

Original Research Article

Impact of middle level eye care personnel on the delivery of eye care services in South-western Nigeria

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ABSTRACT

Background: The objectives of the study were to review the training and assess the impact of middle level eye care personnel (community ophthalmic technician) with skills to complement the services of the ophthalmologist for efficient eye care system and fulfilling vision 2020 goals.

Methods: The collaboration between 2010 and 2015 was reviewed with an institutional questionnaire for both Eye Foundation Centre and College of Health Technology in Ijebu, Nigeria: structure of 2 year training Programme and one year internship, community ophthalmic technicians (COT) as assistants to ophthalmologists, hierarchy/career options and challenges and ensuring clinical quality and their strength in the Eye Foundation Eye Health System were appraised.

Results: From 2010 to 2015, a total of 72 COTs have graduated, 41(57%) of them employed by the Eye Foundation Hospital Group. Apart from this, 28 did their internship in 2015, 19 (68%) out of this at Eye Foundation establishments in southwestern and north central Nigeria. Others are employed by other government or nongovernmental agencies. From 2010 to 2015, outpatients' visits have increased from 42,962 to 104,239 at its peak, surgical volume from 3,999 to 18,350 at the Eye Foundation Hospital Group. The COT programme has been accredited by International Joint Commission on Allied health personnel in Ophthalmology (IJCAHPO).

Conclusions: COTs with skills are required in large numbers to complement the services of ophthalmologists for efficient eye health system. Their contribution is very important to meet the vision 2020 human resources objectives for Sub-Saharan Africa.

Keywords: Community ophthalmic technicians, Ophthalmologists, Eye foundation

INTRODUCTION

The result of the Nigeria national blindness and visual impairment survey showed that an estimated 4.25 million adults aged ≥ 40 years have moderate, severe visual impairment or blindness. Out of this, >1 million adults with blindness are seriously in urgent need of attention.¹

One of the key element of vision 2020, the right to sight is human resources development. It has suggested human resources target that will be needed to significantly reduce avoidable visual impairment in 2020.^{2,3} The human resources for eye health (HReH) are ophthalmologist-led. Other key members are optometrists, ophthalmic nurses, midlevel ophthalmic

personnel, (ophthalmic assistants/technicians/medical technologists), refractionists etc.⁴

Recent data suggest that there is shortage of ophthalmologists in developing countries.^{4,5} The capital cities are in most cases over supplied to the detriment of majority in the rural areas. Furthermore, training of ophthalmologists takes a long time and it is expensive. Cataract surgical rate and cataract surgical coverage are very low.^{4,7}

In Nigeria, the traditional setting in HReH is: ophthalmologist, optometrist and ophthalmic nurses. MLOPs have not been adequately utilized in the Nigerian ophthalmic establishment. There are no cataract surgeons in Nigeria.⁷ Ophthalmic nurses are concentrated in the urban centres and expensive to employ in rural areas and private/mission establishments.⁷

Also in Nigeria where the number of ophthalmologists almost equal the required number estimated for a million population (4 per million population), there is maldistribution of ophthalmologists and other eye care workers.⁶⁻⁸

One way to increase the efficiency of ophthalmologist and other key eye care workers and lessen the impact of shortages is to increase the efficiency and effectiveness of each ophthalmologist by the training and use of mid-level ophthalmic personnel (MLOP). It is also a cost effective option.⁹⁻¹⁰

MLOP are dedicated ophthalmic paramedics and nurses in ophthalmic department. In 1980, a World Health Organization (WHO) task force on training such auxiliaries identified 3 levels of workers and varying levels of training. MLOP might be hospital-based or community-based personnel.¹¹⁻¹² Optometrists are nonmedical and they maintain an independent role.¹²

Observations from world health organization (WHO) meeting and report in 2001 included availability, production, distribution and utilization of MLOP in the South East Asia Region (SEAR). Therefore, MLOP is a cadre of mid-level eye health worker formally recognized by WHO.¹¹⁻¹³ MLOP is also part of "Allied Ophthalmic Personnel" (AOP).¹⁴

The WHO global action plan 2014-19 states that AOP comprise opticians, ophthalmic and optometric technicians, ophthalmic nurses, ophthalmic photographer/imagers, ocularists, orthoptists, vision therapists and ophthalmic administrators.¹⁴

