

FEDERAL REPUBLIC
OF NIGERIA

NATIONAL GUIDELINES FOR SCREENING & MANAGEMENT OF DIABETIC RETINOPATHY

FEDERAL MINISTRY OF HEALTH, NIGERIA - 2023



Acronyms

BP	Blood Pressure
DM	Diabetes Mellitus.
DMO	Diabetic Macular Oedema
ETDRS	Early Treatment Diabetic Retinopathy Study
FBS	Fasting Blood Sugar
FMOH	Federal Ministry of Health
HbA1c	Glycated Haemoglobin
ICO	International Council of Ophthalmology
IRMAs	Intraretinal Microvascular Abnormalities
NPDR	Non Proliferative Diabetic Retinopathy
NVD	Neovascularization at Disc
OCT	Optical Coherence Tomography
PLWDM	People Living with Diabetes
PDR	Proliferative diabetic Retinopathy
PRP	Pan-retinal photocoagulation
VTDR	Vision threatening diabetic retinopathy
VEGF	Vascular Endothelial Growth Factor

Definition of Terms

1. **Blindness:** Visual acuity measuring less than 3/60 in the better eye.
2. **Cataract:** an opacity in the lens of the eye. It prevents light travelling through the lens from sending clear images to the retina.
3. **Cotton Wool Spots:** an abnormal finding on the retina. They appear as fluffy white patches and are caused by damage to retinal nerve fibres.
4. **Diabetic Maculopathy:** any abnormality involving the macula (central part of the retina) caused by diabetes mellitus.
5. **Exudates:** small yellowish white lipid deposits located in the outer layers of the retina. They are caused by leaking of fluid from blood vessels into the retina.
6. **Grading Hub:** A national or subnational centre where teleophthalmology grading of DR is performed.
7. **Guidelines:** sets of evidence-based recommendations that aid decision-making about care in health systems.
8. **Macula:** centre of the retina, it is responsible for sharp, detailed and colour vision.
9. **Macular Oedema:** any thickening of the macula (central part of the retina) detectable on clinical examination or investigation.
10. **Microaneurysm:** a tiny saccular protrusion from very small blood vessels in the retina. These protrusions may rupture or leak.
11. **Mydriasis:** dilatation of the pupil. To examine the retina more reliably, eye drops can be instilled in the eye to dilate the pupil.
12. **Neovascularization:** abnormal new blood vessels that grow on the iris or within the retina into the vitreous.
13. **Prevalence:** the proportion of cases of a condition in a specific population at a point in time.
14. **Protocols:** agreed frameworks outlining the care that will be provided to patients in a designated area of practice, such as screening for people who have diabetes.
15. **Retina:** the innermost lining of the eye on which images are formed.
16. **Retinopathy:** disease of the retina.
17. **Vision Impairment:** any kind of vision loss below the normal level.
18. **Vision-Threatening Diabetic Retinopathy:** defined as a level of retinopathy and/or maculopathy that indicates significant risk of vision loss and progression to advanced disease.
19. **Vitreous:** the transparent gel-like fluid behind the lens that fills the globe of the eye.
20. **Vitreous Haemorrhage:** a bleed that occurs in the vitreous

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Foreword

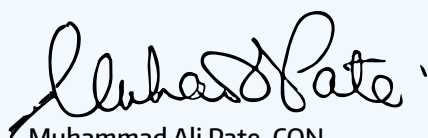
Diabetic retinopathy (DR) is a public health concern in Nigeria as in other low and middle-income countries (LMICs). According to the Nigerian Blindness and Visual Impairment survey 20.5% of people with diabetes had DR and 10% were at risk of sight loss. The pooled prevalence of DR from a recent systematic and meta-analysis is 21.3%. These figures are likely to increase due to demographic shifts and the rising prevalence of diabetes from lifestyle changes and the health system must be ready to respond to this challenge.

This guideline is a paradigm shift from a fragmented methodology towards a nationally effective framework with a cohesive, cost-effective, comprehensive, and patient centred approach, critical to making the needed impact by increasing the opportunity for prevention and prompt treatment at early stages. Service integration is one of the enablers underpinning the main strategic thrusts of the National Eye Health policy. This document aligns with the National Eye Health Policy and the National DM guidelines, integrating DR services into the routine diabetic service structures at the primary, secondary, and tertiary levels.

These guidelines recommend strategies to strengthen leadership and clinical governance, protocols that standardize care and define care pathways including strengthening referral mechanisms, financing and sustainability and research to improve service delivery and patient outcomes in the long run.

This document represents this administrations' drive and commitment to achieving Universal Health Coverage through the provision of integrated, comprehensive screening and treatment services that reduce the onset and prevalence of DR-and its blinding complications.

I therefore endorse its implementation at all levels of care.



Muhammad Ali Pate, CON
Coordinating Minister of Health & Social Welfare

Acknowledgement

The National Diabetic Retinopathy Screening and Treatment guidelines was developed by the Federal Ministry of Health (FMOH) through a collaborative process involving a wide range of stakeholders notably government, representatives of professionals in care of diabetic patients, private organizations as well as development partners to whom the FMOH is indebted. We sincerely acknowledge the time and technical expertise committed to the timely development of this resourceful document.

The Ministry appreciates the effort of the consultants Professor(s) Dennis Nkanga and Odarosa Uhumwangho as well as all members of the technical working group including the DR-NET of the International Centre for Eye Health (ICEH) particularly in the planning and facilitation of the stakeholder's workshop in addition to their inputs in the final document.

Finally, we are grateful to the National Coordinator National Eye Health Programme Dr Oteri Okolo and her deputy Dr C. Obi-Mgbam and indeed all the staff of the National Eye Health Programme FMOH for their diligence and effective coordination throughout the process. We thank all our partners, the Eye Foundation Hospital Group and Novartis Pharmaceuticals Nigeria for the important roles that they played in finalizing this document.



Dr M.O. Alex-Okoh

Director/Head Department of Public Health

Executive Summary

The National Diabetic Retinopathy (DR) Screening and Treatment Guidelines for Nigeria aims to reduce the burden of DR related visual impairment by providing a comprehensive framework for screening, diagnosis, and management of the disease. It will serve to facilitate the attainment of the goals and provisions of the National Eye Health Policy while advancing several Sustainable Development Goals. The guidelines were developed by a team of experts in eye care, endocrinology, public health, and health policy, with input from stakeholders, NGOs, pharmaceuticals, and persons living with diabetes.

These guidelines are structured in three parts. Part 1 introduces the document and focuses on epidemiology of DM and DR, needs assessment for screening and treatment, classification and guideline development. Part 2 refers to the clinical guidelines and Part 3 addresses the implementation of the national diabetic retinopathy screening and treatment programme in Nigeria.

The guidelines emphasize the importance of regular screening for DR among people with diabetes, particularly those with risk factors such as poor glycaemic control, hypertension, and longer duration of diabetes. The guidelines recommend annual screening for people living with diabetes. Screening should be performed using validated retinal imaging technologies, such as fundus photography and optical coherence tomography.

The guidelines also provide recommendations for the diagnosis and integrated, patient-centred management of DR. Treatment options, such as laser photocoagulation and intravitreal injections, are discussed in detail, along with their indications, risks, and benefits. The guidelines emphasize the importance of a multidisciplinary approach to DR management, involving ophthalmologists, endocrinologists, primary care physicians, and other healthcare providers.

The successful implementation of these guidelines is expected to lead to a reduction in the prevalence of visual impairment caused by DR in Nigeria, improving the

quality of life of people living with diabetes and reducing the economic burden of the disease on individuals and the healthcare system. The guidelines provide a valuable resource for healthcare professionals, policymakers, and patients, and their implementation should be supported by adequate funding, training, and monitoring.

In addition, the guidelines highlight the importance of patient education and empowerment in the prevention and management of DR. Patients should be informed about the risk factors for DR and the importance of regular screening, as well as lifestyle modifications, blood sugar, blood pressure and lipid control measures that can help reduce the risk of developing the disease.

The guidelines also call for the establishment of a national, subnational, and institutional DM and DR registry to track the prevalence, incidence, and outcomes of the disease in Nigeria. The registry will serve as a valuable tool for monitoring the impact of the guidelines, identifying areas for improvement in DR management and research.

Finally, the guidelines emphasize the need for collaboration between the public and private sectors, as well as between different levels of the healthcare system, to ensure effective implementation of the guidelines. This includes the development of partnerships between government agencies, healthcare providers, and patient advocacy groups to support the dissemination of the guidelines and the provision of DR screening and treatment services.

Overall, the National Diabetic Retinopathy Screening and Treatment Guidelines for Nigeria provide a comprehensive framework for the prevention, diagnosis, and management of DR, with the goal of reducing the burden of the disease on individuals and the healthcare system in Nigeria. The guidelines are a valuable resource for healthcare professionals, policymakers, and patients, and their successful implementation will require a concerted effort from all stakeholders involved in DR management.



PART 1

INTRODUCTION

1. Introduction

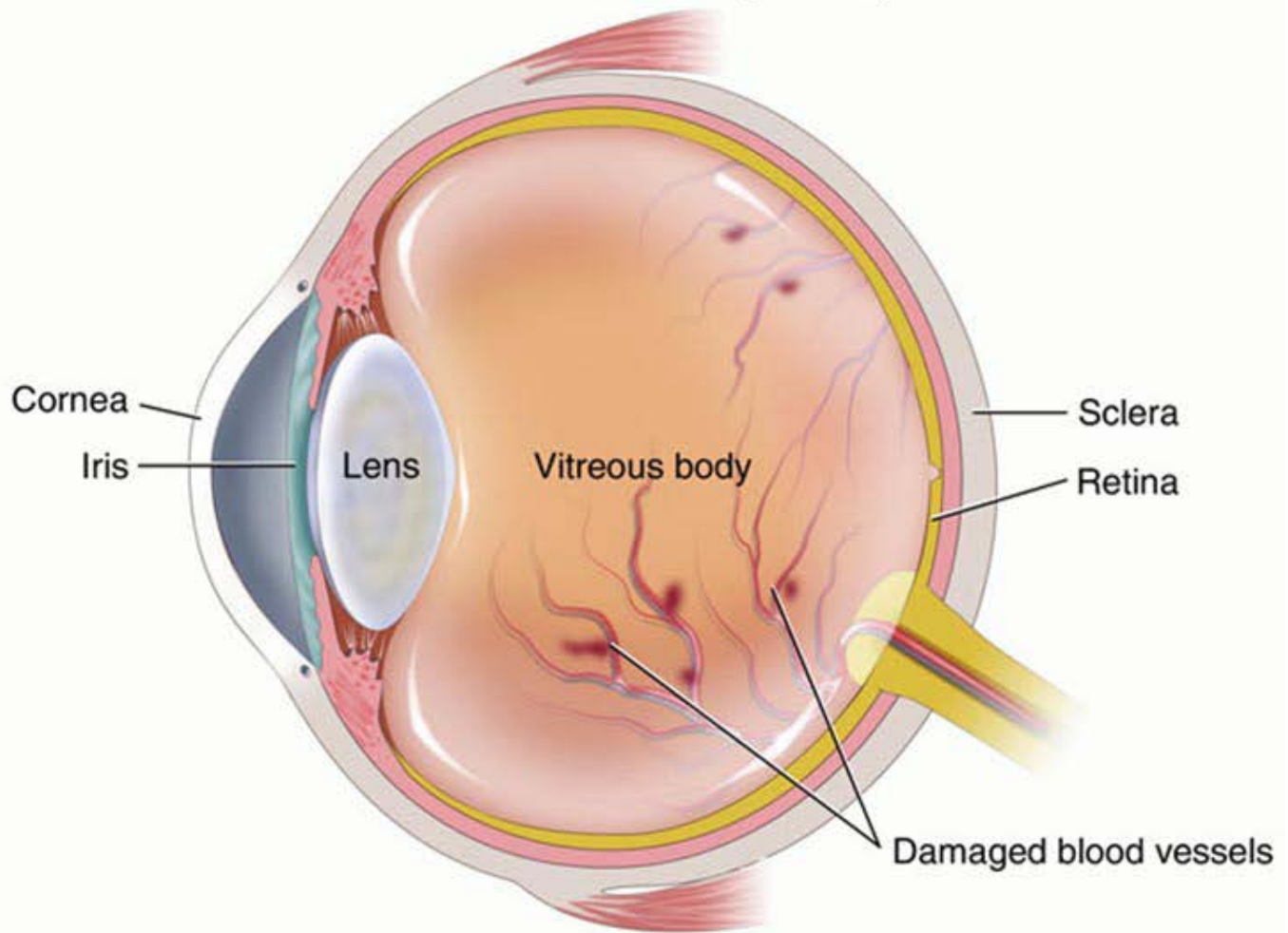
Diabetes mellitus (DM) is a group of non-communicable metabolic disorders of multiple aetiologies characterized by chronic hyperglycaemia with disturbances of carbohydrate, protein, and fat metabolism.¹ It is a result of relative or absolute defects in insulin secretion, action, or both. The major types of DM include Type 1 in which there is an absolute deficiency of insulin, Type 2 in which there is relative deficiency of insulin and Gestational DM which occurs for the first-time during pregnancy. Due to the life-long multisystemic nature of DM, complications of DM can affect every organ. The care for people living with diabetes (PLWDM) requires a whole person approach due to its multidimensional effects on all aspects of life such as the physical, mental, and social health of the individual, family, and community. This entails a multidisciplinary intervention targeted at DM, associated comorbidities and its complications.

PLWDM are known to resort to the use of traditional and alternative therapies such as herbal treatment, acupuncture, yoga, dietary supplements, hydrotherapy, ayurvedic and homeopathic remedies to improve their wellbeing.² These guidelines are only addressing management of DM and DR through conventional medicine and don't attempt to discuss or evaluate the role of alternative therapies.

