



UNIVERSITY OF CAPE TOWN
IYUNIVESITHI YASEKAPA • UNIVERSITEIT VAN KAAPSTAD

Health System Analysis of Diabetes and Diabetic Retinopathy Services in Nigeria – The Case of Akwa Ibom State.



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(STPMAD001, 2017)

Dissertation submitted in partial fulfilment for the requirements for the degree Masters' in Public Health, Community Eye Health; School of Public Health, Faculty of Health Sciences and Family Medicine, University of Cape Town

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(HREC REF 134/2018)

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December 2018.**

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Abstract

This research project, undertaken for a MPH dissertation investigated and analysed the situation of diabetes and diabetic retinopathy services and management systems in four (4) government hospitals in Akwa Ibom State Nigeria using the World Health Organisation (WHO) Tool for the Assessment of Diabetic Retinopathy and Diabetes Management Systems (TADDS).

Part A is the research protocol, which explains the background and the key components of this research study. This is a cross sectional descriptive case study involving primary data collection. We conducted the case study using the WHO TADDS to survey health personnel involved in the management of diabetes mellitus (DM) and diabetic retinopathy (DR) in four (4) government hospitals in Akwa Ibom State. Concurrently, semi-structured interviews were conducted with key informants to investigate and analyse the situation of DM and DR services in Akwa Ibom State in Nigeria.

Part B is a structured literature review of published articles, online reports, and summaries related to DR. It covers the review of scientific evidence (clinical overview) about the aetiology and prevention of DR and the known risk factors; the review of epidemiological evidence on DM and DR globally and in sub-Saharan Africa (SSA); and the review of the evidence on effectiveness and cost-effectiveness of public health and health system interventions for the prevention and management of DR.

Part C is the journal-ready manuscript. In this part, the format of the journal *Ophthalmic Epidemiology* was used to present the research project and its main findings.

Part D contains all the relevant appendices used during the research project.

DECLARATION

I, **Stephen Maduabuchi Samuel**, hereby declare that the work on which this dissertation/thesis is based is my original work (except where acknowledgements indicate otherwise) and that neither the whole work nor any part of it has been, is being, or is to be submitted for another degree in this or any other university.

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Acknowledgements

1. Prof Robert Geneau, thank you for supervising this research. Your research expertise, understanding and support made this research a success.
2. Prof Caleb Mpyet, (Co-Supervisor), thank you for your skilful guidance and understanding throughout the period of this research.
3. Prof Colin Cook, thanks for your tutelage, guidance and mentoring throughout my academic years in UCT.
4. Petra Adams, thanks for logistical support throughout this research.
5. Chervons van de ross thanks for logistical support throughout my academic years in UCT.
6. My wife, Esther Stephen and son, Rex Chikamso Stephen, thanks for your prayers and supports.
7. Benue State Hospitals Management Board, thanks for granting me study leave to chase this study.
8. The management of University of Uyo Teaching Hospital and the Akwa Ibom State government, thanks for approving the use of your health facilities for this research.
9. I honour the Almighty God for the grace to carry out this study and the grace to meet all the wonderful people I mentioned above.

PART A: Dissertation Protocol

Health System Analysis of Diabetes and Diabetic
Retinopathy Services in Nigeria – The Case of Akwa
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1.0 Purpose of study

1.1 Primary objective

The primary objective of this study is to investigate the situation of diabetes mellitus (DM) and diabetic retinopathy (DR) services in government hospitals in Akwa Ibom State (AKS) Nigeria using the World Health Organisation (WHO) Tool for the Assessment of Diabetes and Diabetic Retinopathy Management Systems (TADDS).

1.2 Secondary Objectives

The secondary objectives of this study are as follows:

- I. To investigate the referral pathways between diabetes and eye care services in AKS.
- II. To identify the cadres of staff, their distribution, and number as well as the training of staff included in the DM and DR services in AKS.
- III. To explore the challenges faced by different cadres of staff involved in DM and DR services in AKS.
- IV. To explore and describe the follow-up systems for patients with DM and DR in AKS.
- V. To describe the policies and programmes on DM and DR services in AKS.
- VI. To identify the financial resources dedicated to the delivery of DM and DR services in AKS.

2.0 Background

Diabetes mellitus (DM) is one of the commonest non-communicable diseases (NCDs) worldwide and has become a major public health problem.^{1,2}

In the year 2000, the total number of people with diabetes for all age-groups was 171 million worldwide.³ Presently, about 500 million people live with diabetes, 425 million of those people are between the ages of 20 to 79.⁴ It is estimated that by 2045, the number of people with DM will be 629 million.⁴ In sub-Saharan Africa (SSA), the prevalence of DM was estimated to be 19.8 million in 2013 and by 2035 it is projected that the number will increase to 41.4 million, yet public health approaches required to combat the developing epidemic of DM are limited or not existing at all.⁵

About 80% of the global DM burden is in low and middle-income countries. “Rapid urbanization, unhealthy diets and increasingly sedentary lifestyles have resulted in previously unheard-of rates of obesity and diabetes, and many countries do not have adequate resources to provide preventive or medical care for their populations”.^{6,7}

Findings from the survey carried out in Nigeria in 2003 reported that prevalence of DM was 6.8% for individuals who are 40 years and above,⁸ while in individuals aged 15 years and above the prevalence varied from 1.6% to 12.7%.^{5,9-12}

In 2014, Nigeria was estimated to have 4 million diabetes patients, a fifth of all SSA diabetes cases.¹³ However, 70% - 80% of the 4 million as estimated in 2014 remained undiagnosed or untreated.¹³ This resulted into many patients presenting to the secondary and tertiary health care centres with the disease already at an advanced stage.¹⁴ “Poverty, unawareness, attribution of symptoms to other myths, lack / inadequate tools and basic infrastructure, inadequate

training of health workers were shown to be factors responsible for most of the failures to detect DM, increased risk of misdiagnosis and late diagnosis of patients at complication stages of the disease”.¹⁵

DM can present acute and chronic severe complications which can lead to incapacitation and death.¹⁶

Diabetic retinopathy (DR) may be the commonest and potentially most blinding of all the complications.¹⁷⁻¹⁹ DR is diabetes-related structural and functional damage to the retina.²⁰ DR is a progressive condition and is potentially vision threatening.²¹ The underlying pathogenesis is because microangiopathy and capillary occlusion.²²

Globally, DR accounts for 5% of all blindness²³ and cause visual impairment for 4.2 million people.² DR is one of the leading cause of blindness in people aged 15 – 64 years in developed countries.²⁴ DR is responsible for most blindness amongst the working population in the USA.²⁰ It has become a significant cause of blindness in the developing world with the near pandemic situation of DM in the world.⁷ DR has few ophthalmic symptoms until visual loss occurs.²⁰ Up to 21% of DM patients have DR at the first time of diagnosis of DM.^{25, 26}

DR can be non-proliferative (NPDR) or proliferative (PDR)²⁷. PDR is sight-threatening which can lead to visual impairment and even to blindness.²⁶

Poor control of blood sugar, high blood pressure and having DM for a long time have been reported as risk factors for DR,²⁶ however, clinical trials have reported that early treatment of DR can preserve vision.²⁵

DR affects about 55% of all DM cases at diagnosis, with a high proportion of PDR and macula oedema (DME).²⁸

It has been reported also that DR is common among patients who have suffered DM for 15 years or more, and also common in patients with non-insulin dependent diabetes (type 2) compared to patients with insulin dependent diabetes (type 1).²⁹

Similarly, Omolase et al. (2010) reported that among DM patients attending a tertiary health centre in Ondo State, Nigeria, 85% had T2DM, while 15% had T1DM. Varying degrees of DR was present in 15% of the respondents and the development of DR had a significant association with the duration of DM.³⁰

Azuamah et al. (2013) reported that in South Eastern Nigeria, DR contributed 1.12% of the total blindness among adults with the average age of 59 years. This made DR the fifth more common cause of blindness in this zone.³¹

In 2010, a study among patients with DM in AKS aged 19 to 82 years revealed that 94.5% of the patients had T2DM, 4.6% had T1DM and 0.9% had gestational DM. The prevalence of DR was 52.7% while 36.7% of patients presented no signs of and 8.7% of the patients could not have their retina examined.²⁰ Among the 52.7% that had DR, 1.7% had PDR, 63.4% had NPDR and 32.2% had diabetic maculopathy. Also, among the 52.7% patients with DR, 55.5% had poorly controlled DM, while 44.5% controlled theirs well. More patients on insulin (71.0%) developed DR compared to 53.7% patients on oral hypoglycaemic who developed DR.²⁰

“Public health strategies to control visual disabilities due to DR include generating evidence for planning, implementing standard operating procedures, periodic DR screening, focusing on primary prevention of DR, strengthening DR management, health information management and retrieval systems for DR, rehabilitating persons that are visually disabled from DR, using low-cost technologies, adopting a comprehensive approach by integrating DR care into the existing health systems, health promotion/counselling, and involving the community”.³²

Eastern Mediterranean Region (EMR) nations prioritized public health approaches to control visual impairments due to DR.³²

Although countries of EMR had prioritized public health approaches to tackle visual impairments due to DR, inadequate workforce, poor health care and unwillingness of DM patients to change their lifestyle all constitute important implementation challenges.³²

DR-related visual impairments and blindness is expected to increase in the near future. There is a call for all stakeholders to unite to minimise DR-related visual impairments and blindness.³²

Evidence from studies on planning and developing services for DR in SSA revealed that planning for an effective DR screening programme required a health systems approach and partnerships with various ministries and professional bodies.³³ This study discovered that development of DR services should include: “increasing geographical coverage, integration into the general healthcare system, and movement from passive, opportunistic services to a systematic and proactive service delivery system that is concerned with the prevention of DR”.³³ It entails that the WHO health systems framework should be used as a tool to systematically plan DR services.³³

Kyari et al. (2014) reported that an effective DR program requires the availability of more training for retina specialists, the need to provide laser and surgical equipment, availability of a system to track patients that needs treatment and follow-up,⁵ illustrating the need for a holistic health systems approach to tackle vision disorders and disabilities due to DR.

In Oyo state, Nigeria, patients and health care providers reported inadequate health education on the effects of DM on the eyes as a significant barrier for seeking diabetic eye services.³⁴

High cost of DM and DR treatment was identified as a barrier because of user fees and lack of health insurance. Long waiting time before consultation due to high patient to provider ratio, staff attitudes and lack of empathy towards patients, appointment scheduling strictly based on

quota system and missing case files during schedules were all reported by both patients and providers as barriers to DR care.³⁴

“To assess both management of DM and DR in countries and to estimate the level of cooperation and synergy between these two branches of health care, The World Health Organisation (WHO) has designed the Tool for the assessment of Diabetes and Diabetic Retinopathy Management Systems (TADDS)”.² The tool was designed to be used “to carry out situation analysis, define service provision levels, and identify the gaps to be addressed in ensuring universal access to DM care and to effective prevention and treatment of DR.”² The WHO health systems framework guided the development of this tool into service delivery, health workforce, health information management systems, medical products and technologies, health financing, leadership and governance”.²

Despite the rapid increase in the prevalence of DM and DR in AKS,²⁰ and the development of the TADDS by WHO to assess DR and DM services for effective and efficient DM and DR services,² no research or situation analysis have been carried out in AKS and Nigeria to assess the situation of DR and DM management systems.² This study is being undertaken using the WHO TADDS².

2.1 Significance of the study; Increased visual loss from DR in SSA looms from emerging DM epidemic.³⁵ In SSA more research efforts are needed to bridge the evidence gaps related to both the “problem” posed by DR (epidemiological evidence and burden of disease across population groups) and the “solutions” that could be implemented to prevent avoidable blindness due to DR. Many of the solutions are health-systems related and WHO recommended for health systems analysis of DM and DR services using WHO TADD². This study will provide evidence for aspect of DM and DR management systems that need to be prioritized and strengthened in AKS.

3.0 Methodology

3.1 Study design

This was a cross-sectional descriptive case study with the “case” being the prevention and management systems of DR in AKS, Nigeria. The decision to do a descriptive case study stems from the shortage of current knowledge about DM and DR services in AKS. This study involved concurrent use of a questionnaire (WHO TADD) as well as the conduct of semi structured interviews. The questionnaire is mostly comprised of close ended questions, therefore limiting the possibility of exploring the “how” and “why”. Qualitative interviews were used to understand better the barriers and opportunities to improve DM and DR services.

3.2 Characteristics of study population

The study population included the stakeholders involved in DM management and DR in AKS, Nigeria. The stakeholders included representatives of the Ministry of Health (Federal and state levels), nurses involved in the care of diabetes, primary care diabetes educators, primary care/ family physicians, endocrinologists, diabetologists, ophthalmologists, vitreoretinal specialists, and optometrists in AKS.

3.2.1 Number of participants

This study included 21 surveys using the WHO “Tool for the assessment of Diabetes and Diabetic Retinopathy Management Systems (TADDS)”. In addition, a total of 10 semi structured interviews were conducted.

3.2.2 Inclusion criteria and exclusion criteria

This research included stakeholders involved in the management/ care of DM and DR. It also included the stakeholders involved in policy development of the prevention and control of diabetes in AKS and Nigeria.

This research excluded diabetic patients, stakeholders in private hospitals in AKS and stakeholders who refused to give consent.

3.2.3 Location of the research

AKS is in the south geopolitical zone of Nigeria. It has the 10th largest land mass in Nigeria, covering 7,249 square kilometres. AKS has 31 local government areas (LGA's). The estimated population in 2016 was 5,452, 277. Uyo is the state capital. "The major towns include Eket, Ikot Ekpene, Oron, Abak, Itu, Etinan and Ibeno".³⁶ AKS has a total GDP of \$11.179 billion, per capita level of \$2, 779^{36,37} and poverty rate of 23.8 percent making it the 11th out of the 36 states in Nigeria in terms of least poverty rate.³⁸ Health facilities are not evenly distributed in all the LGA's but skewed in favour of the urban areas.³⁹

AKS has one (1) federal government owned tertiary hospital, the University of Uyo Teaching Hospital (UUTH), under the care of the Federal Ministry of Health serving the entire population. UUTH has two (2) endocrinologists, three (3) ophthalmologists, four (4) optometrists and four (4) ophthalmic nurses. AKS has forty-three (43) government owned state hospitals out of which only three (3) hospitals provide eye care. The entire state-owned general hospitals have six (6) optometrists, two (2) ophthalmologists with no ophthalmic nurse and no endocrinologist.

In AKS, between January 2009 and December 2010, the prevalence of DR was 52.7% among patients with diabetes aged 19 to 82 years.²⁰ This study by name and al. (year) is one of only few studies on diabetic retinopathy in that state.

The research involved stakeholders from the four hospitals that provide eye care services in AKS, that is UUTH, the three-state owned general hospitals (state clinic Uyo, General hospital Eket and General Hospital Itu Mbang), as well as from Ministry of Health departments with public health responsibilities for the prevention and management of DM and DR.

