

# **KNOWLEDGE, ATTITUDES AND PRACTICES OF DIABETIC RETINOPATHY AMONG MEDICAL OFFICERS IN THE REGIONAL HOSPITALS OF GHANA**

A thesis submitted in partial fulfillment for the Degree of Masters in  
Medicine (Ophthalmology), Faculty of Medicine, Department of  
Ophthalmology, University of Nairobi

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This dissertation is my original work and has not been presented for a degree in any other university.

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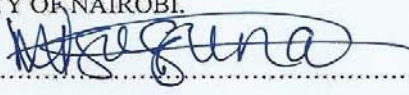
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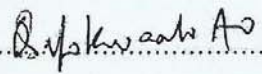
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## **DEDICATION**

This work is dedicated to all who have lost their vision as a result of diabetic retinopathy.

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## **LIST OF ABBREVIATIONS**

AAO	American Academy of Ophthalmologists
ADA	American Diabetic Association
A1C	Glycated haemoglobin
CSME	Clinically Significant Macula Edema
DCCT	Diabetes Control and Complications Trial
DM	Diabetes Mellitus
DR	Diabetic Retinopathy
DRS	Diabetic Retinopathy Study
DRVS	Diabetic Retinopathy Vitrectomy Study
ETDRS	Early Treatment Diabetic Retinopathy Study
EASD	European Association for the Study of Diabetes
FLA	Fluorescein Angiography
HO	House Officer
IDF	International Diabetes Federation
IVTA	Intravitreal Triamcinolone Acetate
KAP	Knowledge Attitudes and Practices
MO	Medical Officer
NPDR	Non Proliferative Diabetic Retinopathy
PDR	Proliferative Diabetic Retinopathy
PRP	Panretinal Photocoagulation
UKPDS	United Kingdom Prospective Diabetes Study
VEGF	Vascular Endothelial Growth Factor

## **Abstract**

**Background:** Diabetic retinopathy is responsible for 4.8% of blindness worldwide and is largely preventable. It is diagnosed by performing a retinal examination and early treatment would depend on an early referral to an eye care personnel by the primary doctors of diabetic patients. In Ghana, these doctors include house officers and medical officers.

**Objective:** To assess the knowledge, attitudes and practices of diabetic retinopathy amongst medical and house officers in the regional hospitals of Ghana.

**Study type:** Cross-sectional study.

**Methodology:** House officers and medical officers in the ten (10) regional hospitals of Ghana were included in the study. After signing a written consent form, participants filled a self administered questionnaire. The data collected was statistically analyzed using the Statistical Analysis System (SAS) version nine software.

**Results:** Ninety- one medical and house officers participated in the study with a male to female ratio of 2.1:1. There were 31 medical officers and 60 house officers.

Participants had poor knowledge about risk factors for DR with only 46.2% and 28.6% mentioning hypertension and duration of DM as factors although 86.8% knew of the level of glycaemic control. Knowledge of the treatment options for DR was poor. Fifty five percent of participants knew about laser photocoagulation whilst 12.1% and 27.5% mentioned surgical and medical modalities respectively.

Knowledge of the systemic implications of DR was good with 80.2% being aware that nephropathy was another complication of DM whilst 96% of participants agreed that the presence of retinopathy could indicate the presence of other complications of DM.

In terms of practice, only 34% of the doctors tested the vision of their diabetic patients within a year and 17.6% did retinal examinations Only 33% had access to an ophthalmoscope and respondents who had access to ophthalmoscopes were more likely to do retinal examinations.

Attitudes towards retinal examination for DR were positive. About 92% of respondents agreed that fundus examinations by non ophthalmologists could help detect DR.

**Conclusions:** The participants had gaps in their knowledge but good attitudes on DR that did not translate into good practice.

## **1.0 Introduction**

Diabetic retinopathy (DR), a complication of diabetes mellitus can be a devastating disease, especially in its advanced stage, when it is associated with loss of vision. Apart from reduced productivity of blind patients, caring for them also puts a huge strain on resources available. Patients also require more physical, social and psychological support which further reduces the productivity of the society as a whole.

The best way to manage this problem is by preventing the development or progression of DR.

In this regard, the primary doctors of diabetic patients can play a major role. In Ghana, these primary doctors include medical and house officers. If they could educate diabetic patients about the risk factors of DR, how to control the risk factors and also institute management to prevent the progression of DR, it would go a long way to prevent blindness secondary to DR.

It would be beneficial to know how knowledgeable medical and house officers in Ghana are on DR and whether their attitudes and practices could contribute to reduce the burden of blindness caused by DR.

### **1.1 Diabetes Mellitus and Diabetic Retinopathy.**

Diabetes mellitus is a common metabolic disorder that occurs as a result of diminished efficacy, lack of or both of endogenous insulin. This leads to sustained hyperglycaemia of variable severity. There are two types of diabetes mellitus; type 1, also known as immune mediated diabetes, and type 2.<sup>1</sup>

Diabetes mellitus (DM) affects the blood vessels leading to macrovascular and microvascular complications which manifest in the eyes, kidneys, brain, extremities and other parts of the body.

The exact cause of diabetic microvascular disease is not known. It is however believed that prolonged exposure to hyperglycemia results in a number of biochemical and physiological changes that finally result in endothelial damage. Some of the retinal capillary changes include selective loss of pericytes and thickening of the basement membrane which favor capillary occlusion and retinal non perfusion, as well as decompensation of the endothelial barrier function. This allows serum leakage and retinal edema to occur.<sup>1</sup>

According to WHO, about 50% of persons with diabetes are unaware that they have the condition, although about 2 million deaths every year are attributable to complications of diabetes mellitus.<sup>2</sup> A community based survey done in Accra, Ghana, revealed that out of 300 subjects diagnosed with diabetes, 209 (69.7%) had no prior history of the disease.<sup>3</sup>

## **1.2 Diabetic Retinopathy**

Diabetic retinopathy (DR) is a microvascular complication of Diabetes Mellitus (type 1 and 2) affecting the retina.

DR progresses from mild through moderate and severe non proliferative diabetic retinopathy (NPDR) to proliferative diabetic retinopathy (PDR).

NPDR is characterized by retinal vascular abnormalities such as microaneurysms, intraretinal haemorrhages, and cotton-wool spots. Increased vascular permeability leads to retinal thickening and exudates. In severe NPDR there is vascular closure leading to retinal ischemia characterized by venous loops, beading, intraretinal microangiopathy (IRMA), extensive haemorrhages and exudates.<sup>4</sup>

In PDR, there is neovascularisation caused by capillary non perfusion as a result of retinal hypoxia. The neovascularisation may extend into the posterior vitreous (pre-retinally) and intraretinally. Advanced diabetic eye disease is characterized by tractional retinal detachment, significant persistent vitreous haemorrhage and neovascular glaucoma<sup>4</sup>.

Diabetic maculopathy refers to the presence of any retinopathy at the macular especially vision threatening edema or ischemia. Clinically significant macula edema (CSME), a term used to describe macular thickening and or exudates at or encroaching on the macula can develop at any stage from leaky vessels.<sup>4</sup>

## **1.3 Risk Factors for Developing DR**

Duration of Diabetes is the most important risk factor. According to the Wisconsin epidemiological study of diabetic retinopathy (WESDR), the duration of diabetes is directly associated with an increase in the prevalence of diabetic retinopathy (DR) in patients with both types of diabetes. After 20 years of having the disease, almost 99% and 60% of patients with type 1 and 2 respectively have some degree of retinopathy. Also, 3.6% of type 1 patients and 1.6% of

type 2 patients were legally blind with 86% and 33% of the blindness attributable to retinopathy in type 1 and 2 diabetes respectively. <sup>1</sup>

Poor glycaemic control is a key risk factor for the development of DR. The Diabetes Control and Complications trial reported that intensive glycaemic control reduced the risk of developing retinopathy by 76% and slowed progression of retinopathy by 54%. The United Kingdom Prospective Diabetes Study (UKPDS) also confirmed that Intensive control of blood glucose slowed progression of retinopathy and reduced the risk of other microvascular complications of diabetes. <sup>1</sup>

Hypertension is known to influence the progression of DR. The UKPDS evaluated the effect of hypertension on DR and reported that patients with tight blood pressure control (<150/85) were found to have a 37% reduction in microvascular changes, 34% risk reduction in the need for laser and 47% risk in reduced vision compared with patients with less tightly controlled blood pressure (<180/95).<sup>6</sup>

Pregnancy is occasionally associated with a rapid progression of DR especially in patients with poor pre-pregnancy glycaemic control, too rapid glycaemic control in early pregnancy and development of preeclampsia.

Patients with nephropathy and type 1 diabetes mellitus almost always have other signs of diabetic microvascular disease, such as retinopathy and neuropathy.