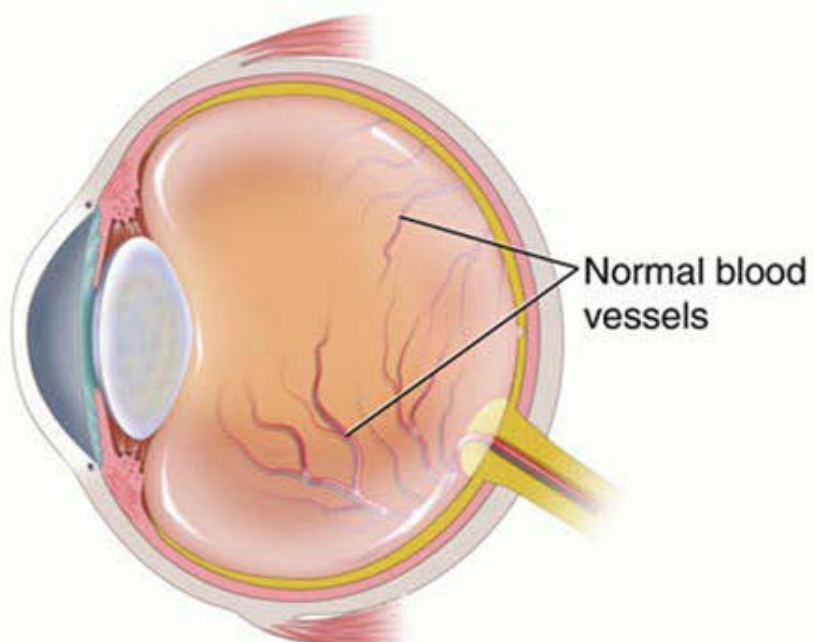
Diabetic retinopathy (DR) is a complication of DM that damages the small blood vessels in the retina which subsequently become leaky or blocked. Abnormal blood vessels can grow from the retina, which can bleed or cause scarring and detachment of the retina which leads to permanent vision impairment or blindness. Vision loss also occurs following thickening in the central part of the retina, diabetic macular oedema, which can become irreversible if not detected and appropriate treatment instituted early.³ The main risk factors for the development of DR include poor blood sugar control, longer duration of DM and elevated blood pressure. Other related factors are hyperlipidaemia and pregnancy.

Slowing the progress of diabetic retinopathy to vision threatening disease depends on good diabetes management, patient education and promotion of self-care. Early identification of DR, control of risk factors such as poor blood sugar control, kidney disease, and elevated triglycerides, can help prevent progression to proliferative disease and save sight.⁴

DIABETIC RETINOPATHY



Diabetic retinopathy affects the blood vessels in the retina, leading to new abnormal blood vessel growth, leakage, and bleeding.



Normal Eye



Close-up of leaking vessel

2. Epidemiology of Diabetes Mellitus & Diabetic Retinopathy: Global/Nigeria

An estimated 537 million adults aged 20-79 are believed to be living with diabetes. This number is expected to increase by 2045 to 783 million people. There is need to intensify efforts for case detection of DM as it is estimated that 50% of PLWDM have not been diagnosed. In 2021 the IDF estimated the prevalence of DM in Nigeria in 20 to 79 year-olds was 3.7%.⁵ A systematic review and meta-analysis by Uloko et al (2018) reported a prevalence of DM of 5.77%.⁶ The difference in these estimates is likely the result of different inclusion criteria for the sources of evidence in the two studies.

DR is the most common microvascular complication of DM and a leading cause of vision loss in the working adult population in many countries, accounting for 3.28 million people experiencing moderate-to-severe vision impairment and 1.07 million people being blind with devastating socioeconomic consequences for families and communities.⁷ In Sub-Saharan Africa, the reported prevalence of DR and vision-threatening DR (VTDR) in PLWDM ranged from 13% to 82.6% and 2.1% to 51.4% respectively.⁸ The Lancet Global Eye Health Commission estimated that there are 6.7 million people with DR and 2 million people with VTDR in Sub-Saharan Africa.⁹ The Nigerian National Blindness and Visual Impairment Survey found the proportion of PLWDM with DR to be 20.5% and estimated that 10% of PLWDM aged 40 years and above may have VTDR.¹⁰ A systematic review and

meta-analysis of DR showed the pooled prevalence of diabetic retinopathy in PLWDM in Nigeria to be 21.3%.¹¹

Vision impairment resulting from DR is associated with poorer quality of life which includes reduced social, economic, and emotional wellbeing. About 60% of persons with Type 2 and nearly 100% of persons with Type 1 DM have been reported to have DR after 20 years.¹² Since all PLWDM will eventually develop DR over time, the need for regular, systematic DR screening followed by treatment has been recognized as a cost-effective intervention for reducing blindness and vision impairment in PLWDM. Screening enables early detection and referral of DR at a threshold where laser photocoagulation and/or anti-VEGF therapy can prevent, halt disease progression, and improve vision. A sustainable, patient centered, multidisciplinary, integrated care with full disease approach within the existing structure of primary, secondary, and tertiary care is recommended to prevent vision loss due to DR.^{13,14}

2.1 Needs assessment for DR screening and treatment in Nigeria

POPULATION AT RISK		
Total population ¹⁵	213,401,323	
Population to be covered (age group 20 years and above) ¹⁶	98,591,411	

DIABETES MELLITUS		
Prevalence of DM ^{5,6}	IDF estimate 3.70%	Uloko et al. estimate 5.77%
Number of PLWDM needing examination of the retina every 1-2 years	3,647,882	5,688,724

DIABETIC RETINOPATHY		
Proportion of PLWDM (%) who have DR ⁷	22.27%	22.27%
Number of PLWDM with DR	812,383	1,266,879

VISION THREATENING DR (VTDR)		
Proportion (%) of PLWDM who have VTDR ⁷	6.17%	6.17%
Number of people with VTDR (needing treatment)	225,074	350,994

KEY INDICATORS OF NEED		
CASE DETECTION - How many people will need a retinal examination every 1-2 yrs.?	3,647,882	5,688,724
TREATMENT - How many need treatment (per year)?	225,074	350,994

3. International Classification of Diabetic Retinopathy & Diabetic Macular Oedema¹⁸

International Classification of Diabetic Retinopathy

CLASSIFICATION	CLINICAL FINDINGS	ACTION RECOMMENDED
No apparent NPDR Mild NPDR Moderate NPDR	No abnormalities Microaneurysms only Microaneurysms and other signs (e.g., dot and blot haemorrhages, hard exudates, cotton wool spots)	Re-screen in 1 year Re-screen in 1 year Refer to Ophthalmologist within 1 month
Severe NPDR	Moderate non-proliferative DR with any of the following: Intraretinal haemorrhages (≥ 20 in each quadrant); Definite venous beading (in 2 quadrants); Intraretinal microvascular abnormalities (in 1 quadrant)	Refer to Ophthalmologist within 1 month
PDR	Severe non-proliferative DR and 1 or more of the following: Neovascularization Vitreous/preretinal haemorrhage	Fast track referral to Ophthalmologist

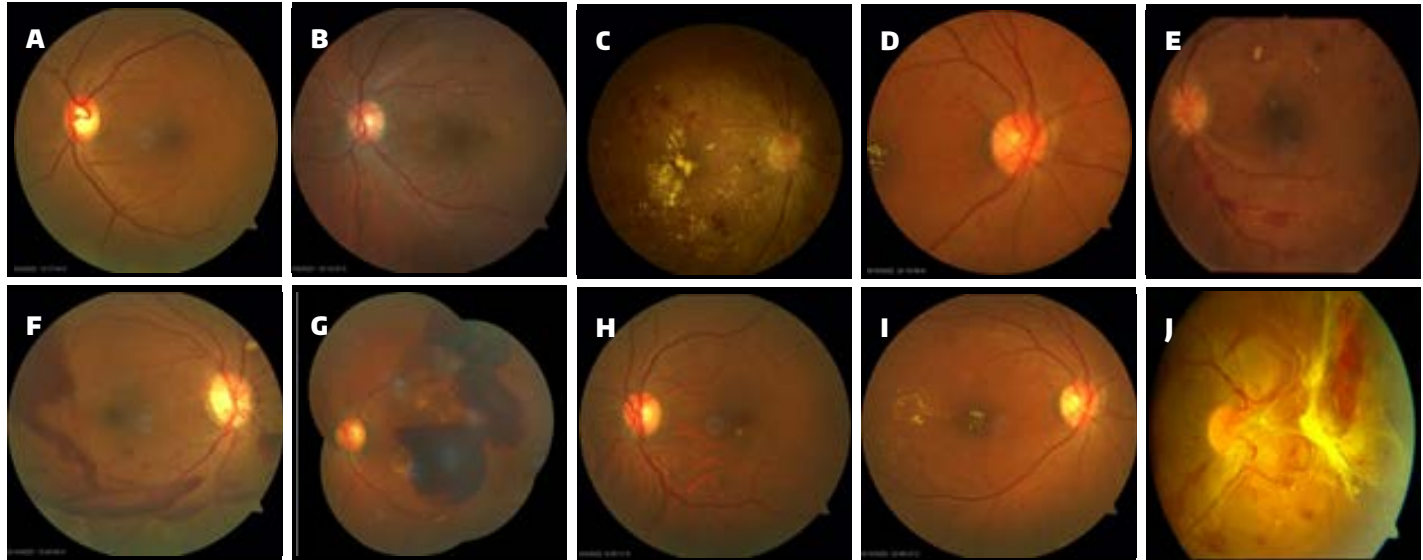
International Classification of Diabetic Macular Oedema (DMO)¹⁸

CLASSIFICATION	CLINICAL FINDINGS	ACTION RECOMMENDED
No macula oedema	No retinal thickening or hard exudates in the macula	For rescreening in 1 year
Noncentral-involved DMO	Retinal thickening in the macula that does not involve the central subfield zone that is 1mm in diameter	Refer to Ophthalmologist
Central-involved DMO	Retinal thickening in the macula that does involve the central subfield zone that is 1mm in diameter	Fast track referral to Ophthalmologist

NOTE

- A screen negative individual does not have any form of DR or has mild NPDR
- A screen positive individual is one who has moderate NPDR, severe NPDR, PDR or any form of DMO

Stages of DR and DMO



- A. Mild NPDR with dot haemorrhages and microaneurysms
- B. Moderate NPDR
- C. Severe NPDR with DMO
- D. PDR with NVD and DMO
- E. PDR with NVD and NVE
- F. PDR with Pre-retinal haemorrhages
- G. PDR with Pre-retinal haemorrhages
- H. Central-Involved DMO
- I. Central-Involved and Noncentral-Involved DMO
- J. Advanced Diabetic Eye Disease with tractional/exudative retinal detachment

Image Credit

Fig 1a,1b,1d,1f,1h,1i Courtesy of Dr. Ogugua Okonkwo

Fig 1c Courtesy of Prof. Tunji Oluleye

Fig 1e Courtesy of Dr. Olufemi Oderinlo

Fig 1g Courtesy of Prof. Dennis Nkanga

Fig 1j Courtesy of Prof. Sebastian Nwosu

4. Rationale and Scope for DR Guidelines

Diabetes is the most common endocrine disorder encountered in clinical practice in Nigeria.¹⁹ It is managed at primary, secondary, and tertiary healthcare facilities. All people with diabetes are at risk of diabetic eye disease, which can affect different eye structures. The focus of this guideline is on DR. An integrated approach for the care of PLWDM is recommended as diabetic retinopathy does not usually occur alone. DR screening and treatment should take place within the context of good care for PLWDM. Health-care workers and care systems should not operate in silos. Relevant information about diabetes and eye complications should be shared with PLWDM and across the system to facilitate integrated care. Results of eye screening should be shared with those responsible for diabetes care, and any incidental findings during eye screening, such as cataract or glaucoma, should be referred appropriately to eye-care services.

Member states of the United Nations, in 2015 made a commitment “to all people everywhere to end poverty in all its forms by 2030 in an agenda for the planet, our common home.” The 17 Sustainable Development Goals (SDGs) ushered in a new era of development through multidisciplinary and multisectoral collaboration.²⁰ Goal 3 is to ‘Ensure healthy lives and promote wellbeing for all at all ages’ with target 3.8 being the attainment of Universal Health Coverage (UHC) which forms the bedrock of the Nigeria National Health Policy.²¹ UHC “leaving no-one behind” entails equitable access to a guaranteed package of quality health services as well as protection against financial risks in the uptake of such services.²²

The World Health Assembly resolution (WHA) 73.4, in 2020 urged Member States, considering their national circumstances and priorities, to implement the recommendations in the World report on vision to make eye care an integral part of universal health coverage and integrate people-centred eye care in health systems.²³

It is well recognized that improving eye health and preventing blindness in PLWDM reduces mortality, improves other health related outcomes and quality of life, enhances productivity while advancing several Sustainable Development Goals (SDGs), including Poverty Reduction (Goal 1), Zero Hunger (Goal 2), Good health and Wellbeing (Goal 3), Quality Education

(Goal 4), Gender Equality (Goal 5), Decent Work and Economic Growth (Goal 8) and Reduce Inequality (Goal 10).²⁴

It is in this context that the National Guidelines for Screening and Management of Diabetic Retinopathy have been developed to provide guidance for policy makers, PLWDM, health care workers and other stakeholders in Nigeria. It will serve to facilitate the attainment of the goals and provisions of the National Eye Health Policy and the National Strategic Health Development Plan II along with the 2020 WHA resolution urging the integration of people centred eye care to be embedded within the principal health agenda of UHC and to expand the scope of eye care into the mainstream as an integral issue for sustainable development.^{25,26}

The primary goal of the National Guidelines for Screening and Management of Diabetic Retinopathy is to serve as a roadmap towards the reduction of vision impairment and avoidable blindness caused by DR and the achievement of UHC and relevant SDGs in Nigeria. It should serve to mitigate the social and economic burden of avoidable vision loss and blindness for individuals, communities, and the country.

The scope of the National Guidelines for Screening and Management of Diabetic Retinopathy includes:

1. Standardization of quality of care
2. Screening and Referral Guidelines
3. Referral system and network
4. Leadership and governance
5. Integration of diabetic retinopathy services into existing diabetic service structures at primary, secondary and tertiary care levels
6. Financing and sustainability mechanisms
7. Research

5. Methodology

The mandate was to formulate a National Guideline for the screening and management of diabetic retinopathy in Nigeria. This was carried out by adapting from existing local and international, evidence based guidelines and DR toolkits through a consultative, step by step process involving a technical working group and multiple stakeholders representing policy, multidisciplinary clinical practice (including non-communicable diseases, endocrinology, general medicine, public health, ophthalmology, optometry, pharmacy and nursing), the National Primary Healthcare Development Agency, National Health Insurance Agency, academia, representatives of primary, secondary and tertiary level facilities, programme implementers (such as non-governmental organizations), pharmaceutical companies, private sector, researchers, and patients' support groups.

