

BEYOND VISION

1.0 PROTOCOL

- Professor Benjamin Chukwuma Ozumba, the Vice chancellor, UNN
- The Deputy Vice chancellors and other Principal officers of the university
- President of the University of Nigeria Alumni Association and other officers present
- Deans of faculty
- Directors of institute and Centre
- Heads of Department
- Distinguished Professors
- Past Inaugural lecturers
- Heads of Administrative units
- Distinguished Academics and Administrators
- My Lords, Spiritual and Temporal
- Igwes, Chiefs and Elders
- Gentlemen of the Press
- Lions and lionesses
- My students, past, present and future
- My patients without whom the content of this lecture could not have been experienced
- Ladies and gentlemen

I warmly welcome you to this august event. It is indeed a privilege to be given the opportunity to deliver the 88th inaugural lecture of this prestigious university. It is also an honour to be a part of the renewed vision of the university to revive the tradition of inaugural lectures.

Thank you, my Vice Chancellor sir and grateful thanks to the University Senate for the approval of my request. With great pleasure and humility therefore, I stand before this highly esteemed assembly to deliver my inaugural lecture.

2.0 PREAMBLE

Past inaugural lecturers have tried to define 'inaugural lecture'. I shall only reiterate and say that, essentially, an inaugural lecture

- a. Is an opportunity for a new professor to inform colleagues, the university community and the general public of his contributions to the world of knowledge through research findings and other academic activities in his/her area of specialization
- b. Gives the lecturer an opportunity to declare his future research plans
- c. Introduces a new professor to mark a fresh impetus of a deeply mature scholarship and productivity

When should a professor deliver his/her inaugural lecture?

Professors are usually required to give their inaugural lecture within 12 months of their appointment.

The ideal example of Professor Lord Acton, one of the most important British historians of the early 20th century, may well stand as the *locus classicus* when, in 1895, he delivered his inaugural lecture¹ four months into his Chair of the Regius Professor of Modern History, University of Cambridge.

In contrast, in the University of Nigeria, the period to a delivery of an inaugural lecture could stretch to decades; sometimes it is not given at all. This is a subject which may, infact benefit from a professorial level of research as to the

whys, with an in-depth analysis of the findings, concluding with recommendations and an implementation plan. The time lapse between appointment as a professor and delivery of an inaugural lecture, however, is just one half of the question. Of greater interest and import is the time it takes for the appointment to be made. Mine is a case study which I shall crave your indulgence to listen to; I shall give it as a timeline '2004-2011'.

2000: At the turn of the century, I became a Senior Lecturer
2004: Four years later, four years of hard work and doing what I believed was necessary, I applied for promotion to the rank of Associate Professor(Reader).

2004-2006: My application suffered the MISSING APPLICATION SYNDROME

2006: After a fruitless search for it, I withdrew it and re-applied, now for promotion to the higher rank of Professor, as advised by Prof Aloy Aghaji of blessed memory, then the Dean of the Faculty of Medical Sciences whom I was working with as the Clinical Dean.

2006-2008: My new application underwent scrutiny by the University Appraisal Committee and was approved.

2008-2010: Back to the beginning. Again, my application found itself in the bottomless pit. It took the Intervention of the Almighty God through a human instrument for the whole process of considering my papers for promotion, to start all over again.

2011: Again, the application received approval by the University Senate Committee

2011: A few months later, this time around, I received my official letter of appointment; the system redeemed itself with a backdated appointment to 2006.

As in all things human, I acknowledge divine intervention and give glory to God for His faithfulness and gratitude to the human instrument through whom He worked out His plan. Prof Bartho Okolo, I remain ever grateful to you.

In keeping with the tradition in the academia therefore, to deliver an inaugural lecture at some point in the career of the professor, today, I stand here to share with the audience my humble contributions to date to the world of knowledge.

The **title** of my lecture is **BEYOND VISION**.

3.0 MY ACADEMIC BACKGROUND

No house is built without a foundation.

I never had the opportunity of choosing the course to study in the university. While in primary school in All Saints School now known as Ekulu Primary School, Enugu, my father, Late Justice Michael Ekwerekwu called me and said to me 'Chichi, you will be a medical doctor'. I didn't have insight into what being a medical doctor entailed because there was none close to me or around me. Lawyers, yes.....my family has a lot of them. My daughter has also joined them. My mother, now a retired nurse, was working in the then Specialist Hospital, Enugu now known as University of Nigeria Teaching Hospital. That was the closest I was to the health care profession. The only thing my young mind knew or thought about 'medical doctors' was that they were highly respected professionals and only intelligent people studied medicine. It was therefore exciting to me, to be told by 'Papa' as we addressed our father, that I would be a medical doctor.

Papa loved academic excellence and mama(as we addressed our mum) supported him by making sure all assignments given to us in school were done and in time too.

Papa was very strict and a no-nonsense man. Each time I was tops in class, he personally went to the bookshops to buy me storybooks, took time to write something on them and adorned it with his signature. Thereafter, he would ask my Mum to append her own-signature as well, call a family meeting where he would present the books to me, but not before he had made everyone give me a standing ovation. Of course, this made me feel very good. Seeing how pleased everybody was with me it further motivated me to work harder.

My teachers in primary school especially Mrs. Nwogu(primary 4-1971/2) and Mrs. Ugwuegede(primary 5-1972/3) helped in moulding me in preparation for the academic journey ahead.

Mrs. Ugwuegede was particularly very hard on me. Each time I failed a question she would stand me up in class and sometimes flog me. Even when I scored 9 out of 10 in a class where some had scored zero, she made me stand up and thoroughly scolded me leaving me crying all the time. I could not understand why she was doing all that to me. Allmy young mind concluded was that she hated me. Fortunately, I had parents who did not believe in coming to school to warn their children's teachers or threaten them for being hard on their children. They always believed that teachers meant well so I had no choice than to study more in order not to fail any question Mrs Ugwuegede asked me.

Early hours of every morning, therefore, before it was time to start getting ready for school, I would get out of bed to study

and do all my assignments. I also always tried to read ahead of the class. When I finally came first in the final exams in my final year in primary school my parents came to thank Mrs. Ugwuegede.

I had succeeded in pleasing her but I was pleasantly surprised at what she further told my parents. She had seen the potentials in me and did not want me to ever lag behind. To achieve that she had chosen to be very strict with me, she revealed. She hugged me and I shed tears of joy. Incredible! 'So this woman was very hard on me because of the love she had for me?' I didn't know it. She congratulated my proud parents.

In learning to study to avoid being beaten or rebuked by Mrs. Ugwuegede, I didn't realize that I was only launching myself into the path of individual effort in private study; a fact that has continued to help me till date. I learnt from primary school that to be successful, one needed to be determined, hardworking and persevering.

When I gained admission into the Queen of the Rosary College (QRC), Onitsha, Anambra State, I just applied what I learnt in primary school and at the age of 15 I graduated from secondary school. From there, I proceeded to Federal Government College, Enugu, for my Higher School. After the first year, I gained admission to read Medicine in the University of Nigeria, Nsukka.

My proud father came to the school to pick me. Again, he advised me 'Chichi, make sure you do not specialize in leprosy or tuberculosis'. These were the deadly 'specialties', he, as a lawyer knew, understood and would never want me to venture into. If he were still alive today, with this outbreak of 'ebola virus disease' I am sure he would have summoned me to seriously warn me against getting involved in any area

that would bring me in contact with the disease. Understandably, he was only being protective as a doting father.

In 1979, I commenced my undergraduate medical training which was a totally different world altogether.

By the time we moved over to Enugu campus after our first year in the Nsukka campus, we were poised to squarely face the much dreaded 2nd MBBS examination that determined whether you would end up being a medical doctor or not.

We therefore read for it with all the youthful strength, energy and determination in us. We put in our all.....never missed lectures, formed discussion groups, read through our textbooks inside out, 'upside down', over and over again.

I would sit down in one spot in the Physiology classroom reading for up to ten hours non-stop! For that, my classmates(the 1985 class) who had named the Physiology classroom THE SQUAD ROOM now nicknamed me SQUAD QUEEN. Some combined 'Chimdi' and 'Queen' to now call me 'Chimquii'. Till date, you would hear some of my classmates address me as 'Queen'(not BEAUTY QUEEN but READING QUEEN). Sweet innocence! God rewarded our efforts with success.

On graduating in 1985 I faced another challenge. In which field would I specialize? Challenges never end. No wonder Nelson Mandela wisely quoted that 'After climbing a great hill one only finds that there are many more hills to climb'. I pondered on the various fields of medicine.

My first choice of area of specialty was *Surgery* and second, *Paediatrics*. As a house-officer I had found them action-packed specialties. In surgery, quick decisions are always

made and actions taken on account thereof. When you are not sure of what is before you, you take the patient into the theatre for either an exploratory surgery or biopsy but you must take another pro-active step.

As for **INTERNAL MEDICINE**, I saw the Physicians as the 'legal practitioners' of the medical profession. For each patient, there was almost always a minimum of ten differential diagnoses none of which may be confirmed until the patient died and then autopsy was finally done to give a diagnosis for the future. The internists are very knowledgeable. I admire them.

COMMUNITY MEDICINE: As a medical student, my project in Community Medicine had to do with '**GASTROENTERITIS AND SEWAGE DISPOSAL**'. During the period of data collection, I must confess that momentarily I forgot I was studying to be a medical doctor. In Community Medicine, it isn't the usual clinical medicine practice. As an area of specialty I gave it no thought at all. It's such a wonderful specialty.

OBSTETRICS AND GYNAECOLOGY? Great field but didn't quite like the smell of liquor.

As for **OPHTHALMOLOGY**, what business did I have with that? Surgery and Paediatrics remained top on my list. I recall how, as a medical student, my posting in Ophthalmology was one of the two I didn't enjoy at all. I had actually wondered why it was carved out, in the first place, as a specialty in medicine, considering how small the eye is. I came to a decision never to specialize in Ophthalmology, swearing rather to remain a GP if Ophthalmology were the only field one could specialize in in Medicine.

However, on realising how capable I was of being passionately dedicated to my work it dawned on me that my passion for any of these two fields I was settling for would drastically cut into the quality time I would give my family. Hence I decided to give other fields some thought, but inside my heart, I knew I wanted a field with those characteristics of Surgery and Paediatrics: action-packed activities, quick decision-making, quick results; exciting and never a dull moment.

After a long and fruitless search, I finally decided to give **OPHTHALMOLOGY** a chance. To my pleasant surprise, I found out that **OPHTHALMOLOGY** had all my young mind sought for, and even more than I could have wished. It was going to be a 'trip' of a lifetime.

Thus began my journey to becoming a 'doctor of the eyes'. Thus began my odyssey as a Visionsaver.

To the uninitiated, Ophthalmology stops at vision, but to the initiated, it goes "beyond vision." It encompasses the invisible as well.

However, before I could serve as an instrument through which people's eyes could be opened, I needed, first of all, to have mine opened. That was how in September 1987, I commenced the initiation process into the occupation of vision-saving – *Ophthalmology*. The drilling process removed the scales from my eyes and enabled me see beyond vision into the person. The journey so far has been enthralling. The two-week posting in Ophthalmology we were exposed to during the undergraduate medical training did not give us even a peep into this new and passionately exciting world!

Oh, the wisdom of the Almighty Creator is beyond comprehension!

Five years later, in October 1992, I passed the final fellowship examination of the West African College of Surgeons and was awarded the prestigious fellowship of the West African College of Surgeons three months later.

In April 1993, three months later, I was appointed a lecturer in the University of Nigeria, Nsukka and an Honorary Consultant of Ophthalmology in the University of Nigeria Teaching Hospital, Enugu, respectively. The journey took a new turn when I was assigned a team to head; thus the shift of responsibility from a trainee to both a trainer and a decision-maker. This was yet another challenge but an exciting one which I faced with equanimity.

One day I had a patient whom I diagnosed with glaucoma, a cause of irreversible blindness if detected late. She needed surgery, which she accepted without any reservation after my counseling. Three days later, she had the surgery and as is the practice, the eye was padded on the operating table.

At the ward round on the first day after surgery, with resident doctors and nurses accompanying me I uncovered the eye. The surgery was successful- the external characteristics of a successful surgery were there but I discovered that the patient now had cataract, another cause of blindness **BUT REVERSIBLE!** My heart sank like lead in a bucket of water!

As the leader of the team however, I needed to remain strong, keeping a calm front in spite of the turbulence within. I continued with my ward round, seeing other patients. When it was over, I left the ward and literally flew straight to the church! I have always known what formed the matrix of my inner strength and the source of my peace which I was in short supply of at that instant.