Key informant interviews took place in the offices of the stakeholders at UUTH, Federal Ministry of Health in Abuja (to have an idea of the national policy on DM and DR), Ministry of Health in Uyo (Capital of AKS) and three government owned general hospitals in AKS.

The questionnaires were administered at the offices of the respondents after obtaining consent.

3.3 Recruitment and enrolment

For semi-structured interviews: Participants were selected using a purposeful sampling approach by enrolling participants directly involved in programmes or services related to DM and DR.⁴⁰

The embedded researcher, as a health worker who did part of his internship in AKS in 2008, has a relationship with some of the stakeholders, so these potential participants were contacted first.

For the key informant interviews, stakeholders were contacted by the embedded researcher in their various offices and the aims of the research were explained to them. Stakeholders were given recruitment flyers to read and given time to make decisions whether to participate or not in the research. Stakeholders who declared their willingness to participate in the research were enrolled,

appointments made for convenience and their consent sought before interviews. Stakeholders were interviewed until saturation was reached. In qualitative research, the sample size is determined when saturation has been reached and new themes stopped emerging from the data. When saturation is reached, the researcher stops data collection.^{40, 41}

For the questionnaire (survey): questionnaire surveys were conducted in the four government owned hospitals where services for both DM and DR are available because one of the aims of this research is “to explore the existence and the nature of referral pathways between diabetes and eye care” and the synergy between DM and DR services. These four hospitals were the only hospitals where both DM and DR services are provided, other hospitals do not provide both services.

The researcher approached the Head of the department of ophthalmology and internal medicine or their equivalent in each of the selected hospitals for approval to distribute recruitment flier to the medical and health personnel in these departments. After securing approval from the Heads of department, the researcher visited these departments on the clinic days when all the medical and health workers were present. The recruitment flyers were shared with the personnel. The researcher was available to answer their questions. The recruitment flyers also contained the phone number and the contact address of the researcher for clarifications. The personnel were given two weeks to make their decision either to participate or not. Personnel willing to participate were recruited and issued with the questionnaires after consent was obtained.

3.4 Research procedure and data collection methods

Key informant interviews were conducted face to face as was preferred by all the participants.

Face to face interviews took place at the offices of the key informants or any other private room suggested by the key informant without a third-party present, to maintain privacy and confidentiality. Key informant interviews were recorded with a tape recorder for transcription after securing consent from the respondents. The interview lasted an hour on average for each participant.

The questionnaires were administered face to face in private rooms without a third party. The participants were asked not to write their names or any information that could be linked to them in the questionnaire to maintain privacy and confidentiality. Each questionnaire was assigned a unique code by the researcher. The questionnaire was completed in about one hour.

3.5 Data safety and monitoring plan

As mentioned, each questionnaire was given a unique code and the data extraction was carried out by the researcher alone. The recorded interviews were cross-checked and kept under lock and key. The data was stored in a password protected computer and backed up on a password protected compact disc plate. Only the researcher had access to the data. After analysis, the data was stored in the computer and will be deleted permanently.

3.6 Data analysis

3.6.1 Research instrument

The research instrument for this research is the WHO TADDS² and interview guide (see appendix). The interview guide has the same themes as the WHO TADDS.²

3.6.2 Validity and reliability of measuring instrument

According to the WHO, “Development of the TADDS was coordinated by the World Health Organization, Prevention of Blindness and Deafness, and technically supported by the Centre for Eye Research Australia (University of Melbourne) and the Menzies Centre for Health Policy (University of Sydney). The International Council of Ophthalmology provided technical comments throughout.² The research instrument was also field tested for validity and reliability”.² The semi structured interview was conducted using an interview guide. The interview guide was developed under the same themes as the TADDS. The researcher piloted the interview guide by interviewing some ophthalmologists outside AKS to validate the interview guide before the actual research in AKS.

3.6.3 Plan for data analysis

KI interviews were recorded after obtaining consent from participants or handwritten if a participant refused to be voice recorded. Each interview was transcribed verbatim and, as recommended by WHO, coded thematically based on the WHO TADDS² dimensions of DM and DR systems.

Descriptive statistics - frequency and percentages - were used to summarise quantitative data under the themes used in the TADDS using Stata 14 software.

4.0 Ethics considerations

Ethical approval from University of Cape Town Human Research Ethics Committee (HREC), University of Uyo Teaching Hospital (UUTH) ethics committee and the ethics committee of the Ministry of Health in AKS will be obtained before proceeding with the research.

5.0 Description of risks and benefits

This study does not pose a physical risk or medical risk to the participants. However, the participant might face the risk of being sanctioned for giving out sensitive information concerning understaffing/ lack of staff, inadequate/lack of infrastructures or ineffective health systems generally which are mostly political issues in Nigeria. However, this risk was eliminated through conducting interviews in private rooms without a third party and coding data such that it cannot be linked to the participants. Information that can reveal individual identities like names, age is not required in the survey.

There might not be direct individual benefits for the participants. However, this research will benefit the health system generally through the recognition of the gaps that should be filled for effective holistic management of DM and DR. The findings from this research will also be used to advocate for more attention in the prevention, management and care of DM and DR in AKS. The findings from this research can also be used to inform policy that will tackle the increasing rate of DM and DR. Other researchers will also benefit from the findings from the research for further researches.

6.0 Informed consent

The purpose and objectives of this research were explained to the participants. The participants were informed that participating in this research was voluntary and that they had the right to discontinue their participation in this research at any time. They also had right not to answer any question that they were not comfortable with.

The participants were given reasonable time to decide if they were willing to participate in this research or not.

The participants signed consent forms before participating in this research.

For telephone and internet-based interviews, participants were required to give verbal consent.

No information was withheld from participants concerning this research.

7.0 Privacy and confidentiality

Interviews and surveys were carried out at the respondents' convenient time. Interviews and surveys took place in private rooms without a third party. Personal identifiable details were collected during the interviews and surveys. Data has been coded by the researcher. The research data, electronic and hard copy, was stored in a password protected computer and under lock and key respectively. Only the researcher has access to the data. At the end of the research, hardcopy data will be burnt while data in the computer will be wiped permanently.

8.0 Reimbursement for participation

Participants were informed that there was no financial compensation for participating in this research.

9.0 Dissemination of study

The participants were informed that the results from this research will be presented in conferences and seminars. The findings from this study will be provided to policy makers in AKS for policies that will strengthen gaps in DM and DR management systems in AKS.

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PART B

LITERATURE REVIEW

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Specific objectives of the literature review

The specific objectives of this literature review are:

- 1) To review the scientific evidence (clinical overview) on the aetiology, known risk factors and prevention of DR;
- 2) To review the epidemiological data on DM and DR globally and in sub-Saharan Africa (SSA), and
- 3) To review the evidence on effectiveness and cost-effectiveness of public health and health systems interventions for the prevention and management of DR.

Search strategy

For the first and second objectives of the literature review, we present only an overview of the available evidence. There is a greater emphasis on the third objective on effective interventions, as it is more centrally aligned with the main objective of this dissertation and the content of the WHO TADDS (health systems readiness).

Databases: The following databases were searched: PubMed, Science, web of science, ProQuest, Cochrane library, google scholar and grey literatures through Google and medical websites.

We used general search terms with the Boolean operator “AND” in PubMed and google scholar for objectives 1 and 2 – using “diabetic retinopathy” AND the following terms in succession - “risk factors”, “epidemiology”, “Nigeria” and “sub-Saharan Africa.”

For the search on public health and health systems interventions, we used the following strategy with index and subject terms:

Keywords: ("methods"[Subheading] OR "methods"[All Fields] OR "methods"[MeSH Terms]) AND ("methods"[MeSH Terms] OR "methods"[All Fields] OR "intervention"[All

Fields]) AND ("diabetic retinopathy"[MeSH Terms] OR ("diabetic"[All Fields] AND "retinopathy"[All Fields]) OR "diabetic retinopathy"[All Fields]) AND services [All Fields].

Inclusion: All study designs, summaries, reports and articles that reported relevant DR interventions associated with effective outcomes. There was no year restriction.

Exclusion: Studies that merely proposed or recommended interventions without proven effective outcomes were excluded in this review. Studies with only abstract but no full text, studies published in languages other than English.

Results: fifty-nine articles (53 journal articles, 3 reports and 3 website articles) on features of intervention with better outcome on DR management challenges were reviewed out of the of 545 literatures from the search results.

Literature review

Diabetic Retinopathy: Clinical overview

Diabetic retinopathy (DR) is a diabetes-related structural and functional damage to the retina caused by persistently abnormal blood sugar levels damaging blood vessels that supply the retina.¹ DR develops in patients with both type 1 (T1DM) and type 2 (T2DM) diabetes who have suffered from the disease for a long time.² DR is a secondary microvascular complication of DM and can cause blindness if left undiagnosed and untreated.³ It starts with retinal nonperfusion and ischemia resulting from the closure of blood vessels.⁴ DR can be non-proliferative (NPDR) or proliferative (PDR).⁵

NPDR is the early stage of DR characterized by tiny blood vessels leak, which makes the retina swell.⁴⁻⁷ Retinal non-perfusion and ischaemia result from the closure of the blood vessels.⁴ PDR happens when retinal ischaemia is sufficiently severe causing the retina to start growing new blood vessels (neovascularization). These fragile new vessels might bleed into the vitreous, causing floaters or complete loss of vision.⁷ PDR can lead to both central and peripheral (side) vision loss.⁶ 50% of patients with PDR could become blind within 5 years without treatment.⁸

Risk factors

Numerous risk factors of DR have been investigated and identified in epidemiological studies and clinical trials, as summarised below:

Hypertension: Elevated blood pressure is a major risk factor for the development of DR.⁹⁻¹⁶

Klein et al. (1995), in their study to determine whether blood pressure at baseline was associated with incidence or progression of DR during a 10-year interval in a population-based cohort, reported that increased systolic blood pressure at baseline was associated with increased risk of incidence of DR in subjects with younger-onset diabetes (odds ratio, 1.27; 95% CI, 1.03

to 1.57).¹⁷ Similarly, in a large cohort study conducted in Germany by Hammes et al.(2011), among patients with T1DM, elevated blood pressure (>140/90 mmHg) was reported as a risk factor for advanced DR (OR 1.70, 95% CI 1.34–2.16).⁹ While some studies reported elevated systolic blood pressure as the risk factor for DR,¹⁰⁻¹⁴ other studies on the contrary reported elevated diastolic pressure as the risk factor for DR.^{15, 16}

Age and Sex: Zou et al. (2016) reported that onset of diabetes at age of 31–45 years was linked with increased risk of developing DR; however, the causal mechanism remains unclear.¹⁸ Stratton et al. (2001) reported that the older the age among diabetics, the higher the likelihood to develop DR.¹⁹ A study by Zhang et al, (2010) showed that among US adults with diabetes aged 40 years and older, older age among the males was reported as a risk factor,¹⁰ also, Hammes et al. (2011) reported male sex as a risk factor for DR.⁹

High Haemoglobin A1C Level and Hyperglycaemia: The systematic review and meta-analysis by Song et al. (2018) reported higher HbA1c as a risk factor for DR (OR=1.15 (95% CI= 1.09-1.20) in China.²⁰ Yau et al. (2012) reported that prevalence of DR among those with HbA1c of 7 or less was 18% and 51.2% among those with HbA1c of greater than nine.²¹ High HbA1c has been reported as a risk factor for DR in various studies.^{10, 12, 15} Van et al. (2003) reported an association between hyperglycaemia and the incidence of DR (OR 3.29 (95% CI, 1.11-9.72)) in the Hoorn study.²²

Insulin use: In the systematic review and meta-analysis of risk factors of DR in China, Song et al. (2018) reported that insulin use was significantly associated with DR (OR=1.99, 95% CI= 1.34-2.95).²⁰ Similarly, in the systematic review and meta-analysis of BMI and DR, Zhou et al. (2017) reported an association between insulin use (OR=2.64, 95% CI: 1.50-4.64, p=0.001) and DR.²³ However, other studies gave inconsistent associations between insulin and DR.^{13, 19, 24}

Dyslipidaemia: In a systematic review and meta-analysis to evaluate the association between triglycerides (TG), serum total cholesterol (TC), high-density lipoprotein cholesterol (HDL-C), low-density lipoprotein cholesterol (LDL-C) and DR, Zhou et al. (2018) reported slightly higher LDL-C levels in DR cases (MD 3.74 mg/dL, 95% CI: 0.13–7.35, $P=.04$) compared to controls.²⁵ Also, Shi et al. (2018) reported that lipid-lowering medications were associated with reduced risk in DR progression [OR=0.77 (95% CI: 0.62, 0.96), $P=0.02$].²⁶

Body mass index (BMI): the meta-analysis conducted by Zhu et al. (2018) showed an association between obesity and high incidence of DR (relative risk [RR], 1.20; 95% confidence interval [CI], 1.01–1.43; $I^2 = 59.6\%$). However, the study found no association between obesity and PDR but a harmful association between obesity and T2DM (RR, 1.40; 95% CI, 1.05–1.87; $I^2 = 67.6\%$). However, it found no harmful association between BMI and the mixed group (RR, 1.04; 95% CI, 0.97–1.18; $I^2 = 0.00\%$). The study concluded that “obesity was a risk factor for NPDR”.²⁷

Duration of DM: Systematic review by Yau et al. (2012) reported that globally 21.1% of those with DM duration of less than ten years develop DR compared to 76.3% for those with DM duration of twenty years and above.²¹ Studies have shown that diabetic patients after 10 years of disease with poor glycaemic control have a higher risk of DR²⁸ and patients with poor glycaemic control are more likely to develop DR with higher risks in 11–15 years of disease and greater than 15 years.²⁸ So, there is a recommendation for proper and adequate glycaemic control to minimise DR.¹⁹

Epidemiology of DR in Africa

DR is a leading cause of preventable vision loss globally²⁹ and the leading cause of vision loss in adults (20-65 years).³⁰ In 2010, it was estimated that one third of the estimated 285 million

people with DM worldwide have signs of DR.²¹ It is estimated that 21% – 25% of individuals with type 2 diabetes mellitus have DR at diagnosis of diabetes and, overall, DR affects 15% - 55% of all DM cases at diagnosis.³¹

In SSA, few data on the prevalence of DR have been published.³² The International Diabetes Federation (IDF) however estimated that the number of adults with DM in Africa will increase from 12.1 million in 2010 to 23.9 million in 2030.³³ Almost all the 48 resource-poor countries, as defined by the United Nations (UN), are in Africa.³⁴ Therefore, the epidemic rise in diabetes poses important public health and socioeconomic challenges for Africa.⁷

According to the systematic review of sixty-two studies from 21 African countries by Burgess et al. (2013), the prevalence estimates of DR in patients with DM ranged from 30.2% to 31.6%, for PDR from 0.9% to 1.3%, and for any maculopathy from 1.2% to 4.5% in population-based studies. In diabetes clinic-based surveys, the prevalence estimates of DR ranged from 7.0% to 62.4%, for PDR from 0% to 6.9%, and for any maculopathy from 1.2% to 31.1%.⁷