The Federal Ministry of Health initiated the process by the appointment of two consultants to work with a technical working group (TWG) to coordinate the guideline development process. A literature search strategy was adopted for obtaining evidence-based guidelines and toolkits

on the subject to guide the TWG. Databases searched included PubMed, Global Health, Cochrane Library, ELDIS, EMBASE and Grey Literature including references cited within key literature, Google and Google scholar internet search engines were utilised in the search, using terms that included 'diabetic retinopathy' and 'clinical guidelines. TWG members were encouraged to search their personal libraries for relevant published papers that related to Diabetic Retinopathy guidelines. The websites of International Diabetes Federation (IDF), World Diabetes Foundation (WDF), National Institute for Health and Care Excellence (NICE) and American Diabetes Association (ADA) were also searched. The recommendations in this document were adapted from high-quality diabetes prevention, care and treatment guidelines selected for the process of adaptation including but not limited to the following International Council of Ophthalmology Guidelines for Diabetic Eye Care (2017), Guidelines for Screening and Management of Diabetic Retinopathy -Kenya (2017), VISION 2020 LINKS Diabetic Retinopathy Network (DR-NET) Toolkit (2021) and WHO DR screening guidelines.^{3,18,27-29}



- The Consultants and TWG were mandated to:
- Develop the scope and purpose of the guidelines.
- Develop health questions to be addressed.
- Identify and appraise the quality of existing diabetic retinopathy screening and management guidelines, using the (Appraisal of Guidelines for Research and Evaluation (AGREE) II checklist and scoring system.³⁰
- Select the guidelines that will be used for the adaptation process.
- Extract recommendations from selected guidelines for further discussion by the TWG and stakeholders.
- Develop the zero draft of the guidelines.

The process was vigorous, systematic, and participatory, while preserving the integrity of evidence-based recommendations. External expert review was sought from the International Centre for Eye Health (ICEH), London School of Hygiene & Tropical Medicine (LSHTM). Consensus building, an inclusive participatory process was extensively used in the process to

ensure that the diverse scenarios of clinical and public health practice across the country, technical expertise of health care providers, and lived experiences of people living with diabetes were adequately considered in the recommendations.

At the end of a two-day workshop, a zero draft was produced. This was edited by the consultants and resubmitted to the TWG for review and agreement. The first draft was subsequently presented to stakeholders for further review in a subsequent two-day meeting. The experts reviewed the background information and recommendations to ensure that all guideline recommendations were consistent with the goal of ensuring comprehensive prevention and management of DR within the outlined scope and that the recommendations were in line with current evidence, practice approaches and scenarios in the country.

Guideline development

SN	ACTIVITY	BY WHOM	TIMELINE
1	Determination of Need for National DR guideline	FMOH	2017
2	Engagement of Consultants	FMOH	August 2022
3	Establishment of Multidisciplinary Technical working group	FMOH	August 2022
4	Defining the scope and questions relevant to guideline development	TWG	August 2022
5	Desk and literature review	TWG	August 2022
6	Preparing zero draft	TWG	August 22 -24th 2022
7	Stakeholders' engagement	FMOH	January 2023
8	External Review and feedback	Consultants	July 2023
9	Ministerial review	FMOH	August 2023
10	Printing	Partners	September 2023
11	Launch	FMOH	October 2023
12	Announcement at National Council of health and dissemination to 36 states and FCT	FMOH	December 2024
13	Pilot: Training and implementation	FMOH/ICEH/LSHTM/DR-NET	February 2024
14	Programme evaluation	FMOH/ICEH/LSHTM/DR-NET	June 2027
15	Review and revision of guideline	NEHP	2028



PART 2

CLINICAL GUIDELINES

A. Prevention/Delay of onset of DR.

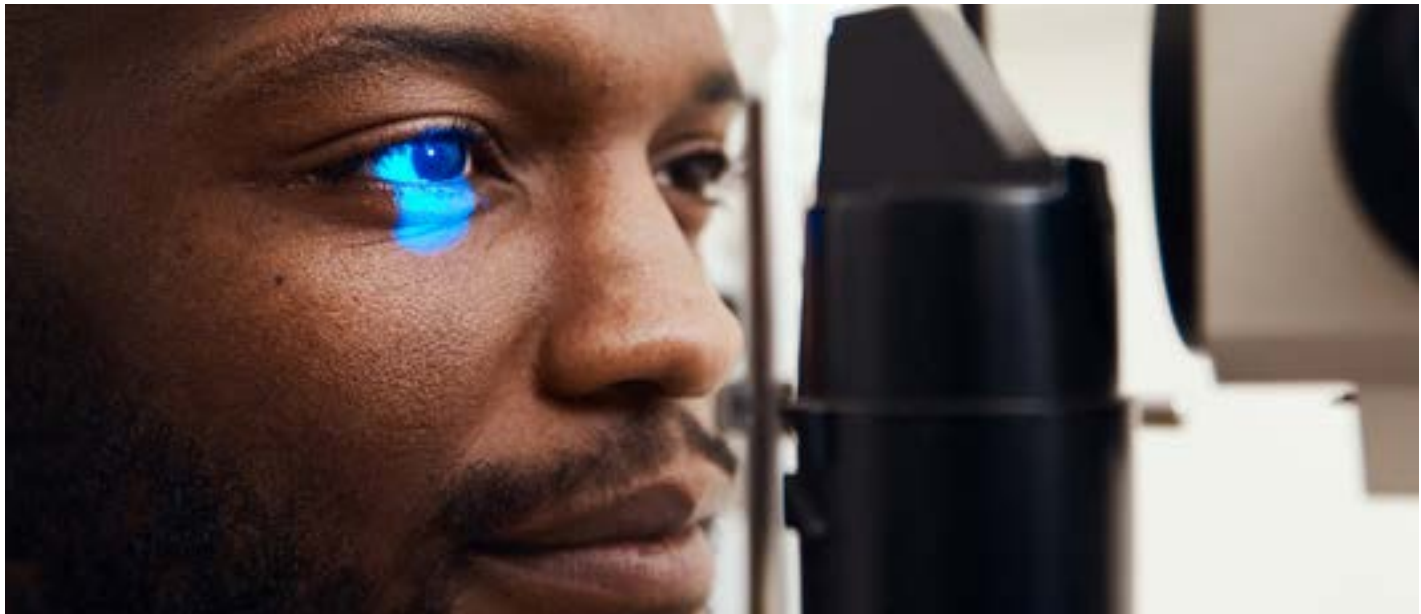
6. The Standards for Health Care for Persons Living with Diabetes



1. **Prevention of Type 2 Diabetes Mellitus** The government at national and subnational levels shall promote strategies to reduce the risk of developing Type 2 diabetes in the population: including promotion of a healthy lifestyle and reduction in obesity. city.
2. **Identification of PLWDM** The government at national and subnational levels shall develop and implement strategies to identify PLWDM in the population who do not know they have diabetes.
3. **Empowering PLWDM** All PLWDM shall receive a service which encourages good knowledge of their health condition, promotes a healthy lifestyle and good management of their diabetes including provision of health insurance.
4. **Clinical care of PLWDM** All PLWDM shall receive good quality care, including:
 - Rapid and effective treatment of diabetic emergencies
 - Appropriate management during pregnancy
 - Support to optimise control of their blood glucose
 - Support to manage high blood pressure, dyslipidaemia and other risk factors that worsen the complications of DM.
5. **Examination of the retina** The government at national and subnational levels shall promote and develop services that ensures all PLWDM are screened at least every year to detect DR early.
6. **Clinical care by an eye specialist for people with diabetic retinopathy** The government at national and subnational levels shall promote and develop services that ensures all PLWDM with VTDR receive ongoing care from an ophthalmologist.
7. **Treatment for vision threatening diabetic retinopathy** The government at national and subnational levels shall promote and develop protocols/ systems of care to ensure that all PLWDM who develop VTDR receive appropriate and effective care to reduce their risk of visual loss.
8. **Provision of Low vision/Rehabilitation services** The government at national and subnational levels shall ensure that PLWDM who develop irreversible vision impairment and blindness from DR receive low vision aids/ rehabilitation services in such a way that no one is left behind.

B. Early Detection of DR

7. DR Screening and Referral Guidelines³¹⁻³⁴



Screening shall be conducted by designated personnel in appropriately equipped facilities..

7.1. **DM/DR Register**

Comprehensive data of PLWDM shall be obtained from every point of access to care: primary, secondary and tertiary health care facilities and private hospitals. This data would be used to develop a DM register following patient's consent.

7.2. **Screening Guidelines**

Annual screening for DR shall be a mandatory component of DM management in Nigeria.

DR screening shall include visual acuity testing and retinal examination ideally through digital fundus photography. The screener must be trained to perform retinal photography and the screening test, retinal images, must have enough quality to ensure adequate DR classification for appropriate referral to the eye clinic. Vision shall be tested and recorded prior to pupil dilation (if used) by trained personnel using high contrast near and distance visual acuity charts and a pin-hole option if visual acuity is reduced.

The screener may also be trained to determine the

presence and/or the severity of DR. In this case, grading of the retinal images can happen at the point of screening. Alternatively, if the screener is not trained to grade retinal image, this could be achieved using telemedicine approaches or assisted by validated artificial intelligence grading systems.

If the retinal images have poor quality due to media opacities, considering the patient history and visual acuity, the patient shall be referred to an ophthalmologist unless it is obvious that there is no DR, or at most, only mild non-proliferative DR (i.e., microaneurysms only). In addition, persons with unexplained vision loss shall be referred to an ophthalmologist.

When opportunistic screening is done in the eye clinic, retinal examination may involve ophthalmoscopy, slit lamp biomicroscopic examination with indirect lenses (+78D or 90D), retinal (fundus) photography and OCT scanning. This will be followed by grading of the images by a trained eye care worker.

The screening examination of PLWDM shall include documentation of diabetes control including the most recent blood glucose level, blood pressure and

serum lipids when available. In addition, women shall be asked if they are or could be pregnant. Poor control of diabetes in pregnancy may require further appropriate medical intervention.

7.3. Screening Models

- **Who should be screened?**
All people with Type 1 DM shall be screened yearly from the age of 12 years and those with Type 2 DM shall be screened at diagnosis.
- **Systematic vs opportunistic screening**
When first established, DR screening is often opportunistic, targeting patients when they access diabetes or eye care services routinely. When DM registers become available, DR screening progresses to systematic as the registers allow to call and recall people yearly to be screened.
- **Where should screening be delivered?**
Ideally screening should be based in the diabetes and medical clinics routinely attended by PLWDM at the different levels of the health system. This way, the screening will be delivered to people who are still asymptomatic and can be identified and treated early. A one-stop multispecialty service model is recommended where DR screening is delivered as part of comprehensive diabetes care in the diabetes centre, in collaboration with physicians and other health care workers involved in diabetes care. Patients identified to have advanced stages of DR need to be referred to the eye clinic for treatment.

In practice, eye clinics also perform opportunistic screening but are less likely to identify people with early stages of DR.

- **At which level of the health system should screening be delivered?**
The beneficiary of a DR screening programme is the person with confirmed diabetes mellitus. In the current health system structure confirmation of diagnosis is more often done in secondary and tertiary care. However, there are plans to strengthen diabetes care at primary care level which means in the future, there may be a significant number of confirmed people with diabetes managed at primary care. The screening programme should be implemented in phases, starting with secondary care where currently confirmation of DM diagnosis is made but looking to expand to primary care in the future.

- **Screening delivery models:**
DR screening shall be conducted using any of the following models:
 1. **Fixed model:** where DR screening is carried out routinely as part of diabetes care in either the diabetes centres, medical and endocrinology clinics or PHCs and general practice clinics.
 2. **Outreach model:** where DR screening teams are deployed to outreach health facilities in the community.
 3. **Mixed model:** which is a combination of the fixed and outreach models, using the hub and spoke approach.



7.4. Screening services

DR screening services should aim to eventually integrate into the diabetic services of the National Primary Health Care Development Agency (NPHCDA) in the PHC's nationwide. Referrals shall be to the nearest DR treatment centre.

There shall be screening for DR at every major diabetes clinic in secondary and tertiary care and at least one PHC per LGA.

7.4.1. Competencies for Screening

The screener/grader should have undergone accredited training and requisite certification in DR screening and/or grading with commitment to Continuous Professional Development

7.4.2 Equipment for DR screening at various health care levels

Equipment for designated screening centres include:
In primary, secondary, and tertiary care screening centres:

- Visual acuity chart or App
- Fundus camera or smart phone with adapters for fundus photographs
- Computer
- Internet access and data storage (hard drive or cloud) for transmission of images
- Reliable source of power supply

Equipment for eye clinics (DR screening referral centres) include:

In secondary care:

- Visual acuity chart or app
- Fundus camera, smart phone with adapters for fundus photographs
- Slit Lamp Examination with accessory lenses
- Direct ophthalmoscope
- OCT
- Computer
- Internet access and data storage (hard drive or cloud) for transmission of images
- Reliable source of power supply

Tertiary Health Care:

- All the equipment present at a secondary level eye clinic.
- Binocular indirect ophthalmoscope

7.4.3. Image Quality

Emphasis should be on image characteristics. Two non-stereoscopic photographs of each eye with a field of view of 45° horizontally and 35° vertically should be made through dilated or non-dilated pupils as follows:

1. One photograph should be centred on the fovea, with the nasal edge of the optic disc at the edge of the photograph and a nasal field with 1-disc diameter at the temporal edge of the optic disc, while the second photograph is centred on the optic disc.
2. The minimum acceptable standard is a resolution

of 30 pixels per degree. This is because it provides a large visible area of the fundus at the magnifications generally used for grading. Larger screens are recommended for comfort than smaller ones.³⁵

3. Local DR screening services should consider larger screens in areas where graders are working for extended periods of time. Services should optimise the positioning, ambient lighting, and reflectivity of screens.^{36,37}

7.5. Referral of patients from screening

7.5.1. Referral decision timeline

Where a screener is also trained to grade retinal images, they can assess the image at the point of screening and give the patient a decision on whether they can come back in a year or if they must go to the eye clinic for further examination.

Where the screeners are only trained to take the images, but not to grade, image grading and referral decision may be done via teleophthalmology or later by trained graders in a grading hub. In this situation the decision must be communicated back to the patient within 7 days of screening. The mode of communication will depend on methods available to the centre.