I knew I needed God's intervention. "What had I done wrong," I asked, as I knelt before the altar.

That was my baptism of fire into the career.

This experience marked a turning point in my career. I had been challenged. I sought to know what went wrong in the course of the surgery. I searched and researched. Each search led to more questions and as I searched for the answers the search continued.

As Robert Kiyosaki, the famous author of the book 'RICH DAD AND POOR DAD' pointed out, 'while in school, the smartest people are the ones who don't make mistakes, in the real world the smartest people are the ones who make mistakes and learn'.

Bill Gates, the richest man in the world drove that point home by stating that 'It is fine to celebrate success, but it is more important to heed the lessons of failure'. Those lessons make us better.

Three days after the woman was discharged from the hospital she came to our house with tubers of yam and chicken in appreciation. I wondered why. Ten years later I ran into the woman at the airport. She hugged me so passionately. By this time, she had had cataract surgery in both eyes and that eye I had performed glaucoma surgery on was now the only good eye with which she now sees. Over and over, she thanked me for giving her back her vision. Well, I acknowledge the role of knowledge and science in the lives of people as they are helped in various ways, but I also recognize that God, the Almighty Physician is the creator Himself. Hence I quickly re-directed the glory to God as I shed tears of joy.

On my side I also expressed gratitude to God because that challenging experience I had on her account had aroused my interest and passion for glaucoma and all it stood for.

Standing today, on the platform of discussing glaucoma, I will enlighten the audience on the impact of glaucoma **beyond** stealing **vision**; I will also make known to this august assembly my contributions to knowledge **beyond** saving **vision**.

4.0 RESEARCH

A few months after I was appointed a lecturer in 1993, I earned the British Council Chevening Scholarship to undergo a Masters degree programme in Community Eye Health at the Institute of Ophthalmology of the University of London. I was in England for one year.

Back then, there was paucity of data on the prevalence and types of glaucoma in Nigeria. Most existing information on glaucoma blindness in Nigeria was from blindness surveys and clinic-based studies in various parts of the country. The only population-based study to measure the prevalence of glaucoma and glaucoma-related parameters was in the communities in Kaduna, Northern Nigeria² with and without onchocerciasis (river blindness). It reported prevalences lower than those reported in other studies among blacks.

To help fill a gap in knowledge therefore, under the supervision of Prof Gordon J Johnson, London, I conducted the first population-based study on glaucoma in South Eastern Nigeria and the second in Nigeria. That study was fully sponsored by British Council.

Over a 5-week period in April 1994, we examined all the adults aged 30 years and above, in Alum-Inyi, a community in Oji River LGA of Enugu State, South-Eastern Nigeria with

onchocerciasis. They were subjected to basic eye tests for the diagnosis of glaucoma. The suspects, additionally, had visual field analysis carried out on them.

Of the 664 eligible persons examined, 14 definite cases of glaucoma were identified giving a prevalence of 2.10% in the age group. The study also confirmed the report from other studies that the prevalence of glaucoma varied from ethnic group to ethnic group and that the risk of glaucoma increased with age, particularly after the age of 60^{3,4}.

I came out with a distinction in this programme.

The findings from this study have since been published in the West African Journal of Medicine⁵.

On completion of my Masters' degree programme in London I requested for a clinical attachment in a glaucoma unit. My sponsors, British Council, granted that. For three months, I worked with the glaucoma expert, John Salmon, in Oxford Eye Hospital as I understudied his art of managing glaucoma patients with expertise.

John Salmon is a world renowned glaucoma expert. He has done a lot of work in Glaucoma and has over 100 original publications. He is also the author of many books on glaucoma including 'Glaucoma-a colour manual of diagnosis and therapy'.

On return from England, I started running a Glaucoma clinic in addition to my general clinic, in the Ophthalmology Department of University of Nigeria Teaching Hospital, Enugu. Two of the visual field analysers we used in the clinic were donated to us by Moorefields' Eye Hospital, London, through the help of Prof Gordon Johnson.

I have performed several successful glaucoma surgeries ever since. **Beyond vision**, these patients have had their quality of life improved.

Up to the '90s, the success rate of glaucoma surgery in black African patients with primary open angle glaucoma was reported to be as low as 39% by the second year after surgery⁶. In young black Africans, the success rate was even lower than that for the older patients. The black African patient will initially do well after surgery, but in a few weeks, the eye pressure rises again and the drainage blebs disappear⁷. Compared to the white man's eye, the reaction to trauma which could be surgery in the black man's eye is more severe leading to poor success rates with such surgeries.

Drugs known as 'antifibrotic' or 'antiproliferative' agents which modulated wound healing were introduced to help improve the success rates of glaucoma surgeries. These agents are applied on the eye during the surgery to reduce scarring after surgery. In a randomised, prospective study in Ghana, eye pressure fell to 20 mmHg (the normal pressure is between 10 and 21mmHg) or less in 83% of eyes that received the antifibrotic agent, 5-Fluorouracil, during surgery, compared to 39% of eyes that did not⁸.

Will the effect be the same in Nigerian eyes? To answer that question, in 1996, we retrospectively studied the outcome of glaucoma surgery with the use of one of the antiproliferative agents, 5-Fluorouracil, among the Nigerian patients we had operated on.

With at least a 3-month postoperative follow up, 10 out of the 14 eyes (71.4%) studied had eye pressures of ≤ 18.5 mmHg. In the short term, our study confirmed that trabeculectomy with antifibrotic agent was also effective in Nigerian eyes.

The success rate of glaucoma surgeries amongst blacks has improved significantly with the introduction of these drugs. The findings from our study have since been published in the Nigerian Journal of Ophthalmology⁹.

To determine the types of glaucoma seen in a West African population, we analysed the cases seen at a Glaucoma workshop organized by Prof James Standefer in the Gambia in 2001, which I had participated in. Out of the 145 eyes of 88 patients, 118 had glaucoma. 65, 17 and 8 eyes out of the 118 examined had POAG, angle closure and pseudoexfoliative glaucoma respectively. These findings reaffirmed the fact that POAG is the most common type of glaucoma seen in Africa and also confirmed that pseudoexfoliative glaucoma is also seen in African eyes, though rarely.

The findings from this study have since been published in the Nigerian Postgraduate Medical Journal¹⁰.

From my interaction with glaucoma patients and relatives over the years I have also observed that this disease is the most misunderstood disease in spite of it being an ancient disease which dates back to 400BC when it was first documented, as well as, currently a leading cause of irreversible blindness globally.

There are many misconceptions, preconceived ideas and superstitious beliefs regarding this condition. This is worrisome because they are misleading and 'at worst dangerous as they may persuade people not to get their eyes screened or even cause them to consciously avoid treatment'¹¹.

In addition, individuals may even ignore obvious symptoms of glaucoma because they genuinely hold the mistaken belief that they are not at risk of developing it.

Most people can recite the warning signs of diabetes; almost everyone here can even discuss the risk factors for heart disease BUT.....

How many here have heard about the disease glaucoma? How many know the facts about it?

Even amongst the glaucoma sufferers and the non-ophthalmic medical doctors, it will shock you to know that a majority do not know much about this common and leading cause of irreversible blindness!

In a study we conducted¹² amongst non-ophthalmic medical doctors in UNTH, Enugu and Federal Medical Centre, Owerri, to determine how much knowledge of glaucoma they possessed, barely 52% of the doctors could correctly describe the clinical features of the disease. 78% and 72% respectively did not know that having a family history and being black were risk factors for developing the disease. About 48.8% of the non-ophthalmic medical doctors did not know that the disease caused painless progressive loss of vision.

How much more the lay man?

5.0 THE MYTHS

What are the prevalent myths about glaucoma?

A myth is simply defined as ‘an unproved or false collective belief that is used to justify some actions’¹³

From interviews and qualitative studies, here are some of them:

- **No 1: Glaucoma is a disease that only occurs in older people**

It is commonly believed that glaucoma affects only elderly people.

Fact: Anybody can be affected by glaucoma. Some children are even born with glaucoma.

The commonest type of glaucoma seen in Africa, Primary Open angle glaucoma, increases dramatically in incidence with age, particularly among black persons. Generally, it is unusual to diagnose it before the age of 40 years but it develops earlier, and is more severe in blacks than in whites¹⁴.

- **No 2: Glaucoma is curable or surgery cures glaucoma**

After a patient is diagnosed to have glaucoma the next question he would naturally ask is ‘Can it be cured?’

Fact: Glaucoma is manageable **but not** curable. Glaucoma surgery and medical treatment do **not** repair or regenerate the damaged optic nerve (nerve of vision). Any loss of vision is permanent, and surgery can only attempt to preserve what vision remains to the patient.

The **good news** however, is that blindness/visual impairment from glaucoma is preventable, with early diagnosis and compliance with treatment.

- **No 3: Glaucoma is rare**

Fact: Globally, it affects 60.5 million people; 8.4million people are bilaterally blind from it.

It is projected that by the year 2020, almost 80 million people in the world will be affected by glaucoma and more than 11 million will be bilaterally blind¹⁵.

In Africa, 6million people are estimated to be affected by the disease with 0.5million already blind from it¹⁶.

From the Nigerian National Blindness and visual impairment survey in 2008¹⁷, glaucoma accounted for 16.3% of the cases of blindness in the country among those aged ≥ 40 years.

In the South East geopolitical zone it accounted for 1.15% of severe visual impairment and blindness (approximately 1 out of every 100 severe visually impaired and blind persons)¹⁷.

Is it rare? Of course not!

- **No 4: Glaucoma does not cause blindness**

Fact: Glaucoma is the leading cause of irreversible blindness worldwide.

- **No 5: Only patients with a family history can develop glaucoma/Glaucoma does not run in families**

Holding any of these opinions about glaucoma can be dangerous.

Fact: Glaucoma can be hereditary as well as non-hereditary.

- **No 6: Some people would tell you ‘My vision is good; I can read all the letters shown on the vision chart; I don’t even wear glasses SO I COULDN’T HAVE GLAUCOMA.**

In other words, they believe there must be symptoms like pain, redness of the eyes, blurry vision that will warn one of glaucoma.

Fact: Glaucoma is generally asymptomatic until it is moderate to advanced. By the time an individual complains of reduced vision as a result of glaucoma he has lost over half of the nerve fibers responsible for vision.

This is why the disease is referred to as 'the silent or sneak thief of sight'.

(The normal eye has 1.2 million fibers for vision).

▪ **Ng 7: Glaucoma is caused by raised eye pressure.**

Fact: It is **not** very true. This belief gives an individual false comfort if only his eye pressure is checked and it is found to be within the normal range. There is no specific level of raised eye pressure (intraocular pressure) that definitely leads to glaucoma; conversely, there is no lower level of eye pressure that will absolutely eliminate a person's risk of developing glaucoma. Increased eye pressure only increases the individual's risk of developing glaucoma.

In other words, even if your eye pressure is recorded to be normal it does not rule out glaucoma.

Secondly, eye pressure varies throughout the day and night so even a patient suffering from glaucoma caused by raised eye pressure may register a normal reading at the time the eye pressure is measured. That single reading is not enough to give us

information on the patient's eye pressure at other times of the day¹¹.

Thirdly, individuals react differently to raised eye pressure. Some eye pressure measurements that are high may not affect some individuals whereas others with normal eye pressure may suffer from glaucoma¹¹.

In other words, some people with high eye pressure do not have glaucoma while some with normal pressure do.

Using the eye pressure reading alone to rule out or diagnose glaucoma may be misleading.

- **No 8: Glaucoma also has to do with the blood pressure. When the blood pressure is high the intraocular pressure becomes high too and vice versa.**

Fact: There is no link between intraocular pressure and blood pressure. Even in the presence of raised blood pressure an individual can have normal eye pressure and vice versa.

- **No 9: Glaucoma cannot be treated. It always leads to blindness:** This is one of the most dangerous of all the glaucoma myths. It prevents the individual from keeping his appointments with his doctor or complying with his treatment.

Fact: Early diagnosis, regular treatment can prevent blindness.

THE SUPERSTITIOUS BELIEFS ABOUT GLAUCOMA:

- **Glaucoma is a curse.**

This was a story told by an Igbo woman when she was interviewed by a cousin who is an ophthalmologist:

'My mother placed a curse on me because I did not take care of her when she was blind.

I had despised her; I had no respect for her because I had seen her as a liability. I had also blamed her for the abject poverty we were in because if she was working like other mothers our financial status would've been better than it was. I was bitter with her therefore I had no regards for her.