In 2015, International agency for the prevention of blindness (IAPB) with partners International Joint Commission on Allied Health Personnel in Ophthalmology (IJCAHPO)/ Joint Commission on Allied Health Personnel in Ophthalmology (JCAHPO) and ICO signed the Cambridge Declaration. The declaration acknowledges the critical role of AOP in the delivery of

high quality comprehensive eye services - and their role in achieving Universal Eye Health.¹⁴

By delegating time-consuming patient tasks like medical record activities and patient evaluation (visual acuity, intraocular pressure etc.) to MLOPs, the ophthalmologists can efficiently deal with patient diagnosis and treatment thus increasing quality and quantity in patient care.

The community ophthalmic technician (COT) programme was mooted in January 2006 when Deseret Community Vision Institute, an Eye Foundation Centre for the prevention of blindness started operations in Ogun state of Nigeria. Its officials and that of Sheikh Zayed Regional Eye Care Centre, The Gambia had a discussion that there is need to train middle level ophthalmic man power if the Eye Foundation Centre is to be a high volume ophthalmic centre. After this the idea was sold to the college of health technology for partnership. (Personal communications).¹⁵

The Eye Foundation Centre for the Prevention of Blindness consists of:

1. The Eye Foundation Hospital group which consist of 5 hospitals with state of the art equipments. This is the private arm of the establishment. They are located in: Ikeja (Headquarters), Victoria Island, Ikorodu and Lekki in Lagos state, Abuja (Federal capital territory) and Ijebu-Imushin (Ogun state).
2. The public/community hospitals- Deseret Community Vision Institute (DCVI) Ijebu-Imushin (Ogun state) and Deseret Eye Centre, Lagos.
3. The community outreach programme.

In this paper, the authors review the training and assess the impact of middle level eye care personnel (Community Ophthalmic Technician) with skills to complement the services of the ophthalmologist for efficient eye care system and fulfilling vision 2020 goals in southwestern Nigeria.

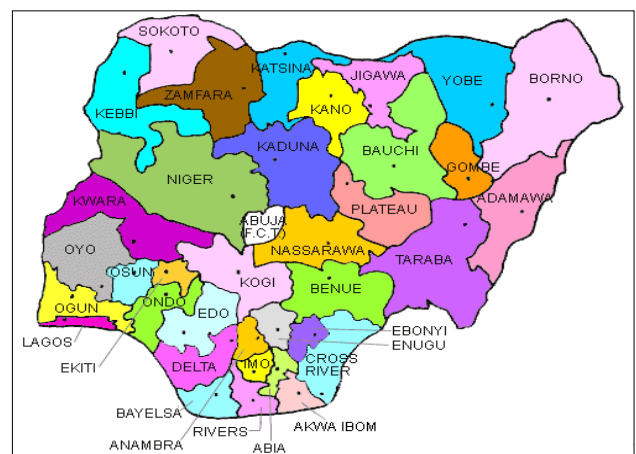


Figure 1: Map of Nigeria showing states of the federation. Source: Nigerian official website.



Figure 2: Map of south-western Nigeria.
Source: Nigerian official website.

METHODS

This is a descriptive cross-sectional study

The collaboration between 2010 and 2015 was reviewed with an institutional questionnaire for both Eye Foundation Centre and College of Health Technology in Ijebu, Nigeria: structure of 2 year training Programme and one year internship

Structure of the 2 year training programme

COT development in Nigeria started in 2010. Initiative from The Eye foundation hospital group in collaboration with the Ogun state school of health technology under the Department of Public health Nursing

The programme starts with a 2 years diploma as community ophthalmic technician. This is the Basic level which is a pathway to the advanced level.

Recruitment/strategy

Examination of need and capability to train average of 30 students yearly: information is provided in newspapers and on the website of the college. 1. Application packet, 2. Admission policies and procedures. 3. Institutional tuitions, fees, expenses, prerequisite course work requirements, student selection in to the Programme, sponsors institutional and pragmatic accreditation status, student tuition accurately stated.