Hyperlipaemia, smoking and obesity are other risk factors.<sup>5</sup>

#### **1.4 Epidemiology of DR**

The prevalence of all types of retinopathy increases with increasing duration of the disease and with increasing age. It is rarely found in children and the risk of developing retinopathy increases after puberty.<sup>5</sup>

Diabetic retinopathy is responsible for 4.8% of the 37 million cases of blindness due to eye diseases according to World Health Organization (WHO). At least 171 million people worldwide have diabetes, and this figure is likely to more than double by the year 2030, to 366 million. After fifteen (15) years, about 2% of persons with diabetes become blind, and about 10% develop

severe visual loss. After twenty (20) years, more than 75% of patients will have some form of diabetic retinopathy.<sup>2</sup>

“The prevalence of DR varies substantially between studies even among contemporary diabetic populations in the same country but is probably up to 40%. DR is more common in type 1 diabetes than type 2 and sight-threatening disease is present in up to 10%. PDR affects 5-10% of the diabetic population; type 1 diabetics are at a particular risk with an incidence of about 60% after 30 years.”<sup>5</sup>

Reports from developing countries indicate diabetic retinopathy prevalence of 47.8% in Lesotho and 49.8% in Kenya.<sup>7, 8</sup>

In Nigeria, the prevalence was found to increase with increasing duration of disease, being 12.7%, 16.8% and 20.0% in patients with duration less than five (5) years, between five (5) and ten (10) years and greater than ten (10) years respectively.<sup>9</sup>

A cohort study done in Nigeria and Ghana reported a prevalence of diabetic retinopathy of 17.9% type II diabetics with an average duration of seven (7) years of Diabetes Mellitus.<sup>3</sup>

### **1.5: Treatment of DR**

Visual disability from DM is mostly preventable and treatable with early intervention.

Prevention of DR involves “lifestyle modification, exercise, and smoking cessation, as well as better control of blood sugar, blood pressure, blood lipids, and body mass index.”<sup>5</sup>

Patients with mild NPDR require no treatment but should have strict glycaemic control so as to prevent or slow down progression of the DR.<sup>5</sup>

Laser treatments have been shown to be beneficial in reducing the risk of severe loss of vision in severe NPDR and PDR. One of the objectives for the Diabetic Retinopathy Study (DRS) was to determine whether photocoagulation helps prevent severe visual loss from proliferative diabetic retinopathy. It confirmed that photocoagulation, as used in the study, reduces the risk of severe visual loss by 50% or more.<sup>1</sup>

The ETDRS results also demonstrated that, “for eyes with macular edema, focal photocoagulation is effective in reducing the risk of moderate visual loss but that scatter photocoagulation is not. Focal treatment also increases the chance of visual improvement,

decreases the frequency of persistent macular edema, and causes only minor visual field losses. Focal treatment should be considered for eyes with macular edema that involves or threatens the center of the macula.”<sup>10</sup>

Eyes with CSME should be considered for laser photocoagulation because treatment reduces the risk of visual loss by 50%<sup>1</sup>. Laser photocoagulation for CSME can be applied in a grid or focal pattern.

Pars plana vitrectomy is useful when macular edema is associated with tangential traction from a thickened and taut posterior hyaloid. It stabilizes or improves vision in eyes with macular edema.<sup>5</sup>

It is also indicated in vitreous haemorrhage and vitreoretinal membranes which are complications of PDR. The Diabetic Retinopathy Vitrectomy Study (DRVS) was a prospective, randomized clinical trial investigating the role of vitrectomy in managing eyes with severe PDR. The study also showed an advantage for early vitrectomy compared to conventional management in eyes with very severe PDR<sup>1</sup>.

“The Diabetic Retinopathy Research Network Laser- Ranibizumab- Triamcinolone study showed that intravitreal ranibizumab with prompt or deferred macular laser had significantly superior visual and OCT outcomes than laser alone in eyes with diabetic macular edema.”<sup>5</sup>

The above study also found that intravitreal triamcinolone injection followed by prompt laser may be as effective as ranibizumab at improving vision and reducing retinal thickening in pseudophakic eyes. In phakic eyes however, there is a risk of elevation of intraocular pressure and an increased rate of cataract formation.<sup>5</sup>

## **1.6 Screening for DR**

For a chronic illness like DM with complications that worsen with poor control, standards of care are needed to “provide clinicians, patients, researchers, payers, and other interested individuals with the components of diabetes care, general treatment goals, and tools to evaluate the quality of care.” These include screening, diagnostic, and therapeutic actions that are known or believed to favorably affect health outcomes of patients with diabetes.<sup>11</sup>

“Early detection of retinopathy in individuals with diabetes is critical in preventing visual loss, but current methods of screening fail to identify a sizable number of high-risk patients”.<sup>11</sup>



“Screening for diabetic retinopathy should be mandatory for all diabetes patients as diabetes mellitus is now assuming alarming epidemic proportions in developing countries”<sup>12</sup>

The American Diabetes Association (ADA) and American Academy of Ophthalmology (AAO) have developed screening guidelines based on studies that demonstrated that blindness secondary to DR could be prevented.

The AAO recommends that patients with type 1 DM should have their first dilated fundus examination three (3) to five (5) years after diagnosis since DR is rarely detected before this time. Patients with type 2 DM should however be screened at diagnosis since most patients are diagnosed long after the onset of the disease. The findings after the first examination would then determine the frequency of subsequent examination otherwise a routine yearly follow up is required.

Patients with DM who desire to get pregnant should be screened prior to conception and during the first trimester. Subsequently, they can be examined every three (3) to twelve (12) months if they have less than severe NPDR but up to every three (3) months if otherwise.

The gold standard for screening for DR is stereoscopic fundus photography through dilated pupils, using seven standard fields. Other modes of screening include direct and indirect ophthalmoscopy, slit lamp biomicroscopy with a lens, mydriatic and non-mydriatic digital colour and monochromatic photography.

In developing countries with limited resources, ophthalmologists screen for DR using indirect ophthalmoscopy through a dilated pupil which enables the entire retina to be examined when combined with sclera indentation.

“The provision of appropriate screening protocols and follow-up parameters can enable primary care physicians and support personnel to reliably screen individuals for retinopathy in diabetes<sup>12</sup>. This will reduce the workload of tertiary hospitals, and provide optimal services to the huge majority of the diabetic population that has limited access to eye care services”.

## **2.0 Literature Review: Knowledge, Attitudes and Practices (KAP) Of DR among General Practitioners**

Diabetic patients are primarily managed by physicians and general practitioners. Thus if they are knowledgeable about the microvascular complications of DM affecting the organs, especially the eyes, it will improve their ability to detect DR early for early management. They should also have some examination skills to be able to detect abnormalities in the eye as a consequence of DM.

The loss of vision and the threat of vision loss in patients with DM require substantial patient education and psychosocial support, not only after a devastating loss but also before any appreciable loss is recognized by the patient. Of primary importance is that care for patients with diabetes requires an understanding that diabetic eye disease is an end organ response to a generalized metabolic disease. Patients with DM require concentrated, meticulous, and dedicated care and understanding to preserve vision<sup>13</sup>. This can only be a reality if the primary care givers are dedicated to this end.

R. Khandekar et al assessed the KAP of physicians concerning retinal examination of diabetic patients in Oman. They found that “knowledge about different parts of the eye was satisfactory in only 58% of physicians and knowledge about method of fundus examination for diabetic retinopathy was poor in 40%.The knowledge of eye parts involved in diabetes and components that could be examined by ophthalmoscope was limited”.<sup>14</sup>

In a study by Mahesh et al in India on the KAP pattern among health care providers regarding DR, “27 (93.1%) agreed that serum lipid profile is related to the severity of diabetic maculopathy and 29 (100%) agreed that hypertension and renal disease could influence diabetic retinopathy. Also 27 (93.10%) were of the opinion that retinopathy is related to the duration of diabetes mellitus and 20 (68.97%) agreed that pregnancy could worsen diabetic retinopathy.” Twenty eight of the physicians (96.55%) said that all diabetic patients should have periodical retinal examination. Also 22 (75.86%) opined that Laser treatment is curative for diabetic retinopathy but only 18 (62.07%) said that surgical treatment is available for advanced diabetic retinopathy.<sup>15</sup>

Oenga et al assessed the KAP of DR among general practitioners in Kenya. Their study recruited 91 general practitioners (GP) from the provincial hospitals of Kenya. The study showed that the GPs were knowledgeable about the factors that affect diabetic eye disease: 95.6% indicated that

glycaemic control affected presence and severity of DR, 89% indicated duration as a factor and 84.6% indicated hypertension. Fifty-six percent were aware of the effect of lipid profile in relation to DR. Only 33% were aware that pre-existing diabetes mellitus in pregnant women was a risk factor for progression of DR. In this same study 33% of GPs were not aware that diabetic retinopathy is treatable and a significant proportion were not aware of the modes of treatment available.<sup>16</sup>

“Attitudes towards eye examination by non-ophthalmologists at primary level were positive” as reported by Khandekar et al<sup>14</sup>. Meanwhile Rajiv Raman et al found amongst the GPs they studied that “31.3 per cent (n=50) felt that diabetic patients should undergo an eye examination every six months and 53.3 per cent (n=85) felt that diabetics should undergo eye examination every year. Also 15.4 percent felt that eye examination every two years is sufficient for diabetics”.<sup>17</sup> Rajiv et al studied the knowledge and attitude towards diabetic retinopathy practice in South India.