Burgess et al. (2017), in a study among people with over 5 years diabetes in Southern Malawi, reported that the incidence of ≥ 2 step retinopathy progression was 36.4%; (95% CI: 28.2–44.6). The incidence of sight threatening diabetic retinopathy (STDR) for those with level 10 (no retinopathy) at baseline was 19.4% (95% CI 11.3–27.4) while for those with level 20 (background) retinopathy at baseline it was 81.3% (95% CI 62.1–100).³⁵

In 2011, Glover et al. (2012) reported that in Malawi, the prevalence of any retinopathy among people with T1DM was 28.1%, STDR was 18.8% and PDR was 12.5%, while among patients with T2DM, the prevalence of any retinopathy was 32.5%, STDR was 19.7% and PDR was 4.8%.³²

According to the national survey of visual impairment in Botswana 2007, DR was the second leading cause of blindness after cataract among people aged 50 years and older, with a prevalence of 20%.³⁶

In Nigeria, the national Blindness and Visual Impairment Survey (2005 - 2007) among adults aged ≥ 40 years revealed that DR contributed to 0.29% of the total causes of blindness and visual impairment.³⁷

A study by Bogunjoko (2016) reported that among the estimated population of 740,000 above the age of forty (40) in Ogun State of Nigeria in 2015, 3.3% had DM. Among those with DM, 17% of all DM had DR, 12% of DR cases had sight threatening DR.³⁸

In Akwa Ibom State (AKS), Nigeria, between January 2009 and December 2010, a study of patients with DM aged 19 to 82 years revealed that 94.5% of the patients had T2DM, 4.6% had T1DM and 0.9% had gestational DM. The prevalence of DR was 52.7% among the examined patients.³⁹ Among the 52.7% that had DR, 1.7% had PDR, 63.4% had NPDR and 32.2% had diabetic maculopathy.³⁹

In 2017, Abraham and Megbelayin (2017) reported that DR was the second commonest posterior segment disease (2.0%) after age related macular degeneration (AMD) (37.5%) among 547 participants of free eye screening programs in Uyo, AKS, Nigeria with age ranging from one (1) to eighty-seven (87) years. This study concluded that the eye health awareness and eye health indices of AKS is still very poor.⁴⁰ This entails the need for gap analysis and suitable interventions to improve DR management systems in AKS.

The prevalence of DR in some countries in SSA is summarised in the table below:

Table 1: Diabetic retinopathy prevalence estimates from published studies in Africa.

Country /authors	Type of Study	Prevalence of DR
Egypt. Macky, Tamer A., et al. (2011) ⁴¹	cross-sectional survey among known diabetic patients attending diabetic clinics ≥ 18 years.	20.5%
Ghana. Akpalu (2011). ⁴²	Hospital based cross sectional analytical study. Age range 22 to 82 years (mean age = 55.3 years)	49.0 %
Tanzania. Cleland, et al. (2016) ¹¹	All persons with diabetes screened for retinopathy at entry into a screening programme in Kilimanjaro Region, Tanzania between November 2010 and December 2014 were included.	27.9% (95%CI 26.4-29.5%)
Ethiopia. Sharew, et al. (2013) ⁴³	cross sectional hospital-based study	41.4%
Cameroon. Jingi, et al. (2014). ⁴⁴	prospective cohort study	40.3%
Botswana. Blake, et al. (2015). ⁴⁵	Survey of the National Diabetic Retinopathy Screening register between October 2009 and August 2011. Mean age (standard deviation) was 55.0 (14.1) years	17.7% (95% CI=15.6–19.9)
South Africa. Webb, et al. (2016). ⁴⁶	Community based screening	24.9%

Zimbabwe. Machingura, et al. (2017). ⁴⁷	Hospital based screening (cross sectional study Analytica) Mean (SD) age was 57.5 (14.9) years	28.4%
Kenya. Mathenge, et al. (2014). ⁴⁸	population-based survey of older people aged ≥ 50 years	35.9% (95% CI, 29.7-42.6).
Ivory coast. Kouassi, et al. (2018). ⁴⁹	Hospital based prospective observational study which took place from April to September 2016	45%
Senegal. Ndiaye, et al (1999). ⁵⁰	Hospital based	22.48%
Zambia Lewis, et al. (2018). ⁵¹	Community screening	52%
Guinea Burnett, et al. (2018). ⁵²	A cross-sectional population-based survey of people age 50 years or above	46.4%
Uganda Nyanzi, et al. (2014). ⁵³	Hospital based	66.2%
Mauritius Dowse, et al. (1998). ⁵⁴	Population based survey	Prevalence of NPDR and PDR (14.5% and 0.3% respectively).
Nigeria. Kyari, et al. (2014). ⁵⁵	National blindness and visual impairment survey	20.5%

Health systems challenges for the prevention and management of DR

Studies have reported health systems challenges faced by DR systems globally. The systematic review by Graham-Rowe et al. (2018) identified lack of access to DR services in the rural areas, poverty, ignorance of DR by diabetics, beliefs about consequences of DR, lack of support to people with diabetes. They concluded that the major barriers within these groups included: erroneous diabetic registers and misunderstanding by patients and providers between routine eye care and retinopathy screening.⁵⁶

Other studies also reported similar challenges, but with added factors, which include: lack of knowledge about DR by the patient,⁵⁷ lack/inadequate eye care infrastructure and human resources, lack of systems to trace patients for follow up,⁵⁸ limited access to ophthalmic services,⁵⁹ lack of guidelines for DR services, lack/inadequate staff training, insufficient referral of patients, lack of retinal treatment, cost of DR services,⁶⁰ confusion between health workers, pain and visual disturbances after mydriasis,⁶¹ difficulty with the integration of DR screening with other care, paying more attention to the newly diagnosed by the health workers managing DR,⁶² lack of knowledge of the management of DR (except from the ophthalmologists and endocrinologists),⁶³ and language barrier.⁶⁴

In Nigeria, DR system challenges include: family-related barriers, community and societal influence, use of traditional medications from herbalists, inability of patients to pay for DR services, lack of health insurance, transport and distance to specialists clinics, lack of escorts to clinic, long waiting time in the clinic, inconvenient appointment scheduling, harsh and disrespectful behaviours by health workers towards DR patients, lack/inadequate equipment, equipment malfunction, power failure, lack of clarity of information, and curative expectations.⁶⁵

With these challenges, visual challenges due to DR are likely to increase in the coming years. Experts have called for the adoption of a public health approach for all stakeholders to work together for interventions that will put severe visual disabilities due to DR under control.⁶⁶

Features of interventions associated with better DR outcomes

Based on studies and programmes in Latin America, von-Bischoffshausen and al. (2011) highlighted that a programme to manage DR services should include the following: proper understanding of the present and expected prevalence of DR (to make it possible to plan services for prevention, screening and treatment), the existence of clinical guidelines and effective ways of discovering patients with DM and DR, screening and retinal examination methods that maximize the equipment and personnel available, availability of laser treatment centres for appropriate treatment, health promotion and prevention programmes that reach the whole population, advocacy to obtain the backing and support of the authorities and stakeholders, and lasting sustainability using cost recovery or subsidies.⁶⁷

A similar study in Africa by Poore et al. (2015) revealed that planning for an effective, sustainable and integrated DR screening programme required a health systems approach and partnerships with various ministries and professional bodies. This study reported that the development of DR services should include: integration into the general healthcare system and changing from opportunistic services in the clinic to a regular and proactive service delivery system that is centred on the prevention of DR.⁶⁸ The study suggests that a comprehensive health system approach is necessary to systematically plan for DR prevention and treatment services.

In this section, we adopt a health systems approach to present the results of the literature review related to health systems and health policy interventions for the prevention and management of DR.

This section reviewed studies that reported interventions associated with better outcomes. Studies that proposed or recommended interventions without outcomes were excluded from this review. However, results from our search showed a paucity of studies on DR interventions in Africa.

Service Delivery: Systematic reviews have examined the effectiveness of DR screening intervals.^{69, 70} Echouffo-Tcheugui et al. (2013) reported that it is safe and effective to conduct screening for patients with DM but without DR biannually, except for individuals with poor glycaemic control or uncontrolled hypertension.⁶⁹ The systematic review by Taylor-Phillips et al. (2015) found similar results.⁷⁰ However, they reported that available evidence is not sufficient to extend screening intervals past 1 year because of the lack of experimental research design and differences in the definition of those who are at low risk in the different studies.⁷⁰

The systematic review by Lawrenson et al. (2018) reported that Behavioural Change Techniques (BCT's) improved the DR screening attendance by 12% compared to usual care.⁷¹ The techniques investigated were: “the use of feedback mechanism, proper and effective information on the screening methods and processes, the use of credible sources in the society to provide information to the patients, the use of reminder systems, the use of national guidelines, improved patients convenience and screening environment via online management/booking systems or monitoring tools such as diabetes passports”.⁷¹

In developed clime of Europe, America and part of Asia, service delivery interventions such as: tracing DM patients through phone calls,⁷² recruitment strategies (like target mail outs, printing of program pamphlets, creating awareness in the mass media in ethnic language,⁷³ the use of checklist based intervention for screening of DM complications by health personnel⁷⁴ and use of the reminder system to remind patients of their periodic diabetic retinal examination⁷⁵ improved DR screening uptake, compliance and services.

Telephone intervention was reported to effectively improve participation in DR screening.⁷⁶ Walker et al (2008) reported in a randomised controlled trial that the use of a telephone intervention to promote retinopathy screening increased DR screening by 74% compared to a standard print intervention in three health centres in the Bronx in New York. This study also reported that patients who previously had poor control of diabetes responded with greater success to telephone interventions than standard print intervention.⁷⁶

In sub-Saharan Africa, partnership and joint eye and DM services based in the eye department promoted effective routine referral of DM patients to have their eyes examined in Tanzania and Ghana.⁵³ Similarly, in two clinics in Botswana, joint services based in the eye department resulted in provision of consistent weekly service and stable arrangement of patient movement between the eye and diabetes departments.⁶⁸

However, outreach / field DR screening intervention based at patients' local clinic was effective in the diabetes programs in Kilimanjaro in Tanzania and in the Copperbelt province in Zambia. The programs recorded high screening rates, with a Kilimanjaro diabetic program (KDP) screening rate of 90% among 3,175 registered DM patients within two months, while in the Copperbelt programme screened 1,233 patients within five months. The Copperbelt programme though faced with the lack of systems to facilitate call/recall (poor mobile phone coverage, poor literacy, lack of postal systems, lack of diabetic registers), demonstrated that the Provision of information and education to the diabetic clinics and community was effective in inviting people for screening in the local clinics in Copperbelt, indicating that services can still thrive where resources are not available to start registers and formal call/recall systems.⁶⁸ However, comparative cost analysis was not included.

Cost/financial intervention: A systematic review by Jones and Edward (2010) reported that DR screening programmes are cost-effective interventions in high-income countries. However,

this has not been determined in African settings.⁷⁷ In the developed countries, structured systematic screening program that targets the population has been reported to be cost-effective when compared to opportunistic screening which targets only few patients.⁷⁸⁻⁸¹

A systematic review by Pasquel et al. (2016) reported that telemedicine lessens the burden on the eye clinic, improves access in the inaccessible communities and is cost effective in relation to clinical practice.⁸² This finding is consistent with that of a systematic review by Jones and Edward (2010)⁷⁷ and other studies.⁸³⁻⁸⁵

In SSA, teleophthalmology screenings involving the use of digital non-mydratic fundus photography to capture retinal images by non-ophthalmologist in primary health care setting and images interpreted by experienced medical officer has been reported to be very cost-effective in South Africa.⁸⁶

Early incorporation of DR into the main national diabetes program in the planning phase increases the chances of donor funding of DR in SSA.⁵³ DR programmes in Tanzania involving the Muhimbili Hospital in Dar es Salaam and the KDP Tanzania showed that collaborations with the Tanzania Diabetic Association resulted in the inclusion of DR in the overall diabetes scheme and easier network with diabetic funding bodies.⁶⁸

Free DR screening in SSA is reported to have increased the compliance of eye screening among patients with DM.⁸⁷ In Tanzania, a free examination as an intervention increased attendance from about 20% to 47% of those who had not been examined before this intervention among diabetics over the age of 18 attending the diabetic clinic at Kilimanjaro Christian Medical Centre (KCMC).⁸⁷

Infrastructure/technology and Human Resources: Telemedicine has proven to be an effective technological intervention for DR programmes and management systems.⁸⁸

A systematic review by Shi et al. (2015) reported that teleretinal examination has sensitivity greater than 80% in detecting the absence of DR, pooled specificity of greater than 90%, the use of wider angle image of 100 to 200 degrees and use of mydriatic agents increases accuracy in various clinical levels of DR and DME.⁸⁸ Similarly, Tozer et al (2015) reported high clinical accuracy of telemedicine in the screening of DR in the developed countries, and globally. They concluded that telemedicine has been implemented successfully across the globe.⁸⁹

Similarly, in SSA, Blanckenberg et al. (2011) reported the use of a handheld ophthalmoscope that combines a digital camera to capture retinal images. The images captured are transferred to a mobile phone and then sent to a central website for evaluation. The evaluation report is automatically returned to the mobile phone via SMS. The quality of the images was rated as acceptable for clinical use by medical specialists at the Department of Ophthalmology of the Health Sciences Faculty of Stellenbosch University, South Africa.⁹⁰

However, Poore et al. (2015) reported that in five DR screening services in Botswana, Ghana, Tanzania (with two sites) and Zambia using fundus cameras, four out of the five programmes had setbacks of malfunctioning cameras. They recommended negotiations with suppliers on machine maintenance and training of staff before purchase.⁶⁸

Considering human resources, training of non-ophthalmologists such as optometrists and general physicians to carry out screening of DR were reported to be effective and showed a good rate of agreement with the diagnoses made by the ophthalmologists in different climes.⁹¹

⁹²In SSA, Poore et al. (2015) reported that adequate training for non-ophthalmologists provides them with the competency to screen and grade DR due to the scarcity of ophthalmologists in SSA.⁶⁸

Poore et al. (2015) reported interventions on workforce sustainability to include: training personnel on permanent employment in the eye unit, providing DR services in the facilities,

arrangements with the Ministry of Health (MOH) to keep providers of DR services constant in the eye unit to curb the challenge of staff transfer, open curriculum to meet demands of the epidemic of DM by healthcare professionals, licensing and recognising of the new roles of health workers involved in task shifting.⁶⁸ In Ghana, ophthalmic nurses were trained to use slit lamp after approval was obtained from the Nursing and Midwifery Council of Ghana.⁶⁸ Also, in Tanzanian national eye care plan, the MOH included ophthalmic equipment maintenance in the curriculum of undergraduates.⁹³

Leadership and governance: Leadership intervention that involved the engagement of various stakeholders in the Pakistan diabetic program, via the national diabetic task force, resulted in intense advocacy with evidence on the need for DR services in Pakistan, forcing government to include DR services in the budget and the development of guideline on DR treatment with laser and avastin.⁹⁴ Similar results were reported by Jiao et al. (2016)⁹⁵ and Shaw et al. (2010).⁹⁶

In SSA, Poore et al. (2015) reported that multidisciplinary planning and management involving endocrinologist, programme manager, database designer and ophthalmologists on the management committee in KDP promoted interdepartmental relationships and enabled linkages with other general/diabetic doctors in the region, national diabetes networks and international funding bodies.⁶⁸ The inclusion of MOH in DR screening services, high-level stakeholders' engagements in planning the national programme, availability of national eye care plan and good leadership were responsible for the sustenance of DR services in Botswana, Ghana, Tanzania and Zambia.⁶⁸ These strategies can be utilized to close the leadership gap in the planning and execution of DR programmes.