One day, after the harrowing experience of finding her way to the city from the village, unaccompanied, in search of her sister, she wept bitterly and cursed me. 'Nwanyibuife, I am your mother. I carried you nine months in my womb; I breastfed you. I took care of you as a mother should but in my condition you have neglected me. You have not taken care of me, therefore, blindness shall come upon you then you shall know what it means not to be seeing'.

Two years later, my vision started failing me and five years later, at the age of 45 I became blind.

I never got married; I have no children. Indeed, I am cursed'. Counting the chaplet beads in her right palm for the umpteenth time, she ended, 'I have been asking God for forgiveness for the way I treated my mother. My mother is dead now but everyday I see her face; I hear her voice begging me to

accompany her to the city to stay with her sister and I remember how I had called her names. I had even called her a witch. Several times, mama wept because of the way I treated her. I was unkind to her. Will God be able to forgive me?'She wiped the almost never-drying tears off her cheeks.

Nwanyibuife never saw a doctor because she believed she was under a curse. Rather, she visited prayer houses as well as native doctors, to no avail.

The cousin examined her. Lo! Nwanyibuife had **endstage glaucoma**. All her siblings also had glaucoma at various stages. Did mama also curse them?

- **Glaucoma is due to juju/witchcraft:**

75 year-old Pa Udemezue tells his story:

I became blind about 15 years ago. I know who did this to me.

'Emenike, oh Emenike, it will never be well with you', for the umpteenth time he hit his walking stick on the ground.

Emenike, our father's younger brother had been trying to take over the parcel of land belonging to me; my own inheritance from our father as the first son. I took him to court because of it.

A week before we were to appear in court, he came to my house and after abusing me, pointing at me he told me he would deal with me.

That night, around 12:00am I felt an unseen hand pulling at my eyeballs as if it wanted to pull them out from the sockets. When I woke up my vision was blurred.

Progressively, it worsened until I completely lost vision in spite of all the herbal treatment I received from Onwuamaeze the experienced native doctor.

'Now Emenike has deprived me of vision. Let him collect the land also but it shall never be well with him and his children'

Ocular examination also revealed **endstage glaucoma** in Pa's right eye and far-advanced glaucoma in the other. His first daughter was also diagnosed to have glaucoma.

Was Emenike also responsible for that?

Now, what are your own beliefs about glaucoma?

If you are above 35 years, have you had your eyes checked in the past two years?

Are you aware that you may be suffering from glaucoma unknown to you?

Then, if you have answered no to the first question, see an ophthalmologist immediately after this lecture.

6.0 THE DISEASE CALLED GLAUCOMA

The disorder we now describe as 'glaucoma' was first documented by the Ancient Greeks in 400BC¹⁸.

The name is believed to be derived from the greek word 'glaukos'¹⁸ the meaning of which was based on the observer's perception of the appearance of the supposed 'glaucomatous eye'

- a. Patients with acute glaucoma have very red eyes. This was interpreted as 'glowing' or 'shining' eyes therefore the word 'glaukos' was thought to mean 'to shine' or 'to glow'.
- b. In some acute forms of glaucoma, the cornea(the transparent part of the eye)becomes opaque from swelling. In relation to colour, these corneas could also give the impression of 'blue white' or 'blue-green' colour thus 'glaukos' was also thought to mean any of those two colours
- c. In cases of congenital glaucoma the child has big eyes. This reminded the observers of the owl which also has fierce, big and glowing eyes; again 'glaukos' was thought to mean 'owl'.

Up to the 18th century several authors argued that glaucoma was a malignant form of cataract that began with acute pains and terminated in blindness¹⁸.

Hippocrates in his ancient writings, made no clear distinction between glaucoma and cataract. In antiquity, glaucoma hardly stood for any definite entity.

With lots of researches and studies over the years, a lot is now known about glaucoma and that has also further improved the management of patients.

6.1 Introduction

Glaucoma is not a single disease entity but a group of conditions characterized by damage to the nerve of vision – the optic nerve (detected by pathological cupping of the optic disc) and loss of the field of vision.

It is uncommon among persons under the age of 40 but the prevalence increases with age. The two common types globally are primary open angle glaucoma and primary angle closure glaucoma.

Primary open-angle glaucoma cannot be prevented, but acute attacks of primary angle-closure glaucoma and more chronic forms of the disease can be prevented by early detection, followed by laser treatment.

As the early stages of both types of glaucoma are often asymptomatic, patients often present late, particularly in developing countries.

Once vision has been lost, regardless of the type of glaucoma, it cannot be restored.

Glaucoma is the most common cause of irreversible blindness worldwide.

6.2 Classification: Simply, it can be classified into:

- **Primary glaucomas:** In these, the cause is not known. These are the inherited types. Primary glaucoma could be open- or angle closure. Primary open-angle glaucoma is more frequent in Europeans and Africans while angle closure glaucoma is seen more in Asians
- **Secondary glaucomas:** The cause is known in these types.
- **Childhood glaucomas:** These could be congenital (where the child is born with it); infantile (where it manifests in the first year of life); juvenile onset (which manifests between ages 3-15 years)

6.3 Pathogenesis of the damage seen in glaucoma:

This is not clear but some theories have been put forward and researches are ongoing.

The fluid called *aqueous humor* is continually produced inside the eye at a rate of 2.0-2.5microlitres per minute. This fluid does not remain inside the eye. It exits through two pathways namely the trabecular and uveoscleral pathways. Any resistance in the outflow pathways or increased production of the aqueous humor will lead to accumulation of the fluid and raised pressure within the eye(intraocular pressure). The normal range of eye pressure is 10-21mmHg. When the intraocular pressure rises above 21mmHg and it remains so for a long time the blood vessels that supply the nerve of vision(optic nerve) are compressed thereby depriving the optic nerve of blood supply.

Secondly, this increased pressure compresses the fibres of vision as they pass through a canal on their way to the brain. These effects of raised intraocular pressure on the nerve trigger off a cascade of events which now leads to the characteristic damage of the nerve of vision seen in glaucoma.

Recent research findings are also implicating the cerebrospinal fluid pressure in the pathogenesis of glaucoma. The cerebrospinal fluid(CSF) is the fluid surrounding the brain and spinal cord as well as the optic nerve when it is inside the orbit, the bony encasement containing the eye¹⁹.The optic nerve which is the nerve of vision, connects the eye to the brain. Outside the eye and within the orbit- the bony encasement in which the eyeball is located, before it reaches the brain, it is surrounded by the coverings of the brain. Researchers suggest that reduced pressure in the CSF leads to glaucomatous damage.

Again from the reports from recent research findings, glaucoma is no longer thought of as solely an eye disease. It is now viewed as a neurologic disorder that causes nerve cells to degenerate and die, similar to what occurs in Parkinson and in Alzheimer's diseases²⁰.

6.4 Risk factors for developing Primary Open Angle Glaucoma(POAG):

We will concentrate on Primary Open angle glaucoma because it is the commonest type of glaucoma In Africa.

- **Age:** The prevalence of glaucoma increases from the age of 40 but develops earlier in blacks. Glaucoma is more likely to be diagnosed at a younger age and likely to be at a more advanced stage at the time of diagnosis in black patients than in whites²¹.
- **Race:** The highest prevalence of open angle glaucoma occurs in Africa²¹.The prevalence of POAG is 3-4 times greater in black persons²². Blindness in glaucoma is at least four times more common in blacks than in whites²².
- **A positive family history:** If an individual has a sibling with POAG, the relative risk for developing POAG is increased by about 3.7fold³
- **Raised intraocular pressure:** This is the major risk factor. Intraocular pressure is considered raised when it is above 21mmHg.

- **High myopia**(shortsightedness): The risk is higher in shortsightedness of $\geq 5D$
- **Low central corneal thickness:** Individuals with raised eye pressure without signs of glaucoma are said to have 'Ocular hypertension'. They may or may not develop glaucoma later. The Ocular Hypertension Treatment Study²³ found that the ocular hypertensive individuals with low corneal thickness were more likely to progress to glaucoma compared with those with thicker corneas.
- **Diabetes mellitus:** Is diabetes mellitus a risk factor for developing glaucoma? This is controversial. While some studies found an association between the two others did not. However, it is advised that once you are diagnosed to be diabetic you should have your eyes checked from time to time. Glaucoma is one of the eye diseases that should be examined for.
- **Systemic hypertension:** Is this a risk factor for glaucoma? The very informative Baltimore Eye survey³ found that younger hypertensive patients aged < 65 years had a lower risk of developing glaucoma. In the older hypertensives the risk was higher. The Barbados Eye studies found no association between the systemic hypertension and glaucoma²³.

However, when hypertension is overtreated this can lead to reduction in the blood supply to the nerve of vision worsening the progression of glaucoma in

patients who are also suffering from glaucoma. Overtreatment of hypertension in hypertensive glaucoma patients should therefore be avoided.

- Other conditions that have been identified as risk factors in various studies include **highcholesterol levels, migraine** etc. Further research is required to confirm these.

6.5 Clinical features:

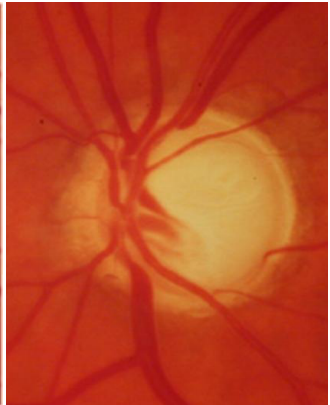
- It is a chronic disease of the optic nerve(nerve of vision).
- It has an insidious onset; slowly progress and is painless.
- It is a bilateral disease but can be quite asymmetric i.e. the extent of involvement is different for each eye
- Central vision is relatively unaffected until late in the disease. At first, the extreme edges of the field of vision are affected. If left untreated the impairment spreads until the central vision is affected. This sparing of the central vision until late into the disease and the painlessness of the disease are some of the reasons why many patients do not know they have the disease until it is quite advanced. By the time the patient presents to the clinic because of reduced vision due to glaucoma, he has lost more than 30-50% of the fibers that make up the nerve of vision. It has been reported that in Africa patients present very late and at presentation 50% of patients are already blind in one eye^{24,25}.
- When it becomes symptomatic the following are the possible symptoms: eye aches/ heaviness; reduced

vision, bumping into objects because of the constriction of the side vision; blindness

- To make a diagnosis of POAG:
 - ✓ the angles of the anterior chamber must be open. The test done to ascertain that is known as gonioscopy.
 - ✓ the eye pressure must be above 21mmHg at some time during the day. The level of eye pressure is essential in classifying the glaucoma not in diagnosis
 - ✓ There will be pathological cupping of the disc and characteristic visual field changes



Healthy disc



Glaucomatous disc

6.6 Investigations:

To diagnose and classify glaucoma, determine the extent of damage as well as monitor the progress of the disease, every glaucoma patient undergoes a number of tests each visit. The tests include:

- Perimetry(visual field analysis):This test gives information on the extent of the functional damage by the disease.
- Gonioscopy:This tells us whether the angles of the eye are open, narrow or closed. The fluid in the eye leaves the eyes through these angles
- Fundoscopy: During this test the back of the eye is examined for structural damage in the optic nerve that will help in diagnosing the glaucoma. This test is very important because the damage to the nerve of vision can be picked up several years before the machine for assessment of functional damage detects any abnormality. This test is however unable to pick up the earliest stages of structural damage before the patient becomes symptomatic. That is why, unlike cancer of the breast, open angle glaucoma is not a screenable disease.
- Pachymetry which gives information on the thickness of the cornea;
- Tonometry(measurement of eye pressure):
- Fundus camera (a photograph of the back of the eye for objective assessment of the nerve for diagnosis or monitoring of progression) and
- There are other more sophisticated tests which require very expensive machines.

In moderate to advanced cases of glaucoma which we see a lot in the clinic, most of these sophisticated instruments are not needed to make a diagnosis.

6.6.1 WITH ALL THESE DIAGNOSTIC TESTS DO WE NOW HAVE ENOUGH?

In spite of the advances in the diagnostic/monitoring tests for glaucoma, a lot of questions are yet unanswered.

- Why do some glaucomatous patients continue to lose vision in spite of the fact that their eye pressure has been reduced with treatment? It's possible that the measurement of eye pressure we get when they come to us in the clinic is different from what they have outside clinic hours. There may be peaks in pressure outside the clinic hours which are responsible for the progressive damage.

A special type of contact lens that will measure eye pressure throughout the 24 hour period in a day has been developed. There are ongoing studies to make it appropriate for clinical use.