According to Mahesh et al, 26 (89.66%) of the physicians disagreed with the statement that eye examination is required in diabetic patients only when vision is affected. 15 (51.72%) were of the opinion that newly diagnosed diabetic patients did not require eye checkups and 27 (93.1%) recommended yearly eye examinations for diabetic patients.<sup>15</sup>

Oenga et al also found that attitudes towards screening for DR was good with 87.9% of the study participants strongly disagreeing with the statement that diabetic patients required eye examination only when their vision is affected.<sup>16</sup>

In practice, “ophthalmoscopy was done by 1.3 per cent (2/159) of the GPs in the study by Rajiv et al. Of the two, one GP performed ophthalmoscopy with dilation while the other performed it without dilation. The reason stated for not dilating was lack of time”.<sup>17</sup>

In the study by R. Khandekar et al 20(50%) physicians had attempted to use an ophthalmoscope and only 9(22.5%) could see details of the retina”<sup>14</sup>

According to Mahesh et al, 17 (58.62%) of the physicians performed direct ophthalmoscopy to examine diabetic patients. Also 24 (82.76%) advised diabetic patients have an eye evaluation as soon as diabetes is detected and 26 (89.66%) would advise another eye checkup after a year if there was no retinopathy at initial examination.<sup>15</sup>

In terms of practice, Oenga et al found that less than half (37.4%) of the GPs assessed vision for their diabetic patients. Majority of GPs never assess vision (26.4%) or only did so when a patient complained of visual disturbance (34.1%). Concerning fundus examination, 58% of GPs never performed retinal examination for their patients. Also 51.6% refer and advise yearly eye examination of diabetic patients while 38.5% referred only when the patient complained of visual disturbance.<sup>16</sup>

Another study was done by Yung CW et al in the State of Indiana to investigate the patterns of diabetic eye care offered by primary care physicians. In their report, thirty-five percent of respondents stated that they never refer patients for ocular examination while 26% refer all patients. The remainders refer on a case-by-case basis and patients who are not referred have their fundus examined only 70% of the time by the primary care physician and 96% of these examinations are performed with an undilated pupil.<sup>18</sup>

Also, 20% of Type I patients are referred at the time of diagnosis and 50% by one year. For type II patients, 2% are referred at the time of diagnosis and 70% by one year.<sup>18</sup>

Another study in Indiana State, USA, found out that recent graduates and general internists were most likely to refer their patients for ophthalmological review. This study by Kraft SK et al looked into primary care physicians' practice patterns and diabetic retinopathy.<sup>19</sup>

Barriers for doing diabetic retinopathy screening by general practitioners are lack of time, lack of ophthalmoscopes and lack of training according to Rajiv et al.<sup>17</sup> Oenga et al also found that 73.6% of the participants cited lack of equipments (ophthalmoscopes and vision charts) as the most common factor that hindered them from performing eye examination. Almost twenty-eight percent (27.5%) felt they lacked the skill to perform funduscopy appropriately and detect signs of DR. Other factors included lack of time, patients not co-operating and lack of funds among patients to pay for specialist eye examination.<sup>16</sup>

Because of the limited experience obtained in ophthalmology by doctors whilst in undergraduate medical school, screening is thought to be done by ophthalmologists only. However, a study in New Zealand found that hospital diabetologists achieved good levels of accuracy when screening diabetes patients for retinopathy with ophthalmoscopy, attaining sensitivities of 70% for any retinopathy and 80–90% for sight-threatening retinopathy. The sensitivity of ophthalmoscopy for

screening for diabetic retinopathy increases with the level of training given to the health care providers, along with their experience in performing eye examinations.<sup>12</sup>

Interestingly, studies have shown that undergraduate training in Ophthalmology is often inadequate to equip general practitioners in the management of patients with eye disease. For instance, Okoye et al assessed the adequacy of undergraduate training in ophthalmology in the University of Nigeria Nsuka. Majority of the students (60%) were of the view that the training was inadequate.<sup>20</sup>

A similar study was conducted in Canada amongst first year residents who had graduated from medical school. "When asked whether sufficient ophthalmology knowledge and skills had been obtained during medical school, only 42.9% and 25.9% agreed, respectively".<sup>21</sup>

The assertion by Fan J.C et al that "Ophthalmology may increasingly be a small, or even absent, component of undergraduate medical curricula"<sup>22</sup> is quite disturbing,

For the purposes of this study, medical and house officers are doctors who are not in any specialty training or have not undergone specialization after medical school. This study is being done to assess the knowledge level of medical officers in Ghana, compare the findings with existing information and make suggestions to bridge any gaps in the detection of DR.

### **3.0 Study Justification**

Diabetic patients presenting with ocular complaints usually do so because of sight threatening complications of DR. The question is: are they never educated about ocular complications of the disease and how come they do not receive screening or referral for screening to detect some of these complications early for early treatment?

Even though the ophthalmologist could provide specialized care for the DR patient, prevention, control and referral to an ophthalmologist largely depends on the primary care physician.

This study seeks to determine whether medical and house officers recognize the important role they play in preventing and managing DR in diabetic patients. It is also to identify the attitudes, practices and beliefs of these care givers that contribute to the late detection of DR among Ghanaians.

There are no studies of this kind reported in Ghana and very few in Africa. The information acquired will therefore add to the data available.

### **4.0 Broad Objective:**

To assess the knowledge and awareness of diabetic retinopathy and the practices of medical officers affecting the detection of diabetic retinopathy.

#### **4.1 Specific Objectives:**

1. To assess the knowledge of diabetic retinopathy among medical and house officers in Ghana.
2. To determine the knowledge of the relationship between DR and other end organ microvascular complications of DM.
3. To assess the participants' practice in screening for diabetic retinopathy
4. To identify the factors affecting their attitude towards screening for and referral of diabetic retinopathy

## **5.0 Study Methodology**

### **5.1 Study Design**

Cross- sectional descriptive study

### **5.2 Study Population**

All the medical officers and house officers who work in the regional hospitals of Ghana were included in this study.

### **5.3 Study Setting**

Ghana is a country in West Africa boarded by La Cote D'Ivoire (west), Burkina

Faso (north), Togo (east) and the Gulf of Guinea (south). Ghana's climate is tropical.

The country is divided into ten regions and has ten regional hospitals located in each regional capital. There are three teaching hospitals in Ghana as well.

Health care in Ghana is structured into a hierarchy with the Teaching hospitals being the highest level. The others in ascending order are:

Community health planning and services (CHPS)

Health centers and clinics

District hospitals

Polyclinics

Regional hospitals

Teaching hospitals.

The regional hospitals are referral points for the district hospitals and thus offer specialized care like specialist consultation, intensive care and life support.

There are medical and house officers in these hospitals who rotate in the various specialties and so are involved in the care of diabetics at a point in time. The hospitals run diabetic clinics with one or two physicians working with medical officers who have completed their two year house

job (internship) and house officers who are undergoing a two year house job program after medical school.

The regional hospitals are appropriate for this study because they all have consistently run diabetic clinics and so their medical and house officers will be well exposed to diabetic patients and the care available to them in their institutions.

# Ghana

## *National and Regional Capitals*





#### **5.4 Study Period**

The study was conducted from 3<sup>rd</sup> to 21<sup>st</sup> December, 2012.

#### **5.6 Sampling Method**

The estimated number of medical and house officers in the regional hospitals of Ghana was about one hundred and twenty (120) according to information gathered from the office of Ghana Health Services.

House officers are doctors doing a two year internship after graduating from medical school. At the end of the two years, they become medical officers.

All medical and house officers found in the regional hospitals were requested to participate in the study.

#### **5.7 Inclusion Criteria**

All medical and house officers who work in the regional hospitals of Ghana and gave their consent to participate in the study

#### **5.8 Exclusion Criteria**

Specialists or doctors in specialty training

## **6.0 Materials**

### **6.1 Explanation of questionnaire (appendix)**

The questionnaire had a cover page explaining the objectives of the study. It was self administered and the participants were requested to complete the questionnaire without consulting any literature.

It had four sections.

The first section required answers about the participants' demographics; age, sex, position and number of years of practice as a medical doctor.

The section with questions addressing the knowledge levels of the participants came next. They were required to provide answers to open ended questions. There were fourteen questions asking about the parts of the eye affected by DM, which parts to examine for DR, signs of DR, risk factors, diagnosis, treatment available, and how retinal findings relate to pathological changes in other organs of the body.

The third part of the questionnaire had nine questions asking about their practices; mainly about access to ophthalmoscopes, whether they perform retinal examinations, their ability to appreciate details on the retina, whether they refer their diabetic patients for screening for DR and when they do so.

Finally, the questionnaire ended with seven questions assessing attitudes towards when and why a retinal examination should be done and who should do it. The adequacy of ophthalmology training in Medical school was also assessed in this section. Participants were required to indicate their agreement or disagreement with the answers on a scale that was provided as options.

The questionnaire was prepared in English with the help of colleague doctors and piloted on eight (8) medical and house officers in Ghana working in hospitals other than the regional hospitals. Modifications were made based on the responses and recommendations obtained from the pilot study for clarity of the final questionnaire.

## **6.2: Data Collection and Statistical Analysis**

Collected data was coded and entered into a Microsoft excel spreadsheet.

Statistical analysis was done using the Statistical Analysis System (SAS) version 9.0 and R version 2.15.2 software.

Categorical variables were summarized using frequencies and percentages. Continuous variables were summarized using, means, percentiles, ranges, and standard deviations, where appropriate. For analytical statistics, chi square test statistics were used to assess the relationship between two categorical variables.

## **6.3 Ethical considerations**

Approval of the proposal was sought from the Ghana Health Service ethical review committee.

Clearance to administer the questionnaire was sought from the administration of the regional hospitals.

The participants were then requested to participate in the study and when they agreed, they were required to sign a written consent with a detailed explanation of the study.

They were also given the option of withdrawing from the study whenever they wanted to do so.