Medical products: The availability of quality medical products is a crucial factor towards the effectiveness of a DR programme.⁶⁸ According to the American Academy of Ophthalmology,

treatment strategies for DR to prevent severe vision loss is effective in 90% of DR cases. The treatment options are laser therapy, anti-VEGF (anti-vascular endothelial growth factor) drugs (bevacizumab, ranibizumab, aflibercept) and surgery.

The introduction of intravitreal injections such as anti-VEGF for DR has had a huge influence on the DR treatment paradigm worldwide. Intravitreal injection of anti-VEGF agent has now become the principal treatment modality for diabetic macular oedema.⁹⁷⁻¹⁰⁰ According to the DR Clinical Research Network (DRCR), anti-VEGF therapy for DME results to lasting vision improvements compared to laser or combination treatments.⁹⁹

However, the United Kingdom Proliferative DR study (DCCT-UKPDS) reported that the crucial factor in therapeutic management of DR is effective glycaemic control, which will result to reduction in the risk of diagnosing new cases of DR and reduction in the progression of existing DR.

In Africa, given the current difficulty in providing costly therapeutic interventions, a well-planned, cost-effective prevention strategy is required.¹⁰¹

The International Diabetes Federation (IDF), Africa Region, initiated the African Diabetes Declaration,¹⁰² that required the governments, non-governmental organisations (NGOs) and stakeholders to guarantee availability of inexpensive medications.¹⁰³ Novo Nordisk (a multinational pharmaceutical company) introduced equity pricing initiative in the 50 poorest countries by supplying insulin at prices not higher than 20% of average prices in developed countries.¹⁰⁴ This intervention crashed the price of insulin in the public sector in Mozambique by 50%. Novo Nordisk through World Diabetes Foundation provided grants to support prevention and treatment of diabetes in Tanzania, collaborating with the Tanzanian Diabetes Association and Ministry of Health to establish a system of diabetes clinics throughout the country, provide health-workers training, guidelines, and patient education material.¹⁰⁵

The IDF team through its “twinning initiative”¹⁰⁶ inspired IDF member associations in developed countries to partner with associations in developing nation to aid them.¹⁰³ This initiative resulted in support from diabetes UK to diabetes Mozambique and support from Norwegian Diabetes Association to Zambia.¹⁰³

Africa is faced with numerous DR systems challenges with little interventions to combat these challenges.⁶⁸ These gaps are contextually peculiar to each DR management system hence the need for contextual interventions.⁶⁸ The first step will be to carry out a situational analysis in each setting to assess the gaps and needs that exists in such DR systems before interventions.¹⁰⁷ No known study of situational analysis of DR system has been carried out in Akwa Ibom State, Nigeria. Hence, this study has been conducted to fill this gap.

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Part C

Journal ready manuscript

Health system analysis of diabetes and diabetic retinopathy services in
Nigeria – The case of Akwa Ibom State.

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ABSTRACT

Purpose: To investigate and analyse the situation of diabetic mellitus (DM) and diabetic retinopathy (DR) services in government hospitals in the Akwa Ibom State (AKS) in Nigeria.

Methods: We conducted a descriptive case study using the WHO “Tool for the Assessment of Diabetes Retinopathy and Diabetes Management Systems” (TADDS) to survey health personnel involved in the management of DM and DR in government hospitals in AKS. Concurrently, semi-structured interviews were conducted with ten (10) key informants. Qualitative data from transcribed interviews and quantitative data from the TADDS survey were triangulated and thematically analysed under the WHO health systems framework.

Results: The main gaps identified included: low priority of DM and DR in the National Health Agenda; lack of policies and programmes for DM and DR; lack of consensus about clinical management guidelines for DM and DR; lack of reciprocal referrals between providers of DM and DR services; the lack of follow up systems of patients with DM and DR; inadequate health workforce; lack of training for health workforce; lack of modern technology for DM and DR care; lack of consensus on DM and DR indicators to be monitored; and proportionately high out of pocket payments for DM and DR services.

Conclusion: Findings reveal that several components of the health system need to be strengthened to better serve patients with DR in AKS. The present situation of DM and DR services in AKS requires advocacy by the stakeholders for prioritization of DM and DR by the government, decentralization of DR and DM services to the primary level, employment of more specialists and training of other health workers on how to screen for DR, provision of the modern technologies for DR and DM, and more importantly, formulation of guidelines for DR and DM management by all stakeholders.

INTRODUCTION.

Diabetes mellitus (DM) has become a major public health problem.^{1,2} Presently, it is estimated that about 500 million people live with diabetes, 425 million of those people are between the ages of 20 to 79.³ About 80% of the global diabetes burden is in low and middle-income countries.^{4,5} By 2036,⁶ the number of people with DM is estimated at 529 million, and at 629 million by 2045.⁷

In sub-Saharan Africa (SSA), the number of people living with DM was estimated to be 19.8 million in 2013 and by 2035, it is projected that this number will increase to 41.4 million (+109%)⁶, but public health strategies required for the management of the emerging epidemics of DM are insufficient or not existing at all.⁶

In 2014, Nigeria was estimated to have 4 million diabetes patients, a fifth of all cases of DM in SSA.⁷ However, 70% - 80% of all cases were either undiagnosed or untreated.⁷ This resulted in many patients presenting to the secondary and tertiary health care centres with the disease at an advanced stage.⁸ “Poverty, lack of awareness about the disease, attribution of symptoms to myths, lack or inadequate tools and basic infrastructure and inadequate training of health workers are the factors responsible for most of the failures to detect DM and for the increased risk of misdiagnosis and late diagnosis of patients at complication stages of the disease”.⁹

DR results from the damage caused by diabetes to the blood vessels in the retina. Diabetic retinopathy occurs when the small blood vessels in the retina leak blood and other fluids.¹⁰ DR is a progressive condition and is potentially vision threatening.¹¹ It is the commonest and potentially most blinding of all ophthalmic complications from diabetes.¹²⁻¹⁴

Globally, DR accounts for 5% of all blindness.¹⁵ It is one of the leading causes of blindness in people aged 15 – 64 years in developed countries.¹⁶ DR is now an important cause of blindness in the developing countries with the near pandemic situation of DM in the world.⁵

Findings from the national blindness and visual impairment (VI) survey in Nigeria between 2005 and 2007 showed that the of DR contributed 0.29% of VI (Visual acuity of less than 6/12) and 0.5% of all blindness (Visual acuity below 3/60).¹⁷ However, Burgess et al. (2013), reported that the survey was focused more on treatable causes of VI were over preventable causes hence the likelihood of underreporting the contribution of DR.¹⁸

The prevalence of DR in DM patients aged 19 to 82 years in Akwa-Ibom State (AKS), Nigeria, between January 2009 and December 2010 was estimated to be 52.7%.¹⁹

Visual disabilities from DR are likely to increase in the coming years. An organized public health approach involving all stakeholders is required to prevent and control visual disabilities due to DR.²⁰

The multidisciplinary needs of DM and DR patients over a lifetime is a challenge for health providers because it affects all fundamentals of health systems: leadership and governance, service delivery, workforce, facilities, technology and pharmaceuticals.²¹

The World Health Organisation (WHO) has developed a tool for the assessment of DR and DM management systems (TADDS),² guided by the WHO health systems framework to enable countries to carry out a situation analysis, define service provision levels, and identify the gaps to be strengthened to curb the catastrophic trend of DM and DR epidemics.²

No research or situation analysis have been carried out in Akwa Ibom State and Nigeria to assess the situation of DR and DM management systems despite the estimated high prevalence of DR in this state.

The purpose of this study was to investigate and analyse the situation of DM and DR services in government hospitals in AKS, Nigeria using a systematic approach guided by the WHO TADDS.

MATERIALS AND METHODS

This study is a cross sectional descriptive case study, with the “case” being the prevention and management systems of DM and DR in Akwa Ibom State (AKS), Nigeria. The study participants were recruited using purposeful sampling strategy. The study involved stakeholders directly involved in programmes or services related to diabetes and DR from the four (4) government hospitals in AKS where DM and eye services are provided (University of Uyo teaching hospital, State Clinic Uyo, General hospitals in Eket and Ituk Mbang) as well as from Ministry of Health (MOH) departments with public health responsibilities for the prevention and management of DM and DR.

The study involved concurrent use of semi-structured key informant interview and questionnaire (WHO TADDS) administered to DM and DR stakeholders.

For the questionnaire (survey), the Heads of departments of ophthalmology and internal medicine or its equivalent in each of the selected hospitals approved the distribution of recruitment flyer to health providers in these departments. The researcher was available to answer their questions. The recruitment flyer also had the phone number and the contact address of the researcher for clarifications. The providers were given adequate time (2 weeks) to make their decision either to participate or not. Twenty-one (21) health providers involved in the management of DM and DR in these four (4) hospitals were willing to participate in the research out of twenty-three (23). They were recruited and were issued with the questionnaires after consents were obtained. All participants were administered hard copies of the

questionnaires without identifiers. Questionnaires were filled maintaining confidentiality. Filling of each questionnaire by the respondents took about one (1) hour.

For the key informant interviews, stakeholders were contacted by the researcher in their various offices and the aims of the research were explained to them. Stakeholders were given recruitment flyers to read. They were given time to decide whether to participate in the research or not. Stakeholders who declared their willingness to participate in the research were enrolled, appointments were made, and their consent sought before interviews. The researcher interviewed all the stakeholders at their convenient times, in private rooms without third parties. All the interviews were conducted face to face and in English. Five (5) interviews were recorded with a voice recorder after obtaining permission from the participants, while five (5) were hand written after the participants declined voice recording. The interviews were semi structured, and the researcher used an interview guide that included the same themes as the WHO TADDS. Each interview lasted one hour on average. The process of conducting interviews stopped when data saturation was reached, in this case after ten (10) interviews.²²

²³ Each interview was transcribed verbatim and, as recommended by WHO, coded thematically based on the WHO TADDS dimensions of DM and DR systems.

For the questionnaire, the data was inputted into Microsoft Excel 2010, then a database codebook was created to assist in analysis. The accuracy of the data entry from the questionnaire responses was checked manually and when an error was identified, extra checking and corrections were made by the researcher.

Data was then transferred to statistics and data software, Stata 14 for further analysis. The quantitative data analysis was descriptive. The statistics were mainly frequencies and percentages (proportion). These statistics were summarized under each individual section /category used in the TADDS.

Ethical approval was obtained from the University of Cape Town Human and Ethics

Committee, University of Uyo Teaching Hospital Ethical Committee and the Akwa Ibom State MOH Ethics Committee.

Participants signed informed consent forms before participating in interviews and surveys

RESULTS

Among the 10 (ten) stakeholders interviewed, there were: 2 (20%) endocrinologists, 3 (30%) ophthalmologists and 2 (20%) Ministry of Health directors (see Table 1.0). Twenty-three (23) questionnaires were sent out while twenty-one (21) (91.30%) were returned. The other two (2) (8.70%) could not be reached.

Table 1.0 Key informants and questionnaire respondents on DR and DM services.

Category	Frequency/ percentage Semi-structured interviews	Frequency/percentage TADDS Questionnaire
Endocrinologist	2 (20.0%)	1 (4.8%)
Medical officer	2 (20.0%)	6 (28.6%)
Ophthalmologist	3 (30.0%)	4 (19.0%)
Optometrist	1 (10.0%)	6 (28.6%)
Director from the Ministry of Health	2 (20,0%)	4 (19.0%)
Total	10 (100.0%)	21 (100.0%)

PRIORITIES, POLICIES AND PROGRAMMES

National Diabetes Plan or Programme

Among the 21 questionnaire respondents, 71.5% reported that DM is not a priority and that there is no national plan and no DR program in Akwa Ibom state (AKS) (see table 2).

Table 2.0 Existence of priority, policies, programs and availability of clinical guideline for the management of DM and DR.

Situation of DM and DR services in Akwa Ibom State	Frequency	%
Existence of priority, policies and programs		
<i>DM not a priority, no national plan, no program</i>	15.0	71.5
<i>DM is a priority, there is national plan, no program implemented</i>	2.0	9.5
<i>DM is a priority, there is a national plan but does not cover the whole country</i>	0.0	0.0
<i>DM is listed as a priority; both a plan and a program are in place and there is national coverage</i>	2.0	9.5
<i>Not aware if DM is a national priority, national plan and program</i>	2.0	9.5
Guidelines for clinical management of DR		
<i>There are no Ministry of Health recommended guidelines</i>	17.0	81.0
<i>Ministry of Health guidelines formulated, health professionals unaware of it, so they are not widely used</i>	0.0	0.0
<i>Ministry of Health guidelines are available and known to the appropriate audience, but they are not widely followed</i>	1.0	4.8
<i>Ministry of Health guidelines have been formulated and are commonly followed</i>	0.0	0.0
<i>Not aware of the existence of Ministry of Health guidelines</i>	3.0	14.2

Similarly, most interviewed participants reported that DM and DR are not priorities, that there are no policies and programmes targeted at DM and DR, either at the national level or in AKS. Also, all interviewed participants reported that there is no national diabetic plan available in AKS. However, a director at the national level reported that there is no exclusive policy or plan on DM.

“No. There is no exclusive policy on diabetes prevention... diabetes prevention activities are under the NCD Division”. (respondent 10)

Participants attributed the lack of priority, policies and programmes to a variety of factors, as explored below:

i. Lack of prioritising of DM and DR in the national health plan:

Participants reported that the state health systems policies in Nigeria align with the national health policies;

“The State will always align with the national, that is the federal ministry of health in this case. The national did not prioritize it so why would the state?” (respondent 2)

ii. Lack of political will

One of the participants offered the view that health priority, policies and programmes are influenced by the political class at the national level and in AKS. Most diabetic patients are aged and mostly apolitical and do not really have leverage to influence government policies in favour of DM and DR.