Information for enrolling students

The following are explained to them when they are finally enrolled: they undergo examination and interview before they are enrolled: student handbook, minimum grade average, programme policies and procedures,

communicable disease policies, procedure for undergoing student evaluation, student grievance procedure and faulty grievance procedure.

General admission requirements:

1. The admission requirements for National Diploma (ND) programmes are a minimum of five (5) 'O' Level credits passes in English Language, Mathematics, Chemistry, Physics and Biology from WAEC or NECO in not more than 2 sittings.
2. The admission requirements for Higher National Diploma (HND) programmes is National Diploma (ND) not lower than lower credit in relevant programme in addition to five (5) 'O' level credits passes in English Language, Mathematics, Chemistry, Physics and biology from WAEC/NECO is not more than two (2) sittings.

Course duration and venues

Duration 2 years plus 12 months internship

Main venues:

1. Ogun state college of Health Technology, Ilese.
2. Deseret Community Vision Institute (DCVI), Ilese/Ijebu-Imushin.

Centres for practical/clinical:

1. DCVI/Eye foundation hospital, Ilese/Ijebu-Imushin.
2. Deseret Eye Centre (DEC)/Eye foundation hospital, Ikeja, Lagos.
3. Eye foundation Hospital, Abuja.
4. Primary Health Centres in Ogun State.

Hierarchy of each subset/career options

- Community Ophthalmic Technician (COT) - as student
- Ophthalmic Practitioner (OPs) - interns -1 year
- Nursing care ophthalmic Practitioner (NCOP) step1- 1 year post internship
- NCOP step2- 2 years post internship
- NCOP step3-3years (attempt IJHCAPO certification examination in third year)
- Senior NCOP-after IJHCAPO certification
- Principal NCOP (3 years after senior NCOP)
- Chief NCOP- (after 3 years of Principal NCOP).

Statistical analysis

Spearman's correlational analyses were used to examine the relationship between staff strength and the volume of work done in the OPD and surgical departments. The p value of <0.05 was taken as significant. All the analyses in the study were performed using SPSS version 22.

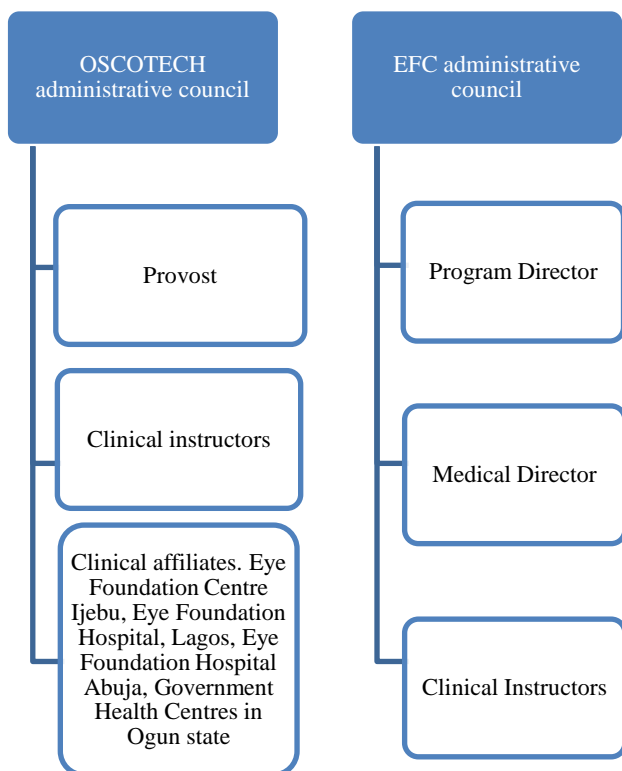


Figure 3: Program organizational chart.

RESULTS

Community ophthalmic technician (COT) programme

The programme started in October 2010 (Table 1).

- The first set of 22 COT interns graduated in October 2013.
- The second set of 23 graduated in October 2014.
- The third set of 27 graduated in October 2015.
- The fourth set of 28 started their one year internship in October 2015.

Nursing care ophthalmic practitioner (NCOP) in the Eye Foundation Hospital (EFH) group

A total of 72 COTs have graduated from inception and 41 (57%) of them were employed by EFH group.

28 are currently undergoing internship training and 19 (68%) of the interns are observing their internship with EFH group, others are in different local government cottage hospitals and primary health care centres.