- Till date, glaucoma is not detected until a considerable percentage of retinal ganglion cells have been lost through the process of neuronal 'apoptosis' or so-called 'programmed cell death'. Retinal ganglion cells are the cells in the back of the eye from which the fibers that make up the nerve of vision originate. This programmed cell death is one of the earliest hallmarks of glaucoma.

DARC (detection of apoptosing retinal cells)²⁵ is a new technology undergoing clinical trials in humans. It will help the doctor observe individual nerve cells dying in the living eye. If the trials become successful, this will provide a powerful clinical tool with which patients with glaucoma can

be diagnosed in the early stage before they lose vision. It should also help in monitoring the patients' treatment to assess their response to it.

6.7 Treatment:

Available glaucoma treatments are directed towards lowering eye pressure. This is because, currently, eye pressure is the only modifiable risk factor in glaucoma management. Its reduction has been shown, to be effective in preventing or slowing the deterioration of visual function. Lowering of eye pressure can be achieved medically, with the use of laser treatment; or surgically.

Every patient receiving glaucoma treatment of any type should be made to understand that the aim of the treatment is not to get him to see better BUT to help preserve what he presented to the doctor with.

6.7.1 Medical treatment of glaucoma: This is the most common form of treatment for glaucoma. There is an armamentarium of drugs for the medical treatment of glaucoma. These include the:

- **Prostaglandin analogues** (e.g. Latanoprost-xalatan; Bimatoprost- Lumigan; Travoprost-Travatan): are now the most prescribed glaucoma treatment worldwide. It is applied once a day and at night so compliance with it is very good.

A bottle costs about N3,500 –N4,500.

- **Beta-adrenergic antagonists**(non-selective and selective e.g. Timoptol 0.5%, Betaxolol 0.5% etc). These are the second most often used class of drugs for glaucoma treatment worldwide. It is applied twice daily. It is cheaper than Xalatan.

A bottle of Timolol costs almost N1,000.00.

- **Alpha₂-adrenergic agonist** (e.g. Brimonidine (trade name: Alphagan))
- **Carbonic anhydrase inhibitors:** These are available as eye drops (Trusopt, Azopt) as well as tablets [Diamox (acetazolamide) and Neptazane (methazolamide)].
- **Parasympathomimetic (miotic) agents** e.g. Pilocarpine eyedrops, ecothiophate iodide eyedrops;
- **Hyperosmotic agents** (e.g. intravenous mannitol etc);
- **Combined medications** can offer an alternative for patients who need more than one type of medication. In addition to the convenience of using one eyedrop bottle instead of two, there may also be a financial advantage.

Combined medications include Cosopt (timolol and Trusopt); Combigan (brimonidine and timolol); Xalacom (Xalatan and Timoptol) etc.

Many patients require more than one drug to control their eye pressure, and despite effective current therapies, they don't work for all patients. For such patients, another treatment option should be tried.

The medical treatment of glaucoma is for life.

6.7.2 Laser Treatment:

This is indicated in patients who cannot tolerate medications or for whom medication alone has not been adequate in achieving the target eye pressure.

Laser may also be used as an initial treatment for glaucoma.

However, the effect of laser treatment is typically not permanent, and many patients will eventually require medications.

The most common laser treatments for glaucoma are argon laser trabeculoplasty (ALT), selective laser trabeculoplasty (SLT) and newly, microPulse laser trabeculoplasty (MLT).

They all lower the eye pressure by increasing the drainage of fluid from the eye.

Laser treatment in the country now is mostly available in privately owned hospitals and on average, cost about N30,000- N50,000 per treatment.

- a. Argon laser trabeculoplasty: This is the oldest of the three.
- b. Selective Laser Trabeculoplasty, or SLT²⁶:
 - It may take 1-3 months for the pressure-lowering results to appear.
 - This type of laser uses minimal heat energy absorption.

-Following the laser treatment, there can be a rise in eye pressure. It is a common complication but it is mild. It usually goes away after 24 hours.

-SLT lowers the eye pressure by about 30% when used as initial therapy. This is comparable to the pressure lowering effect of the most powerful and commonly used class of glaucoma medications(the prostaglandin analogues).

This effect may be reduced if the patient is already on glaucoma medications.

-The effect of SLT will generally last between 1-5 years. If it does not last at least 6-12 months, it is usually not considered successful.

- When it wears off over several years, the procedure can be repeated but the second treatment may not be as effective as the first and may not last as long.

If SLT is not initially successful, repeat treatment is not likely to be effective. Alternatively, glaucoma medication can be used if the effect wears off over time.

-If SLT fails to lower the IOP, then the glaucoma is treated by other means. The laser does not affect the success of these other types of treatment.

-Some patients can be controlled with just laser treatment. Others require additional pressure lowering and may therefore need to use glaucoma medication as well.

Just as some patients will require more than one glaucoma medication to control their eye pressure, some may also require laser plus one or more glaucoma medications.

- c. **Micropulse Laser Trabeculoplasty (MLT):** This is the newest form of laser surgery.

6.7.3 Surgical treatment:

The available options are trabeculectomy, viscocanalostomy, shunts and the newer ones.

Trabeculectomy is the commonest glaucoma surgery. Surgery is the only form of treatment that can keep the eye pressure permanently low, once it is successful. The success rate of glaucoma surgery is now very high with the introduction of the antiproliferative agents.

The feared 'wipe out syndrome' (where following surgery the patient loses all the remaining vision he had) are seen in those with very advanced glaucoma.

Unfortunately, surgery is the most feared treatment option. Most of our patients do not accept surgery until the disease is far-advanced and then they expect to get their vision restored after the surgery. NO, IT IS NOT POSSIBLE. Surgery only tries to preserve what visual field you presented to the doctor with.

Following a successful surgery, the patient's hospital visits reduce improving the patient's quality of life as well as reducing cost.

Surgery further reduces the fluctuations in eye pressure which still occurs with drugs. Successful surgery takes care of compliance and fake drug issues that are associated with medical treatment of glaucoma.

For these reasons, surgery is actually recommended as a firstline treatment for glaucoma in the developing countries.

Due to the sight-threatening complications associated with trabeculectomy however, new surgical options have been developed by medical device companies, in an effort to achieve lower eye pressure with fewer complications. In spite of the potential advantages of these new surgical options, so far there are limited data to support their long-term efficacy and the clear indications for these procedures are still being determined.

The **viscocanalostomy** is another surgical procedure for glaucoma. It's not as effective in pressure lowering as trabeculectomy but it has fewer side-effects.

6.7.4 DO WE HAVE ENOUGH GLAUCOMA TREATMENTS CONSIDERING THE LONG LIST OF AVAILABLE OPTIONS?

a. New glaucoma drug: As a result of the limited pressure-lowering effect(15- 30% reduction) of most currently available medications for glaucoma there is often a need to use more than one drug in patients. Research is therefore still on for a safe drug that will give lower eye pressure to halt progression of the disease.

Rho kinase(ROCK)inhibitors are a new class of drugs still being studied for use in glaucoma patients.

b. Neuroprotection: To address the treatment of those patients who continue to lose vision in spite of reduced eye pressure, some researchers have looked away from eye pressure to mechanisms that cause retinal ganglion cells to degenerate and die²⁰. The retinal ganglion cells, if we recall, are the cells of origin of the fibers of vision.

A number of therapies are being tried for preventing degeneration of retinal ganglion cells and optic nerve(neuroprotective agents); others at **regrowing** retinal ganglion cell axons down the optic nerve towards the brain, termed “regeneration”, and still others at **replacing** retinal ganglion cells altogether.

If this neurologically-based research succeeds, future glaucoma treatments may not only prevent glaucoma from stealing patients' sight, but may actually restore vision.

c. Stem cell therapies for the treatment of glaucoma are in the planning stages too.

6.7.5 Alternative Medicine²⁷⁻²⁹:

This may be defined as non-standard, unconventional treatments for glaucoma²⁷.

We ophthalmologists are often confronted with the question: ‘Doctor, is there anything else I can do other than putting eyedrops regularly, to prevent my eyes from becoming blind from glaucoma?’

In this era of so much advertisements and activities by alternative medical practitioners, patients also come up with all sorts of enquiries about some therapies and practices. If we ignore them they’ll be misled.

It is estimated that 5-15% of glaucoma patients, reportedly spending billions of dollars annually, take some form of alternative medication based only on their impression that it will help treat their glaucoma²⁷.

Let’s take a critical look at some of these alternative therapies:

- a. Regular exercise: There is some evidence suggesting that regular exercise can reduce eye pressure on its own, also improve blood supply to the optic nerve and can also have a positive impact on other glaucoma risk factors including diabetes and high blood pressure.

These exercises include aerobics, riding stationary bikes and brisk walks

However, it is not yet known whether these exercises only lower the eye pressure or in addition prevent visual field loss.

In Yoga and recreational body inversion in which individuals assume a head-down or inverted position there is a potential for increased eye pressure so patients should be careful with such exercises.

Note of warning:

-Some forms of glaucoma (such as closed-angle) are not responsive to the effects of exercise, and

-And remember –as useful as regular exercise may be it cannot replace medications or doctor visits! It is only your eye doctor that can assess the effects of exercise on your eye pressure.

- b. Homeopathic Remedies: Those who advocate the use of homeopathic medicine believe that patient's symptoms represent the body's attack against disease, and that substances responsible for the symptoms of a particular disease or diseases can help the body ward off illness²⁸. Homeopathic remedies have not been proven to be safe or effective in the management of glaucoma.

c. **Holistic Treatments:** Holistic medicine is a system of health care which aims at assisting individuals in harmonizing mind, body, and spirit. Good nutrition, physical exercise, and self-regulation techniques including meditation, biofeedback and relaxation training are some of the popular therapies.

Holistic regimens are a part of a good physical regimen, however, their usefulness in the management of glaucoma is still not proven.

d. Meditation and acupuncture techniques: Acupuncture is also being used in different parts of the world as one of the alternative therapy for management of glaucoma. There is no evidence that these methods are effective for managing glaucoma.

e. **Eating and Drinking:** Even though no conclusive studies prove a connection between specific foods and glaucoma, it is reasonable to assume that what you eat and drink and your general health have an effect on the disease.

- **Caffeine intake and glaucoma:** Some studies have shown that significant caffeine intake over a short time can slightly elevate intraocular eye pressure (IOP) for one to three hours. However, other studies indicate that caffeine has no meaningful effect on IOP²⁷.

To be safe, people with glaucoma are advised to limit their caffeine intake to moderate levels.

- **High volume water intake and glaucoma:** Many dietary programs these days stress the importance of drinking at least eight glasses of water daily.

Studies have also shown that as many as 80% of people with glaucoma who consume an entire quart of water over the course of twenty minutes experience elevated IOP, as compared to only 20% of people who don't have glaucoma²⁷.

To be safe, people with glaucoma are encouraged to consume water in small amounts throughout the day.

- **Alcohol intake and glaucoma:** Weak evidence indicates that alcohol consumption leads to dose-related reduction in eye pressure which may last for several hours through temporary osmotic effect²⁸.

However, intake of large quantities of beer definitely increases eye pressure significantly due to volume overload.

It has been reported that red wine has some 'neuroprotective' effect therefore consuming it may have some cardiovascular benefits. Remember, consuming it also increases the risk of liver disease.

We hereby discourage the belief that drinking alcohol may reduce your risk of developing glaucoma.

- **Marijuana and glaucoma:** Marijuana lowers eye pressure. The active ingredient in marijuana reduces eye pressure by reducing aqueous humor production. The pressure-lowering effect of marijuana is for short term and one needs to smoke marijuana every 3 hours for 24-hour IOP control.

We must note that the use of marijuana for glaucoma management is not a feasible option either for medical or

legal reasons, as it may actually do more harm to other parts of the body.

- Dietary antioxidants/Nutritional supplements: Recently, there is a lot of information on 'healthy eating' with a considerable interest in dietary antioxidants (e.g., red wine, dark chocolate, coca, green tea, curcumin, glutathione, etc) because oxidative stress may induce damage to the outflow channel for the fluid in the eye as well as to the optic nerve²⁸. Antioxidants are substances that protect the eyes against some of the bad effects that can be caused by oxygen in the atmosphere.

Curcumin (used widely in India) having antioxidative property has shown possible beneficial effects on altering various mechanisms like oxidative stress etc.

