon at the state hospital, reduction in the cost of surgery, and further training of surgeon at the tertiary facility are important factors in improving cataract services in Kebbi State.

Recommendations

**Kebbi State government (state hospital)**
1. Employment of more ECWs
2. Establishment of more surgical centers in all the six emirates of Kebbi state.

**Tertiary hospital (FMC)**
1. Employment of more ECWs
2. Reduction in cost of surgery through various cost containments will help in increase uptake of cataract services
3. Training of surgeon and other ECW will improve the effective services delivery.

**Private hospital (REBC)**
1. Reduction in cost of surgery through various cost containments will help in increase uptake of cataract services
2. Promote awareness program about cataract services delivery through various media outlet and establishment of community outreach program will help in the increased uptake of cataract services.

**Ethical approval**
The study was conducted in accordance with the Declaration of Helsinki and was approved by the local ethics committee of the institute. Informed written consent was obtained from all patients prior to their enrollment in this study.

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**Conflicts of interest**
The authors declare that there are no conflicts of interests of this paper.

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