27 COT students in 200 levels are still in school and will be resuming their clinical in February 2016.

100 level COT student started session in October 2016.

Distribution of NCOPs in EFH Group

The NCOPs have been trained to function in different departments and the ones employed were posted to different hospitals and working in different departments namely (Table 1 and 4).

- First set of COTs- 22 graduated, 13 employed

Distribution –Ikeja-7, Lekki -1, VI-1, Ijebu-3, Abuja-1.

- Second set of COTs- 23 graduated and 10 employed.

Distribution- Ikeja - 2, Ijebu- 6, Lekki- 1, VC Sagamu - 1.

- Third set of cot -27 graduated in Oct 2015 and 20 have been interviewed and considered for employment.

Distribution: Ikeja- 9, Abuja-1, Ijebu-7, VC Ilaro- 1, DEC-2,

Internship

28 Ophthalmic practitioners (OPs) started their internship on the 7th October 2015 with 19 of them undergoing their internship with EFH group while 9 are with different local governments PHCs (Table 4 and 5).

Distribution: Ikeja- 6, Ijebu-9, Vision centre (VC) Shagamu-1, Abuja-1, Lekki -1 and Dec-1.

Table 1: Distribution of NCOPs in EFH Group 2013-2015.

Set	EFH Ikeja	DEC Lagos	EFH Lekki	EFH V.I.	EFH/DCVI Ijebu	EFH Abuja	Vision centre Sagamu	Vision centre Ilaro
First (13 employed)	7		1	1	3	1		
Second (10 employed)	2		1		6		1	
Third (20 employed)	9	2			7	1		
Internship	6	1			9	1		1
Total	24	3	2	1	25	3	1	1

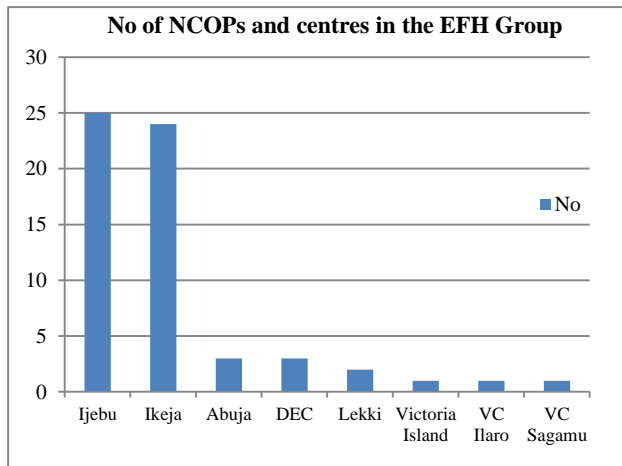


Figure 4: No of NCOPs and centres in the EFH group.
Total NCOP/intern= 60

Outpatient value and surgical volume 2010 to 2015

From 2010 to 2015, outpatients' visits have increased from 42,962 to 104,239, surgical volume from 3,999 to 18,350 at the Eye Foundation Hospital Group. There was a strong, positive correlation between volume of surgery above cost and number of COT ($r=0.880$, $p=0.021$, two-tailed). Correlation between volume of OPD consultations and number of COT was also statistically significant. There was also a strong, positive correlation between volume of OPD consultations above cost and number of COT ($r=0.941$, $p=0.005$, two-tailed). A similar relationship was found between number of COT and volume of OPD consultation below cost (Table 2 and 3). Also see Figures 5 and 6. The COT programme has been accredited by International Joint Commission on Allied health personnel in Ophthalmology (IJCAHPO) and some of the candidates in the first set will be doing their certification exams with JCAHPO in August 2017.

Table 2: Outpatient value 2010 to 2015.

	2010	2011	2012	2013	2014	2015
OPD value	42962	46950	46882	104239	74657	85338
Above cost	23224	28130	28025	29878	32998	36786
Below cost	6235	10394	11805	12427	17051	17893
Free	13470	8426	7052	61001	24608	30659

Table 3: Surgical volume.

	2010	2011	2012	2013	2014	2015
Surgery volume	5739	3999	4676	18350	8068	11769
Above cost	2228	2655	3654	4308	3806	5409
Below cost	1748	925	874	716	1128	1723
Free	1763	419	148	13168	3134	4632

Table 4: Distributions of NCOPs in EFH Group (2013–2015).