Ginkgo biloba and *bilberry* (shrubs that yield a fruit resembling blueberries):

***Ginkgo biloba* is claimed to improve the blood supply to the optic nerve.**

The main components of the *Ginkgo* leaf extract are flavonoid glycosides and terpene lactones. *Ginkgo* is thought to mediate its effects through several biological mechanisms including antiplatelet action, vasodilation, and antioxidant effect. There is little data regarding the effect of *Ginkgo biloba* on the course of glaucoma. A placebo-controlled randomized controlled trial (RCT) found that *Ginkgo biloba* improved preexisting visual field loss in some patients with normal tension glaucoma. Further research is needed in this area.

Bilberry is most often advertised as an antioxidant eye health supplement. *Bilberry* extracts contain high

quantities of anthocyanin, a flavonoid with antioxidant properties.

Advocates claim it can protect and strengthen the capillary walls of the eyes, and thus is especially effective in protecting against glaucoma, cataracts, and macular degeneration.

There is some data indicating that bilberry may improve night vision and recovery time from glare, but there is no evidence that it is effective in the treatment or prevention of glaucoma.

*Other herbs and plants*²⁸: Various other herbs and plants have been proposed in various parts of the world and they are discussed in recent World Glaucoma Association Consensus book on medical management of open angle glaucoma.

However, there is no strong evidence suggestive of beneficial effect of dietary antioxidant intake and its neuroprotective effect on POAG. Further research is needed in this direction.

One cannot, therefore, at this time, promote antioxidant intake as a strategy to prevent the development of POAG or slow down its progression.

Carrots were always thought to be good for protecting vision.

But, according to Steven G. Pratt, MD, Senior Staff ophthalmologist at Scripps Memorial Hospital and Assistant Clinical Professor of Ophthalmology at the University of California, San Diego - carrots may be good

for you but they do not play as big a role in vision as once thought.

The explanation is that they are high in beta-carotene, which is also an antioxidant. Beta-carotene, even though an antioxidant, is not usually found in the eye so carrots' ability to protect vision may actually be limited.

Spinach, on the other hand, contains high amounts of the antioxidants, lutein and zeaxanthin which are nutrients that are found in high amounts in your eyes, in fact, in higher amounts than all others.

Nutritional supplements: Supplements are vitamins, minerals, or herbs that you can buy and take as a way of adding to the nutrition you already get from your daily diet.

The American Heritage College Dictionary defines the word "supplement"³⁰ as "something added to complete a thing, make up for a deficiency, or extend or strengthen the whole."

They usually come in tablet or capsule form but some are a powder that you can mix into a drink.

We have been made to believe that a lot is missing from our daily diet so the use of supplements is now on the increase. This may not be far from the truth because, in the process of refining our foods many important nutrients have been processed out.

The Europeans started supplementing their diet a long time ago. The Chinese have been using herbal remedies for thousands of years. Americans realized this not too long ago and have now flooded the market with all sorts

of supplements. In America now, the 'Supplement business' has grown into a multibillion-dollar industry in the last decade²⁷.

Potentially useful antioxidant medications include, Vitamin A(as beta carotene), Alpha-lipoic acid, Vitamin C, beta-Carotene, Vitamin E, lutein, zinc, selenium, melatonin, glutathione, green tea, grape seed extract, resveratrol, fish oil, and omega-3.

Common fruits and vegetables are also antioxidants. However, none of these has passed the demands of clinical studies.

Note of warning:

Vitamins A, C and E, Zinc etc are antioxidants which help protect our eyes. As good as these may seem, it is possible to overdo it. There are dangers of taking too much of a given vitamin or supplement.

Too much²⁸⁻²⁹:

- Vitamin A can cause you to have headaches, vision problems, nausea, vomiting, dry and flaking skin, or even enlarge your liver or spleen.
- Vitamin C may cause nausea, diarrhea, reduced selenium and copper absorption and increased kidney stone formation. Taking too much vitamin C could even cause you to have a false-positive reaction to diabetes tests. And some studies have shown that vitamin E (in supplement form) can actually raise your cholesterol.

- Zinc in your diet could cause a mineral imbalance and
- Chromium can result in iron deficiency anemia.

Even though vitamins and supplements are good for us we should not abuse them. Always check with your doctor and make sure you're taking the proper amount.

There's as yet no governmental control over this supplement industry, so there's even some concern among doctors that what's on the label may or may not be what the patient is really getting in the bottle.

Good Nutrition: The ideal way to ensure a proper supply of essential vitamins and minerals is by eating a healthy, well balanced diet.

f. Lifestyle²⁷: There's some weak evidence that certain lifestyles may cause an increase in eye pressure thus predisposing an individual to primary open angle glaucoma.

A person playing high wind musical instruments (eg, Saxophone) can have two-fold increase in his IOP from baseline level for short duration. It is not yet confirmed that playing such instruments could predispose the person to glaucoma but a glaucoma patient who plays such instruments should be informed about the possible effect on eye pressure.

Prolonged stress with increase in endogenous cortisol and catecholamines and subsequent alterations of the immune response may increase the eye pressure.

7.0 WHEN TREATMENT HAS FAILED

When treatment fails glaucoma progresses to cause low vision or blindness. Glaucoma is one of the common causes of low vision and blindness.

People with low vision have some useful sight, however, they have a hard time accomplishing daily tasks such as reading, cooking, driving, recognizing people's faces and discerning colour.³¹ Low vision interferes with the ability to perform everyday activities³².

In glaucoma-related low vision the patient has mobility and reading problems due to restricted visual fields; patients with severe glaucoma also report that people suddenly appear in their visual fields.

The glaucoma patient who is blind or has low vision should be rehabilitated visually to help him achieve physical, social, emotional, spiritual independence.³¹ There are many ways of achieving this. They include occupational therapy, use of devices that would help the patients achieve higher standards of living such as video magnifiers, peripheral prism glasses, closed circuit television(CCTV), electronic badges with alert systems, virtual sound systems, smart wheelchairs etc.

Mobility training enables the patient to live independently by training the patient to become more mobile. Training methods include the 3D sound virtual reality system, talking Braille RFID floors.

The home skills training allows patients to improve communication skills, self-care skills, socialization skills, vocational training³³. Visual rehabilitation of the patient with low vision or who has gone blind is one neglected area in

our country. Presently, there's isn't much we do to rehabilitate them. This confirms the report by Pararajasegaram³⁴ that the coverage of low vision care is low. Where the services are available the uptake has remained low even in most industrialized countries. In low income countries the coverage is almost negligible³⁴. This is partly due to lack of awareness about the importance of low vision services among professional groups involved in the delivery of eye care and the community.

According to the report of the Nigerian national survey on blindness in 2009¹⁷, while there are over one million people blind Nigerian adults there are 4.25million with low vision. In studies done in Nigeria, glaucoma was the most important cause of low vision^{35,36}

There is an urgent need for establishment of low vision/rehabilitation units in various accessible parts of the country in Nigeria. The ophthalmologists who manage these patients should also help in creating awareness about the importance of these units, advocate for their establishment as well as encourage utilization of same when and where available.

8.0 SO MUCH HUE AND CRY ABOUT THIS DISEASE CALLED GLAUCOMA- DOES IT DESERVE IT?

A: THE MAGNITUDE OF THE DISEASE

Glaucoma is a disease of public health importance.

It is estimated that only one-half of those affected with glaucoma in developed nations are aware that they have the disease, and as many as 90% of people with glaucoma in underdeveloped countries³⁷ are unaware of having the disease or have not even heard of glaucoma. This is scary.

B: THE PSYCHOSOCIAL IMPACT OF THE DISEASE

Apart from glaucoma being a huge problem from the number of people affected, it also has a severe impact on sufferers.

Bilateral glaucoma has been reported to reduce mobility performance of sufferers³⁸. The level of fear associated with going blind is something that is often underrecognised in these patients.

From studies³⁹:

- Twice as many respondents feared going blind above having a heart attack or dying
- Respondents were 50% more likely to talk to their doctor about blood pressure compared to eye pressure

Patients would rather be deaf, dumb or crippled than blind. Some of my patients have even told me that they would rather die than go blind!

Glaucoma does not just affect patients' ability to carry out physical tasks such as walking, driving and reading, but it also affects their mental health. It can cause depression, social withdrawal due to impaired vision and increased fear of blindness³⁹.

Studies have shown that even in the mild stage of the disease, glaucoma can affect the patient's vision-related quality of life^{39,40}. This impact becomes increasingly significant as the disease progresses and in patients in whom both eyes are affected.

The impairment of quality of life associated with decreased visual ability extends to undiagnosed as well as diagnosed patients. In a study, impact on quality of life was reported in

three-quarters of those affected with glaucoma who were not even aware they had it³⁹.

To help quantify the physical impairment that glaucoma can cause, the report³⁹ further detailed that, when compared to a control group with similar systemic medical conditions, glaucoma patients were:

- More than 3 times likely to have fallen over in the last 12 months
- More than 6 times as likely to have been involved in one or more motor-vehicle collisions over 5 years, and more likely to be at fault

The benefit of early intervention in glaucoma cannot be overemphasized considering the fact that it not only affects the quality of life of those with severe disease, but also those with milder disease.

C: THE ECONOMIC IMPACT OF THE DISEASE

Again, glaucoma has a great impact on the economy of every nation or society.

Its prevalence contributes to significant costs that are both direct and indirect.

Direct costs of an eye disease are those of the treatment of the disease including relevant proportions of costs for running medical and allied health services, pharmaceuticals, research and administration³⁹.

The indirect costs include lost earnings of visually impaired people and their caregivers and costs for visual aids, equipment, home modifications, rehabilitation which include

*guide dogs, nursing home care, welfare payments, lost taxation revenue and the pain, suffering and premature death that can result from visual impairment*³⁹.

Additionally, in the developing countries, direct nonmedical costs include transportation and accommodation where the patient has to travel a long distance to get to the hospital.

For the approximately 2 million US citizens and 300,000 Australian citizens with glaucoma, the direct cost estimates are \$2.9billion and Aus\$144.2 million respectively. This might even be underestimates if all patients were to be treated as about half of the patients are undiagnosed⁴¹.

Regarding major eye diseases in the United States, It was also recently estimated that 17.8% of the direct medical costs were attributable to patients with glaucoma. Given that the annual total direct medical costs for these disorders were estimated to be \$16.2 billion this represents quite a substantial portion. With ageing of the US population and consequent increase in medical care for glaucoma the challenge involved in meeting these costs will undoubtedly increase⁴¹.

A study in the United States also reported a 4-fold increase in direct ophthalmology-related costs as the severity of the disease increased. While the average direct cost per patient per year was \$623 for the patient with ocular hypertension/earliest glaucoma it rose to \$1,915 and \$2,511 for the patient with advanced glaucoma and endstage glaucoma/blindness respectively. At all the stages, the majority of costs were medication-related⁴¹.

A similar trend was observed in Europe, where direct costs of treatment increased by approximately €86 for each incremental increase in glaucoma stage, ranging from €455

per person per year in the ocular hypertensive stage to €969 per person per year for the far advanced glaucoma patient. Medication costs ranged from 42% to 56% of direct costs at each disease stage⁴¹.

In France and Sweden, total annual direct treatment costs per patient in a cohort in whom the majority was in early stages of glaucoma, were estimated to be €390 and €531, respectively. Medication costs comprised nearly half of total costs in both countries⁴¹.

Late disease leads to greater **indirect costs** (eg, family/home help and rehabilitation costs) that become the predominant driver of overall costs. Indirect costs reflect lost productivity, such as days missed from work, and can include the productivity costs borne by caregivers such as family members and friends⁴¹. In the United States, glaucoma accounts for 10 million visits to physicians each year⁴²

The **annual direct health care cost** of glaucoma-related blindness has been estimated to be between €429 and €523 per patient in Europe. When rehabilitation costs and costs to families are included the annual total health care costs rise to between €11, 758 and €19, 111⁴¹.

In 2005, the **annual health care costs** of individuals with late-stage glaucoma were on average €830 per patient across France, Denmark, Germany, and the United Kingdom; assistance in the home accounted for the largest proportion, ranging from €633 in Germany to €4,878 in France⁴¹.

In terms of **social security benefits, lost income tax revenues** and **health-care expenditures** cost to the US government is estimated to be over \$1.5 billion annually⁴³.

The study by Adio et al (*Adio AO, Onua AA. Economic burden of glaucoma in Rivers State, Nigeria. Clin Ophthalmol 2012;6:2023-31*) to determine the economic impact of glaucoma on Nigerian patients seen in a hospital in Portharcourt, Rivers State, Nigeria, reported that the average cost of medications was USD40 per patient per month. When the direct non-medical and indirect costs were included the cost rose to USD105 per patient per month. On the treatment of glaucoma, the middle income earner therefore spent over 50% of his monthly income while the low income earner spent all.