Referral decisions:

1. Screen negatives should be given annual appointments
2. Screen positives should be referred to an ophthalmologist based on the referral guidelines (See 7.6, Tables 2 and 3).
3. Screen positives with vision-threatening diabetic retinopathy (VTDR) should be fast tracked immediately to an ophthalmologist/retina specialist within 7 days.

7.5.2. Referral Guidelines

Minimum referral guidelines are as follows:

1. Best corrected visual acuity of 6/12 or worse (not improved with pinhole) in any eye.
2. Symptomatic eye complaints.
3. DR and/or DMO shall be classified/graded according to the simplified International Classification of DR / DMO (Tables 2 and 3), where patients are referred if they have moderate NPDR, severe NPDR, PDR or any form of DMO.

7.5.3. DR Screening and Referral Pathway

Primary Health Care

Appropriate history shall be documented in the standard form (see section 8.1.1) -Vision shall be tested and recorded prior to pupil dilatation (if used) by screener/grader using a high contrast near and distant acuity charts and a pinhole performed if the visual acuity is 6/12 and below -Good quality fundus photographs shall be taken afterwards (See section 7.4.3 -Telemedicine option available (connected to a DR grading hub) -Grader determines the screening interval according to the type of DR detected -A screen-positive individual shall be referred for treatment at either a secondary or tertiary health centre and feedback shall be sent to the primary health care personnel using the two-way referral system



Secondary Health Care

Screening and/or treatment services available -Treatment available includes lasers and intravitreal injections -Secondary health care facilities without ophthalmologist shall screen and refer either to another secondary health care center with ophthalmologist or a tertiary health care center, for treatment -In a center with only a physician who sends a patient to a secondary or tertiary health care center with both physician and ophthalmologist for DR screening, feedback should be sent to the original physician for continuity of care



Tertiary Health Care

Screening, medical, laser and surgical retinal interventions available -Shall be a "one stop shop" for diabetes care -Patients who have been managed for DR should be referred to the appropriate screening service of their choice when the condition is stable, for follow-up

DR screening and referral pathway

C. Management of Diabetic Retinopathy

8. Ophthalmic Assessment of Diabetic Retinopathy at the Eye Clinic



8.1. Clinical Evaluation Procedure

8.1.1. Patient History

- Type of diabetes
- Duration in months/years
- Current Random/Fasting blood sugar (Finger

prick/venous)

- Past glycaemic control (glycosylated haemoglobin HBA1c within the last 6 months)
- Medications - insulin, oral antidiabetic, antihypertensives, lipid-lowering drugs, contraceptives (please specify etc.)
- History of systemic disease (kidney disease, History of complications of Diabetes)
- General history including alcohol intake, pregnancy, smoking, diet, and allergies.
- Ocular history including cataract surgery, glaucoma and use of prostaglandin analogue eye drops, frequent spectacle change.

8.1.2. Initial Ocular Examination

A complete ophthalmic examination including:

- Visual acuity (LogMar or Snellen): Unaided, with pinhole (when less than 6/6) and best corrected
- Pupillary reaction
- Measurement of intraocular pressure (IOP): Contact/Non-contact
- Gonioscopy when indicated (neovascularization of iris is seen or eyes with raised IOP)
- Slit lamp biomicroscopy of the anterior segment and use of appropriate accessory lenses (+78D or +90D for posterior segment examination through dilated pupils.
- Binocular indirect ophthalmoscopy could also be used to examine the posterior segment.

8.1.3. Ocular Imaging

Anterior segment photograph shall be taken to check for new vessels on the iris and pupillary margin where available. Retinal photography for assessment and documentation of DR. Two stereoscopic or non-stereoscopic 45° photographs of each eye shall be taken through non dilated or dilated pupils. One photograph shall be centred on the fovea, and the other photograph, centred on the optic disc.



A: Disc centred image



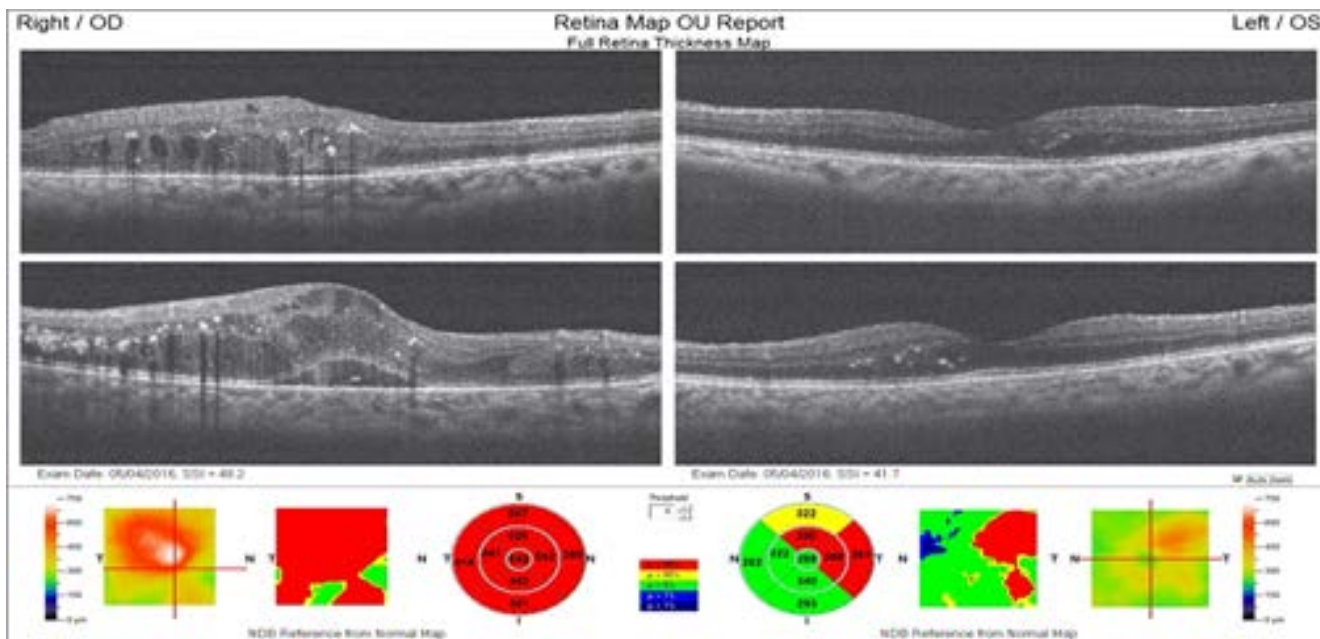
Fig 3b: Macula centred image

Image credit: Prof. Dennis Nkanga

Fundus fluorescein angiography (FFA), OCT and OCT angiography (OCTA) and B Scan ultrasonography as indicated. Fundus Fluorescein angiography (FFA) can be utilized as a baseline investigation for which subsequent comparisons can be made to monitor the clinical course (progression or response to treatment) of DR/DMO. FFA can be used in the evaluation of unexplained vision loss. It can identify areas of capillary non-perfusion, leakage, and neovascularization in

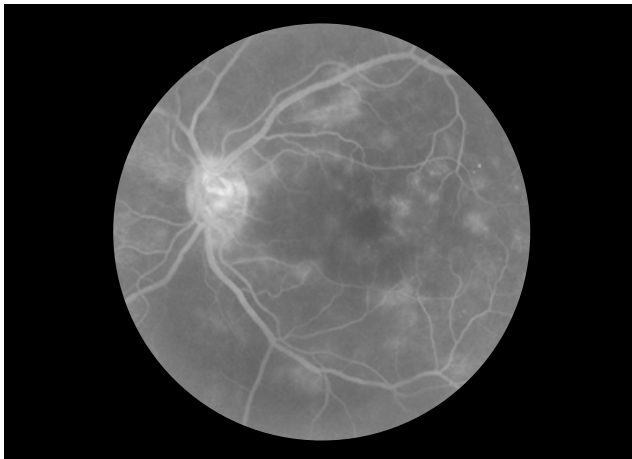
DMO and PDR. OCT is a sensitive, non-invasive investigation which identifies the location and severity of retinal/macular oedema. It is also very useful for follow-up evaluation to monitor the course and response to treatment. Ocular B-scan ultrasonography is indicated in posterior segment evaluation in the presence of media opacities.

If ocular imaging had earlier been performed in another centre,

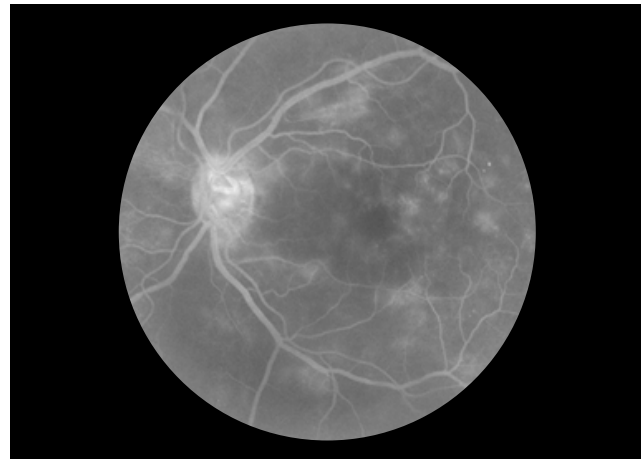


OCT showing intraretinal and subretinal fluid and hard exudates in DMO worse in the RE

Image credit: Dr. Ogugua Okonkwo



A: FFA showing leakage of dye in NVD, NVE and DMO



B: FFA showing areas of microaneurysms, NVE and capillary non-perfusion

Image credit: Dr. Ogugua Okonkwo

the ophthalmologist should review such photographs for signs of progression. Identification and grading of DR severity and presence of DMO for each eye should be documented.

8.1.4. Relevant Systemic Examination and Investigations

- Blood pressure
- Random/Fasting blood sugar
- Glycosylated haemoglobin (HbA1c)
- Fasting serum lipid profile
- Urine microalbumin where available
- Electrolyte/Urea/Creatinine
- Relevant neurologic exam

8.1.5. Guidelines for Management and Follow-up Schedule based on Severity of Diabetic Retinopathy

Relevant history and examination (8.1.1 and 8.1.2) should be conducted to update the clinical records with the aim of establishing progression, regression, or stability of the clinical condition. For all patients, regardless of retinopathy severity, optimization of medical treatment for glycaemic control, hypertension, and elevated serum lipids are recommended. Medical treatment should be optimized for all patients to improve glycaemic control if HbA1c >7% as well as associated systemic hypertension or dyslipidaemia.

Guidelines for Management and Follow up of DR

Retinopathy Classification	Follow up Schedule
No apparent DR	Repeat examination annually
Mild non proliferative DR	Repeat examination annually
Moderate NPDR without DMO	Repeat examination in 6 months
Severe NPDR* without DMO	Consider pan retinal photocoagulation when close follow up not possible and repeat exams monthly initially until stable
PDR**	Pan retinal photocoagulation and repeat exams monthly initially until stable
CSME with central thickness above 400	Focal/grid laser where leaking MA are away from macular centre Otherwise, Intravitreal Anti-VEGF injections with repeat injections and exams monthly until stable
Advanced Diabetic Eye Disease	Refer to Vitreoretinal Services

***Severe NPDR:**

follow closely for development of PDR. Consider early pan retinal photocoagulation for patients at high risk of progression to PDR or poor compliance with follow-up. There are benefits of early pan retinal photocoagulation at the severe NPDR stage for patients with type 2 diabetes. Other factors, such as poor compliance with follow-up, impending cataract extraction or pregnancy, and status of fellow eye.

**** PDR: Treat with PRP.**

There is increasing evidence from clinical trials demonstrating anti-VEGF injections (ranibizumab) as a safe and effective treatment of PDR through at least 2 years and that other intravitreal anti-VEGF agents (i.e., aflibercept and bevacizumab) are also highly effective against retinal neovascularization.

8.2. Patient/Care giver Education by the Multidisciplinary Team

- Discuss outcome of eye examination and implications with patient.
- Encourage patients to continue periodic dilated eye exams according to recommended follow-up schedule.
- Inform patients that effective treatment for DR depends on timely intervention, despite good vision and no ocular symptoms.
- Educate patients about the importance of lowering blood glucose levels, serum lipid levels and maintaining normal blood pressure.
- Communicate with the attending physician (e.g., family physician, internist, or endocrinologist) regarding eye findings.
- Provide vitreoretinal (VR) services or referrals for patients whose conditions require surgical intervention.
- Refer patients with reduced visual function for counselling, vision rehabilitation, low vision aids and social services to appropriate specialists.

follow up for DR screening and treatment when necessary, and the complications of diabetes.

Modalities for patient education:

- Development and dissemination of Information Education Communication (IEC) materials e.g., fliers, posters and jingles in the mass media and social media. IEC materials would be based on key messages contained in the guidelines (see Appendices 2 and 3). This is encouraged in different Nigerian languages, Pidgin and English language.
- Health talks to patients during clinics about DM being a life-long disease with emphasis on their role in management.
- Messages by religious and traditional leaders (pastors, imams, traditional rulers) and organizations such as churches and mosques
- Inclusion of DR support activities into existing activities of DM support groups and establishment of DM support groups when not available.

8.2.1. Strengthening patient self-management

The focus shall be to educate the patient on the importance of self-management. These includes dietary control, lifestyle modifications, adequate glycaemic, blood pressure and serum lipid control, regular blood sugar checks, merits of having a glucose meter, adherence with medications for DM, regular clinic attendance,

9. Treatment of Diabetic Retinopathy³⁸⁻⁴²



9.1. Who will treat diabetic retinopathy

Ophthalmologists

9.2. Treatment Options

- Laser photocoagulation (focal, grid, modified grid and panretinal photocoagulation)
- Intravitreal anti VEGF
- Surgery

9.2.1. Pan-retinal Photocoagulation

Indications for PRP:

- Severe NPDR when close follow-up cannot be guaranteed
- PDR

Current evidence shows it is the current gold standard. It can be delivered using either slit lamp or laser indirect ophthalmoscopic (LIO) delivery systems with accessory lenses (pan fundoscopic and +20D lenses respectively). Slit lamp delivery systems can be delivered via either multispot pattern or single spot.

Types of lasers include:

- Argon 514nm (green)
- Frequency doubling Nd-YAG laser 532nm
- Diode laser 577nm (yellow)
- Diode 810nm (red)
- Red laser can be used if vitreous haemorrhage is present.