“...in Nigeria each regime places emphasis on where it feels to be more important and for political gain. Most diabetic patients are the aged who do not have political influence.” (respondent 1)

i. The disease burden of DR in Nigeria in the context of blindness prevention efforts
For some participants, the fact that DR is not the commonest cause of blindness in Nigeria means that it is normal that it should be less prioritized than, for example, cataract:

“diabetic retinopathy but it is not a common cause of blindness here in Nigeria, so it is not something that we will say it is a priority in this part of the world...” (respondent 6)

However, the absence of a State’s prevention of blindness plan in AKS is also believed to be responsible for the non-prioritization, lack of policies and programs for DM and DR. *“...the same negligence trickled down to the state because there is no prevention of blindness plan in Akwa Ibom State.” (respondent 9).*

Clinical management guidelines

81.0% of questionnaire respondents reported that there are no Ministry of Health recommended guidelines for the management of DR (Table 2.0).

All participants interviewed agreed that there are no national consensus clinical guidelines for the management of DM and DR at all the levels of the health systems in AKS and Nigeria in general. Practitioners use guidelines from various sources they consider fit.

“In Nigeria, there is no guideline but there are textbooks and online materials, you can reference.... So different individuals use different guidelines and materials online but at the end the same result is achieved.” (respondent 8)

SERVICE DELIVERY, HEALTH WORKFORCE AND TECHNOLOGY

Network and Linkages

A total of 76.2% of participants reported that DR services are available in few places and to few people in AKS (see table 3.0).

Table 3.0 Location of DR services and accessibility to the population

Situation of DM and DR services	Frequency of responses	Percentages (%)
Location of DR services and accessibility to population in need		
<i>Services available in few places and few people</i>	16.0	76.2
<i>Some services are available to part of the population</i>	3.0	14.3
<i>Services are available everywhere but do not reach some of the population.</i>	2.0	9.5
<i>Services are available everywhere for the population</i>	0.0	0.0
Network between the care providers for DM and DR		
<i>No known collaboration between separate providers of care of DM and DR</i>	7.0	33.3
<i>Few centres provide patient centred care</i>	8.0	38.1
<i>Some centres provide patient centred care by means of collaboration between DM and DR services</i>	6.0	28.6
<i>Most centres provide patient centred care based on collaboration between DM and DR services</i>	0.0	0.0

Participants interviewed reported that DM and DR services are available only in the three General Hospitals (secondary hospitals), and the tertiary hospital (UUTH) situated in the urban areas. Basic DM services and DR screening are available in the general hospitals (secondary levels) while specialists services for DM and DR are available at UUTH (Tertiary level):

“This facility, that is the University of Uyo teaching Hospital is the only tertiary hospital in Akwa Ibom State with specialist services like that of the endocrinologists...” (respondent 2)

“.... Tertiary care levels, there is also a retinal specialist, we do not have any retinal specialist in any state general hospitals.” (respondent 4)

Access to DM and DR services

All participants reported that less than thirty percent (30%) of DM patients in AKS has access to DR services. Their reasons for poor access to DR services were categorized into:

- i) Lack of awareness: Many DM patients are not aware of the ocular effects of DM. Some believes that blindness is inevitable in old age, and so they do not seek treatment for DR early.
- ii) Traditional medications: Some DM patients believe that traditional medication is cheaper and can be used for multiple eye conditions, and this belief leads some patients to seek traditional medication instead of DR care in the hospitals.
- iii) Inadequate health workforce / lack of specialists: DR care providers are few and not evenly distributed in AKS which hinders access to DR care.

Participants reported that the categories and number of health workers involved in DM and DR care in AKS are inadequate. Participants reported a total of eleven (11) optometrists (7 with AKS civil service and 4 with the UUTH), seven (7) ophthalmologists (five with the UUTH and two with the AKS civil service), four (4) ophthalmic nurses, two endocrinologists with UUTH and above one hundred (100) medical officers in government hospitals in AKS as the main categories of workers involved in DM and DR services in this state.

“.... From my records, Akwa Ibom State civil service has 10 optometrists, 2 ophthalmologists and above hundred (100) medical officers. We do not have ophthalmic nurses and endocrinologists here, but the teaching hospital has.” (respondent 9)

“... here at the teaching hospital, we have two endocrinologists, that is the report from the Endocrinologist unit... there are four (4) optometrists, five (5) ophthalmologists which one of them is a retinal specialist, four (4) ophthalmic nurses...” (respondent 5)

Participants reported that the specialists involved in DR and DM care are situated in UUTH in the state capital, while eye units for DR screenings are available in only three general hospitals situated in the town.

Participants attributed shortfall in the workforce to lack of employment by the government, absence of diabetic centre in Akwa Ibom State and lack of training opportunities for providers.

Questionnaire findings showed that 42.9% of respondents reported that workforce training opportunities in AKS are largely inadequate, 42.9% reported few training opportunities consequently fewer human resources than needed, 9.5% reported that training is only available in large cities and hospitals while 4.7% reported that training for DM and DR is appropriate and of good quality (see Table 4.0).

Table 4.0 Training opportunities and quality for DM and DR services

Training opportunities and quality for DM and DR services	Frequency responses	of Percentages (%)
<i>Largely inadequate.</i>	9.0	42.9
<i>Few training opportunities, consequently fewer human resources than needed.</i>	9.0	42.9
<i>Training available only in large cities and hospitals.</i>	2.0	9.5
<i>Training for DM and DR is appropriate and of good quality</i>	1.0	4.7

iv) Lack of basic infrastructures and equipment: retinal imaging cameras and lasers are not available in the government hospitals in AKS.

“.... We do only direct ophthalmoscopy, no instruments and equipment like the indirect ophthalmoscope, OCT I am limited with only direct ophthalmoscopy.” (respondent 8)

Among the questionnaire respondents, 61.9% reported that modern examination technology for DM and DR is not available for a majority of the patients. 33.3% reported that modern examination technologies are available only in major hospitals and private clinics (see table 5.0).

Table 5.0 Accessibility of modern technology for DM and DR services

Health Technology	Frequency of responses	Percentages (%)
Accessibility of health technology examination (modern technology)		
<i>Not available for the majority of the patients</i>	13.0	61.9
<i>Available only in major hospitals and private clinics</i>	7.0	33.3
<i>Available in most provincial hospitals and clinics</i>	0.0	0.0
<i>Available to all patients</i>	1.0	4.8

Participants reported that the basic technology required for DM investigation is available in the general hospitals and UUTH, but dialysis machine is available only in UUTH.

“Every hospital should have the glucometer at least and should be able to carry out the urine test. There is a dialysis machine at the teaching hospital.” (respondent 3)

However, most participants reported lack of modern technology for DR examinations in AKS.

They reported that the instruments available for DR services in Akwa Ibom State include:

Slit lamp and direct ophthalmoscope are available in UUTH and in three general hospitals which provides eye care services. Indirect ophthalmoscopes are only available in UUTH. There is no laser technology and retinal imagine technology in any government hospital in AKS.

“we don’t have lasers in this hospital and I am sure the other government hospitals don’t have equally.” (respondent 6)

v) Prohibitive cost of DR services: the cost of injections, lasers and testing with OCT is high and that means that many patients cannot afford care because it is only available in private clinics.

“.... the cost of treatment also is a problem to some people because the injection I was mentioning that could be given here are expensive the cheapest ones are like maybe 40,000 naira that the patients must take every month and the NHIS doesn't cover it.” (respondent 6)

vi) Distance to care: DR management services is only available in UUTH, so all DR patients need to travel to UUTH for care, which discourages access to DR care.

“The location of the teaching hospital in Uyo means that the people in the rural areas cannot have access to diabetic retinopathy services.” (respondent 9)

Networks between the care providers for DM and DR

None (0%) of the questionnaire respondents agreed that most centres provided patient centred care based on collaboration between DM and DR services (see Table 3.0).

Similarly, interviewed participants reported lack of both routine and reciprocal referral systems between diabetes and eye units. The eye unit refers patients to diabetes clinic when they suspect DM and diabetes providers refers DM patients to eye unit only when they have eye complaints (see Table 3.0).

DM and DR provider networks are affected by:

i. Workload: Some participants feel that access is reduced due to inadequate workforce caring for diabetics and the disparity in clinic days between the diabetes units and eye units, the extra financial burden for patients, as well as long waiting times.

“.... people with diabetes are not routinely referred for eye examination except when they have eye related complaints. I know that they should be referred routinely but do to workload I do not until any patient complain of eye problems. If you also consider that such patients will have to come back another day for eye clinic. In the eye unit the patient will be required to start registration afresh, buy another patient card, join the queue and pay transport to and from a

far location for an asymptomatic condition you might just decide that it is not necessary till the patient complains.” (respondent 2) ii. Apathy by the health workers managing diabetes: one participant reported routine referral is not necessary.

“.... I do not think that it is necessary to refer diabetes patients except if they complain about their vision.” (respondent 3)

HEALTH INFORMATION MANAGEMENT SYSTEM

Follow up and recall systems

Reports of follow up and recall of patients to have their eyes tested using hospital information card which contains patients follow up appointment days was reported by all participants.

Knowledge of disease burden

A total of 71.4% of the questionnaire respondents reported that prevalence of DM and DR is neither known nor estimated (Table 6.0).

Table 6.0 Knowledge of disease burden

Situation of DM and DR services in Akwa Ibom State responses (%)	Frequency	of Percentages
Knowledge of disease burden		
<i>Prevalence of DM and DR is neither known nor estimated.</i>	15.0	71.4
<i>Prevalence of DM is known but not the prevalence of DR.</i>	2.0	9.5
<i>Prevalence of DR is known but not the prevalence of DM</i>	2.0	9.5
<i>Prevalence of both DM and DR is known or has been estimated; patients' data is used to analyse data at the national level</i>	1.0	4.8
<i>Prevalence of both DM and DR is known or has been estimated; patient's records are collated, analysed and regularly published</i>	1.0	4.8

However, interviewed participant reported that both incidence and prevalence of DM is monitored in AKS via data collected from the patient folders in health facilities:

“.... both incidence and prevalence are monitored.... in this facility we do it annually... in this facility data are collated from patients' folders by the record keepers. These data are entered into a standardized broadsheet capturing the required variables. The standardized broadsheet is sent to the Federal Ministry of Health for planning, budgeting and policy making.”

(respondent 2)

All participants also reported not being aware of agreed health indicators for monitoring DR in AKS.

HEALTH PROMTION FOR DM AND DR

All participants reported that awareness for the DM and DR in AKS is carried out through the diabetes support group/ association in meetings, World diabetes days and World sight days.

“Yes. During our support group meetings, we do invite the ophthalmologists for lectures and they do talk about diabetic retinopathy.” (respondent 1)

“World sight day, we go on radio, television to create awareness. Apart from that, we also actually go to rural areas to give health talk and to do eye screening, general eye screening not particularly, we pick up some cases of diabetic retinopathy, but we do general eye screening for eye problems including diabetic retinopathy.” (respondent 5)

Health promotion for the disadvantaged and disabled in the communities.

Regarding awareness for DM and DR, it is made accessible to the disadvantaged groups of the population through the mass media, the use of the local dialects and the use of special doctors:

“.... patients’ support organization is made accessible to disadvantaged groups of the population through radio and television awareness programmes in the Efik and Ibibio languages...we have a doctor who is a specialist in sign language, he interprets for the deaf and dumb.” (respondent 4)

HEALTH INFORMATION FOR DM AND DR IN THE COMMUNITIES.

A total of 66.7% of the questionnaire respondents reported that little information is provided to the community and the patients (see Table 7.0).

Table 7.0 Information and education provided to the community and to patients on DR and DM.

Situation of DM and DR services in Akwa Ibom State	Frequency of Responses	Percentages (%)
Information/education provided to the community and to patients on DM and DR		
<i>Little information is provided to the community and patients.</i>	14.0	66.7
<i>Information to the community is produced occasionally and only through national level media; not all patients receive education.</i>	2.0	9.5
<i>Information is provided at national and provincial level; most patients receive education.</i>	3.0	14.3
<i>Information is provided to the community at all levels; all patients receive education and patients are actively involved</i>	2.0	9.5

Participants reported that the factors constraining DM and DR health promotion activities in AKS are the lack of access to diabetes support group to the rural population and the lack of diabetes specialists in general hospitals and NGO hospitals.

HEALTH FINANCING FOR DM AND DR.

Among the twenty-one (21) participants in the questionnaire, 57.1% reported that there is no financing for DR and DM services- patients pay out of pocket for all services. 23.8% reported that government through the NHIS provide some financing - patients pay out of pocket for some services, while 19.1% reported not to be aware of how DR and DM services are financed. (see Table 8.0).

Table 8.0 Health financial interventions for DR and DM services

Situations of DM and DR services in Akwa Ibom State	Frequency of responses	Percentage (%)
Health financing Interventions		
<i>No financial intervention for DR and DM services; patients pay out of pocket for all services.</i>	12.0	57.1
<i>Government through the national health insurance scheme (NHIS) provide some financial intervention; patient pay out of pocket for some services.</i>	5.0	23.8
<i>NGO's provide some financial intervention; patient pay out of pocket for some services.</i>	0.0	0.0
<i>Government and NGOs mostly provide financial interventions for DR and DM services</i>	0.0	0.0
<i>Not aware of how DR and DM services are financed</i>	4.0	19.1

Reports from interviewed participants corroborated the questionnaire findings. Patients majorly pay out of their pocket for DM and DR services in AKS with little government financial intervention under the national Health Insurance Scheme (NHIS). NHIS only captures civil servants active in AKS and federal government.

“... the national health insurance scheme covers 90 percent of the expenses while the patients under this insurance pay 10 percent. The NHIS covers some medications though and some services. However, most people are not covered by the NHIS, so they pay out of their pocket. In Nigeria and Akwa Ibom state for now, interventions for people with diabetes is majorly financed by the patients out of their pocket.” (respondent 9)

DISCUSSION

Our findings suggest gaps in several components of the health system that need strengthening to better serve patients with DR.

Low priority, lack of policies and programmes towards DM and DR and lack of consensus about clinical management guidelines for DM and DR entails that DM and DR care is neglected in AKS and that DM and DR care is not part of the AKS health care agenda. This neglect could lead to catastrophic trend of DM epidemics resulting in high prevalence of blindness from DR in the nearest future.^{24, 25} Systematic reviews have reported lack of national policies, low priority of DM and DR in the national health agenda and lack of consensus clinical management guideline as responsible for the catastrophic trend of DM epidemics and high prevalence of DR in sub-Saharan Africa (SSA).^{24, 25}

Non-availability of DM and DR services at the primary health level and rural areas, noncollaboration between providers of DM care and DR care, lack of reciprocity in referral of patients suggests lack of patient centred care in AKS. Studies have reported that DR detection and management services are important but only exists in urban settings. Poor organisation of referral pathways between the primary level, secondary level of care, providers of DM care and eye care are part of the gaps of DM and DR systems in SSA.^{21, 24} In SSA, DM occurs mostly in the urban and peri-urban areas and therefore these areas need DR prevention services the most.²⁶ Our study did not cover prevalence of DM and DR per area in AKS.