The study further reported that in Nigeria, the total annual direct treatment costs for those already blind was USD3,064,587. This was in addition to the USD 4.1 million being spent yearly on medical treatment by those who were visually impaired by glaucoma.

Remember that these costs were exclusive of the indirect cost of visiting all the synagogues, temples and prayer houses in the country!

With the ageing population and the number of glaucoma patients that will increase as a result of that, the economic burden of glaucoma will, no doubt, increase with time.

D: GLAUCOMA AS A NON COMMUNICABLE DISEASE (NCD)

According to WHO, vision impairment mostly due to cataract, refractive errors and glaucoma account for 3% of the global dalys⁴⁴, much more than unhealthy diet (1 - 2%) and physical inability (2.1%) which are currently enjoying attention of the global health community for control⁴⁴.

DALYs are a measurement of time lived with a disability combined with time lost due to premature mortality.

The noncommunicable eye diseases, even though, not directly associated with high mortality rate have significant DALYs which should bring them into prominence for prevention and control by integration into the control activities for the major NCDs (cancer, cardiovascular diseases, diabetes etc).

9.0 MANAGING GLAUCOMA IN A RESOURCE-POOR SETTING

Many factors make management of glaucoma in developing countries very challenging.

I will be referring to sub-Saharan African countries and Nigeria in this discussion.

a. Lack of awareness of the disease:

To reduce blindness and visual impairment from glaucoma early diagnosis and appropriate treatment are necessary.

Yet many people in our country do not have regular eye checks. This is partly due to lack of awareness/knowledge of the disease. It is estimated that as many as 90% of people with glaucoma in underdeveloped countries³⁷ are unaware of having the disease or have not even heard of glaucoma.

To confirm these, studies from Sub-Saharan Africa reported that 98.5%⁴⁵, 90.2%⁴⁶ and 87.1%⁴⁷ of participants in glaucoma surveys in Kongwa, Tanzania; Hlabisa, South Africa and Temba, South Africa, who had glaucoma did not know that they did.

Among Nigerians, studies have equally reported low levels of awareness and knowledge of glaucoma^{48,49}. As a result of

this, up to 50% of glaucoma patients are already blind in one eye at presentation in Africa³. Eye health education that influences people to participate in regular eye check and counselling are important for early detection of glaucoma.

In 2008, the World Glaucoma Association(WGA)and the World Glaucoma Patient Association (WGPA) initiated the annual global observance of a day(World Glaucoma Day), now a week(World Glaucoma Week), in the month of March for activities that will raise the awareness of glaucoma. The week consists of the sum total of local, regional and national initiatives and events organised by willing groups and individuals around the world. The activities include media campaigns, public-oriented events(e.g. screenings in public places); and institutional events(open doors day at eye clinics and universities, with lectures addressed to both professional and lay audiences). It would be interesting to know the impact the annual observance of the World Glaucoma Day for the past six years has made on the level of awareness of glaucoma in our society.

b. Poor access to eye care service:

Like most sub-Saharan African countries, health care is available through several services in Nigeria, the major one being the public health service. These public services in most instances focus on providing curative care.

The role of private hospitals are on the increase especially in the urban settings⁵⁰. Informal private providers which include the patent medicine dealers also provide service and medications⁵¹.

Traditional healers are widely patronized in many settings⁵²⁻⁵⁶.

Primary health care is also an approach that enables a full range of health care with prevention equally important as cure, from households to hospitals⁵⁷.

Specialist eye care services and equipment required to reliably diagnose and manage the major causes of vision impairment are generally available in only tertiary and some secondary services. These conditions, which include cataract, refractive error, diabetic retinopathy and glaucoma, usually have a gradual onset. The affected individuals may not experience or notice symptoms. When they do they may use traditional medicine, self-medicate or cope with it. Thus, their presentation to eye care service may be delayed leading to complications and even irreversible visual loss. Individuals with these conditions would benefit from earlier identification, counseling and referral.

Other factors responsible for delays in presentation of sight-threatening conditions, include lack of finances and/or ignorance at the community level that interventions are available. This can be compounded by lack of awareness of the availability of appropriate management and specialist eye care services even within the health sector.

Poor access to eye care is one of the major reasons for the unmet needs in eye care in Africa.

To facilitate access to eye care, the WHO considered integrating eye care as a key element of primary health care, in the 1978 Alma Ata declaration⁵⁷.

However, in the literature there is paucity of evidence on the effectiveness of this approach^{58,59}.

In 1984, WHO recommended primary health care approach to address issues of access to eye care service⁵⁷. This includes appropriate management of eye conditions at the primary care level with cascading levels of referral for more complex conditions.

From 1999 the VISION 2020 Initiative^{60,61}, became the dominant guide for eye care⁶². VISION 2020 focuses on priority blinding conditions with the goal of the elimination of avoidable blindness and visual impairment by the year 2020. Primary eye care as an integral part of primary health care was recommended as a key strategy that included “promotion of eye health and/or the provision of basic preventive and curative treatment for common eye disorders”.

The primary health care system thus eye health has been greatly challenged by ‘often fragile, fragmented and under-resourced systems’⁶³.

In May 2013, the 66th World Health Assembly unanimously approved the **Global Action Plan(GAP)**⁶⁴ for Universal Eye Health towards the Prevention of Avoidable blindness and visual impairment between 2014-2019.

The GAP is a commitment endorsed by all WHO member states. Its goal is to reduce avoidable visual impairment as a global public health problem by 25% and to secure access to rehabilitation services for the visually impaired.

The purpose of the action plan is to achieve the goal by improving access to comprehensive eye care services that are integrated into health systems.

Universal Health Coverage and thus Universal Eye Health was defined by WHO as ‘ensuring all people have access to needed promotive, preventive, curative and rehabilitative health services, of sufficient quality to be effective, while also ensuring that people do not suffer financial hardship when paying for these services’. This means all people should

enjoy access to the best quality health care without risk of impoverishment.

The vision of the global action plan is similar to IAPB's 'a world in which nobody is needlessly visually impaired, where those with unavoidable vision loss can achieve their full potential and where there is universal access to comprehensive eye care services'.

GAP is now the most strategic document in eye health. It builds upon and replaces previous Vision 2020 and GAP 2009-2013 action plans.

In Nigeria, the current situation of eye care service in the country makes every Individual's eye health solely his business. As we all know, in Nigeria, any business which is perceived as 'income- degenerating' rather than 'income-generating' is relegated to the background even if it is health-related.

In running an eye care programme which makes eye care accessible to all, in West Africa, we have a model in The Gambia. There is a structured and effective eye care delivery service at the three levels of primary health care delivery(primary, secondary and tertiary).Within the community the 'nyateros'(which means 'friends of the eye')who are community members who live within the community are equipped to be responsible for the eyes of certain numbers of households. They visit these families from time to time to detect or identify any eye problem they may have. When they do they refer them to the village health post. Depending on how severe the problem is the patient may be treated there or referred to the next higher level with more qualified eye health care workers. Patients who have had eye surgeries are also visited by these 'nyateros' to ensure they are using their drugs as prescribed

and to identify any complication if present to refer accordingly.

Diseases that cannot be handled at the community level are referred to the next primary level. Those at the primary level are trained to handle some eye diseases, beyond that they refer the patient to the secondary level. At this level you find ophthalmic nurses and the ophthalmologist pays supervisory visits to these centers quarterly. The tertiary hospital handles the specialist and complicated cases.

This confirms that if effective, the primary health care approach to eye care delivery makes eye care accessible to everyone.

c: Unaffordable cost of diagnosis and treatment:
Glaucoma is an expensive disease in all aspects.

Diagnosis of glaucoma:

While cataract can be diagnosed with a simple pen torch(N100.00) and direct ophthalmoscope(N50,000.00), to diagnose glaucoma, we need the following:

- a. Direct ophthalmoscope(N50,000)
- b. Volk lens(N30,000.00)
- c. Slitlamp biomicroscope(N650,000 –N3.5 million depending on the model)
- d. Tonometer(may come with the slitlamp or when alone: N50,000-N95,000)
- e. Goniolens(N30,000.00)
- f. Perimeter(N1million to N2.5million)
- g. Pachymeter(N650,000 to N800,000)
- h. Fundus camera(N1million)(*optional*)
- g. OCT machine(N3million)(*optional*)
- *h. HRT(*optional*)
- *i. GDxVCC(*optional*)
- **Not available anywhere in Nigeria.*

To fully equip one unit to be able to diagnose glaucoma, a whopping sum of at least N10 million is needed! Most of our

government-owned hospitals cannot afford that. Private hospitals where you find most of these instruments now charge highly to be able to recover the cost of their instruments. When the charges are high, who then can afford those services? The rich and sparingly, the middle income group. The poor who constitute a majority of our patients are naturally excluded.

Treatment of glaucoma:

Medical treatment: We have discussed the cost of drugs under the 'ECONOMIC IMPACT OF THE DISEASE'.

Laser treatment: The laser machine alone costs about \$800,000 to \$1,000,000! (*Anecdotal information*). This is equivalent to about (N150-170million). This machine is therefore rarely seen in any government-owned hospital. How much will a doctor in private practice who has bought this machine charge his patients for each session of treatment? How does he ensure that he gets enough patients to recover his money and still make some profit? How many patients can afford N50,000.00 per session of laser treatment? Will the doctor now advise patients on choice of glaucoma treatment based on his objective to recover his money? In other words, will he now be recommending laser for every glaucoma patient that comes into his clinic, whether he needs it or not, in order to recover his money?

At the end of the day, the patient bears the cost.

Surgery: On the long run, this is the cheapest form of treatment for the glaucoma patient. For glaucoma surgery you need:

- An operating microscope(N650,000- N2.5million)

- Glaucoma operating set(N60,000- N120,000.00).

The surgery itself costs about N50,000- N80,000 in government-owned hospitals.

These instruments can last for many years and be used for several patients. Where there is a large volume and high

turnover of patients the cost of the instruments can be recovered over time.

Once the surgery is successful (meaning that the eye pressure is sufficiently low based on the estimated target pressure), the patient may not need to be on drugs anymore. If at all he requires any it will be just one or two medications compared to the three or four he was on before surgery.

d: Low socioeconomic status:

A majority of patients seen in the glaucoma clinic are poor. Poverty is associated with the development of myriad health conditions. Is glaucoma one of them? Does poverty lead to glaucoma?

Studies in the United Kingdom and Canada have shown that those in lower socioeconomic classes are more likely to present with more advanced glaucoma at the time of the initial diagnosis⁶⁵.

Lower utilization of eye care services is also seen among those in the lower socioeconomic class as well as those with lower educational attainment⁶⁶.

Poverty could therefore be said to worsen glaucoma because it leads to low literacy level, low utilization of eye care services and nonadherence to medications.

e. Poor compliance/nonadherence to drugs:

Medical therapy is generally the most preferred treatment for glaucoma because the risks are low and nonserious. Even when side effects occur they are reversible. However, its major disadvantage is that it is subject to noncompliance. Goldberg defined non-compliance as 'the intentional or accidental failure to follow a doctor's directions in the self-administration of any medication'⁶⁷.

Adherence is defined as the extent to which patients are able to follow the recommendations for prescribed treatments (Vrijens B, De Geest S, Hughes DA, et al. A new

taxonomy for describing and defining adherence to medications. *Br J Clin Pharmacol.* 2012;73(5):691–705.)

Research has shown that patients with chronic medical conditions take only 30-70% of prescribed medication doses and 30-50% of patients will stop taking their medication in the first months of therapy⁶⁸.

A literature review⁶⁹ that looked at 34 studies of adherence to antiglaucoma drugs found nonadherence rates ranging from 4.6% to 80%.

When the low levels of adherence to glaucoma medication regimens are taken into account, as much as 80% of glaucoma patients in the US population may actually be untreated.^{70,71}

Nonadherence to glaucoma therapy results in failure to lower the eye pressure satisfactorily. It can also negatively impact on therapeutic choice by leading the doctor to believe that a drug is not working and unnecessarily switch to another drug or treatment option.

Reasons for nonadherence are multifactorial and vary from patient to patient. In general though, 4 types of barriers have been identified⁷²: medication regimen, patient factors, provider factors, and situational or environmental factors.