Appropriate anaesthesia shall be provided as required.

9.2.1.2. Pre-treatment counselling

- Patients may require multiple follow-up visits and additional laser sessions.
- PRP reduces the risk of visual loss and blindness.
- Although laser treatment is effective, some patients may still develop vitreous haemorrhage. The haemorrhage is caused by DR in which the fragile new vessels on the retina bleed and not by the laser; it may mean the patient requires more laser treatment.
- Laser treatment often reduces peripheral and night vision which might affect driving; treatment may moderately reduce central vision, temporary visual reduction secondary to macular oedema, and failure of treatment may occur.
- Explain to the patient the importance of not looking at the laser beam during treatment.
- Obtain informed consent for pan-retinal photocoagulation (PRP)

9.2.1.3. Lenses for PRP

- Wide- field contact lenses are commonly used. Although the image is inverted, the large field of view allows many scattered burns to be placed in a single view, while the orientation to the disc and macula is maintained. The magnification of the lenses affects the laser spot size on the retina.
- The three-mirror Goldman laser

contact lens has a central opening for treating the posterior pole, and side mirrors for treating the mid peripheral and peripheral retina. The disadvantages include a small field

of view, which requires continual manipulation of the lens to complete treatment. The spot size is set at 500µm.

Laser Spot Size Adjustment Required for Different Lenses¹⁸

CONTACT LENS	FIELD OF VIEW	AXIAL MAGNIFICATION	SPOT MAGNIFICATION	SPOT SIZE SETTING FOR ~ 500 µm
Mainster Wide-Field	125°	0.46	1.50x	300µm
Volk TransEquator	120-125°	0.49	1.43x	300µm
Volk Quad/Aspheric	130-135°	0.27	1.92x	200 to 300µm
Mainster PRP 165	160°	0.27	1.96x	200 to 300µm

9.2.1.4. Technique for PRP

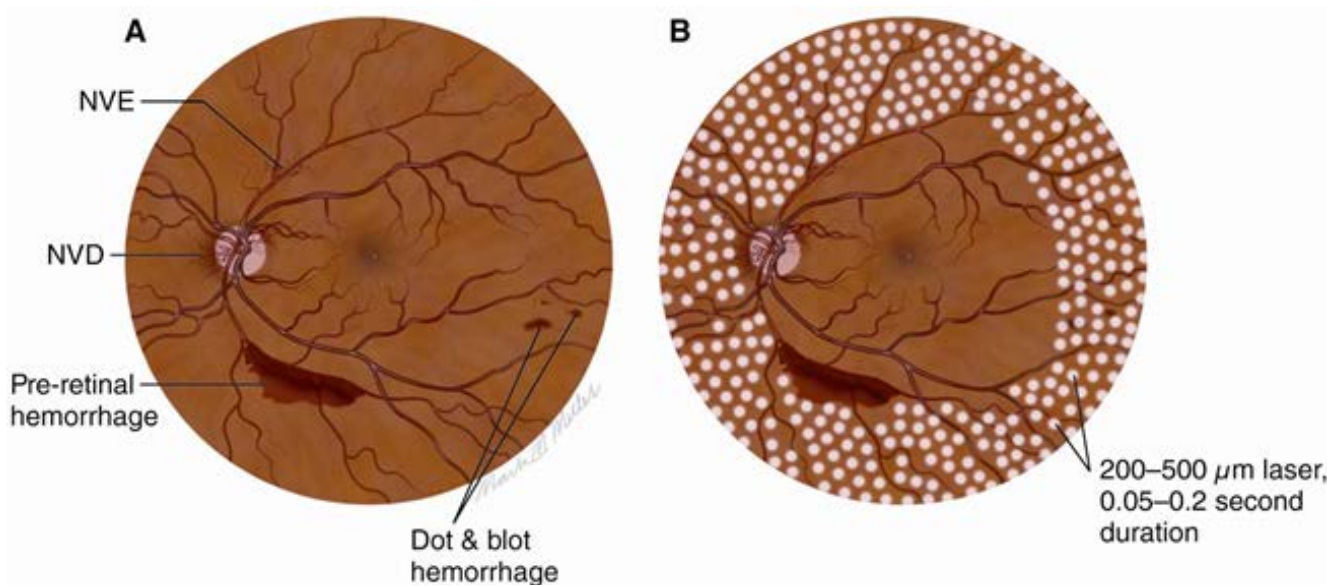
1. Document the best corrected visual acuity. The pupil should be fully dilated, and topical anaesthesia instilled. Retrobulbar or sub tenon anaesthesia to reduce pain and decrease eye motion can be utilized as necessary.
2. Typical initial settings on the Argon laser would be 200-500 µm spot size, a 0.1 second exposure (multispot laser 0.01-0.02s) and beginning from 250-270 mw power for slit lamp delivery. This may generally be lower with Laser indirect ophthalmoscopic application. Shorter duration can be less painful for the patient. The power is gradually increased until faintly visible blanching of the retina is obtained. The lesions are placed 1 burn width apart.
3. A total of 1600-3000 burns are placed in 1 or more sittings, carefully avoiding the macular area and any areas of tractional elevation of the retina (at least 1-disc diameter). The burns are placed 2-to-3-disc diameters away from the centre of the macula on the temporal aspect and 1-disc diameter away from the disc nasally, usually outside the arcades and extended peripherally up to the equator and beyond.
4. Treat the inferior retina first, placing the burns one burn width apart, and continue until the entire lower half is treated. This is because that area of the

retina would have already been treated if a vitreous haemorrhage occurs before the procedure is completed. Laser treatment should not be applied over major retinal vessels, preretinal haemorrhages, darkly pigmented chorioretinal scars, or within 1 DD (200-300 µm) of the centre of macula, to avoid risk of haemorrhage or large scotomas.

5. Other considerations:
 - PRP is typically performed in 2-3 sessions; wait 2-4 weeks before treating the superior retina. If the patient is comfortable or unlikely to return, treat the entire retina in one sitting.
 - Additional photocoagulation is needed if there is evidence of worsening of proliferative DR. Add laser burns in between scars of initial treatment and further peripherally.
 - Favour quadrants with active new vessels or areas with intraretinal microvascular abnormalities where scars are more widely spaced and areas of severe ischaemia not previously treated, such as the temporal part of the posterior pole.

The burn characteristics for panretinal photocoagulation

Spot size (on retina)	200 µm
Exposure	0.05 to 0.1 seconds recommended. 0.02 or 0.03 seconds can be considered for use in High Resource Settings (in certain laser machines, where applicable).
Intensity	mild white (i.e., 2+ to 3+ burns)
Distribution	Mild and moderate PDR: Edges 1 burn width apart Severe PDR: Edges 0.5 to 0.75 burn width apart
Number of sessions/sittings	1 to 3
Nasal proximity to disc	No closer than 500 µm
Temporal proximity to centre	No closer than 3000 µm
Superior/inferior limit	No further posterior than 1 burn within the temporal arcades
Extent	Arcades (~3000 µm from the macular centre) to at least the equator
Total number of burns	1200 – 1600. There may be instances where 1200 burns are not possible such as the development of vitreous haemorrhage or inability to complete a sitting precluding completion of the PRP session. Similarly, there may be clinical situations in which more than 1600 burns are needed such as initial difficulty with laser uptake due to media opacity.



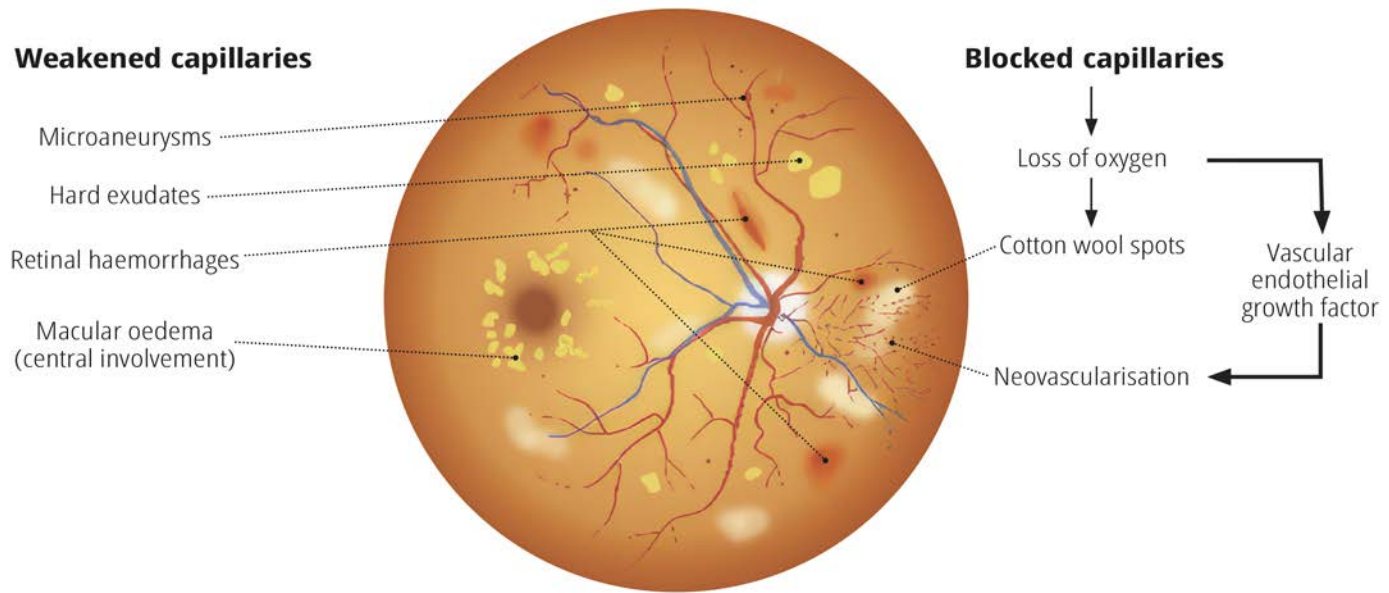
PRP in PDR⁴³

9.2.2. Intravitreal AntiVEGF

Currently available antiVEGF include:

- Intravitreal Bevacizumab 1.25mg/0.05ml
- Intravitreal Ranibizumab 0.5mg/0.05ml

- Intravitreal Aflibercept 2.0mg/0.05ml
- Newer antiVEGF medications include Brolicizumab (6mg/0.05ml) and Faricimab-svoa (6mg/0.05ml). There is increasing evidence that the use of anti-VEGF can produce regression in the signs of severe



NPDR and early stages of PDR.⁴⁴ Thus, they may be recommended for well-motivated patients in which the side-effects of PRP are a concern.

9.2.3. Vitrectomy Surgery

Generally, the need for a vitrectomy for advanced diabetic retinopathy is a sign that other treatment has failed either because it was inadequate or more likely that patients did not attend for screening and treatment in a timely fashion. Vitrectomy should be considered if the visual function after surgery is likely to be significantly better than not intervening. Despite the complexity and cost, diabetic vitrectomy has an important role in a diabetic retinopathy programme, as these patients usually have severe disease in both eyes, and this surgery can prevent or cure blindness.

9.2.3.1. Indications for Vitrectomy

1. Severe vitreous haemorrhage of 1–3 months duration or longer that does not clear spontaneously. Earlier intervention may be warranted in a one-eyed patient.
2. Advanced active proliferative DR that persists despite extensive PRP.
3. Surgery is reasonable in eyes with recurrent episodes of vitreous haemorrhage from PDR due to persistent vessels despite PRP or mechanical traction on NV.
4. Traction macular detachment of recent onset. Fovea-threatening or progressive macula-involving traction detachments benefit from surgical management.

5. Combined traction-rhegmatogenous retinal detachment.
6. Tractional macular oedema or epiretinal membrane involving the macula. This includes vitreomacular traction.

Vitreous haemorrhage: The timing and outcome of vitrectomy depends on the state of the underlying retina. In an eye with haemorrhage in the vitreous cavity but little other pathology apart from retinal neovascularization and no fibrovascular membranes, then vitrectomy and intra-operative laser is likely to improve the vision. This is a cost-effective treatment. If the retina has already had adequate pan-retinal laser and the retinopathy is regressing, then waiting six months for the blood to clear is reasonable. However, if the retina has not had previous laser, or the retinopathy is still active, urgent surgical intervention within two months is necessary. An ultrasound B-Scan can be useful to help monitor the retina while waiting for surgery. In patients with poor vision in their other eye, earlier surgery should be considered. Fibro-vascular membranes with retinal/macular traction: the surgery is complex, time-consuming, and expensive. Outcomes are not as good as for simple vitreous haemorrhages and complications such as retinal detachment are not uncommon. Close follow-up is required, which may require inpatient

10. Treatment of Diabetic Macular Oedema (DMO)



10.1 Clinical Assessment and Diagnostic Evaluation of DMO

1. Optimize medical treatment: Improve glycaemic control if HbA1c >7% as well as associated systemic hypertension or dyslipidaemia. This should be performed in collaboration with the physicians.
2. DMO without centre involvement (e.g., circinate [lipid] ring threatening the centre of the macula or when no vision loss has occurred despite centre involvement): May observe while optimizing systemic parameters for possible reversal. If there is progression to centre involvement, consider focal laser to leaking microaneurysms if thickening is threatening the fovea. No laser treatment is applied to lesions closer than 500 μm from the centre of the macula.
3. DMO with centre involvement (<400 μm) and associated good visual acuity (> 6/12): Careful follow-up while optimizing systemic parameters for possible reversal. Anti-VEGF treatment can be commenced if DMO worsens.
4. DMO with centre involvement of $\geq 400 \mu\text{m}$ and/or associated vision loss ($\leq 6/12$): Intravitreal anti-VEGF treatment (e.g., ranibizumab 0.5mg, aflibercept 2mg therapy or off-label use of bevacizumab 1.25mg). Consideration should be given to monthly injections (loading dose of minimum 3 injections) followed by “treat and extend” protocol based on visual stability and OCT findings. Typically, the number of injections is 7-10 in the first year, 2-4 during the second year, 1-2 during the third year, and 0-1 in the fourth and fifth years of treatment.
5. For eyes with persistent retinal thickening despite anti-VEGF therapy, consider laser treatment after 24 weeks. Treatment with intravitreal steroids (triamcinolone 2mg/0.05ml or 4mg/0.1ml, Dexamethasone implant or Fluocinolone acetonide implant) may also be considered in pseudophakic eyes. Intravitreal injections are given 3.5 to 4 mm behind the limbus under topical anesthesia using a sterile technique (10.2.6). Laser treatment is recommended in phakic eyes if intravitreal anti-VEGF agents are not accessible or if monthly follow up is not possible. Laser can be applied to areas of persistent retinal thickening in eyes unresponsive to anti-VEGF treatment.
6. In DMO associated with PDR, monotherapy with intravitreal anti-VEGF therapy should be instituted with re-evaluation for PRP versus continued anti-VEGF once the DMO resolves. If intravitreal anti-VEGF agents are not accessible or monthly follow up not possible, focal/modified grid laser and PRP is recommended.