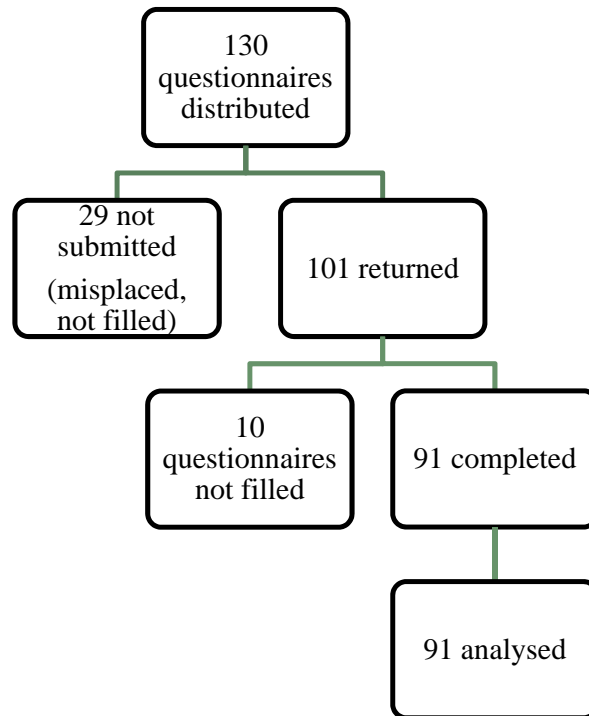
The questionnaires did not require the names of the participants and data was compiled by the principal investigator alone and stored on a personal computer to protect the privacy of the participants.

Analysis was done with confidentiality maintained; the names of participants and the hospitals they work in were not mentioned in the dissertation.

## 7.0 Results

130 self-administered questionnaires given out to medical and house officers in 10 regional hospitals. 101 were submitted with 91 completed.

Figure 1: flow chart of data collection.



70% response rate

The hospitals included Effia Nkwanta regional hospital, Cape Coast regional hospital, Ridge hospital, Koforidua regional hospital, Volta regional hospital, Suntreso regional hospital, Sunyani regional hospital, Wa regional hospital, Tamale regional/teaching hospital and Bolgatanga regional hospital.

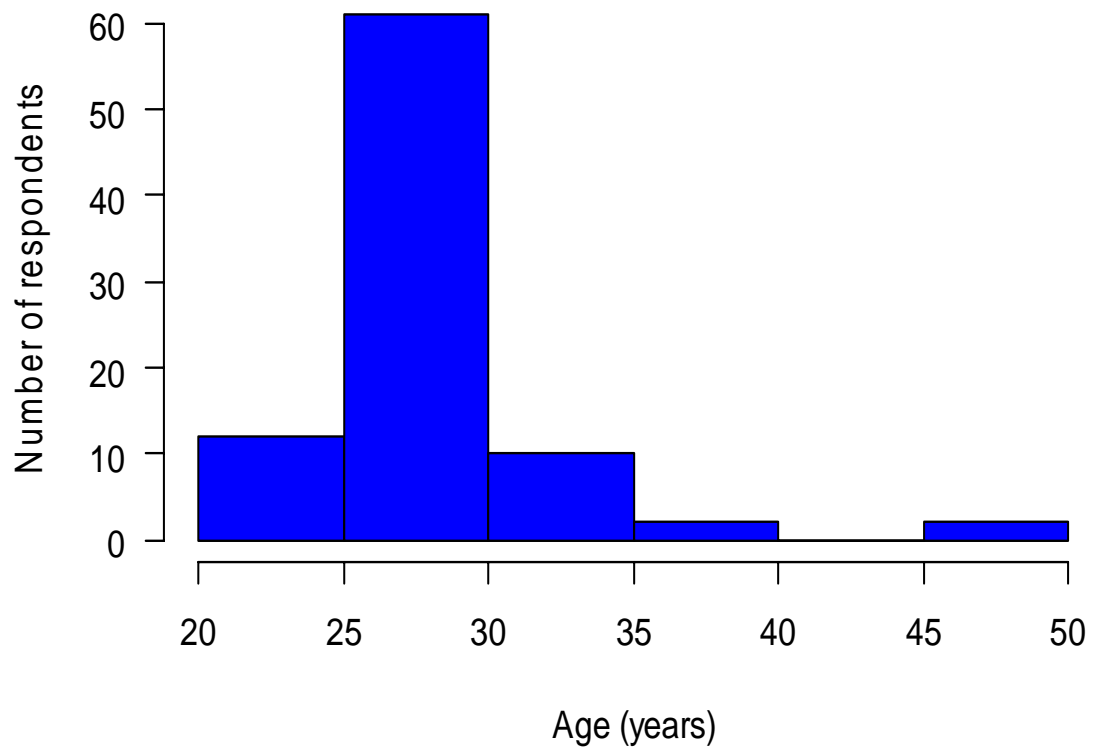
## Demographics:

Table 1: Distribution of respondents by sex

Variable	Frequency (%)
Sex	n= 91
Male	62 (68.1)
Female	29 (31.9)

Male to female ratio: 2.1: 1

Figure 2: Distribution of respondents by age



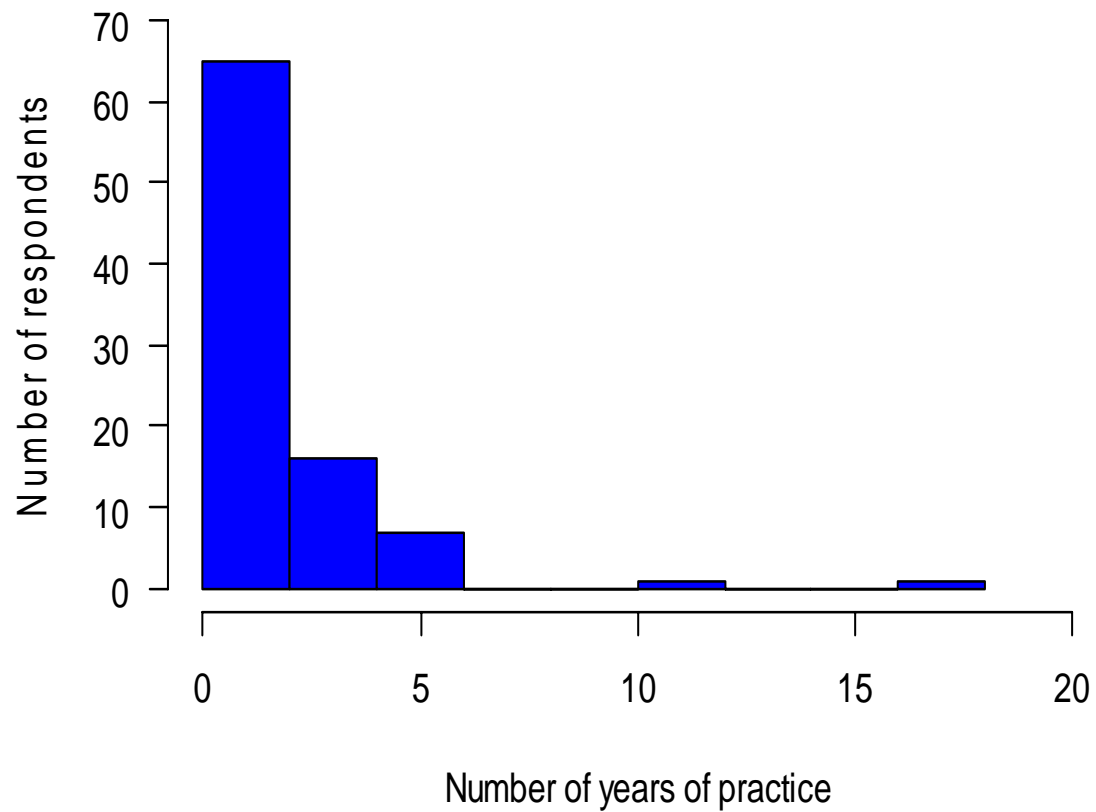
Mean age 28.6 years (SD = 4.09). The minimum age was 23 years and the maximum; 48 years.

[Table 2: Distribution of respondents by position

Variable	Frequency (%)
Position	n= 91
Medical officer	26 (28.6)
House officer	65 (71.4)

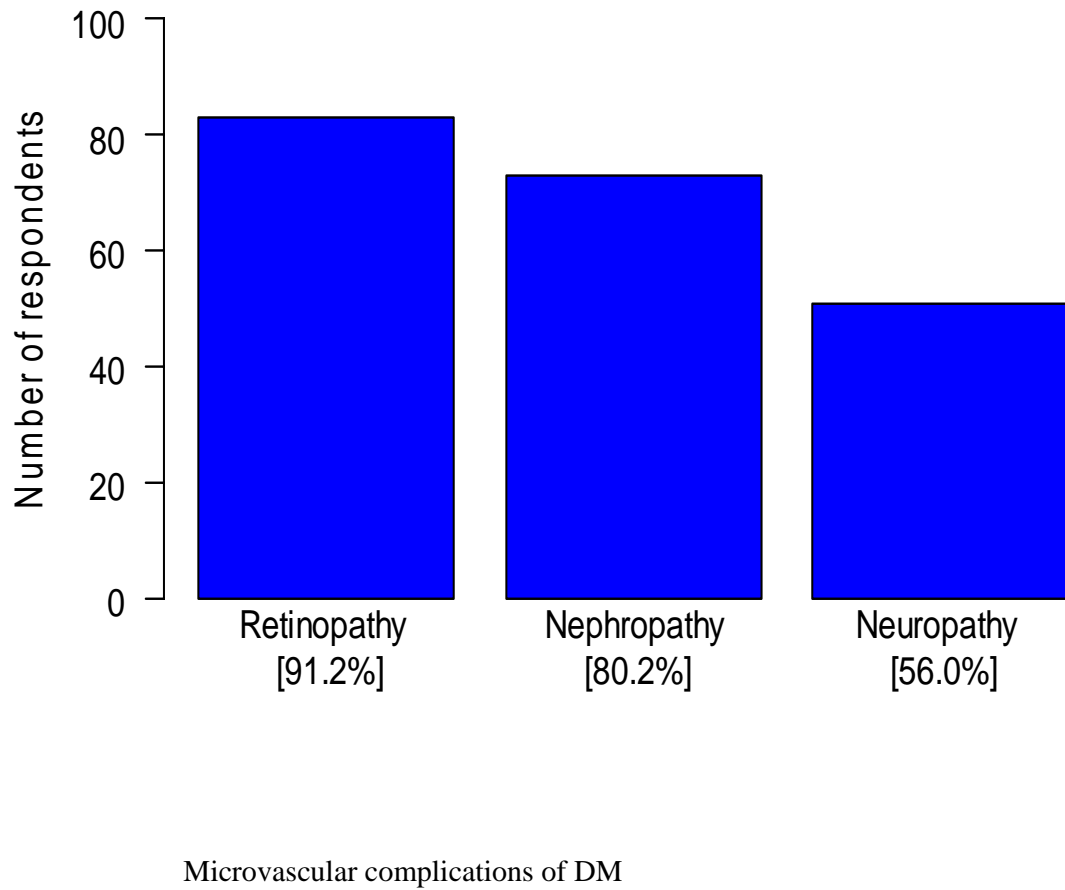
There were more house officers (71.4%) compared to medical officers