The results of a survey of 50 patients with glaucoma⁷³, presented at the American Academy of Ophthalmology, specifically identified the following as causes of nonadherence:

a. Side effects of drugs (24% of respondents);

b. Lack of information about glaucoma (22%): Glaucoma eyedrops often have visible side effects such as redness of the eyes or changes to periocular skin that are irritating or cosmetically unacceptable to patients to justify continuing their use. Due to the lack of understanding of the nature of the disease.....glaucoma is asymptomatic and its damage may go undetected for several years - and because the

results of treatment are not obvious, patients may feel that medications are not necessary and therefore may be less willing to tolerate side effects.

c. Difficulties in understanding information and in patient-doctor communication (14%):

Health literacy (or the ability to understand health-related information) has been shown to play a role in adherence to antiglaucoma therapy. Glaucoma patients with poor health literacy are less likely to adhere to medication dosage schedules, and more likely to miss scheduled appointments⁷⁴.

Difficulty understanding information may occur because eye medications often have complicated regimens requiring multiple applications that can be confusing, particularly for those with imperfect cognition such as the elderly.

The physician should ensure that patients understand both the medication they are using and the disease being treated. Communicating the fact that any side effects experienced are generally short term and reversible can be very effective in convincing patients to stay with a prescribed therapy.

Furthermore, offering advice about ways to avoid side effects - including dosing minimization, wiping away excess medication, and timing of dosing -- can make a difference between success and failure with a prescribed regimen.

d. Difficulties in administering the treatment (14%): With glaucoma therapy, there are some unique challenges, with its administration as an eyedrop. For example, topical eyedrop administration can be a difficult task for any age group, but for the elderly, it is especially challenging. This is because the level of manual dexterity and adequate vision

required to easily open the bottles and administer the drops may not be present. Bottle sizes are small and may be difficult to hold, and medication labels often contain small font sizes that are difficult to read.

A study⁷⁵ presented at the American Academy of Ophthalmology, which looked at the force required to press the thumb and first two fingers together in 279 patients observed that age and loss of force were correlated. The proportion of patients (12.9%) who could not generate the force needed to squeeze the drops out of the bottle was highest in the oldest subgroup (ages 60-99 years).

e. Lack of financial resources to acquire eyedrops (10%): Limited income, premature depletion of drop volume, and unanticipated expenses may impede therapy.

f. Patients' beliefs and attitudes (10%).

g. Another reason is forgetfulness. Remembering to take a daily medication is one of the challenges in the treatment of any chronic condition, and glaucoma is no exception.

To improve patient adherence to their treatment, regimens should be simplified, doctor/patient communication improved, patients educated better on the disease. In addition, the doctor should, be aware of the patient needs(e.g. financial constraints) as well as open to patient concerns so that he can be guided in the drugs he prescribes for him.

e. **Acceptance rate of surgery:** Initial treatment of POAG is commonly medical in the developed world.

In Africa, on the contrary, there are enormous challenges with continuous medical treatment and these include affordability, availability and compliance.

The issue of fake drugs is also a big problem in the society. A story once had it that a patient who started itching to some antibiotic capsules that were prescribed for him for some infection returned to his doctor to complain. These capsules, in the course of the counseling, were tested in the pharmacology lab and found to contain chloroquine powder (antimalarial drug) and not the antibiotic it was meant to contain!

Late presentation of patients in Africa is another major challenge. It is difficult to find patients who still have some useful vision to save at the time they present to the hospital. Audits in some hospitals have shown that 29 per cent of glaucoma patients (Dar es Salaam)⁷⁶ and 53 per cent of eyes (Kano)⁷⁶ present to hospital blind. Seventy per cent of patients had cup/disc ratios of more than 0.8 in their better eye in Dar es Salaam⁷⁷ and 63 per cent of eyes in Kano⁷⁶ had cup/disc ratios of more than 0.8 at the time of presentation.

As a result of the above challenges, surgery has been recommended as the primary treatment for glaucoma in Africa⁷⁶⁻⁷⁹.

The World Glaucoma Association has also recommended that primary glaucoma surgery could be offered on the basis of socioeconomic constraints⁸⁰.

However, a number of studies have demonstrated poor uptake of glaucoma surgery in Africa even when it has been provided free.^{76,81}

Quigley *et al*⁸², found an acceptance rate of 46% in Tanzania, Omoti *et al*⁸³ an acceptance rate of 32.5% in Benin City, Nigeria, a south-southern part of the country, with 8.2% found by Adegbehingbe⁸⁴ in Ile-Ife, Nigeria; 46.8%

by Onyekwe *et al*,⁸⁵ in Onitsha, Nigeria, and 48% by Mafwiri *et al*,⁸⁶ in Tanzania.

Reasons for not accepting surgery have been reported as follows:

- Fear of surgery. This in itself was the most common (47.7% patients) reason for refusal of surgery⁸⁷
- Fear of going blind (29.2% patients)⁸⁷
- The high cost of surgery (12.3% patients)⁸⁷,
- Religious beliefs (1.5% patients)⁸⁷.
- Gender⁷⁶: From the audit of their hospital records in Dar es Salaam, Bowman *et al*⁷⁶ have also observed that some of the barriers to surgery may be related to gender. Women were not only less likely to present to the hospital with glaucoma but also less likely to be referred for surgery once they do present.
- Other reasons include a patient's perception that surgery should only be performed on non- or poorly seeing eyes if at all, he accepts surgery. In contrast to cataract surgery, glaucoma surgery is performed on a seeing eye so it is more difficult to convince a patient with glaucoma to undergo surgery in his better eye. This is obviously because they do not have a clear understanding of the aim of surgery in glaucoma which is to prevent further loss of visual field and not to restore what has been lost.

These barriers to uptake of glaucoma surgery should be overcome by adequate counseling of the patients on the reason for the surgery, expected outcome, other

possible outcome, advantages of the surgery over alternative treatment options. It should also be recommended that less be charged for trabeculectomy compared to a cataract surgery, as it is not a vision-restoring surgery as the latter.

F. Loss to follow up: Generally, patients get lost to follow up. This is even worse with glaucoma patients because they see no improvement in their vision on commencement of treatment and so are not motivated to keep their appointments. Counselling about the importance of follow-up is essential.

Following trabeculectomy (glaucoma surgery), a good number of studies have reported poor long-term follow up^{88,89}. Only 7 per cent of patients at Kano, Northern Nigeria had more than two weeks' follow-up⁷⁶.

For those who have had surgery, counseling is even more important as late failure of drainage or treatable visual loss from cataract may occur.

g. On reflecting on my own experience in running a glaucoma clinic in a resource-poor setting, additionally:

- **Non-prioritization of eye care:** Eye care is not seen as a priority by any management. More attention is given to diseases that cause deaths. As a result, upgrading of the eye care delivery system by human resource development through sponsorship to attend courses/conferences etc as well as provision of modern equipment and/or newer instruments are neglected.

Without the right instruments, diagnosis of glaucoma in the early stages and in suspicious cases has been extremely difficult. Where a quick decision needs to be taken to help guide counseling and decision to treat or not, patients are referred to private hospitals for further management. This increases the direct cost to the patient with an increased risk of loss to follow up.

10.0 CONTROL AND PREVENTION OF BLINDNESS FROM GLAUCOMA

10.1 THE GLOBAL INITIATIVE: VISION 2020 AND GLAUCOMA

Vision 2020

'Vision 2020: the Right to Sight', is the global initiative for the elimination of avoidable blindness, a joint programme of the WHO and the International Agency for the prevention of blindness(IAPB), with international membership of NGOs, professional associations, eye care institutions and corporations. The caption 'Vision 2020' given to this initiative by WHO was coined from the American terminology for perfect vision⁹⁰.

The initiative was launched in 1999 with the twin aims of eliminating avoidable blindness by the year 2020 and preventing the projected doubling of avoidable visual impairment between 1990 and 2020. The ultimate goal of the initiative is to integrate a sustainable, comprehensive, high-quality, equitable eyecare system into strengthened national health-care systems.

The vision of this initiative is 'A world in which no one is needlessly blind and where those with unavoidable vision loss can achieve their full potential'.

Vision 2020 and Glaucoma

Even though glaucoma is recognized as a disease of public health importance, In the first five year action plan of VISION 2020, glaucoma was not one of the diseases listed for disease control and intervention for prevention of visual impairment. Cataract, onchocerciasis and trachoma are easier to control and they were included.

The known limitations for this intervention are as follows:

- Glaucoma-associated visual impairment and blindness remain difficult to prevent because of the lack of methods to identify persons who are likely to develop substantial visual loss.
- There is lack of awareness in the community about glaucoma and the threat it poses to vision. A majority of the patients present late
- Early diagnosis of primary open-angle glaucoma is difficult, as no single test is sufficiently sensitive or specific for screening populations for glaucoma.
- Assessment for glaucoma of all adults attending eye units is not routine practice everywhere.
- Compliance with daily, lifelong use of eye drops is a challenge in all countries, but particularly so where the cost of medication is relatively high, services are at a distance and understanding of the condition is limited. Under these circumstances, early surgery is recommended.
- In many low-income countries, eye-care services lack the necessary equipment and expertise for diagnosing and managing glaucoma.

Glaucoma is a disease that increases dramatically with age. More individuals are likely to be affected with glaucoma and glaucoma-related visual disability in coming years with the ageing of the population worldwide. In recognition of this it has become an emerging priority for all eye health

interventions as an integral part of the elimination of blindness.

In its second action plan(2006-2011) VISION 2020 included glaucoma for disease control.

With the aim of reducing visual impairment and blindness from glaucoma the objectives of the intervention were then listed as follows:

- Strengthen human resource development, with adequate training in the diagnosis and management of glaucoma.
- Ensure that eye-care units are adequately equipped for the diagnosis and treatment of glaucoma. Ensure that effective, low-cost eye drops are available for lowering intraocular pressure.
Strengthen advocacy and awareness of possible ways of preventing visual loss due to untreated glaucoma, targeting the public, eye health-care professionals and policy-makers.

However, in view of the limitations of interventions for the prevention of blindness from glaucoma the scope of interventions were largely determined by the socioeconomic status of the country concerned.

The proposed interventions:

In low-income countries:

- Ensure that training curricula for ophthalmologists adequately address glaucoma, including the skills needed for diagnosis and treatment. Ensure that training curricula for optometrists and mid-level

personnel adequately address glaucoma, including the skills needed for diagnosis.

- Ensure that training centres are adequately equipped to provide essential services for glaucoma patients and for training personnel.
- Identify opportunities for diagnosing glaucoma, for example, at the time of refraction testing; before or after cataract surgery.

APPROACHES TO PREVENTION OF VISUAL IMPAIRMENT

- Wherever possible, ensure that basic equipment and low-cost medication are available.
- Whenever possible, collect data on the prevalence and types of glaucoma and the availability and use of services.
- In the context of VISION 2020, public health approaches for the control of glaucoma-associated blindness in a given country should be further addressed by an expert group.

In middle-income countries:

- Ensure that training curricula for ophthalmologists, optometrists and mid-level personnel, including refractionists, adequately address glaucoma.
- Ensure that secondary and tertiary eye centres are adequately equipped to provide essential services for glaucoma patients.
- Ensure that glaucoma screening is part of regular eye checks, particularly for persons at increased risk (e.g. with a positive family history or because of age or ethnicity).
- Increase public awareness about glaucoma and the risk for visual loss if it is undiagnosed and untreated.
- Increase compliance with the use of eye drops through health education and counselling.

- Encourage clinical and operational research.

In high-income countries:

- Increase public awareness about the need for early detection of glaucoma through regular eye examinations.
- Ensure that detection of glaucoma is part of regular eye examinations, e.g. at the time of refraction testing.
- Increase compliance with the use of eye drops through health education and counselling.
- Encourage further research on all aspects of glaucoma.

The International Agency for the prevention of blindness (IAPB), in its report in 2010, listed the number of targets VISION 2020 should achieve by its end date. These included:

- teaching and practicing comprehensive eye care examination,
- glaucoma diagnosis by routine case detection rather than population-based screening
- initiating glaucoma programs only once diagnostic skills and surgical training are in place,
- integrating glaucoma care into existing eye care initiatives, and
- reporting visual outcomes and complications of surgical interventions, rather than simply the number of operations.

The report did not fail to mention the remaining challenges, such as further glaucoma research on effective population-based strategies for glaucoma management, best approach to treatment of cases detected at the primary and secondary centre levels and the cost of achieving these.

The VISION 2020 action plan remained the eye care working document for the global health community until 2013 when the global action plan was adopted.

10.2 DEPARTMENTAL INITIATIVE: MAKING EYE CARE ACCESSIBLE TO THE RURAL POOR

With the objectives of Vision 2020 and the vision of the department in view, as soon as I was appointed the head of my department in 2011 I set up among others, a Community Outreach committee under the Chairmanship of the very energetic young man, Dr. Obi Okoye, a lecturer as well as consultant in the department. The aim was to enable the department reach out to the rural poor who have no access to eye care.