7. Vitreomacular traction or epiretinal membrane on OCT: pars plana vitrectomy may be indicated depending on visual status.

10.2. Treatment Options

- Laser photocoagulation
- Intravitreal anti VEGF

10.2.1. Pre-treatment counselling for laser photocoagulation for DMO

1. Consider risk factors: is blood glucose and blood pressure control optimum?
2. Document the corrected visual acuity.
3. Obtain informed consent based on institution policy, detailing the potential benefits and risks as:
 - Benefits: prevent further visual loss (note that the vision rarely improves)
 - Risks:
 - failure of treatment,
 - re-treatment required,
 - loss of vision due to foveal burn,
 - paracentral scotomas which usually fade but may persist
4. Dilate the eye to be treated.
5. Explain to the patient the importance of not looking at the laser beam during treatment.

10.2.2. Technique for Laser Photocoagulation for DMO

1. Modified ETDRS guidelines recommends focal laser treatment of leaking microaneurysms and

- grid treatment of areas of diffuse leakage within 2DD of center of the macula.
2. Use topical anesthesia and a macular contact lens.
3. Set the spot size at 50-100 μm . A small area of thickening close to the fovea (not closer than 500 μm) can be treated with 50 μm spot size.
4. Start at a low power (e.g., 70 mW) and a short duration (e.g., 0.05 seconds). Increase the duration to 0.1s before increasing the power until there is faintly visible blanching of the retina. Remember that the burn will get more intense in less oedematous areas and closer to the fovea. Care should be taken to avoid the foveal avascular zone.
5. If DMO is associated with large areas of macular ischemia, only the areas of retinal thickening are treated.
6. Directly treat microaneurysms in areas of retinal thickening. A mild grey burn should be evident beneath the microaneurysm.
7. Place burns two burn widths apart in areas of thickening not associated with microaneurysms. Only treat areas of retinal thickening between 500 and 3000 microns from the fovea at the first session (see diagram on p15). Consider treating to within 300 μm of the fovea if initial session does not resolve oedema.
8. Where available, subthreshold micropulse mode laser can be used for the treatment of DMO.

Modified-ETDRS and Macular Grid Laser Photocoagulation Techniques

Focal laser treatment	
Directly treat all leaking microaneurysms in areas of retinal thickening between 500 and 3000 μm from the center of the macula (but not within 500 μm of disc). Change in microaneurysms color with direct treatment is not required, but at least a mild gray-white burn should be evident beneath all microaneurysms.	
Burn spot size	50 μm
Burn duration	0.05 to 0.1 sec
Wavelength	Green to yellow wavelengths
Modified Grid laser treatment	
Applied to all areas with diffuse leakage and retinal thickening. Treat the area 500 to 3000 μm superiorly, nasally and inferiorly from the center of the macula, and 500 to 3500 μm temporally from macular center. No burns are placed within 500 μm of disc. Aim barely visible (light gray) laser burn and each burn should be at least two visible burn widths apart.	
Burn spot size	50 μm
Burn duration	0.05 to 0.1 sec
Wavelength	Green to yellow wavelengths

10.2.3. Intra-vitreous anti-VEGF Therapy for Diabetic Macular Oedema (DMO)

10.2.3.1. Treatment Protocol

The indication for treatment is reduced visual acuity with central macular oedema in a patient with diabetes. Intravitreal injections should be performed in sterile conditions which should preferably be in the operating theatre.

1. A proposed treatment protocol for anti-VEGF treatment is as follows:
2. • Monthly injections for 3-5 months, followed by a “treat and extend” regimen until the macula is dry or until there is no further improvement.
3. • 4-8 weekly follow-up of patients undergoing anti-VEGF treatment visual acuity
4. assessment with examination of the macula, and if available, OCT scan to decide if re-treatment is required.
5. • In year two, if the patient is stable without treatment for several monthly assessments the frequency of follow-up appointments may be reduced
6. gradually to 3-4 times / year.
7. A switch from one to another anti-VEGF may be considered when there is non-response after 3-monthly injections.



10.2.3.2. Medications

Anti-VEGF

1. Intravitreal Ranibizumab (0.5mg/0.05ml)
2. Intravitreal Aflibercept (2.0mg/0.05ml)
3. Off-label use of Intravitreal Bevacizumab (1.25mg/0.05ml)

Others

1. Intravitreal Triamcinolone (2-4mg/0.05-0.1ml) and Dexamethasone/Fluocinolone acetonide implants

10.2.3.3. Pretreatment counselling for Intravitreal anti-VEGF

Discuss the indications, risks, benefits and alternatives with patients.

Obtain informed consent.

The RISKS of intra-vitreous injections include:

1. Pain
2. Bleeding (sub-conjunctival, vitreous hemorrhage)
3. Retinal tear / detachment
4. Cataract (from inadvertently hitting the lens)
5. Infection (endophthalmitis)
6. Loss of vision (from any of above)
7. Need for multiple injections in the future (patients need to understand this)

10.2.3.4. Anti VEGF technique for DMO

Performing an intra-vitreous injection involves the following steps:

1. Explain the diagnosis and treatment plan to the patient and obtain informed patient consent.
2. Place the patient in the supine position if possible.
3. Confirm the eye to be injected.
4. Apply topical anesthetic and wait at least 10 seconds.
5. Apply 5% povidone iodine to the conjunctival surface, eyelids, and lashes and leave for 60 seconds.
6. Apply 10% povidone iodine to the eyelids and lashes and leave for 60 seconds.
7. Apply drape, sterile lid speculum.
8. Have the patient look 180 degrees away from the injection site. For example, if injecting the right eye in the infero-

temporal quadrant, ask the patient to look up and to the left.

9. Check the correct dose of medication is being given and make sure the needle tip (which is usually a short 27-30G) is always kept sterile.
10. Insert the needle at the marked site in a smooth and single motion, aiming for the mid-vitreous cavity. The injection is placed 3.5-4.0mm posterior to the limbus. Injection in the infero-temporal quadrant is common, although any quadrant maybe used.
11. After the sclera is penetrated, the needle is advanced toward the centre of the globe and the medication is gently injected into the mid-vitreous cavity.
12. The needle is removed, and a sterile cotton swab is immediately placed over the injection site to prevent reflux.

10.2.3.5. Immediate post-injection care

1. Check and ensure there is good optic nerve perfusion i.e., the patient can see your hand moving. Central retinal artery occlusion is indicated by the absence of light perception. In this case, paracentesis is indicated in an attempt to restore central retinal artery perfusion immediately.

2. Reassure patients that they may see floaters which can be an air bubble, or medication.
3. Transient, mild elevations of IOP are common, although IOP usually drops below 30mmHg 15 to 20 minutes after injection.
4. Endophthalmitis is the most feared complication of intra-vitreous injection. All
5. patients should be provided with information regarding the signs and symptoms of complications, such as eye pain or discomfort, redness, photophobia and diminished vision. Patients should be instructed to return immediately if these signs or symptoms develop.

10.2.3.6. Follow-up.

At follow-up, determine the need for further therapy by measuring visual function and review the results of ocular imaging studies. Also check the status of the fellow eye.

11. Management of Diabetic Retinopathy in Special Circumstances



11.1 Pregnancy

Progression of DR is a significant risk in pregnancy. There should be collaboration between the ophthalmologist, endocrinologist (physician) and obstetrician. The following are recommendations:

1. Patients with pre-existing diabetes planning pregnancy should be informed on the need for DR screening before and during pregnancy. Eye examination should include a dilated fundal examination and baseline fundal photography. Pregnant women with pre-existing diabetes should be referred for DR screening following their first antenatal clinic appointment and thereafter every trimester, if the first assessment is normal. If any DR is present, the pregnant woman should be referred to the retina service based on the referral criteria already stated in section 8.3.
2. Good control of glycaemic and other systemic parameters should be emphasized. DR should not be considered a contraindication to rapid

optimization of glycaemic control in women who present with a high HbA1c in early pregnancy.

3. DR should not be considered a contraindication to vaginal birth.
4. Laser treatment is recommended when a pregnant woman has PDR or DMO.

11.2 Cataract

The prevalence of cataract and frequency of cataract surgery is higher in PLWDM. Cataract also occurs at an earlier age in PLWDM compared to the general population. The control of DM with restoration of normal blood glucose level has been observed in some cases to slow or stop the progression of lens opacities in diabetic cataracts (snowflake/snow-storm cataract). Cataract may coexist with DR/DMO while obscuring adequate visualization of retinopathy in PLWDM. Cataract surgery may aggravate existing DR/DMO. Recommendations for management include:

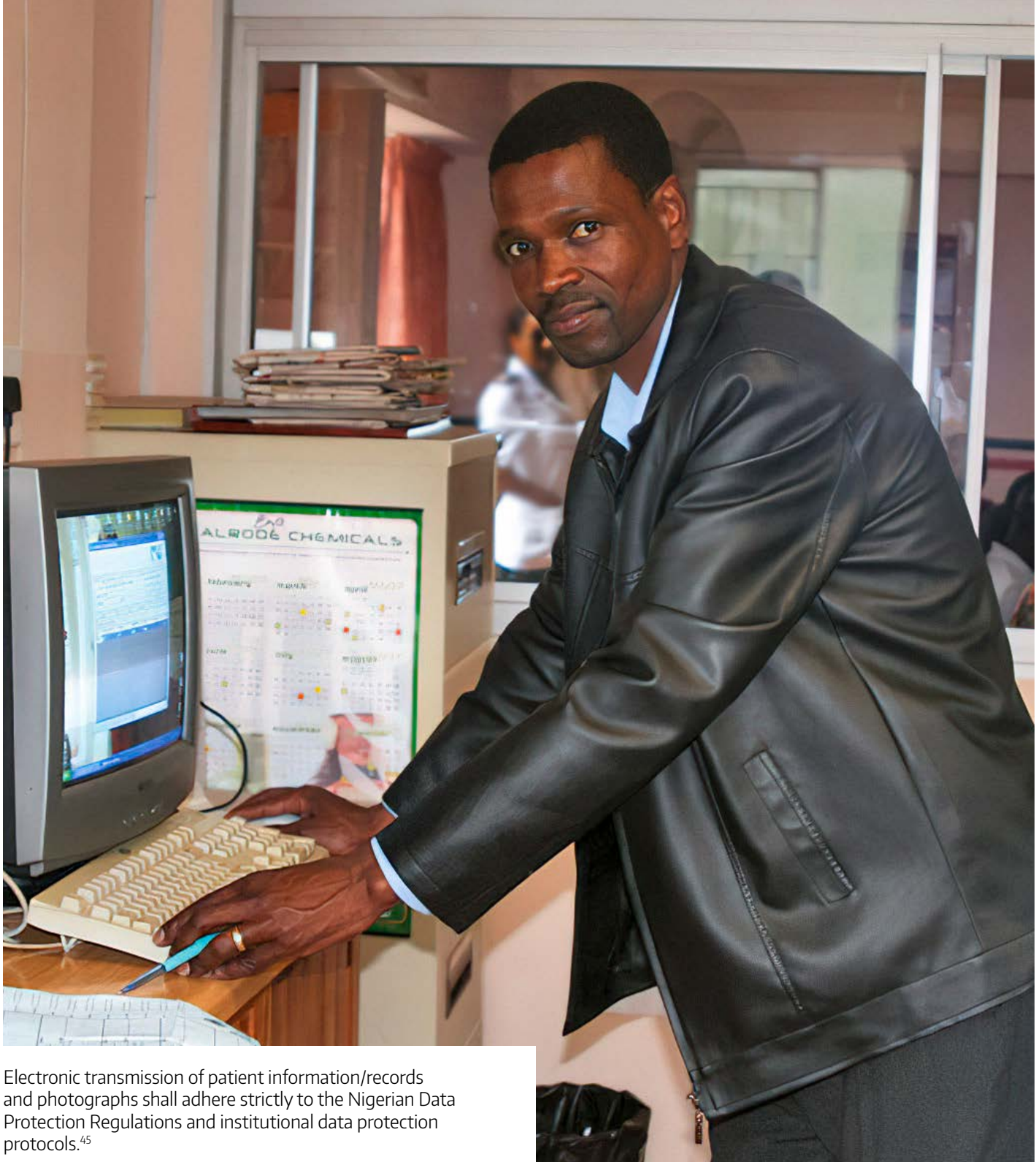
- i. Mild cataract - carefully assess DR/DMO status.

Patients without vision loss with good view of the fundus may not require cataract surgery.

- ii. Moderate cataract - carefully assess DR/DMO status. Attempt to treat any severe NPDR with PRP, and/or DMO with focal/modified grid laser or anti-VEGF therapy, before cataract surgery. Once DR/DMO is stable, consider cataract surgery to improve vision.
- iii. Severe to advanced cataract with poor view of the fundus - if DR status cannot be adequately assessed, consider early cataract surgery followed by assessment and treatment as necessary. If DMO is present, consider anti-VEGF before surgery, at the time of surgery, or after surgery if DMO is discovered when the media is cleared. Treat any severe NPDR or PDR with PRP as soon as possible when media is cleared. Patient should be counselled and made to understand that he or she may need further treatment with laser or intravitreal anti VEGF injections after cataract surgery.