A lack of workforce for DR and DM is not unique to AKS but is a challenge observed in many low and middle-income countries. The fundamental challenge to the increasing blindness rate from DR globally is the lack of access to high-quality ophthalmologists, with most ophthalmologists available only in big cities.¹⁶ This is similar to DM and DR workforce situation in SSA which hinders access to quality care.^{21, 24}

Lack of modern technology for DR screening and diagnosis in AKS suggests the likelihood of misdiagnoses, increased visual impairment and blindness from DR.²¹

Nonexistence of a formalized health information management systems for DM and DR suggests that the lack of standardized data probably responsible for the lack of DR policies in AKS.²⁰

Inadequate patient education on DM and DR in AKS suggests that patients may not be proactive with the prevention of DM and DR, and in accessing other DM and DR services due to ignorance and late presentation, resulting in more complications and blindness. Especially, those in the rural areas who cannot access the support group in the tertiary hospital situated in Uyo the urban centre of AKS, this type of situation has similarly been reported by other authors in other poor resource settings.^{21, 27}

A high proportion of out of pocket payment for DR and DM services would have discouraged patients from accessing care in AKS.²⁸ Studies have reported lack of health insurance as a barrier to take up eyecare.²⁸⁻³⁰ The government of AKS needs to cover every patient under the NHIS to reduce the financial burden associated with DM and DR care.

During the 1980s, low income countries, such as, India couldn't manage eye problems, especially cataract. Then, India accounted for about 33% of the world's blind population.³¹ India couldn't manage eye problems, especially cataract, because it was of low priority at the time, also, they lacked skilled eye care professionals and had obsolete technology. Cataract blindness in India accounted for 80 percent of all blindness compared to a global proportion of 50% at that time.^{16, 31, 32} India was doing only about 1.5 million cataracts yearly then, most of the surgeries were done in field/makeshift rooms in the rural areas, and often not by a specialist and with unacceptable results. Be that as it may, in the early 1990's, India collaborated with Non-governmental organisations (NGO's), global agencies like the World Bank, instituted eye

care friendly policies, and eye care service models thus eye programs prospered even over infectious and diarrheal diseases.¹⁶

In 1995, the Indian government propelled a seven-year plan— the Cataract Blindness Control Project sponsored by the World Bank. This project resulted to countrywide improvement in surgical innovation leading to about 15.3 million cataract surgeries performed, of which women and tribal population constituted more than 50%. About 842 ophthalmic surgeons were trained in performing cataract surgery using new technology with improvement in pre and post-surgical care using the new technology. This project also resulted to significant infrastructural strengthening, including the development of 301 operation theatres and 273 eye wards. Furthermore 45 medical colleges, 259 district hospitals, 254 district mobile units and 3281 primary health centres were provided with eye-care equipment, including 747 operating microscopes, 600 slit lamps, 821 A-Scans, 344 AVUs, 681 keratometers, and 178 Yag lasers.³¹

The cataract blindness control project presented new assessment tools, which the National Program Management Cell used to monitor implementation and outcomes. Management of the cataract blindness control program was established at the central, state, and district levels. The project raised public awareness about cataracts as curable and the advantages of the new surgical technology.³¹

India also pioneered the cross-subsidization model for eye care, where fees from wealthier patients helped cover the costs of treatment for the poor. Aravind and other hospitals charged fees on a tiered scale according to how much a patient can pay. Aravind covers all its expenses with this model. In this model, effective and efficient collaboration with “allied ophthalmic personnel” — nurses, technicians, and assistants — who do the initial evaluations, enabled hospitals to carry out large number of surgeries daily. Most of the major hospitals developed their own training programs for eye care support staff.^{16, 32}

Globally, India has one of the highest number of diabetics.²⁷ India and surrounding states face many of the same barriers to DR care recognized in Africa: lack of resources and trained manpower to screen and treat the large number of people with DR; unequal distribution of resources between urban and rural areas; and populations with high levels of poverty and poor education many of whom are remote from health services.²¹ India have utilized varieties of screening and treatment models involving advances in information, medical and communication technology to reduce inequalities in service delivery including connecting diabetics to DR services.²⁶ Also, economic modelling analysis showed that their rural teleophthalmology program where screenings are done in the rural area with cameras and fundal images transferred to a specialist was cost effective compared to no screening.³³ Sustainable models of screening and treatment for DR in Africa and Nigeria could be modelled on those already operational in India.

The strength of this study was that all stakeholders involved are all experienced in management and policy making with regards to DM and DR in AKS. The use of both qualitative and quantitative methods provided a better understanding of the situation.

The limitation was that patients were excluded because during the time of this research, government hospitals in Nigeria were on strike. Patients' opinions should be explored also.

The present situation of DM and DR services in AKS requires advocacy by the stakeholders for prioritization of DM and DR by the government, decentralization of DR and DM services to the primary level, employment of more specialists and training of other health workers on how to screen for DR, provision of the modern technologies for DR and DM, and more importantly, formulation of policies for DR and DM by all stakeholders.

The results from this study has provided evidence on the present DM and DR gaps in AKS, which will inform stakeholders and policy makers on where to strengthen to better serve patients with DM and DR.

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Part D

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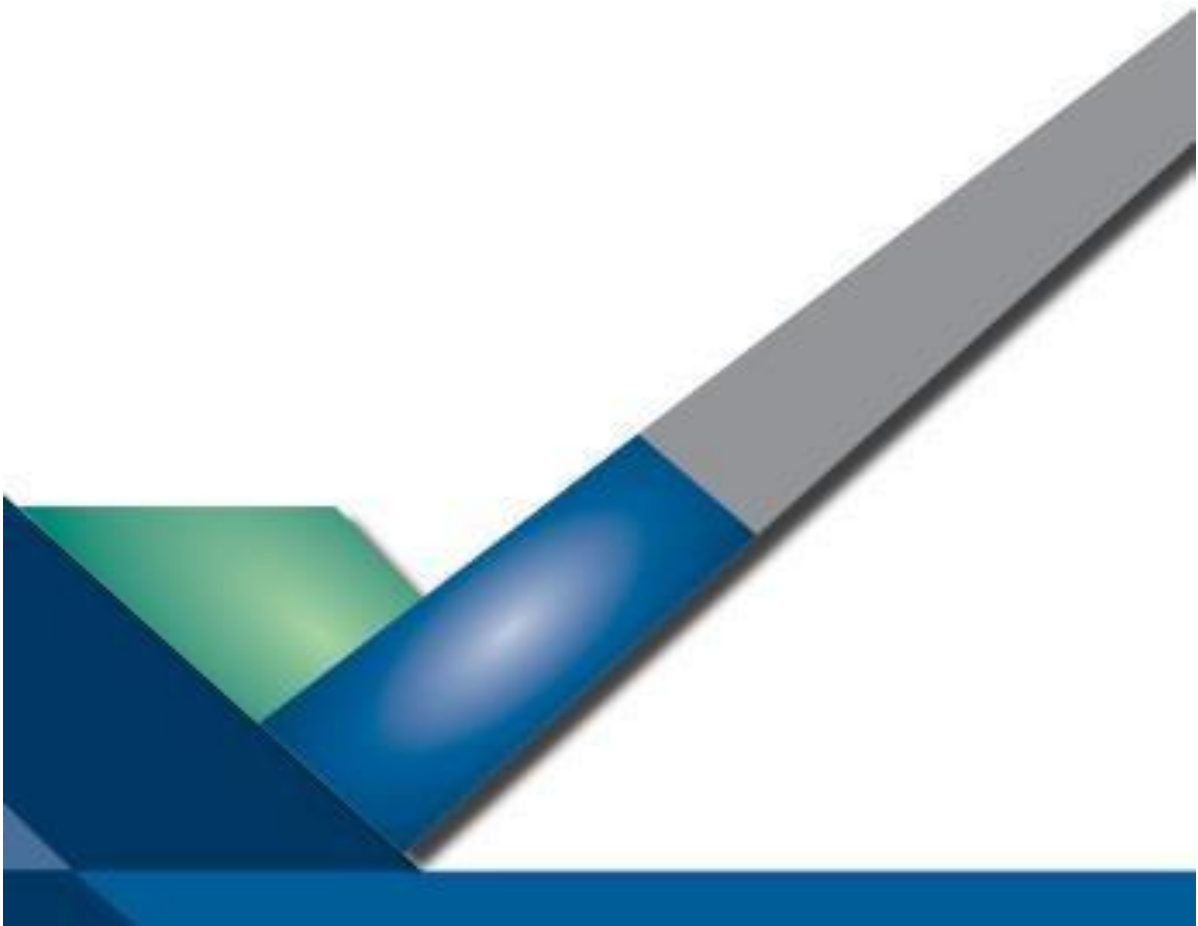
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Appendix 1: Tool for the management of diabetes and diabetic retinopathy management systems (TADDS).



TADDS

Tool for assessment of diabetes and diabetic retinopathy



ACKNOWLEDGEMENTS

This project has been developed as part of the cooperative agreement between Lions Clubs International Foundation and the World Health Organization.

The development of the tool, the field testing and translations were supported by funds from the Ministry of Foreign Affairs and Development Cooperation of Italy.

Development of the TADDS was coordinated by the World Health Organization, Prevention of Blindness and Deafness, and technically supported by the Centre for Eye Research Australia (University of Melbourne) and the Menzies Centre for Health Policy (University of Sydney). The International Council of Ophthalmology provided technical comments throughout.

PURPOSE OF THE DOCUMENT

In order to assess both management of diabetes and diabetic retinopathy in countries and to estimate the level of cooperation and synergy between these two branches of health care, WHO has designed this assessment tool. The tool will make it possible to carry out situation analysis, define service provision levels, and identify the gaps to be addressed in ensuring universal access to diabetes care and to effective prevention and treatment of diabetic retinopathy.

PRIORITIES, POLICIES AND PROGRAMMES

1

SECTION

NATIONAL DIABETES PLAN/PROGRAMME

1. Is diabetes listed as a national health priority?

Yes No

2. Is diabetic retinopathy (DR) listed as a priority in the national prevention of blindness plan?

Yes No

3. Does your country have a national diabetes plan?

Yes No

4. If so, what does this national plan cover?

- Primary prevention of diabetes
- Complications (including vision impairment)
- Community awareness and patient education
- Clinical care, services, and supplies

Remarks:

5. Is there a national policy on food and/or nutrition?

Yes No

6. Is there a national programme on food and/or nutrition?

Yes No

Name of programme:

Lead organization responsible for the programme:

7. Is there a national policy on diabetes prevention?

- Yes No

8. Is there a national diabetes prevention programme?

- Yes No

Name of programme: _____

Lead organization responsible for the programme: _____

9. Is there a national diabetes association?

- Yes No

a. What does it do?

- Patient education and awareness
 Clinician education and awareness
 Policy development and advocacy
 Networks between service providers and people with diabetes

b. What health promotion and patient education strategies are used by the diabetes association?

Select the number¹ below that best represents the situation in the country:

Existence of priority, policies and programmes for DM: 1 2 3 4

¹ Key:

- 1—DM is not a priority; there is no national plan and no national programme.
2—DM is listed as a priority; there is a national plan but no programme has been implemented.
3—DM is listed as a priority; a national plan has been formulated and a programme is in place but does not cover the whole country.
4—DM is listed as a priority; both a plan and a programme are in place and there is national coverage.

CLINICAL MANAGEMENT GUIDELINES

10. Are there guidelines for the management of diabetes?

- Yes No

(If yes, please give the full title of the clinical management guidelines most commonly used and provide a copy.)

a. Is diabetic retinopathy included as a component of these guidelines?

- Yes No

b. For what levels of the health care system (primary, secondary, tertiary) are the guidelines applicable?

c. What is the intended target audience (e.g. primary care workers, specialists) for the guidelines?

11. Are evidence-based guidelines available for the management of diabetic retinopathy?

- Yes No

(If yes, please give the full title of the clinical management guidelines most commonly used and provide a copy.)

a. Do they cover:

- prevention of vision loss from diabetic retinopathy?
 treatment?
 follow-up?

b. For what levels of the health care system are the guidelines applicable?

- Primary
 Secondary
 Tertiary

c. The guidelines are:

- Evidence-based Consensus-based Mixture of both

If consensus-based, who (stakeholders) was involved in guideline development?

12. Are the guidelines being used?

Subjective rating scale: 1 = unused, 12 = widely used (click the appropriate number)

1 2 3 4 5 6 7 8 9 10 11 12

13. Describe how the intended audience is made aware of the existence of the guidelines? How were they disseminated (e.g. in print, by website)? In what languages are they produced?

Select the number¹ below that best represents the situation in the country:

Guidelines for clinical management of DM: 1 2 3 4

Guidelines for clinical management of DR: 1 2 3 4

¹ Key:

1 – There are no ministry of health-recommended guidelines.

2 – Ministry of health guidelines have been formulated but health professionals are unaware of their availability and thus they are not widely used.

3 – Ministry of health guidelines are available and known to the appropriate audience but they are not widely followed.

4 – Ministry of health guidelines have been formulated and are commonly followed.

Additional information for Section 1

SERVICE DELIVERY

2

SECTION

NETWORKS AND LINKAGES

14. Describe how people with newly diagnosed diabetes are identified.

a. Where are the services located (village, district, regional, provincial, tertiary levels of care)?

b. The facilities are:

Private Public

15. Describe how ongoing care of people with diabetes is performed.

a. Where are the facilities located (village, district, regional, provincial, tertiary levels of care)?

b. The facilities are:

Private Public

16. Describe the access to care services for people with diabetes.

a. What proportion of the population can access this service?

b. What are the barriers that prevent access to services?

17. What services are available at the community level for people with diabetes?

a. Clinical services:

for patient identification and risk assessment

b. Patient education and support services:

for diabetes

for diabetic retinopathy

18. Is there a specialist diabetes centre?

- Yes No

a. If yes, what services does it provide?

b. What proportion of the population has access to these services?

Select the number¹ below that best represents the situation in the country:

Location of DM services and accessibility to population in need: 1 2 3 4

¹ Key:

- 1 – Services available in few places and to few people.
 - Services are not available everywhere; they can be found only in large hospitals and are accessible only to those who can pay.
- 2 – Some services are available to part of the population.
 - Services are available in regional hospitals or health centres and are partly paid by the patients. Populations in rural areas cannot reach services easily; transport to the health facilities and the cost of service are the main barriers.
- 3 – Services are available everywhere but do not reach some of the population.
 - Services are available in most rural and urban areas providing care at district, regional, provincial and tertiary levels; however, costs and transport are barriers for some patients.
- 4 – Services are available everywhere for the whole population.
 - Services are available in all locations and costs are paid by insurance schemes, are subsidized by the state, or are available free of charge.

DIABETIC RETINOPATHY SCREENING

19. Are people with diabetes routinely referred for eye examinations?

- Yes No

a. Does this include referral of people who are asymptomatic?

- Yes No

b. Are people referred only if they report symptoms of vision loss?

Yes No

c. Is an eye examination incorporated into the annual cycle of care for people with diabetes?