Set	EFH Ikeja	EFH Lekki	EFH Victoria Island	EFH/DCVI Ijebu	EFH Abuja	DEC Ikeja	Vision Centre Sagamu	Vision Centre Ilaro
First	7	1	1	3	1			
Second	2	1		6			1	
Third	9			7	1	2		1
Interns	6	1		9	1	1	1	
Total	24	3	1	25	3	3	2	1

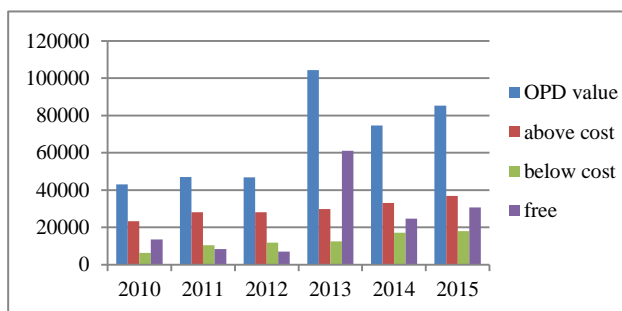


Figure 5: Bar chart for OPD value.

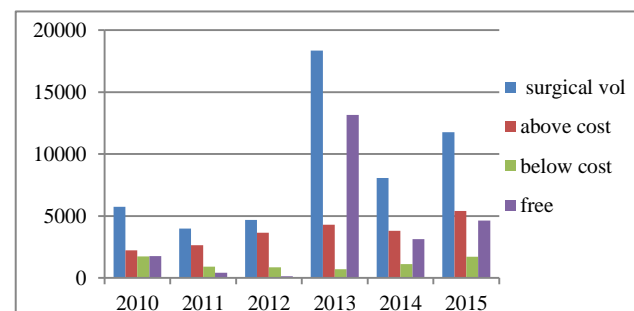


Figure 6: Bar chart for surgical volume.

Table 5: Table on departmental distribution of NCOPs in EFH (2010 – 2015).