Figure 3: Distribution of respondents by duration of practice in years. n = 91



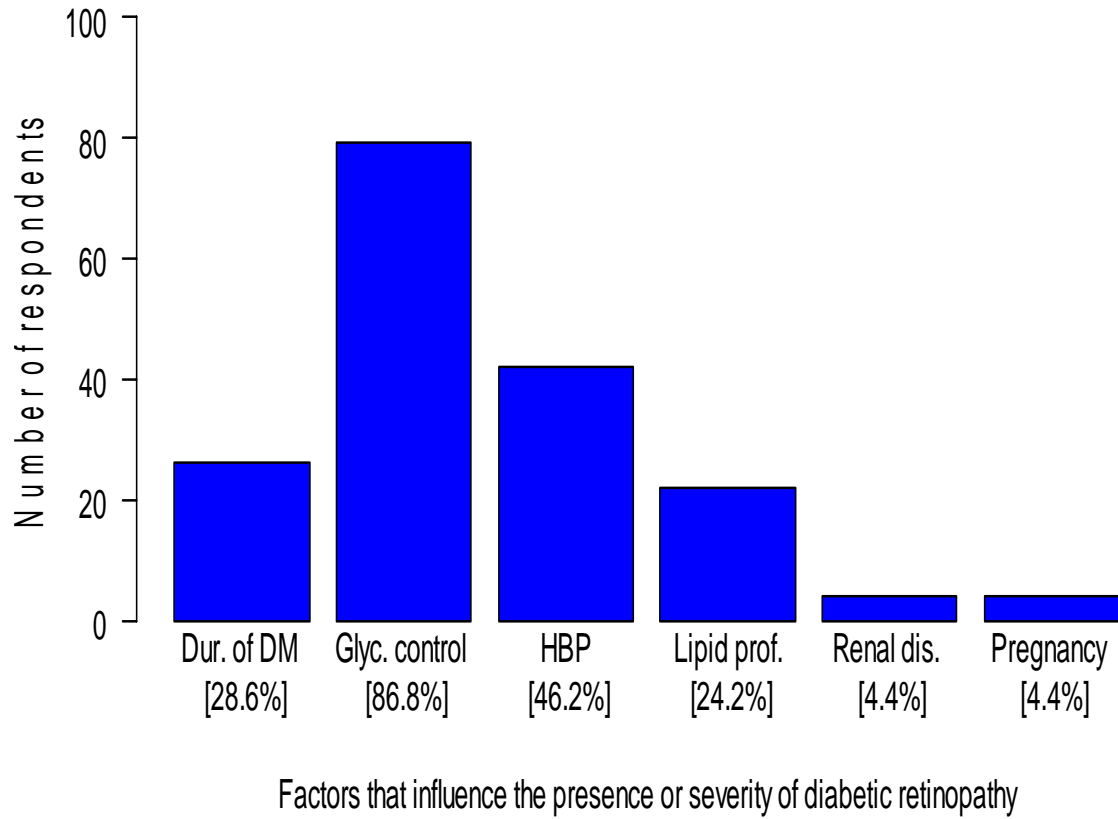
The median duration of practice was 1.5 years.

Figure 4: Respondents' knowledge on microvascular complications of diabetes mellitus.



Eighty percent (80%) of participants mentioned nephropathy as a microvascular complication of DM

Figure 5: Respondents' knowledge on factors influencing the presence or severity of diabetic retinopathy (DR). n = 91



Eighty six percent (86.8%) of participants mentioned that the level of glycaemic control and 28.6% mentioned the duration of DM as a factor influencing the presence or severity of DR.



Table 3: Respondents' knowledge on parts of eye affected by DM

Variable	Frequency (%)
Which parts of the eye can be affected by diabetes mellitus?	n = 91
Cornea	12 (13.2)
Iris	23 (25.3)
Lens	46 (50.6)
Retina	86 (94.5)
Optic nerve	16 (17.6)
Vitreous	12 (13.2)

50.6% knew the lens could be involved but only 25.3% knew the iris could be affected.

Table 4: Number of parts of eye mentioned by participants as parts of the eye that could be affected by DM

No of parts of eye mentioned	Frequency	Percentage
0	2	2.2
1	23	25.3
2	34	37.4
3	26	28.6
4	4	4.4
5	2	2.2

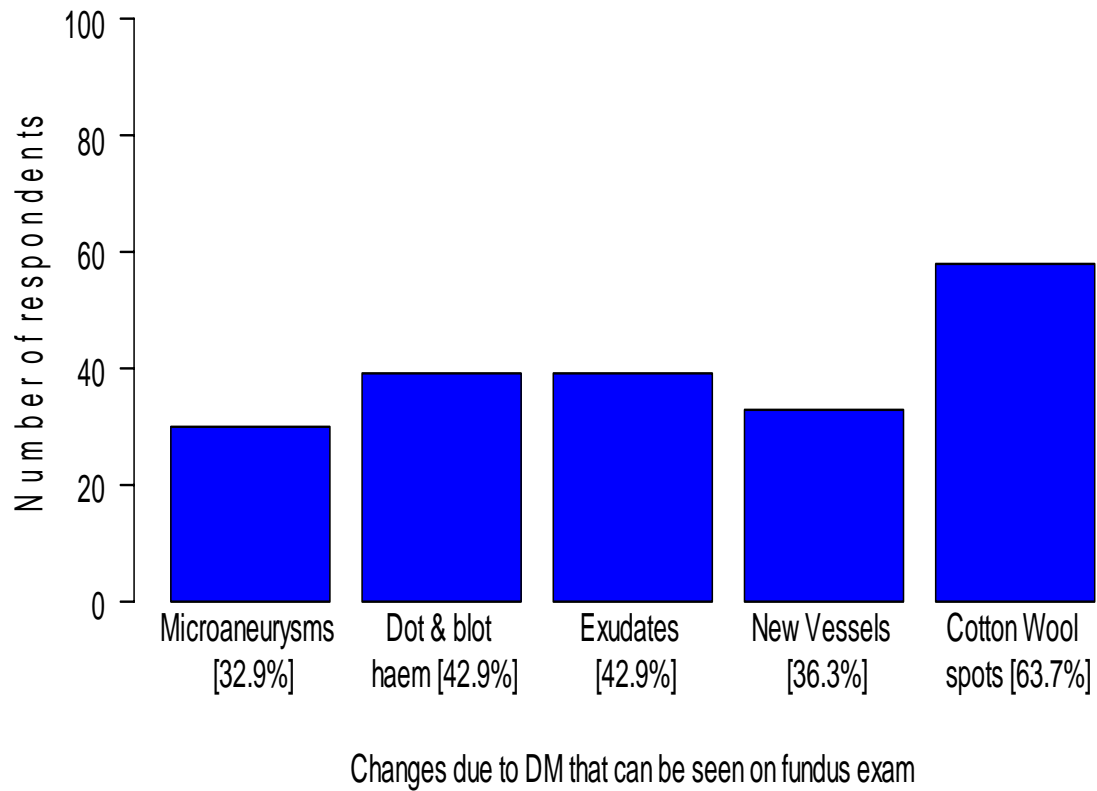
72.5% of participants mentioned at least two (2) parts of the eye that can be affected by DM

Table 5: Respondents' knowledge on parts of the eye to be examined for changes due to diabetic retinopathy

Variable	Frequency (%)
Which parts of the eye should be examined for changes due to diabetic retinopathy?	n = 91
Iris	14 (15.4)
Retina	84 (92.3)
Optic disc	15 (16.5)
Vitreous	6 (6.6)

Majority of the participants (92.3%) knew the retina should be examined for DR.

Figure 6: Respondents' knowledge on changes due to diabetes mellitus that can be seen on funduscopy (n = 91)



For the changes due to DM that could be seen on the fundus, 63.7% mentioned cotton wool spots.