Yes No

20. Is there a community screening programme for diabetic retinopathy?

Yes No

a. How are people with diabetes recruited for screening?

b. What personnel are involved?

c. Is any outreach screening provided?

Yes No

d. Coverage of screening?

e. Who pays for the screening?

21. Where are eye examinations for diabetic retinopathy performed most commonly in villages, at district, regional, provincial, tertiary levels of care)?

a. What proportion of the population can access this service (no one, 30%, 60%, 90%, 100%)?

b. What are the barriers that prevent access to services?

c. The services are:

- Private Public

Select the number ³ below that best represents the situation in the country:
Location of DM services and accessibility to population in need: <input type="radio"/> 1 <input type="radio"/> 2 <input type="radio"/> 3 <input type="radio"/> 4
Key:
1 – Services available in few places and to few people. * Services are not available everywhere; they can be found only in large hospitals and are accessible only to those who can pay.
2 – Some services are available to part of the population. * Services are available in regional hospitals or health centres and are partly paid by the patients. Populations in rural areas cannot reach services easily; transport to the health facilities and the cost of service are the main barriers.
3 – Services are available everywhere but do not reach some of the population. * Services are available in most rural and urban areas providing care at district, regional, provincial and tertiary levels; however, costs and transport are barriers for some patients.
4 – Services are available everywhere for the whole population. * Services are available in all locations and costs are paid by insurance schemes, are subsidized by the state, or are available free of charge.

22. Describe the networks between services for diabetes care and eye care.

a. Stakeholders

b. Referral pathways (one-way, reciprocal)

c. What information is shared between practitioners?

23. Are any nongovernmental organizations (NGOs) involved in the care of people with diabetes and diabetic retinopathy?

- Yes No

If so, what roles do they perform in diabetes and in eye examination for people with diabetes (health promotion, screening, laser, vitreoretinal surgery)?

Select the number¹ below that best represents the situation in the country:

Networks between the care providers for DM and DR: 1 2 3 4

¹ Key:

- 1 – There is no known collaboration between separate providers of care for DM and DR.
- 2 – Few centres provide patient-centred care.
- 3 – Some centres provide patient-centred care by means of collaboration between DM and DR services.
- 4 – Most centres provide patient-centred care based on collaboration between DM and DR services.

Additional information for Section 2

24. What categories of health professionals (endocrinologist; ophthalmologist; primary care physician; general, diabetes or ophthalmic-trained nurse; dietician; etc.) are available to care for people with diabetes?

What is the ratio of providers to patients at each level of the health system?

25. What aspects of diabetes management are included in the teaching curriculum for primary health care workers (nurses and primary care physicians)?

- Awareness of complications of diabetes – specifically, vision loss from diabetic retinopathy
- Health education for patients
- Need for and timing of referral for eye examination
- Management of diabetic retinopathy

26. How is continuing medical education provided to primary health care workers?

- Formal training by government, university, professional organizations
- Regular informal updates
- Workshops
- Updates on guidelines

Select the number[†] below that best represents the situation in the country:

Training opportunities and quality for DM and DR care providers: 1 2 3 4

[†] Key:

1 – Largely inadequate.

2 – Few training opportunities; consequently fewer human resources than needed.

3 – Training available only in large cities and hospitals.

4 – Training for DM and DR is appropriate and of good quality.

27. Are the following investigations/equipment available?

- Biochemical laboratory tests for HbA1c (glycated haemoglobin), lipids, creatinine, urinary protein
- Blood glucose meter (owned/kept by patients with diabetes or by the health service)
- Slit lamp
- Direct ophthalmoscope

28. What technologies are used to perform retinal examination for diabetic retinopathy?

- Dilated eye examination by ophthalmologist
- Dilated eye examination by refractionist/optometrist
- Retinal imaging – mydriatic camera
- Retinal imaging – non-mydriatic camera

29. Where are these technologies available (villages, district, regional, provincial, tertiary levels of care)?

Select the number¹ below that best represents the situation in the country:

Accessibility of health technology: 1 2 3 4

¹ Key:

- 1 – Modern examination technology not available to the majority of patients.
- 2 – Modern examination technology available only in major hospitals and private clinics.
- 3 – Modern examination technology available in most provincial hospitals and clinics.
- 4 – Modern examination technology available to all patients.

Additional information for Sections 3 and 4

30. What nationally agreed health population indicators of diabetes are monitored?

- Prevalence
- Incidence
- Not measured

How often are they measured?

31. What nationally agreed health population indicators of diabetic retinopathy are monitored?

- Prevalence of vision impairment and blindness
- Not measured

How often are they measured?

32. Describe the methods used (surveys, hospital data, health insurance statistics) to collect this information.

33. Describe how the information is collated and reported (standardized data set).

34. What information about individual patients with diabetes is recorded in their patient medical records in hospitals?

- Risk factors
- Complications – including diabetic retinopathy
- Previous eye examination for diabetic retinopathy
- Treatments
- Follow-up

35. Is there a recall system for people with diabetes to have follow-up eye examination?

Yes

No

Communication methods: personal record books, information cards

mHealth: text messaging reminders using mobile phones

Select the number¹ below that best represents the situation in the country:

Knowledge of disease burden: 1 2 3 4

¹ Key:

1 – Prevalence of DM and DR is neither known nor estimated; information about patients is inadequate.

2 – Prevalence of DM is known but not the prevalence of DR.

or

Prevalence of DR is known but not the prevalence of DM, and patients' records are not utilized.

3 – Prevalence of both DM and DR is known or has been estimated; patients' records are used to analyse data at national level.

4 – Prevalence of both DM and DR is known or has been estimated; patients' records are collated, analysed and regularly published.

Additional information for Section 5

HEALTH PROMOTION FOR DIABETES AND DIABETIC RETINOPATHY

6

SECTION

36. Is information provided to the community about diabetes?

- Symptoms and signs
- Risk factors
- Complications
- Management
- Where to seek help

37. Is information provided to the community about diabetic retinopathy?

- Yes No

38. How is community education regarding diabetes delivered?

- Print media
- mHealth: text messaging reminders using mobile phones
- Radio/television

39. What is the coverage of health promotion and patient education?

- National
- Provincial
- District

40. Are people with diabetes made aware of diabetic patients' organizations?

- Yes No

How are patients' support organizations made accessible to disadvantaged groups of the population:

In rural locations?

In what languages/dialects?

For people with disabilities?

41. Give examples of how initiatives such as World Diabetes Day and World Sight Day are used to educate people and medical professionals on vision impairment from diabetes.

Select the number¹ below that best represents the situation in the country:

Information and education provided to the community and to patients on DM and DR:

1 2 3 4

¹ Key:

- 1 – Little information is provided to the community and little education to patients .
- 2 – Information to the community is provided occasionally and only through national-level media; not all patients receive education.
- 3 – Information is provided at national and provincial level; most patients receive education.
- 4 – Information is provided to the community at all levels; all patients receive education and patients' organizations are actively involved.

Additional information for Section 6

7

HEALTH FINANCING

42. How are interventions for people with diabetes financed?

Activity	% of cost funded by government	% of cost funded by private insurance	% of cost funded by patient (out-of-pocket)	% of cost funded by NGO	% of cost funded by others (please specify)
Medical treatment					
Hospital treatment					
Medications					
Laboratory tests					
Other:					

43. How are interventions for people with diabetic retinopathy financed?

Activity	% of cost funded by government	% of cost funded by private insurance	% of cost funded by patient (out-of-pocket)	% of cost funded by NGO	% of cost funded by others (please specify)
Prevention (retinal screening)					
Laser photocoagulation					
Vitreoretinal surgery					
Other:					

Additional information for Section 7

Appendix 2: Informed consent to participate in a research

Title of Research Project: HEALTH SYSTEMS ANALYSIS OF DIABETES AND DIABETIC RETINOPATHY SERVICES IN NIGERIA: The case of Akwa Ibom State

Contacts:

- **Name of Investigator:** Stephen Maduabuchi Samuel
Phone Number of Principal Investigator: +234(0)8122042244

- **University of Cape Town**
Faculty of Health Sciences
Human Research Ethics Committee
Room E53-46 Old Main Building
Groote Schuur Hospital
Observatory 7925
Telephone [021] 406 6626
Email: shuretta.thomas@uct.ac.za
Website: www.health.uct.ac.za/fhs/research/humanethics

A. PURPOSE AND BACKGROUND

Stephen Maduabuchi Samuel, a Master of Public Health Student in the University of Cape Town South Africa is conducting a research on THE HEALTH SYSTEMS ANALYSIS OF DIABETES AND DIABETIC RETINOPATHY SERVICES IN NIGERIA: The case of Akwa Ibom State. The purpose of your participation in this research is to help the researcher: To investigate and analyse the situation of diabetes (DM) and diabetic retinopathy (DR) services in government hospitals in Akwa Ibom State (AKS) Nigeria using the World Health Organisation (WHO) health system framework.

B. PROCEDURES

If you agree to participate in this research study, you will be interviewed and will also be given a questionnaire to fill, which will cover leadership and governance, service delivery, health workforce, health information management systems, financing, medical products and technologies involved in the management and care of diabetes and diabetic retinopathy in Akwa Ibom State. The interview will be conducted face to face, telephonically or via skype depending on your preference. Interviews will be recorded with a tape recorder for transcription. The interview is expected to last for one hour on average for each participant. The questionnaires will be administered face to face or via the internet depending on your convenience and preference.

C. RISKS

This study does not pose a physical risk or medical risk to the participants. However, the participant might face the risk of being sanctioned for giving out sensitive information concerning understaffing/ lack of staff, inadequate/lack of infrastructures or ineffective health systems generally which are mostly political issues in Nigeria.

D. CONFIDENTIALITY

Personal identifiable details will not be collected during the interviews and Surveys. Data will be coded by the researcher. The research data, electronic and hard copy, will be stored in a password protected computer and, in a password, protected external computer hard disc as back up. Only the researcher will have access to the data. On completion of analysis, after manuscripts have been accepted for publication, the analysed dataset will be returned to University of Cape Town for secure archiving while the copy on the student's computer will be permanently deleted

E. BENEFITS OF PARTICIPATION

There will be no direct benefit to you for participating in this research study. However, this research will benefit the health system generally through the recognition of the gap that are required to be filled for effective, holistic management of diabetes and diabetic retinopathy in Akwa Ibom State. The findings from this research will be used to advocate for more attention in the prevention, management and care of diabetes and diabetic retinopathy in Akwa Ibom State Nigeria. Other researchers will also benefit from the findings from the research for further researches.

F. VOLUNTARY PARTICIPATION

Your decision whether to participate in this research is voluntary and will not affect your relationship with the researcher. You can also withdraw your consent and discontinue participation at any time without prejudice.

G. QUESTIONS

If you have any questions or concerns about this study, please contact

- Stephen Maduabuchi Samuel by calling 08122042244

or

- University of Cape Town

Faculty of Health Sciences
Human Research Ethics Committee

Room E53-46 Old Main Building
Groote Schuur Hospital
Observatory 7925

Telephone [021] 406 6626

Email: shuretta.thomas@uct.ac.za

Website:

www.health.uct.ac.za/fhs/research/humanethics

H. COMPENSATION

There will be no financial compensation for participating in this research.

CONSENT

You are deciding whether to participate in a research study. Your Signature below indicate that you have decided to participate in the study after reading all the information above and you understand the information in this form, have had any questions answered and have received a copy of this form for you to keep.

Research Participant's Signature _____ Date _____

Investigators Signature _____ Date _____

Appendix 3: key informant interview guide

The key informant interviews will be semi-structured and open ended to gain an in-depth understanding of the situation of DM and DR services in Akwa Ibom State. The interview guide follows the structure of the World Health Organisation (WHO) tool for the assessment of diabetes and diabetic retinopathy services.

Some of the questions are more relevant to stakeholders at the Federal and State Ministries of Health (e.g. development of diabetes policies, programmes and guidelines) while others are more relevant for the medical personnel (e.g. service delivery).

The main questions under each topic are already included in the WHO TADD (questionnaire). More questions will arise from the response of the respondents and we will use face to face interviews with the respondents to explore the ‘whys’ and ‘hows’. The semi structured interviews format complements the WHO tool and will lead to a more rigorous analysis of the challenges and opportunities for improvement associated with the management of DR in Akwa Ibom State.

Priorities, Policies and Programmes

In this section, the tool contains questions related to policies and programmes for DM and DR, with questions like:

- Does your country have a national diabetes plan (yes/no)?
- Is diabetic retinopathy (DR) listed as a priority in the national prevention of blindness plan (yes/no).

In our follow-up questions we will ask the respondents to expand their initial answers. For example, if DR is not listed as a priority in the national prevention of blindness plan, why is that so? Is there available evidence about the prevalence and burden of DR in Nigeria and Akwa Ibom State? If DR is listed as a priority, what resources are available to address this priority and how are these resources deployed (example training and continuing medical education, new DR programmes etc) as part of the implementation of the national prevention of blindness plan?

Service delivery

In this section, the tool contains questions related to how DM and DR services are delivered, with questions like:

- What services are available people with diabetes? Where can they access these services (screening, diagnosis and management)?
- Are people with diabetes routinely referred for eye examinations? If not, why? What referral systems/pathways exist between DM and DR services?
- How many public (government) hospitals provide diabetes and DR services in Akwa Ibom State? Any information regarding their capacity to provide eye care?
- What equipment is available in the public (government) hospitals for the management of DM and DR services in Akwa Ibom State?

Follow up questions will require the respondents to expand on the questions to give insight on the factors that enable or constrain service delivery, and what recommendations they have to improve service delivery.

Health workforce

In this section, the tool contains questions related to the cadres, numbers, distribution and training of staff involved in diabetes and eye care services.

- What categories of medical/ health personnel are involved in the management of DM and DR?
- Can you estimate the number and distribution of these medical/ health personnel including registered ophthalmologists (including vitreoretinal surgeons and medical retinal specialists), internal medicine physicians, general practitioners, nurses, optometrists?
- What aspects of diabetes are included in the teaching curriculum for primary health care workers (nurses and primary care physician)?

We will ask respondents to identify priorities for strengthening human resources for eye health in Nigeria, including for DR management.

Health information management systems

This section will cover questions like:

- What nationally agreed health population indicators of diabetic retinopathy are?
- Monitored, and how are the data collected? What methods are used, if any for sharing patient data between providers of health care services?
- Is there a recall system for people with diabetes to have follow-up eye examination? The interviewees will be asked to identify gaps and recommendations to improve health information systems for DM and DR.

Health promotion for diabetes and diabetic retinopathy

Health promotion questions for DM and DR services will be asked in this section. Questions like:

- Is information provided to the community about diabetic retinopathy? if yes, how?
Could you provide us with the titles and details of public health materials used for community awareness or patient education?

- Are World Sight Day and World Diabetes Day used as opportunities for major awareness raising initiatives?

Health financing

Issues related to the financing for DM and DR services will be raised in this section of the tool.