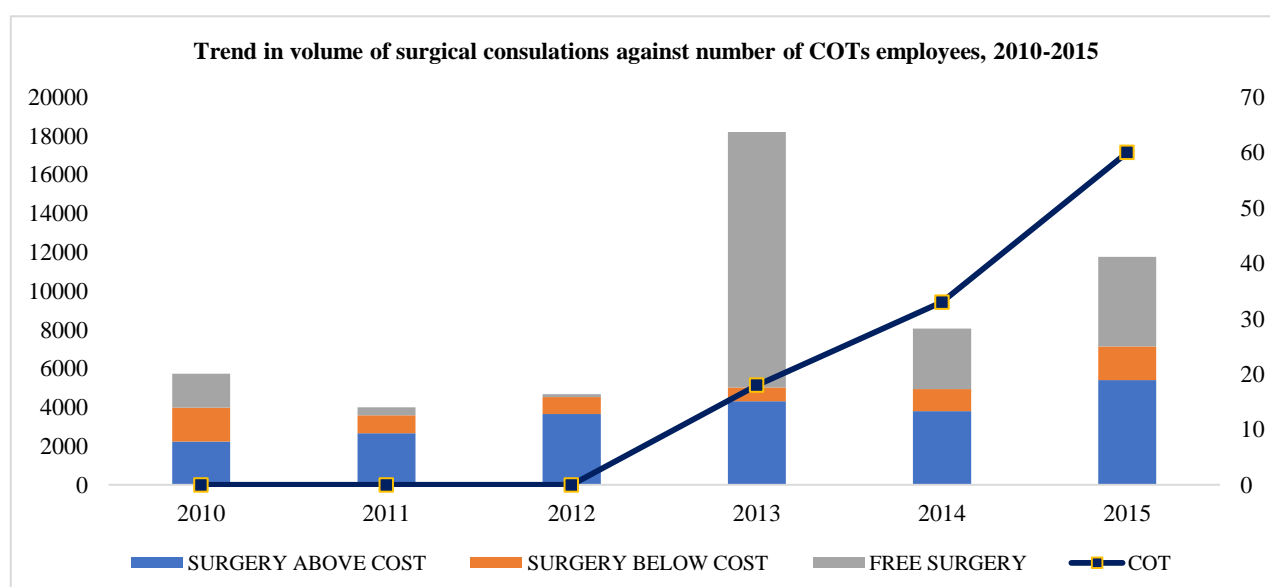
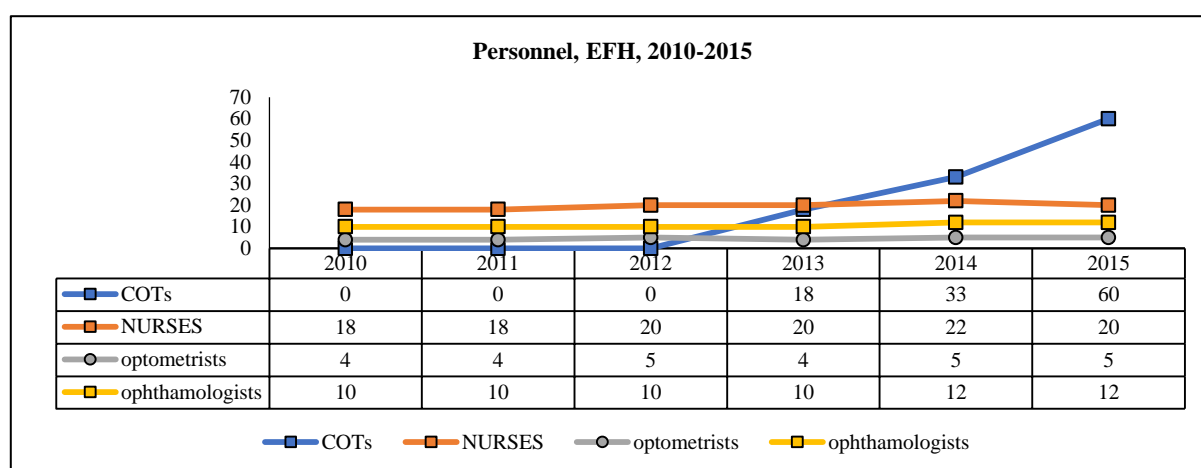
Department	EFH Ikeja		EFH Lekki		EFH V.I.		EFH/DCVI Ijebu		EFH Abuja		DEC Ikeja		Vision Centre Sagamu		Vision Centre Ilaro		Total
	Staff	Trainee	Staff	Trainee	Staff	Trainee	Staff	Trainee	Staff	Trainee	Staff	Trainee	Staff	Trainee	Staff	Trainee	
Theatre	4	3	1		1		3	2	1		1	1					17
Clinic	3	3	1	1		1	5	3	1	1	1			2		1	23
Pharmacy	1						3										4
Procedure	3				1		1	1	1								7
Front desk	2						1	1									4
Outreach																	
Counselling							2										2
Ward																	
I.T./Data							3										3
Total	13	6	2	1	2	1	18	7	3	1	2	1	2	2	1	1	60

Table 6: Comparison of staff and patient strength from 2010-2015.

	COTs	Nurses	Optometrists	Ophthalmologists	OPD value	Surgical volume
2010		18	4	10	42962	5739
2011		18	4	10	46950	3999
2012		20	5	10	46882	4676
2013	18	20	4	10	104239	18350
2014	33	22	5	12	74657	8068
2015	60	20	5	12	85338	11769

Table 7: Role of MLOP and impact on ophthalmologist.

Role of MLOP	Impact on ophthalmologist	Impact on Hospital
<ul style="list-style-type: none"> • Patient evaluation • Monitoring • Diagnostic tests • Surgical assistance • Counselling 	<ul style="list-style-type: none"> • More surgery • Improve quality • Training 	<ul style="list-style-type: none"> • Skilled support staff • Not independent decision makers • Main workforce in the hospital setting • Cost effectiveness

**Figure 7: Trend in volume of surgical consultations against number of COTs 2010-2015.****Figure 8: Personnel in the EFH Group from 2010-2015.**

Relationship between number of overall OPD consultation and surgery; and number of COT was strongly positive but not statistically significant ($r=0.759$, $p=0.08$) (Table 6).