Table 6: Dilatation of the pupil before fundoscopy

Variable	Frequency (%)
Is it essential to dilate the pupil before fundoscopy?	n = 91
Yes	71 (78.2)
No	8 (8.8)
Unknown	12 (13.2)
If yes, why?	n= 91
To give a wider view of the retina	62 (87.3)
Unknown	9 (12.7)

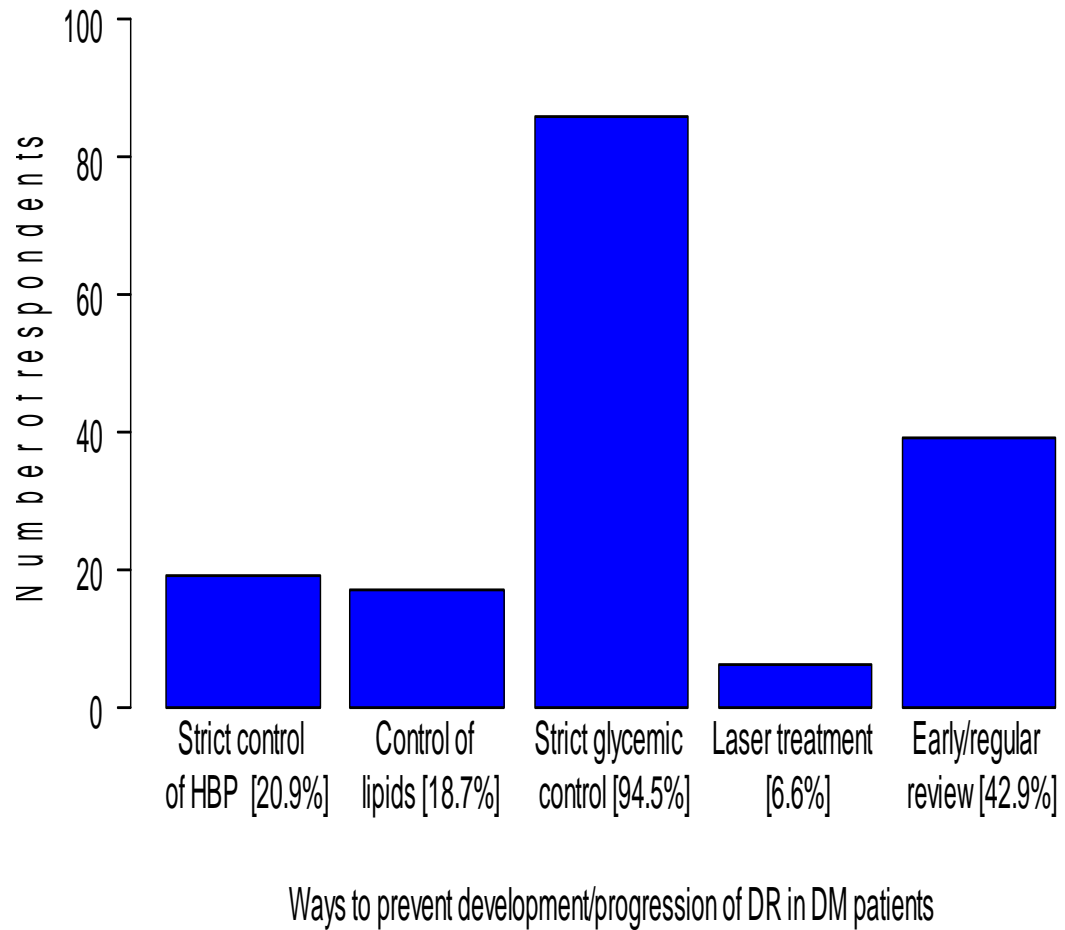
8.8 % of the participants said it was not essential to dilate the pupil before fundoscopy.

Table 7: Timing of eye review for newly diagnosed diabetic patients.

Variable	Frequency (%)
Should a person with diabetes mellitus visit an eye worker after diagnosis?	n = 91
Yes	91 (100)
If yes, how soon after diagnosis should the visit be made?	n= 91
As soon as possible	84 (92.3)
Within 6 months	2 (2.2)
Within 1 year	2 (2.2)
Within 2 years	1 (1.1)
Depends on onset	1 (1.1)
Unknown	1 (1.1)

All the respondents indicated that a person with DM needed to visit an eye worker.

Figure 7: Respondents' knowledge on prevention of DR or its progression in a patient with diabetic mellitus (n = 91)



Ninety four (94.5)% of participants in the study mentioned that strict glycaemic control could prevent the development or progression of DR and 42.9% of them mentioned early and regular eye review as a way of prevention

Table 8: Respondents' knowledge on treatment for DR

Variable	Frequency (%)
Are there any modes of treatment for DR? Yes No Unknown	n = 91 71 (78) 4 (4.4) 16 (17.6)
If yes, please name any modalities you know  Laser photocoagulation  Surgical  Medical	n= 71 of 91  50 (70.4) (54.9)  11 (15.5) (12.1)  25 (35.2) (27.5)

78% of respondents said DR was treatable and 4.4% said it was not.

Table 9: Respondents' practice of vision testing (Uncorrected visual acuity)

Variable	Frequency (%)
How often do you test the vision of your patients?	n=91
Every visit	2 (2.2)
Every admission	1 (1.1)
Every 6 months	17 (18.7)
Every year	11 (12.1)
Rarely	23 (25.3)
Only when patient has complaints about sight	5 (5.5)
Never	12 (13.2)
Unknown	20 (22)

Twelve (13.2%) admitted never testing the vision of their patients.

Table 10: Respondents' practice of fundoscopy.

Variable	Frequency (%)
Do you examine the fundi of your patients?	n=91
Yes	16 (17.6)
No	73 (80.2)
Unknown	2 (2.2)
Timing of fundoscopy.	n = 16
Every visit	2 (2.2)
Every 6 months	3 (3.3)
Every year	3 (3.3)
Only when patient has an eye complaint	1 (1.1)
Once in a while	4 (4.4)
Unknown	3 (3.3)

Eighty (80.2) percent of the participants do not examine the fundi of their patients.

Table 11: Referral and practice of fundoscopy

Variable	Frequency (%)
Do you refer diabetic patients for eye exams?	n=91
Yes	84 (92.31)
No	4 (4.40)
Unknown	3 (3.30)
Do you have access to an ophthalmoscope at your work place?	n = 91
Yes	30 (32.97)
No	61 (67.03)
Have you attempted fundus examinations in any of your patients over the past 1 year?	n = 91
Yes	16 (17.6)
No	75 (82.4)
If yes, were you able to appreciate the details of the retina?	n = 16
Yes	10 (62.5)
No	4 (25)
Unknown	2 (12.5)
Did you dilate the pupil?	n = 16
Yes	8 (50)
No	8 (50)
Reasons for not dilating pupil	n = 8
Did not see the significance of dilating	2 (25)
Lack of dilating drops	5 (62.50)
Lack of time	1 (12.5)

Ninety-two percent refer patients for eye examinations, 67% do not have access to an ophthalmoscope.



Table 12: Participants' attitudes towards screening for DR

Variable	Frequency (%) n=91			
	Agree	Neutral	Disagree	Unknown
Eye examination is only required in diabetic patients when vision is affected.	0	0	90 (98.9)	1 (1.1)
Ophthalmology training in medical school adequately equips the HO or MO to manage eye complaints.	22 (24.2)	20 (22)	48 (52.8)	0
Fundus examinations should be done by eye workers only	6 (6.6)	6 (6.6)	79 (86.8)	0
Fundus examination by non-ophthalmologists could help detect DR in diabetic patients.	84 (92.3)	5 (5.5)	2 (2.2)	0

Ninety – two percent (92.3%) agreed that fundus examinations by non ophthalmologists could help detect DR in diabetic patients

Table 13: Participants' attitudes towards DR and other microvascular complications of DM

Variable	Frequency (%) n= 91			
	Agree	Neutral	Disagree	Unknown
Pregnant women with diabetes require more frequent eye checkups than non pregnant ones.	64 (70.3)	21 (23.1)	6 (6.6)	0
The presence of diabetic retinopathy may indicate the presence of other microvascular complications of DM	88 (96.7)	1 (1.1)	2 (2.2)	0
A good lipid profile is essential for preventing vision loss in diabetic retinopathy	65 (71.4)	18 (19.8)	7 (7.7)	1 (1.1)

96.7% acknowledged that the presence of DR may indicate the presence of other microvascular complications of DM.

Table 14: Association between participants' number of years of practice and their practice of funduscopy

Variable	Fundus exam		Chi square test (95% CI)	P value
	Yes	No		
Duration of practice (n=91)				
<2(House officers) , n= 60	10 (16.67%)	50(83.33%)	1.9570	0.3759
>=2 (Medical officers), n= 31	5 (16.13%)	25 (80.65%)		

There was no significant statistical difference between the duration of practice and the practice of fundus examination.

Table 15: Association between participants' access to ophthalmoscopes and their practice of funduscopy

Variable	Fundus exam		Chi square test (95% CI)	P value
	No	Yes		
Participants' access to Ophthalmoscope (n = 91)				
No , n= 61	55 (90.16)	6 (9.84)	5.94	<b>0.014</b>
Yes , n= 30	21 (70)	9 (30)		

Participants who had access to ophthalmoscope were more likely to do funduscopy for their patients.

## DISCUSSION

The participants for this study were recruited from the ten regional hospitals of Ghana. One hundred and thirty (130) questionnaires were distributed. One hundred and one (101) of them were retrieved and ninety one (91) of them had been filled. The others were either misplaced or not filled by the participants because of time constraints.

Ninety one (91) house officers and medical officers participated in the study. Sixty-eight percent (68.1%) of the participants were males and 71.4% of them were house officers. The median duration of practice was 1.5 years and the mean age was 28.6 years with the ages ranging from 23 years to 48 years.

The regional hospitals are accredited for internship after medical school and so most of the general practitioners are house officers. After internship, they become medical officers and most of them are posted to peripheral hospitals. Medical officers later enter into residency programs and thus leave the regional hospitals. This explains the younger age group and shorter duration of practice represented by the study participants.