Issues like:

- Coverage (% of population) of population with government health insurance for diabetes detection, monitoring and treatment?
- Coverage (% of population) of population with private health insurance?
- List of items / services that can be claimed under government health insurance for diabetes and eye care?
- How are interventions for people with diabetic retinopathy financed?

Follow up questions will be based on the responses of the respondents. We will seek to describe the current funding (private and public) situation for DM and DR, by stream activities (screening, health education, management, training etc.).

Appendix 4: Research recruitment flyer

Stephen Maduabuchi Samuel a Master of Public Health Student at The University of Cape Town South Africa Is Carrying Out a Research titled: *Health Systems Analysis of Diabetes and Diabetic Retinopathy Services in Nigeria; the case of Akwa Ibom State.*

He Is Seeking to Recruit Stakeholders/Medical and Health Workers Involved in Diabetic and Diabetic Retinopathy Services in Government Hospitals in Akwa Ibom State to Participate In this Research.

Each Participant will be required to fill a Questionnaire which will leadership and governance, service delivery, health workforce, health information management systems, financing, medical products and technologies involved in the management and care of diabetes and diabetic retinopathy in Akwa Ibom. The questionnaire is expected to be answered within 30 minutes.

There will be **NO** financial compensation for participating in this research study.

If you wish to participate in this research, please contact:

Stephen Maduabuchi Samuel

08122042244 uandme1010@yahoo.com.

Thanks.

Appendix 5: Ethical approval letter from UCT Human Research Ethics committee

 **UNIVERSITY OF CAPE TOWN**
Faculty of Health Sciences
Human Research Ethics Committee 

Room E53-46 Old Main Building
Grootte Schuur Hospital
Observatory 7928
Telephone (021) 406 6402
Email: [sumayah.ariel@uct.ac.za](mailto:samayah.ariel@uct.ac.za)
Website: www.health.uct.ac.za/the/research/humanethics/forms

27 March 2018

HREC REF: 134/2018

Prof R Geneau
Division of Ophthalmology
H-53
OMB

Dear Prof Geneau

PROJECT TITLE: HEALTH SYSTEMS ANALYSIS OF DIABETES AND DIABETIC RETINOPATHY SERVICES IN NIGERIA: A SITUATION ANALYSIS OF AKWA IBOM STATE (MASTERS CANDIDATE - DR M STEPHEN)

Thank you for your response letter dated 13 March 2018, addressing the issues raised by the Human Research Ethics Committee (HREC).

It is a pleasure to inform you that the HREC has **formally approved** the above-mentioned study.

Approval is granted for one year until the 28 March 2019.

Please submit a progress form, using the standardised Annual Report Form if the study continues beyond the approval period. Please submit a Standard Closure form if the study is completed within the approval period.
(Forms can be found on our website: www.health.uct.ac.za/fhs/research/humanethics/forms)

We acknowledge that the student: Dr M Stephen will also be involved in this study.

Please quote the HREC REF in all your correspondence.

Please note that the ongoing ethical conduct of the study remains the responsibility of the principal investigator.

Please note that for all studies approved by the HREC, the principal investigator **must** obtain appropriate institutional approval, where necessary, before the research may occur.

Yours sincerely


Signature Removed

PROFESSOR M BLOCKMAN
CHAIRPERSON, FHS HUMAN RESEARCH ETHICS COMMITTEE


Federal Wide Assurance Number: FWA00001637.

HREC:134-2018

Appendix 6: Approval certificate letter from the University of Uyo Teaching Hospital, Uyo Nigeria.



UNIVERSITY OF UYO TEACHING HOSPITAL
P.M.B. 1136, UYO, AKWA IBOM STATE
e-mail: info@uuthyo.net



Dr. Isaac A. Udo, M.B.Ch.B. FRCGS
AG. CHIEF MEDICAL DIRECTOR

Dr. Uwemedimok S. Ekanem, M.B.Ch.B. FRCGS
AG. CHAIRMAN, MEDICAL ADVISORY COMMITTEE

Dr. (Barr.) Fidelis O. Algan, B.Sc. U.S. B. MPA, M.P.H., PH.D. FRCR (HON)
DIRECTOR OF ADMINISTRATION / BOARD SECRETARY

Our Ref: UUTH/AD/5/96/VOL.XXI/118
Your Ref: _____

Date: January 30, 2018

UNIVERSITY OF UYO TEACHING HOSPITAL, UYO INSTITUTIONAL HEALTH RESEARCH
ETHICAL COMMITTEE (IHREC)

APPROVAL CERTIFICATE LETTER

Principal Investigator: Stephen Maduabuchi Samuel

Protocol Title: "HEALTH SYSTEM ANALYSIS OF DIABETES AND DIABETIC RETINOPATHY SERVICES IN NIGERIA"

STATUS

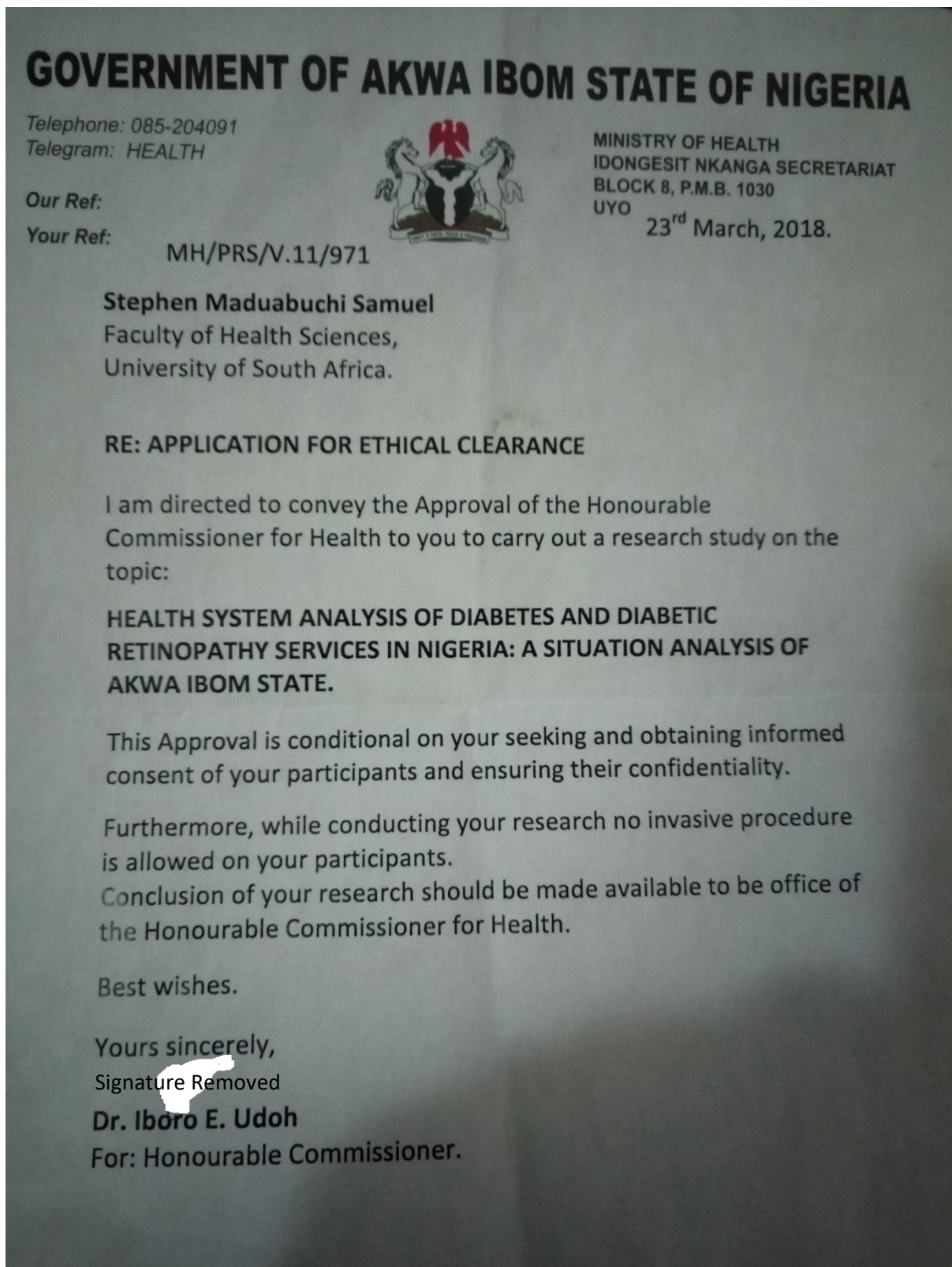
The University of Uyo Teaching Hospital, Uyo Institutional Review Committee has reviewed your protocol title: "HEALTH SYSTEM ANALYSIS OF DIABETES AND DIABETIC RETINOPATHY SERVICES IN NIGERIA"

The research protocol described above has been approved by the University of Uyo Teaching Hospital, Uyo Institutional Health Research Ethical Committee (IHREC) as indicated.

Signature Removed

Barr. Onwuezobe, Eseoghene Irene
Secretary, UUTH
Uyo IHREC

Appendix 7: Ethical clearance letter from the Government of Akwa Ibom State Nigeria.



Appendix 8: Instructions for Authors (Ophthalmic Epidemiology).

The following are the files need to make your online submission complete:

I. MANUSCRIPT FILE

1. Cover page –

- a) list the title of your submission – no abbreviations or acronyms (acronyms may be considered if important for recognition of a prominent study, and in that case, they should be used only after defining the acronym in the title)
- b) supply a running head - a shortened version of title, not to exceed 50 characters. If the full title is 50 characters or less, they can be the same.
- c) All authors of a manuscript should include their full name and affiliation on the cover page of the manuscript.
- d) indicate who is the corresponding author and the corresponding contact information (especially email),
- e) financial support – list all financial support
- f) list any proprietary interests or conflicts of interest for any and all authors related to this submission. “If none, please state: None of the following authors have any proprietary interests or conflicts of interest related to this submission.”; then list all the authors with no such interests. “None of the authors” suffices if no one has any such interests. Please err on the side of disclosure if it is unclear whether something is an interest or not, and please include relationships that may be perceived by others as a conflict of interest.
- g) statement that this submission has not been published anywhere previously and that it is not simultaneously being considered for any other publication. Note: if the paper previously has been reviewed and rejected by another journal, please indicate so, and please indicate what criticisms were given and what changes have been made in response (as if you were revising and resubmitting to the original journal). We are open to accepting such papers if they have merit, and there is no need to hide this information.

2. Abstract – start on new page – not to exceed 250 words, define all abbreviations or acronyms used at first use, formatted into the following four sections:
 - a) Purpose
 - b) Methods
 - c) Results
 - d) Conclusion

3. Manuscript text – start on a new page. The text should not exceed 4,000 words. Define all abbreviations and acronyms at first use (even if previously defined in abstract). The text should be divided into the following 5 sections:
 - a) Introduction—give the rationale for why this manuscript is important
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the Institutional Review Board which granted approval, or which indicated approval was not needed. Any waivers granted, such as HIPAA waivers or waiver of consent, should be mentioned. Whether patients consented to participate in the study should be mentioned; if not, the reason why not should be mentioned (e.g., Institutional Review Board waiver of consent)

- c) Results—summarize the key and supportive results in a clear, crisp, straightforward manner.
- d) Discussion—discuss what the key findings are, how it fits in with existing knowledge on the subject, and if their alternative explanations of the observations such as bias or random error. Please include a strengths and limitations paragraph, as well as a concluding paragraph summarizing the main items of knowledge that the paper has provided and relevant applications.
- e) References – Please follow the directions in Section 4 below.

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AMA (AMA Manual of Style, 10th ed.)

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Author listings in references should be formatted as indicated below.

<i>1 author</i>	Smith A.
<i>2 to 6 authors</i>	Smith A, Jones B, Smythe C, Jonesy D, Smitty E, Jonesi F.
<i>7 or more authors</i>	Smith A, Jones B, Smythe C, et al.

Models from US National Library of Medicine (NLM) resources (e.g., MEDLINE, Index Medicus) should be employed for abbreviating journal titles in the reference section. Examples of common reference types appear below.

Journal article

12. Taylor J, Ogilvie BC. A conceptual model of adaptation to retirement among athletes: a meta-analysis. *J Appl Sport Psychol.* 1994;6(1):1–20. doi:10.1080/10413209408406462.

Book

2. Duke JA. *Handbook of Phytochemical Constituents of GRAS Herbs and Other Economic Plants.* Boca Raton, FL: CRC Press; 2001.

Book with titled volume and edition

18. Bowlby J. *Loss: Sadness and Depression.* Vol. 3 of *Attachment and Loss.* 3rd ed. New York, NY: Basic Books; 1982.

Edited book chapter

34. Gordon S, Lavalley D. Career transitions in competitive sport. In: Morris T, Summers J, eds. *Sport Psychology: Theory, Applications and Issues.* 2nd ed. Brisbane, Australia: Wiley; 2004:584–610.

Edited book chapter with volume and edition

26. Remael A. Audiovisual translation. In: Gambier Y, van Dooslaer L, eds. *Handbook of Translation Studies.* Vol. 1. 2nd ed. Amsterdam, Netherlands: John Benjamins; 2012:12–17.

Online/Website

8. United States Census Bureau. American housing survey: 2013 detailed tables. United States Census Bureau Web site. <http://www.census.gov/newsroom/press-releases/2014/cb14-tps78.html>. Published October 16, 2014. Accessed October 21, 2014.

Dissertation/Thesis

26. Allison N. *Bacterial Degradation of Halogenated Aliphatic Acids* [dissertation]. Nottingham, UK: Trent Polytechnic; 1981.

Conference presentation

4. Alfermann D, Gross A. Coping with career termination: it all depends on freedom of choice. Paper presented at: 9th

Annual World Congress on Sport Psychology; January 23, 1997; Netanya, Israel.

Paper/Report

55. Grigg W, Moran R, Kuang M. *National Indian Education Study.* Washington DC: National Center for Education Statistics; 2010. NCES publication 2010-462.

Newspaper

22. Protzman, F. Clamor in the East: East Berliners explore land long forbidden. *New York Times*. November 10, 1989: A1, A14.

Patent

67. Pfeifer A, Muhs A, Pihlgren M, Adolfsson O, Van Leuven F, inventors; AC Immune S.A, Katholieke Universiteit Leuven, assignees. Humanized tau antibody. US patent 9,657,091. May 23, 2017.

Computer software with developer

10. Noguera J, Cumby C. *SigmaXL* [computer software]. Version 8.0. Kitchener, Canada: SigmaXL, Inc; 2017.

Computer software without developer

76. *SPSS Amos* [computer software]. Version 22.0. Armonk, NY: IBM; 2013. *Dataset*

3. Wang, G-Y, Zhu Z-M, Cui S, Wang J-H. Data from: glucocorticoid induces incoordination between glutamatergic and GABAergic neurons in the amygdala [dataset]. Dryad Digital Repository. <https://doi.org/10.5061/dryad.k9q7h>. Published August 11, 2017. Accessed December 22, 2017.

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