DISCUSSION

This study reviewed the training and assessed the impact of middle level eye care personnel (Community Ophthalmic Technician) with skills to complement the services of the ophthalmologist for efficient eye care system and fulfilling vision 2020 goals. We are not aware of studies on this subject in Nigeria or sub-Saharan Africa.

Structure of training programme

This programme is collaboration between ophthalmology and college of health technology. It is a 2 years course with one year internship which leads to the award of national diploma. This is comparable to the MLOP programme at Aravind hospital in India, though it is a 2 year course.^{16,17} The ophthalmic technician course in Canada is of 10 months duration.^{10,18} and the one at Timor-Leste is a 12 month diploma for midlevel eye care workers.¹⁹ So there is variation depending on the level of need from country to country. Entry point is essentially the same for all countries: secondary school graduates. In a few cases qualified nurses are co-opted in to the programme.

Role of MLOP

It is to assist ophthalmologist to be able to function more effectively in his or her core duties. They are involved in registration, taking of measurements, doing investigations, servicing and repairing instruments, nursing care on admission and camp activities etc. this is what obtains in all the countries where mid-level eye care personnel are needed. They are trained skilled support staff, not independent decision makers and they form the backbone of hospital workforce.^{9,10,16,17} From 2013 to 2015, 72 COTs have graduated with 28 on internship. Aravind started 38 years ago and have graduated thousands.^{9,16,17} Timor-Leste that started 3 years before Eye Foundation had graduated four.¹⁹ The disparity in the numbers of MLOPs graduated is due to need and size. India has a population of 1.2 billion therefore their need will be greater than Nigeria with a population of 170million or Timor-Leste with a population of 1.2 million.

Impact on ophthalmologist and hospital activities

There was a strong, positive correlation between volume of surgery above cost and number of COTs ($r=0.880$, $p=0.021$, two-tailed). This suggests that an increase in number of COT was associated with an increase in volume of surgery above cost. There was also a strong, positive correlation between volume of OPD

consultations above cost and number of COT ($r=0.941$, $p=0.005$, two-tailed). This suggests that an increase in number of COT was associated with an increase in volume of OPD consultations above cost. A similar relationship was found between number of COT and volume of OPD consultation below cost.

Because of the OPs and the NCOPs since 2013, Eye Foundation Hospital Group has been able to handle high volume eye projects all over Nigeria. Prominent among them is the MTN foundation EyeRIS project. Eye Foundation Centre (EFC) partnered with MTN communications limited (foundation) in 2013 to significantly reduce avoidable blindness among the underserved in the Nigerian societies, this resulted in the biggest cataract surgeries ever carried out in a year in Nigeria. 61,000 patients were screened, 15,415 cataract surgeries were done at the base hospital and across the six geopolitical zones.²⁰ Only few of the nurses were involved in these projects. They were left to supervise activities in the base hospitals. Prior to this the EFC was doing an average of 2000 cataract surgeries per year all over Nigeria.²⁰ The NCOPs have made the work of the ophthalmologist easier. They help in setting up the microscopes; they scrub for surgeries, check the visual acuities etc. They are trained to be polyvalent. This type of effect has also been seen in the outpatient visits and surgical volumes of the Eye Foundation Hospital Group. This is comparable to that of Aravind Eye Care System in India, eye health systems in Nepal and Canada.^{16,17,18,21}

Limitations of this study

1. There are issues of confounding factors like increase population over the years, number of doctors, increase in number of equipment etc.
2. This study did not review the quality of services especially the quality of cataract surgery and other ophthalmic surgeries and patient satisfaction. But the services have witnessed more patient turnout and more surgeries being done since the inception of the programme. The number of ophthalmologists in 2010 is about the same as in 2015. But they are able to handle more patients unlike before.

This buttresses the fact that the importance of MLOPs cannot be over-emphasised.

CONCLUSION

COTs with skills are required in large numbers to complement the services of ophthalmologists for efficient eye health system. Their contribution is very important to meet the vision 2020 human resources objectives for Sub-Saharan Africa. This research will provide evidence-based study that mid-level ophthalmic personnel (COT) increase the efficiency of ophthalmologist and other key eye care workers.

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Conflict of interest: None declared

Ethical approval: Not required

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