Cataract extraction in people living with diabetes is associated with higher risks of reported complications such as capsular contraction and opacification. Intraoperative care should be taken to avoid surgical complications like vitreous loss which is associated with increased risk of development of rubeosis iridis, PDR and RD. There is also a higher risk of endophthalmitis. It is recommended that steps be taken to optimize blood sugar levels in preparing for

12. Data protection policy



Electronic transmission of patient information/records and photographs shall adhere strictly to the Nigerian Data Protection Regulations and institutional data protection protocols.⁴⁵





PART 3

IMPLEMENTATION GUIDELINES

13. Implementation of DR screening



13.1 Human Resource Requirements/Training needs

13.1.1. DR Screening and Grading

Minimum requirement per designated screening centre

- PHC screening at 1 centre per LGA, with 3 persons trained to screen, and access to teleophthalmology or validated AI grading technology*.
- Screening in secondary and tertiary centres: 3 screeners/graders in a screening centre and trained according to the standard curriculum. These teams may also deploy screening services to primary care centres on a schedule depending on the local situation.
- **Grading Portals and Hubs:** The government at national and subnational levels shall approve appropriate framework and implement the operation of grading centres or hubs.

*DR screening should be delivered by humans. Grading will be also performed by humans. Artificial intelligence may be considered to assist screeners where available and validated to use in Nigerian populations.

Training and Certification for Screening/Grading:

Training on screening and grading shall be by formal training courses and workshops organised by accredited national and international institutions. A national curriculum will be developed for training and standard operating procedures (SOPs) appropriate to different cadres of personnel screening in the different levels of health care.

13.1.2. Equipment Maintenance

Minimum requirement per LGA: 1 equipment maintenance technician.

Training on equipment maintenance and repairs shall be by formal training courses and workshops organised by accredited national and international institutions.

13.1.3. DR Treatment

Ophthalmologists will deliver laser and anti-VEGF treatment.

Minimum requirement: at least 1 ophthalmologist in every tertiary and secondary eye unit trained to deliver DR treatment.

The government at national and subnational levels shall staff, train and equip laser and intravitreal treatment hubs at secondary and tertiary health facilities within their territory to ensure timely treatment.

Re-training and update on laser and intravitreal treatment of DR shall be by formal training courses/ workshops organised by accredited national and international institutions.

13.2. Clinical Governance

- The ophthalmologist and the physician/ endocrinologist will provide clinical governance as the team leads for the population-based screening and treatment services.
- At the Federal level (FMOH): The National Coordinator, National Eye Health Programme.
- At State Level: The programme officer and Chair of the State Eye health Committee Medical or the HOD Ophthalmology. In the absence of a HOD in the tertiary hospital, the most senior Ophthalmologist in the State.
- At LGA level: The Medical officer of Health or the Executive Secretary of Health.

14. Monitoring, Evaluation and Learning

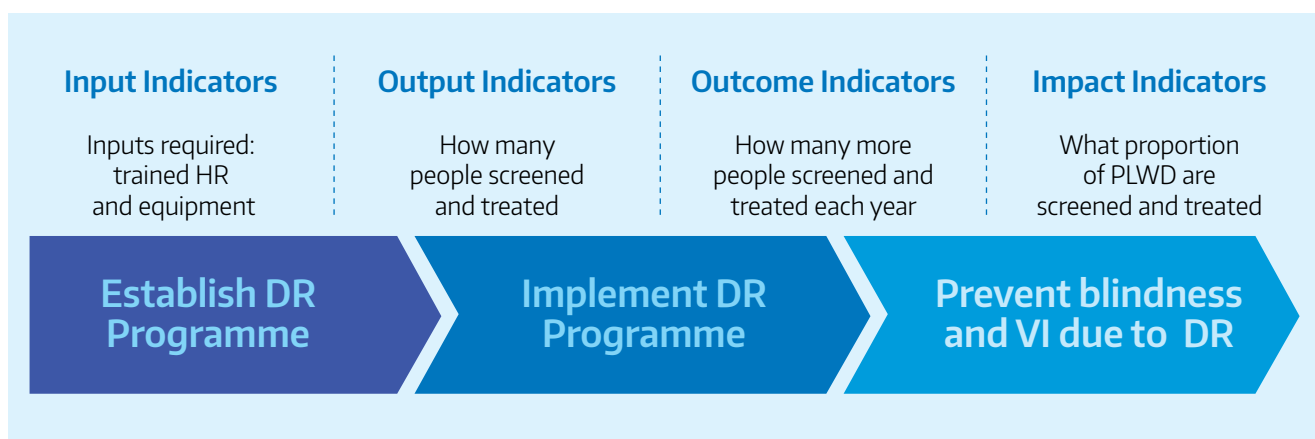


Diabetic Retinopathy is a growing cause of avoidable vision loss and blindness in Nigeria.

The Monitoring and Evaluation framework provides a systematic approach for government at national and subnational levels to track and audit the process of implementation of DR screening and treatment services. Planned DR programme evaluation activities shall be conducted on a quarterly and annual basis.

The monitoring process will track indicators based on routinely collected data, via the National Health Logistics Management

Information Systems (NHLMIS) at various levels of the health care system and other institutional data systems. The National Eye Health Program (NEHP) will work closely with the Non-Communicable Disease (NCDs) division, National Primary Health Care Development Agency (NPHCDA) and other relevant Ministries, Departments and Agencies (MDAs) to ensure that these indicators are included in the NHLMIS and will coordinate the collection of data. The inclusion of information metrics on DR to NHLMIS for DM will allow such information to be transmitted through the already established route for DM.





14.1. Input Indicators (quarterly/annually)

For each State/LGA

1. Number of trained screeners/graders delivering DR screening
2. Number of facilities with the equipment needed for screening and grading
3. Number of re-trained ophthalmologists delivering DR treatment
4. Number of re-ophthalmologists delivering anti-VEGF treatment
5. Number of facilities with lasers for DR treatment
6. Number of facilities with access to Anti-VEGF

14.2. Process Indicators (monthly)

For each state/LGA

Patient related indicators shall be reported with sex disaggregation (male/female)

1. Number of PLWDM screened per month.
2. Number of PLWDM VTDR identified and referred to eye services per month.
3. Number of patients with VTDR treated with laser per month.
4. Number of patients with VTDR treated with anti-VEGF per month.

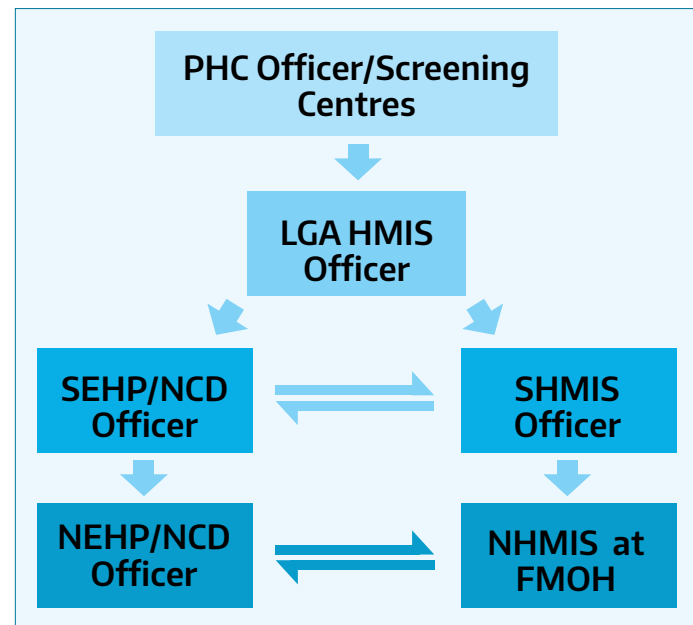
14.3. Outcome Indicators (annual)

1. Percentage of PLWDM screened for DR in a year compared to the baseline year.
2. Percentage of PLWDM treated for DR in a year compared to the baseline year.

14.4. Impact indicator

1. Percentage PLWDM that are screened for DR (screening coverage).
2. Percentage of PLWDM who are treated for DR. (treatment coverage).
3. Percentage of PLWDM with VTDR who are treated for DR (treatment coverage).

Data should flow down as shown in the chart.



KEY

- PHC: Primary Health Care
- LGA: Local Government Area
- HMIS: Health Information Management System
- SEHP: State Eye Health Program
- NEHP: National Eye Health Program
- NCD: Non-Communicable Diseases

15. DR Screening and Referral Pathway (Abridged)



REFERRAL OF DM PATIENTS TO SCREENING/GRADING CENTRE

Referred by general practitioner, physician/endocrinologist, obstetrician, optometrist, community pharmacists, laboratory scientist or self-referral.



SCREENING/GRADING CENTRE

Screening
Grading
Communication of screening outcome
Call/recall system for appointment schedule
Referral to treatment hub where applicable



Treatment hub (SECONDARY OR TERTIARY HEALTH CARE FACILITY)

Multi-disciplinary collaboration
Optimization of DM, BP and lipid control
Laser photocoagulation
Intravitreal Anti-VEGF agents
Vitrectomy

16. Integrating Eyecare Service into Diabetes Care^{46,47}



DM being a multisystemic condition, there is need for early identification of complications and prompt and adequate intervention in a one-stop service corridor that would bring together the multidisciplinary team needed in the management of DM and its complications including DR to reduce treatment burden and multiple clinic appointments thus improving the quality of life of PLWDM. This can be achieved by:

- Integrating DR care into any program for DM and NCDs at the national and subnational levels
- Setting up a DR screening service in the diabetes clinics, so that it is easily accessed by PLWDM
- Building links with local diabetes teams to develop reliable referral pathways for patients from the diabetes clinic to the eye clinic and vice versa
- Ensure DR treatment and clinical care options are available, accessible, acceptable and of good quality and that patients are linked back to their primary diabetes care providers for seamless ongoing diabetes and eye care management
- Building capacity of the diabetes team including eye care workers, through regular training programs
- Prioritising DR as a diabetes issue rather than just an eye issue
- Empowering PLWDM to demand for DR screening from their health care providers
- Encouraging all primary health care workers to recommend all PLWDM to have an annual retinal check
- Provide service delivery that is flexible and responsive

17. Financing and Sustainability



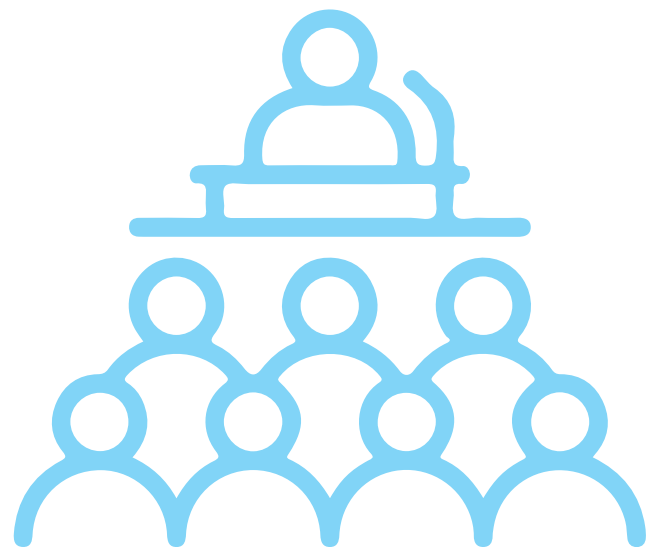
- Creation of a budget line and adequate budgetary provision at the national and sub-national levels.
- Support from National Primary Health Care Development Agency
- Support from Development Partners
- Support from Non-Governmental Development Organizations (NGDO)

Governments at all tiers should establish sustainability mechanisms. There should be a cost recovery process from payments for registration, subsidized screening investigations and treatment. DR screening and treatment should be covered by health insurance. Patients shall be encouraged to register with health insurance authority/agencies.

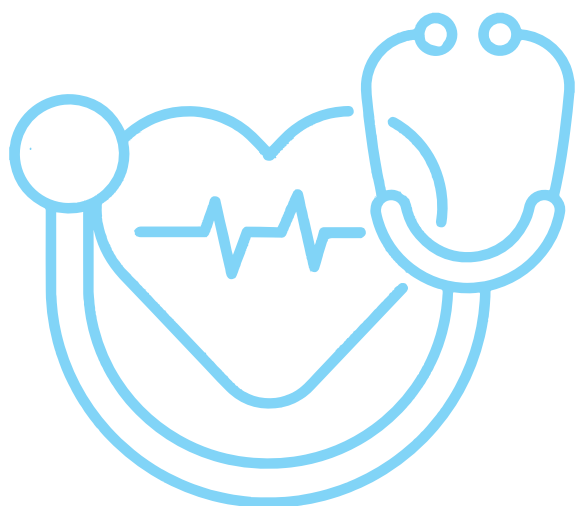
18. Advocacy and Planning

Advocacy to ophthalmologists, physicians, endocrinologists, optometrists, ophthalmic nurses and other health professionals, the community (patients and their families) on the public health importance of DR and its role in causing irreversible low vision and blindness, which could have been avoided with early detection and appropriate intervention.

Government, Development partners and NGDOs, to be involved in planning, implementation, and adequate funding of DR programs for sustainability. Increasing involvement in advocacy for patients with diabetes and diabetic retinopathy should be encouraged.



19. Health Promotion Priorities



Government

- Close collaboration with NCDs.
- Advocacy.
- Funding/budget for awareness/advocacy kit/key messages of DR.
- Initiate and scale up awareness campaigns.
- Integrate DR care into all programs for DM and NCDs.
- Get rebates/subsidies from pharmaceutical companies to reduce cost of drugs.
- Sensitization/engage alternative healers/medicine providers.
- Engaging related sectors and stakeholders such as the Diabetes Association, NCD

- Alliance, Ministry of Education etc as partners in raising awareness about the
- importance of eye health.

Patient

- Patient education about DR screening, other complications, adherence to treatment and follow-up to include education and counselling on the importance of the management and control of key risk factors for diabetic retinopathy, including hyperglycaemia, hypertension, and hypercholesterolaemia, and appropriate referral, where indicated.
- Patient support groups

Family

- Encourage family members to go for screening, follow-up, lifestyle modification etc. The entire family might need to change their diet for example.

Community

- Community mobilization involving the community leaders, religious leaders, women
- leaders, traditional rulers/healers, youth leaders, Community Health Influencers,
- Promoters and Services (CHIPS), Ward and Village Development Committees (WDC) etc
- Other health care providers
- Inclusion of other health care providers in education and counselling services, use of social media, mobile health technology, provision of information on screening and treatment activities/centres
- Distribution of fliers/information leaflets to patients



20. Research Priorities

This will include clinical, health systems, epidemiological and implementation research. The focus of clinical research would be to provide contextual evidence on the management of DR/DMO and the clinical outcomes. The health systems research would be required to understand better the best way to integrate management of DR/DMO across the country. Epidemiological research could help with understanding the profile of people with DM in Nigeria and their eye comorbidities. Implementation research including testing different screening models under a public health approach, validating, and testing the implementation of new technologies including artificial intelligence and exploring patient focused experiences using methods appropriate to the different settings in Nigeria.