When asked which factors affected the presence or severity of DR, 86.8% of participants mentioned the level of glycaemic control, 46.2% mentioned hypertension and only 28.6% mentioned the duration of the disease as factors. Renal disease (4.4%) and pregnancy (4.4%) were the factors that were least mentioned (Figure 4). These values are lower compared to the findings in the study by Oenga et al in which the study participants were aware that glycaemic control (95.6%), hypertension (84.6%) and duration of diabetes (89.0%) influence the severity of diabetic retinopathy<sup>16</sup>. In another study by Mahesh et al in India, 100% of the physicians recruited in the study agreed that hypertension and renal disease can influence DR, 93.1% and 68.97% were of the opinion that the duration of DM and pregnancy respectively can affect DR.<sup>15</sup>

The wide difference between our study and these other two may be attributed to the fact that our study made use of open ended questions whilst the other studies done in Kenya and India had options from which participants chose from. The study from India was also done among physicians who are specialists and so may be more knowledgeable about DM compared to general practitioners. Our study was self administered just like these other two.

The poorer knowledge about the risk factors for development or progression of DR in our participants however needs to be addressed. They need to be well educated about these factors so

they can observe diabetic patients with these risk factors and refer them for screening sooner. This would go a long way to reduce complications due to DR.

A doctor may not be able to prevent someone from becoming diabetic but he or she can help prevent or slow down the progression of DR. According to 94.5% of the doctors recruited in this study, strict glycaemic control could prevent the development or progression of DR. Only 20.9% mentioned hypertension and 18.7% mentioned the control of blood lipids. Furthermore, 42.9% of them were of the opinion that early and regular eye review could be helpful in the prevention or progress of DR. (Figure 6).

Glycaemic control is the most important factor in this regard but studies have shown that adequate control of blood pressure and lipids are also important thus it would be beneficial for doctors in our study to be informed about these facts. If they are well informed about the difference they can make by instituting measures to control these factors better, they would be keener to do so.

Majority of the participants (92.3%) also knew the retina should be examined for DR but only 15.4% and 6.6% mentioned that the iris and vitreous should be examined for DR as well (Table 5). For the changes that could be seen on the fundus due to DM, 63.7% mentioned cotton wool spots, 42.9% of the participants mentioned exudates and dot and blot haemorrhages as well. Only 36.3% mentioned new vessels. (Figure 5)

The findings above show a generally fair knowledge that however may not be adequate for effective screening for DR. Although our participants are not ophthalmologists, knowledge about the parts of the eye affected by DM could be beneficial in that it would give them a high level of suspicion for DR when they see changes in these parts of the eyes in diabetic patients, and therefore refer them early for eye screening. Medical officers may be working in areas that have no access to eye workers. Therefore good knowledge of diabetic retinopathy and good screening practices would be of benefit to patients in that they would be diagnosed early before they lose their sight.

Knowledge about the treatment options for a condition usually translates into instituting the treatment or referring patients to the appropriate place where the treatment is available. Our study in this regard, also sought to find out if our participants knew about treatment for DR. Seventy-eight percent said DR was treatable. Fifty-five percent mentioned laser photocoagulation, only 12.1% mentioned surgical and 27.5% mentioned medical modalities as the forms of treatment for DR available (Table 8). Likewise, in the study by Oenga et al, 67% of participants said DR

was treatable with 47.3% citing laser photocoagulation and 11% surgery as the modalities<sup>16</sup>. In the study by Mahesh et al in India, 75.86% of the physicians were of the opinion that laser could treat DR and 62.07% said surgical treatment was available for advanced DR<sup>15</sup>. These findings in general reflect poor knowledge of the treatment available. The participants in our study need to be made aware of the treatment modalities available so that they would be motivated to refer patients for DR screening and management.

Participants in our study generally had good knowledge of the relationship between DR and other end organ microvascular complications of DM. Ninety-one percent (91.2%) of them knew retinopathy could result from diabetes mellitus, 80.2% and 56% also knew that nephropathy and neuropathy respectively were complications of DM (figure 3). Ninety-six percent (96.1%) of participants also thought that the presence of these microvascular complications could indicate the presence of diabetic retinopathy and vice versa (Table 13) thus indicating their awareness that DR is a reflection of the effect of DM on the body as a whole.

Since it is of primary importance that care for patients with diabetes requires an understanding that diabetic eye disease is an end organ response to a generalized metabolic disease<sup>13</sup>, these findings in our study gives us hope that by the time the general practitioners detect microvascular complications like nephropathy in patients, they would also anticipate the development of retinopathy and refer patients for early screening.

In terms of practice, 17(18.7%) out of the 91 respondents tested the vision of diabetic patients every 6 months, 11 (12.1%) did so every year, 3 (3.3%) tested vision at every visit or admission and 12 (13.2%) admitted never testing the vision of their patients. This shows that within a year, 34.1% of them would test the vision of their patients(Table 9). This reflects poor practice and compares with findings by Oenga et al, in which only 37.4% of participants tested for vision in a year<sup>16</sup>. During our study however, it was observed that none of these doctors had charts for testing vision in their consulting rooms. It is thus not surprising that they do not test vision. Since 98.9% of our participants disagreed that eye exams should be done in diabetic patients only when their vision was affected (Table 13), thus reflecting good will, if these charts are made available, medical and house officers may be able to test vision more often.

It is obvious from our study and other similar studies that fundus examination is rarely practiced by general practitioners. Rajiv found that ophthalmoscopy was done by only 1.3% of his participants<sup>17</sup>. Khandekar reported that 50% of physicians had attempted to do fundoscopy with only 22.5% seeing the details of the retina<sup>14</sup>. In our study, 16 (17.6%) of participants practice it

11% could appreciate the details of the retina. 50% of the fundoscopy was done without dilatation of the pupil. Sixty seven percent of our respondents also did not have access to an ophthalmoscope in their work place (Table 12). Even in experienced hands, doing fundoscopy on undilated pupils is not appropriate for screening for DR because the undilated pupil will block the view. An ophthalmoscope also has to be available if fundoscopy is to be done.

It goes without mention that ophthalmologists have to be involved in making the diagnoses concerning diabetic retinopathy as medical and house officers are not expected to make accurate diagnoses because they are not eye specialists. Their contribution is however priceless and cannot be overemphasized.

Our study found no association between practice of fundus examination and duration of practice; (MOs and HOs) (Table 14). We however found that participants who had access to ophthalmoscopes were more likely to do fundus examinations (Table 15). This reflects the need to offer more hands on training on doing fundoscopy in and out of medical school. This would also help doctors achieve higher levels of accuracy especially when screening for DR. They would also be more confident to do retinal examinations when ophthalmoscopes are available and they know they would be able to appreciate the retinal findings.

Furthermore 92.3% (84 out of 91) of the study participants referred their diabetic patients for eye examinations (Table 11). This is very good practice because if only the patients would report to eye workers, they would have a good chance of being screened for early detection of DR. In the study by Oenga et al, 51.6% referred and advised yearly eye examination of diabetic patients while 38.5% refer only when the patient complained of visual disturbance<sup>16</sup>. In a study done in the State of Indiana to investigate the patterns of diabetic eye care offered by primary care physicians only 26% refer all patients for eye review<sup>18</sup>.

Attitudes towards eye examinations were positive; 98.9% of participants disagreed with the statement that eye examinations should be done in diabetic patients only when their vision was affected. Also 86.8% disagreed that fundus examinations should be done by eye workers only and 92.3% agreed that fundus examinations by non ophthalmologists could help detect DR in diabetic patients (Table 12). Once again, these findings demonstrate good will among our respondents. Screening for DR should thus be promoted to get them involved.

Also 29.7% of respondents did not agree that pregnant women with DM required more frequent eye checkup (Table13). Pregnancy however is an important risk factor for the progression of DR

and so there is still more work to be done creating awareness, among house officers and medical officers that pregnant women with DM need to be followed up closely for DR.

All the respondents mentioned that a person with DM needed to visit an eye worker for review and 92.3% of them suggested the visit be made as soon as possible after diagnosis. Only 2.2% of them thought the visit could be delayed till after one year (Table 7). Mahesh G et al found that 82.76% of the study participants would advice diabetic patients to have eye examination soon after diagnosis<sup>15</sup>. Eighty-five percent (85.2%) of participants in the study by Oenga et al also thought the eye review should be done immediately after diagnosis<sup>16</sup>. Our findings compare very well with these studies and shows a good attitude which if translated into practice could lead to early detection of DR.

These are very good attitudes which were not necessarily translated into good practice as shown from the discussion above. The task ahead is to help make this translation a reality by offering some training in the screening for DR. This can start from the undergraduate level with revision of the Ophthalmology curriculum to make it focus more on the acquisition of examination skills.

A study done in Nigeria by Okoye et al in Nigeria assessing medical students' view of Undergraduate Training in Ophthalmology at the University of Nigeria Nsukka reported that 60% of the students thought the training was inadequate<sup>20</sup>. A similar study was done in Canada by Noble et al among first year residents who had recently graduated from medical school. When asked whether sufficient ophthalmology knowledge and skills had been obtained during medical school, only 42.9% and 25.9% agreed, respectively<sup>21</sup>. Our study also made a similar observation; 52.8% of the study participants thought that ophthalmology training in medical school was inadequate and is reflected by the poor screening practices observed in our study.

These findings stress the need for restructuring of the ophthalmology curriculum to equip doctors to screen for DR. This can be achieved by giving them more hands on experience in doing funduscopy.