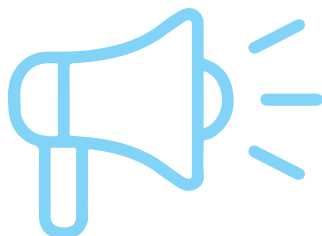
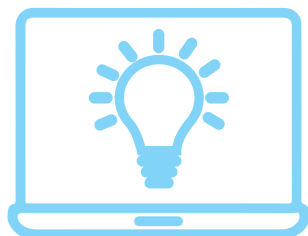
21. Implications for Essential Drug list⁴⁸



Government at national and sub-national levels shall procure or collaborate with drug manufacturers to produce or procure anti VEGF agents for eye treatment and anti-diabetic medications (oral and injectables) at affordable rates to patients.

Furthermore, topical mydriatics and anaesthetics should be made readily available. Bulk purchases can be done for drugs (anti-VEGF agents) to be listed on the essential medicine list as well as the NHIA list to ensure quality, reduced cost and improved access to the medicines.

22. Guideline Dissemination



The launch and dissemination of the guidelines shall be conducted at the national and subnational levels. This can be facilitated by the National Eye Health Committee and State eye health committees in collaboration with DR stake holders.

23. Review of Guidelines

It is recommended that the clinical guidelines be reviewed in 5 years or as new evidence emerges and the implementation guidelines (chapter 13 onwards) may be updated more frequently as a national programme implementation is put in place.



24. Costing



The key parameters that guided the development of the costing for DR implementation are the three major areas of namely i. dissemination of the guidelines, ii. Pilot of screening and treatment which involves a. sensitization of healthcare providers in pilot centres and b. training of screener/graders. The type and number of activities, were extracted to determine the type and number of goods, and services to be procured and thus the unit cost of the activities, goods, and services.

24.1 Determining the unit cost of goods and services

Some cross-cutting cost elements were identified and listed out with their corresponding current rates. They were subsequently used in the determining the cost of the broad activities that have financial implications.

24.2 List of Cross-cutting Cost Elements for Diabetic Retinopathy

Cost Elements	Rate
Airfare + taxi	₦ 150,000.00
DSA	₦ 36,000.00
Intercity Road travels	₦ 20,000.00
Honorarium/day	₦ 20,000.00
Tea-break	₦ 3,000.00
Lunch	₦ 5,500.00
Hall rent (Big space)	₦ 400,000.00
Hall rent (small space)	₦ 150,000.00
Hall rent (very large space)	₦ 500,000.00
Stationary for participants	₦ 1,500.00
Logistics/courier cost	₦ 40,000.00
Refreshment	₦ 5,000.00
Local intracity fare	₦ 10,000.00
Consultancy fee	₦ 100,000.00
Printing of Large banner	₦ 100,000.00

24.3 Summary Table for Diabetic Retinopathy Implementation Costing

ITEM	Quantity	Unit cost	Subtotal
Training of Graders	2 meetings	2,775,000.00	27,800,000.00
Sensitization for HCPs	8 pilot centres	2,500,000.00	22,200,000.00
Development of training manuals	2 meetings	5,000.00	5,000,000.00
Training kits	300	4,000.00	1,500,000.00
Printing of training manuals	1000	1,500,000.00	4,000,000.00
Supportive supervision	8 pilot centres	6,000.00	12,000,000.00
Printing of DR guidelines	1500 copies	10,000.00	9,000,000.00
Dissemination of DR guideline	10(8 centres & 2 for training)	18,750,000.00	370,000.00
Screening equipment (Fundus Camera)	2	40,000,000.00	187,500,000.00
Operational vehicles	14(8 centres & 6 secretariat)	1,000,000.00	80,000,000.00
Project laptops	1		14,000,000.00
Project management software	8	5,000,000.00	8,000,000.00
Post project evaluation			40,000,000.00
Total	10%		411,370,000.00
Operational cost (for data, stipend for support staff & other miscellaneous)	5%		41,137,000.00
Contingency			2,056,850.00
Grand total			454,563,850.00

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26. Appendices

26.1. APPENDIX 1: PROFORMA FOR DR SCREENING/REFERRAL

Patient's name:.....

Screening centre:.....

Registration number:.....

Sex:.....

Date of birth (dd/mm/yyyy):.....

Date of screening:.....

Duration of diabetes mellitus:.....

Have you ever had an examination of the back of the eye (either a photograph was taken or drops were instilled into the eye before examination)?

a. YES b. NO

If Yes, how long ago was the last examination of the back of the eye (specify in months)?

Where was the eye examination done?(facility)

Ocular complaints:.....

Visual acuity (unaided):.....RE.....LE.....

Visual acuity (with glasses):.....RE.....LE.....

Pinhole visual acuity (if <6/12):.....

Photograph taken Yes (date taken dd/mm/yyyy) No

Grade of DR:RELE

Recommendation: Have an eye check: in the next.....week/months at _____ health facility

Date of communication of outcome of DR screening to patient dd/mm/yyyy:.....

Name and signature of screener/grader:.....

.....

Patient's copy

Patient's name:.....

Screening centre:.....

Registration number:.....

Grade of DR:RELE

Recommendation: Have an eye check in the next.....week/months at _____ health facility

26.2. APPENDIX 2: HEALTH INFORMATION FOR PLWDM

1. Blood sugar levels are elevated in DM
2. Damage to small vessels at the back of the eye occurs due to elevated blood sugar. This is called diabetic retinopathy.
3. Damage to the eyes is gradual, painless, may be asymptomatic and can eventually result in irreversible loss of vision and blindness without early intervention.
4. Get your eyes screened annually to detect damage to the eyes before symptoms occur. During the examination, the DR screener/grader will check your vision, and instil an eye drop to allow the back of the eye to be properly photographed and/or examined.
5. For the treatment of diabetic retinopathy, the ophthalmologist in collaboration with the physician would advise on good sugar, blood pressure, and lipid control as well as cessation of smoking and alcohol ingestion.
6. For the treatment of diabetic retinopathy, the ophthalmologist may perform laser, administer injections in the eye or perform eye surgery.
7. For patients with type I diabetes, annual DR screening should commence from the age of 12 years.
8. A pregnant woman with diabetes should undergo DR screening at least once every trimester, and soon after delivery, or as frequently as recommended by the ophthalmologist.
9. Where the eyes are found to be normal during DR screening, continuation of annual screening is recommended. If DR is observed in your eyes, appropriate action would be taken which may include referral to an ophthalmologist.
10. Smoking and alcohol ingestion should be avoided as these could negatively affect DR

26.3. APPENDIX 3: HEALTH INFORMATION FOR HEALTH WORKERS

1. About 1 in 3 patients with diabetes has diabetic retinopathy.
2. All recently diagnosed patients with type II diabetes should be referred for DR screening with or without symptoms.
3. Ensure ALL PLWDM have an annual DR screening examination.
4. REFER any patient with diabetes who has any eye complaints to an ophthalmologist URGENTLY.
5. Good blood sugar control prevents or delays diabetic retinopathy. Glycated haemoglobin (HbA1c) is a good indicator of long-term sugar control and should be done at least quarterly for all PLWDM.
6. Hypertension, hyperlipidaemia, kidney disease and other co-morbidities need to be monitored as these could have a negative impact on diabetes and diabetic retinopathy.
7. Pregnant women with diabetes should have DR screening once in each trimester and post-delivery, or more frequently if recommended by the ophthalmologist.

26.4. APPENDIX 4: QUALITY CONTROLS FOR PHOTO GRADING IN DR SCREENING

1. To ensure quality of fundus photography, the following are necessary:
 - Images are taken and reviewed by appropriately trained screener/grader
 - Screener/graders should have sufficient exposure and regular re-training
 - Dark room
 - Pupil dilated (if possible)
2. To do this:
 - A random sample of the retinal images (20%) should have secondary grading for quality assurance and failsafe purposes.
 - If there are any disagreements between grades by different graders, then images are reviewed by the tertiary level grader or team lead, which include ophthalmologists with specialised training.

27. List of Contributors

SN	NAME	ORGANISATION
1	Dr. Morenike Alex Okoh	Director/Head of Department Public Health, Federal Ministry of Health
2	Dr Chukwuma Anyaike	Director/Head of Department Public Health, Federal Ministry of Health
3	Dr. Oteri Okolo Eme	National Coordinator, National Eye Health Programme Federal Ministry of Health
4	Prof. Afekhide Ernest	Chairman National Eye Health Committee/University of Benin Teaching Hospital Benin, Edo State
5	Prof. Odarosa Uhmwangho	Lead Consultant, University of Benin Teaching Hospital Benin, Edo State.
6	Dr. Oronsaye Darlingtess	Lilly Hospital
7	Prof. Dennis George Nkanga	Lead Consultant, University of Calabar Teaching Hospital Calabar
8	Dr. Abaulkadri Lawal Rafindadi	Ahmadu Bello University Teaching Hospital Zaria
9	Dr. Ofem Enang	University of Calabar Teaching Hospital Calabar
10	Dr. Alkali Mohammed	Abubakar Tafawa Balewa University Teaching Hospital Bauchi
11	Prof. Sebastian Ndulue Nwosu	Nnamdi Azikiwe University Teaching Hospital Nnewi.
12	Dr. Gloria Patrick-Ferife	Nigerian Institute of Medical Research, Delta State.
13	Mr. Ibrahim Wambai Usman	National Chairman, Nigerian Ophthalmic Nurses Association
14	Dr. Obinna Awiaka	President Nigerian Optometric Association
15	Dr. Olufemi Oderinilo	Eye Foundation Hospital Lagos
16	Prof. (Mrs) Folasade Akinsola	Guinness Eye Center /Lagos University Teaching Hospital Lagos
17	Dr. Chimezie Obi-Mgbam	National Eye Health Programme, Federal Ministry of Health
18	Dr. Flora Etim	National Eye Health Programme, Federal Ministry of Health
19	Ms. Victoria Victor-Ashio	National Eye Health Programme, Federal Ministry of Health
20	Dr. Alayo Sopekan Y.	National Desk Officer, Diabetic Mellitus, Federal Ministry of Health
21	Dr. Ayokomino Ajijala	Novartis Nigeria Ltd.
22	Dr. Tolulope Puddicombe	Novartis Nigeria Ltd.
23	Pharm. Ogonna Oraegbuna	Novartis Nigeria Ltd.
24	Dr. Amen Jane Aburime	University of Benin Teaching Hospital Benin, Edo State.
25	Dr. Moriam Chibuzor	Cochrane Nigeria
26	Marcia Zondervan	International Centre for Eye Health, London School of Hygiene and Tropical Medicine/Diabetic Retinopathy -Network
27	Dr. Beatrice Bello-Ovosi	Endocrinologist, Barau Dikko Teaching Hospital Kaduna
28	Prof. Hannah Faal	International Centre for Eye Health, London School of Hygiene and Tropical Medicine/Diabetic Retinopathy -Network
29	Prof Aihanuwa Eregie	Endocrinologist, University of Benin Teaching Hospital Benin, Edo State
30	Dr Cova Bascaran	International Centre for Eye Health, London School of Hygiene and Tropical Medicine/Diabetic Retinopathy -Network
31	Dr Alkali Mohammed	Abubakar Tafawa Balewa University Teaching Hospital Bauchi

SN	NAME	ORGANISATION
32	Dr Samuel C. Obasi	National Primary Health Care Development Agency
33	Dr Modupe A. Ijaduola	University College Hospital Ibadan
34	Dr Adetunji Adenekan	Lagos University Teaching Hospital Lagos
35	Adedoyin Haastrup	National Eye Health Programme Federal Ministry of Health
36	Akinyemiju Tosin	Eye Foundation Hospital Lagos
37	Awodiya Blessing	Eye Foundation Hospital Lagos
38	Dr Olutomi Sodipo	World Health Organisation
39	Dr O. Okonkwo	Eye Foundation Hospital Lagos
40	Dr Funmi Bankole	Lagos State Ministry of Health
41	Dr Elizabeth Oaoge	National Health Insurance Authority
42	Dr Mahmoud Alhasan	Chief Medical Director, National Eye Centre Kaduna
43	Dr Uko Ekaette	Kubwa General Hospital /Federal Capital Development Authority
44	Mr Bimbo Olusanya	Eye Foundation Hospital Lagos
45	Dr Ogechi Nwokedi	Nigerian Optometric Association
46	Arese Igwebuke	Roche Products Limited
47	Dr Olufunmilayo Shokunbi	Lagos State Ministry of Health
48	Dr Chikelu Linda	Novartis Nigeria Ltd
49	Dr Abiola Oyeleye	President, Ophthalmological Society of Nigeria
50	Dr Samuel Oyeyinka	Novartis Nigeria Ltd
51	Prof Bassey Fiebai	Vitreo-Retinal Society of Nigeria
52	Prof Sebastian N. Nwosu	Nnamdi Azikiwe University Teaching Hospital Onitsha
53	Mr Adebajo	Nnamdi Azikiwe University Awka
54	Ekundayo Anthony	Summit Health Care Phapha
55	Dr. Fatima Kyari	International Agency for Prevention of Blindness
56	Dr. Aburime Jane	University of Benin Teaching Hospital Benin, Edo State
57	Mr Bassey Okon Ekpe	University of Calabar Teaching Hospital Calabar
58	Mr John Ale	University of Calabar Teaching Hospital
59	Dr Ferife Gloria	Nigerian Institute of Medical Research Outstation, Asaba
60	Prof. Akinsola Folasade	Lagos University Teaching Hospital – Diabetic Retinopathy Network Lagos
61	Dr. Oluwarotimi Bolaji Olopade	Consultant Endocrinologist Lagos University Teaching Hospital
62	Prof. Olivia Chinyere Afam-Anene	President Dietitians Association of Nigeria
63	Dr Debbie Bako	National Coordinator, Noncommunicable Diseases Division, FMOH
64	Dr Nick Astbury	International Centre for Eye Health, London School of Hygiene and Tropical Medicine/Diabetic Retinopathy -Network







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