## CONCLUSIONS

1. The study participants had good knowledge about DR.
2. They also have good knowledge about the relationship between DR and other microvascular complication of DM like nephropathy (80.2 %) and neuropathy (56 %)
3. Participants had poor practice in terms of screening for DR; only 37.4% test for vision within a year and 17.6% do fundoscopy on their diabetic patients.
4. The study shows a good attitude towards DR but this is not reflected in their practice of testing for vision and doing fundoscopy.
5. Most of the study participants (67%) did not have access to ophthalmoscopes and only 11% could appreciate details of the retina after attempting fundoscopy.
6. Ophthalmology training in medical school is inadequate according to 52.75% of our participants.

## STUDY LIMITATIONS

1. This study may not reflect the KAP of medical and house officers who work in the peripheral hospitals because the regional hospitals have more facilities and more access to eye workers.
2. Many participants left some questions unanswered (denoted as unknown) because of the open-ended nature of the questions.

## RECOMMENDATIONS

1. Undergraduate ophthalmology training could be reviewed to make it more skill oriented.
2. Ophthalmoscopes could be made available in hospitals and doctors encouraged to use them.
3. Continuous medical education and workshops could be organized to refresh doctors' knowledge about DR and how to screen patients for it.
4. Ophthalmology residents could dedicate themselves to adding on to the knowledge acquired by medical students from their lecturers by teaching them as well during their Ophthalmology rotations.

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## APPENDICES

### Budget

ITEM	QUANTITY	UNIT COST (Ksh)	TOTAL COST (Ksh)
<b>Proposal preparation</b>			
Proposal typing & Printing	50 pages	20	1000
Photocopying of proposal	100 pages	3	300
Binding proposal	3 copies	100	300
Proposal printing 2 <sup>nd</sup> draft	50 pages	10	500
Photocopying of proposal 2 <sup>nd</sup> draft	50 pages x5	3	750
Ethics form	1 copy	2000	2000
Subtotal			5,450
Data collection			
Typing and printing of questionnaire	9 pages	20	180
Photocopying of questionnaire	9 pages x 130	3	3510
Telephone and internet communication			3000
Contracted services Statistician	1	25000	25000
Subtotal			31,650
Transport			
Return air ticket (Ghana)	Self	USD	USD
Kumasi- Ashanti region of Ghana	1	50	50
Sunyani – Brong-Ahafo region	1	50	50
Cape- Coast – Central region	1	35	35
Koforidua – Eastern region	1	35	35
Tamale – Northern region	1	50	50
Bolgatanga – Upper East region	1	50	50
Ho – Volta region	1	35	35
Sekondi- Takoradi – Western region	1	35	35
Wa – Upper West region	1	50	50
Subtotal			390 Approx Ksh 34,320

Food and accomodation		USD	USD
Kumasi		40	40
Sunyani		40	40
Cape -Coast		40	40
Koforidua		40	40
Tamale		40	40
Bolgatanga		40	40
Wa		40	40
Ho		40	40
Sekondi- Takoradi		40	40
Subtotal			360 approx Ksh-31,680
Typing and printing of results	65 pages	20	1300
Photocopying of results	2 x 65	2	260
Printing of results (colour)	3 x 15 pages	30	1350
Spiral bound (temporary)	(65 x 10) + (15 x 30) )+ 100		1200
Final book Printing (black and white)	65 pages	10	650
Photocopy ( black and white)	65 x 8	3	1560
Printing of coloured pages	15 pages x 9	30	4050
Binding books	9 copies	200	1800
Subtotal			12,170
Total			Ksh 115,310.

Questionnaire

Department of Ophthalmology, School of Medicine, University of Nairobi.

Knowledge, attitudes and practices of diabetic retinopathy among medical officers in the regional hospitals of Ghana.

Date:

NO.

Demographics

1. Age : \_\_\_\_\_

2. Gender:

Male [ ] Female [ ]

3. What is your position? (MO or HO)?

a. MO [ ] b. HO [ ]

4. How long have you been practicing as a medical doctor?

\_\_\_\_\_

5. What are some of the microvascular complications of Diabetes mellitus?

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

6. What factors influence the presence or severity of diabetic retinopathy?

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

7. Which parts of the eye can be affected by Diabetes Mellitus?

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8. Which parts of the eye should be examined for changes due to diabetic retinopathy?

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9. What are some of the changes due to diabetes mellitus that can be seen on fundus exam?

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10. Is it essential to dilate the pupils before fundoscopy?

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11. If yes, why?

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12. Should a person with diabetes mellitus visit an eye worker after diagnosis?

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13. If answer in Q12 is "Yes", how soon after diagnosis should that person visit the eye worker?

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14. Should a person with diabetes mellitus visit an eye worker on a regular basis after diagnosis?

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27. If you answered 'No' to question 26, why?

- a. Lack of time
- b. Did not see the significance of dilating pupil
- c. Lack of dilating drops
- d. Other (specify)

For the questions below, please indicate whether you:

- a. Agree
- b. Neutral
- c. Disagree

28. Eye examination is only required in diabetic patients when vision is affected.

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29. Ophthalmology training in medical school adequately equips the MO to manage patients with eye complaints.

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30. Fundus examinations should be done by ophthalmologists only.

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31. Fundus examination by non-ophthalmologists could help detect DR in diabetic patients.

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32. Pregnant women with diabetes require more frequent checkups than non pregnant ones.

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33. The presence of diabetic retinopathy may be indication of the presence of other microvascular complications of DM

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34. A good lipid profile is essential for preventing vision loss in diabetic retinopathy

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Thank you.

## **Appendix 2: Explanation of study**

Diabetic retinopathy is a microvascular complication of Diabetes Mellitus. According to WHO it is responsible for 4.8% of the 37 million cases of blindness worldwide.

Diabetic patients are primarily managed by physicians and general practitioners. It is thus imperative they be knowledgeable about the microvascular complications of DM affecting the organs especially the eyes. This will improve their ability to detect DR early for early management. They should also have some examination skills to be able to detect abnormalities in the eye as a consequence of DM.

Diabetic retinopathy is diagnosed by performing a retinal examination and early treatment would depend on an early referral to an eye care personnel. There is however no data on the knowledge, attitude and practices of medical officers, who are an important part of the primary care givers of diabetics, in Ghana, concerning diabetic retinopathy.

This cross sectional study seeks to assess the knowledge, attitudes and practices of diabetic retinopathy amongst medical officers in the regional hospitals of Ghana.

The study would be carried out in the ten (10) regional hospitals in Ghana. All the medical officers and house officers in each of the hospitals would be requested to participate in the study. After signing a written consent form, they would be requested to fill a questionnaire. The data would then be collected and statistically analyzed and used for academic and health improvement purposes.

Thank you.

**Appendix 3: Consent form.**

I am Dr. Virginia Augustina Mensah, a Ghanaian postgraduate student at the University of Nairobi, Kenya. I am conducting a study on the knowledge, attitudes and practices, of diabetic retinopathy, among medical and house officers in the regional hospitals of Ghana. Doctors in the regional hospitals have been chosen for this study because they have special clinics for diabetic patients and are thus involved in their care. The data acquired would be analyzed statistically and conclusions drawn from the results.

The results of this study would help explain whether medical officers are playing a significant role in the prevention of blindness secondary to diabetes mellitus. The recommendations from this study when implemented would also go a long way to help Ghana achieve vision 2020 (reduce the incidence of preventable blindness)

Participation in this study is voluntary and the information gathered will be kept confidential and used solely for academic purposes and improvement of health services. Your name or identity is not required in this questionnaire and you can opt to be excluded from this study at any time. Thank you for your co-operation.

Declaration.

I ..... accept that I have read and understood the above explanation given to me by ..... I have had all my questions concerning this study answered satisfactorily and I am aware I can withdraw from the study at any time. I am willing to participate in the study voluntarily.

Sign .....

Date.....

(Participant)

Sign .....

Date.....

(Interviewer)

For further clarification, you may contact:

Dr. Virginia Augustina Mensah.

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GHANA HEALTH SERVICE ETHICAL REVIEW COMMITTEE

*In case of reply the  
number and date of this  
Letter should be quoted.*

*My Ref. :GHS-ERC: 3  
Your Ref. No.*



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March, 2013

**VIRGINIA AUGUSTINA MENSAH, Principal Investigator**

Department of Ophthalmology  
University of Nairobi  
P.O. Box 19676-00202  
Nairobi, Kenya

**ETHICAL CLEARANCE - ID NO: GHS-ERC: 19/11/12**

The Ghana Health Service Ethics Review Committee has reviewed and given approval for the implementation of your Study Protocol titled:

**“Knowledge, Attitudes and Practices of Diabetic Retinopathy among Medical Officers in Regional Hospitals of Ghana”**

This approval requires that you submit an Inception and Mid-term reports of the study to the Ethical Review Committee (ERC) for continuous review. The ERC may observe or cause to be observed procedures and records of the study during and after implementation.

Please note that any modification of the project must be submitted to the ERC for review and approval before its implementation.

You are also required to report all serious adverse events related to this study to the ERC within seven days verbally and fourteen days in writing.

You are requested to submit a final report on the study to assure the ERC that the project was implemented as per approved protocol. You are also to inform the ERC and your mother organization before any publication of the research findings.

Please always quote the protocol identification number in all future correspondence in relation to this protocol

SIGNED.....

PROFESSOR FRED BINKA  
(GHS-ERC CHAIRMAN)

Cc: The Director, Research & Development Division, Ghana Health Service, Accra