In 2012, a bus was bought for the department to make transportation easier for the team. In the three years I was the head of department, the outreach team went on several sponsored and unsponsored outreaches to several villages, namely: Mbaise, Ohodo, Izzi(Ebonyi), Mmaku, Nkerefi, Mgbo(Ebonyi), Ugbawka, Nguru(Imo state). Patients requiring cataract surgery were transported to UNTH Ituku Ozalla, Enugu for surgery after which they were also taken back to their villages.

Glaucoma patients who could not be managed in the community were referred to UNTH, Ituku Ozalla where they received speedy and specialist attention.

11.0 BEYOND VISION: TEACHING

- **Residency training coordinator:** The skills for 'opening and keeping the eyes open' should be passed on to coming generations. The residency or postgraduate training programme ensures that.

As soon as I became a consultant in 1993 the mantle of coordinatorship for the residency training

programme fell on me. I wasn't officially appointed as one but my trainers then who had observed my passion for training from the time I was a senior resident allowed me to continue coordinating the training. I enjoyed the task. It was so fulfilling seeing residents join the department with little or no knowledge in ophthalmology and by the time we had passed them through the rigorous training processes in two years they are discussing 'Ophthalmology with authority'. Slowly but steadily, we produced specialists who have excelled wherever they have found themselves.

With all humility, giving all glory to God, below is the roll call of those who successfully passed through the residency programme under my coordinatorship:

- Dr.Chio Ugochukwu - -USA
- Dr. Ima Chima - -Abuja
- Dr. Onochie Okoye - -Consultant, UNTH, Enugu
- Dr. BI Eze - - - "'
- Dr. FC Maduka-Okafor -Consultant/UNTH, Enugu
- Dr(Mrs)Nkiru Kizor- Akaraiwe-Consultant/Parklane Specialist hospital, Enugu
- Dr(Mrs) IR Ezegwui - Consultant/UNTH, Enugu
- Dr(Mrs) Ada Aghaji - - "'
- Dr.GC Onyekonwu - - "'
- Dr(Mrs)Chimdia Ogbonnaya- "'
- Dr(Mrs)Chinyere Pedro-Egbe Consultant/UPTH,Portharcourt
- Dr(Mrs)Elizabeth Awoyesuku - - "'
- Dr(Mrs) Fiebai - - - "'

- Dr. Pepple - - - Consultant/BMH,
Portharcourt
- Dr(Mrs)Anthonia Udeaja - Consultant/General
hospital, Onitsha
- Dr. Dike - - -Consultant/FMC,Owerri
- Dr.E.E. Ekwenchi - - -“
- Dr. Agwu - - -“
- Dr.Obi Okoye - - -“
- Dr. Ngozi Onwubiko(Rev Sr)-“
- Dr(Mrs)June Azu-Okeke - FETHA, Abakaliki
- Dr(Mrs)Helen Ginger-Eke - FETHA, Abakaliki

- Dr(Mrs)Chiamaka Cookey- Gam - “
- Dr(Mrs)Soybi Wokoma - - BMH,
Portharcourt
- Dr(Mrs) Ifeoma Nwogu-Ikojo - Parklane
Hospital,Enugu
- Dr. Ekweremmadu - - -“
- Dr(Mrs)Suhanya Okeke - - -“
- Dr. Obi Echedom - - -“
- Dr. WAS Omale - - - Kogi State

- Dr. Nonso Okpala - - - Consultant,
Guinness Eye Centre, Onitsha
- Dr.(Mrs)Abraham - - - Consultant,
University of Uyo Teaching hospital, Uyo
- Dr(Mrs)Ebere Achigbu - - - Consultant,
Federal Medical Centre, Owerri
- Dr(Mrs) Ngozi Oguego - Consultant,UNTH,
Enugu
- Dr(Mrs) Nkechi Uche - - -“

- Dr(Mrs) Edak Ezeanosike - - - - -
Consultant,FETHA, Abakaliki
- Dr(Mrs) Chinyelu Ezisi - - - - - ‘‘
- Dr(Mrs) Nnenma Udeh - - - - - ‘‘
- Dr. Obi Arinze - - - - - ‘‘
- Dr. Jude Shiweobi - - - - - ‘‘

Within the next one year, some of them will become professors.

May I seize this opportunity to remember those days when I stayed up with them from morning till evening in discussion groups, assisting them with their revision for their examinations. Continuous assessments and mock exams were organised for them; I gave them written assignments and stayed up all night marking and correcting them; I gave them topics to discuss outside the departmental seminars and listened to them discuss them criticizing and admonishing as they went on; I insisted that they must have the answer to every ‘why’ that appeared in their questions; I insisted that they must read through each of their recommended textbooks at least three times. They all knew that I hated shallow knowledge; If I wasn’t satisfied with anyone’s discussion he would have to repeat the presentation. This made them work extra hard. We all enjoyed it. I loved to see my residents confident and bold in what they knew, and they came out tops.

Among these listed consultants were prize-winners, a testimony to the thorough training they had. To God be all the glory.

According to John Q Adams, if our actions inspire others to dream more, learn more, do more and become more then we are leaders indeed. As teachers we should aspire to be leaders indeed. When we are gone (through retirement, transfer or death) we shall only be remembered by our works and the number of lives we touched.

As a result of the solid foundation these consultants had the testimonies are still flowing. Five of them have just earned the Queen Elizabeth Diamond Jubilee Trust scholarship to be sponsored to India and South Africa for subspecialty training lasting one to one and a half years for each person. At the moment, in South East Nigeria we have a dearth of subspecialists in all fields. With this scholarship and training, this is soon going to be a thing of the past.

What more would a teacher wish for? To God be the glory.

According to the famous author, Ben Carson, 'Happiness doesn't result from what we get, but from what we give'.

- **Coordinator, the first Neuroophthalmology workshop in Nigeria and the West African subregion:** When the Ophthalmological Society of Nigeria South East South South zonal branch, at one of her meetings, noted that residents were very weak in Neuroophthalmology they endorsed the resolution to start running Neuroophthalmology workshops to address this deficiency.

I organized the first Neuroophthalmology workshop in Nigeria and the West African subregion in 2005. During the 3-day workshop, I sat in with the residents having brainstorming sessions with them after every lecture. This unique approach to teaching was to ensure that they understood each lecture very well. At the end of the workshop the participants testified that it helped them understand the much dreaded field better. The workshop was so successful that participants looked forward to the second one scheduled to hold the following year. The workshop has successfully held every year for ten years now, now under the able coordinatorship of Dr. Ada Aghaji from 2006. Every year for these ten years I have held the brainstorming interactive sessions for the participants. To God be the glory.

In being fully involved in the running of the Neuroophthalmology workshop, my interest in Neuroophthalmology was also aroused. With that, I have come to fully appreciate the link between Glaucoma and Neuroophthalmology. The Optic nerve which shows the signs that lead to the diagnosis of glaucoma links the eye to the brain which is the area that involves the neuroophthalmologist.

I have been giving lectures on Neuroophthalmology topics at the Annual Clinical Update course for resident doctors(organized by the Postgraduate colleges, Nigeria) since 2006.

At the Ophthalmological Society of Nigeria annual congress in 2008, I gave a lecture on 'HEADACHES OF NEUROOPHTHALMIC ORIGIN' during the Neuroophthalmology parallel session.

In 2008, we studied the ocular complications seen among patients with head injury seen in a Neurosurgical hospital in South Eastern Nigeria. The relevant findings in our study were as follows: Men more than women were affected; a majority of the patients were aged between 21-40 years. This is the predominant active age group, which is more vulnerable to injuries. Road traffic accident was responsible for the head injuries in 83% of the patients. All the patients presented within 72 hours of their injury. Ocular complications were seen in 57.7% of our patients and these were more neuroophthalmic than ocular complications. These findings differed from those from other studies where the ocular and neuroophthalmic complications occurred in equal proportions. A larger study was recommended. The

findings from this study have since been published in the Nigerian Journal of Ophthalmology⁹¹.

- At the World Ophthalmology Congress which held in Abu Dhabi, UAE, in 2012, I delivered a lecture on THE PSEUDOGLAUCOMATOUS DISC during the Neuroophthalmology session.
- **A refraction textbook for residents:** In the course of my training these residents, I identified a deficiency in the knowledge and skills of practical refraction. Still burning with the passion to produce fellows who can confidently lead the eye care team comprising optometrists, ophthalmic nurses etc, I wrote a book for residents on 'A BASIC GUIDE TO PRACTICAL REFRACTION'. In this book I painstakingly described the steps in practical refraction as a new resident would understand it. There are self-study questions at the end to help the resident evaluate himself. This book has become a much sought after book by Ophthalmology residents in the West African subregion.
The second edition is on the way. To God be the glory.

Future Research plans

1. Hypercholesterolaemia and glaucoma: Is there any association?
2. The impact of the observance of the World Glaucoma week on the level of awareness of glaucoma in Enugu, South Eastern Nigeria
3. Seven-year follow up of suspicious glaucomatous discs: how many were finally confirmed to be glaucomatous?

4. Management of glaucoma using a PHC approach: A pilot study in Ituku
5. Juvenile onset glaucoma in South eastern Nigeria
6. A collaborative study with the Departments of Social Sciences, psychology and Economics of the University to assess the psychological, socioeconomic impact of blindness on blind patients in South Eastern Nigeria
7. Impact of regular coverage of the eye clinic in Abagana, Anambra State Comprehensive Health Centre on the accessibility of eye care service to the rural people in the community and environs
8. Rehabilitation of the glaucoma-blind and those with low vision in Enugu state: A situational analysis

TAKE HOME MESSAGE

1. Glaucoma is real
2. You could be suffering from glaucoma. The fact that you see well, do not use glasses or have no symptoms does not rule it out.
3. Glaucoma occurs in all age groups....newborn, infant, preschool child, teenager, young adult, elderly being black, age over 35 years increase your risk of developing glaucoma. With a positive family history the risk is even more.
4. When last did you see an eye doctor? How often do you see your eye doctor?

If you have never had a proper eye check or it's been long you had it; If you are still seeing today it's not yet too late....see your eye doctor today and rule out glaucoma.

5. Glaucoma is not curable but it is manageable and blindness from it is preventable if picked up early and treatment commenced
6. Blindness from glaucoma is irreversible. Medical treatment, laser or surgery does not restore vision once it is lost.

CONCLUDING REMARKS

I reaffirm the KAMPALA DECLARATION¹⁶ (made by Glaucoma specialists, health specialists and other specialists from the development sector, state representatives, service providers and managers, advocates, who assembled at the Kampala Meeting on 'Public Health Control of Vision Loss from Glaucoma in Africa', held on 17th and 18th April 2012, together)that:

- Glaucoma is an emerging priority for all eye health interventions as an integral part of the elimination of avoidable blindness
- Glaucoma is a chronic non-communicable disease that requires lifelong treatment
- Being of African descent is a risk factor for glaucoma, it appears earlier, and rapidly progresses to vision loss
- Glaucoma is a disease of public health significance and needs public health control strategies

But always remember:

Even the glaucoma blind have a right to a fulfilling life.....REHABILITATION.

RECOMMENDATIONS

- **Eye check for all academic staff of UNN:** Mr.Vice Chancellor sir, Chairman and members of the Senate Ceremonials Committee of the University, may I seize this opportunity to recommend that all the lecturers in this university get their eyes checked for glaucoma. With the Department of Ophthalmology, Faculty of

Medical Sciences, the university can draw up a timetable for an outreach to the university community in both campuses.

It will be a tragedy for any lecturer of this university to go blind from glaucoma when we have an Ophthalmology department.

- **Sponsorship to professional meetings (international and national conferences/update courses, workshops and meetings):** Beyond the vision of restoring the dignity of man the university should also look at restoring the dignity of the university by reviving the tradition of regular sponsorship of academic staff to academic conferences/workshops/courses in support of the academic excellence for which this university is known.

These conferences serve as continuing medical education for the lecturer. Information keeps changing and to keep abreast of what is happening we need to be interacting with others in the academia through attending conferences, workshops etc. The interaction and exchange of ideas and experiences also motivate and encourage the staff to excel in his field of specialization. The university should therefore give priority to sponsorship of academic staff to international conferences especially where a lecturer has presentations to make. This also helps boost the image of the university.

- **Funding of research:** Research is an integral part of every academic pursuit. Without research, we experience a stunted growth in our career.

Quality research requires first, knowledge of how to conduct one. Functional research labs and committees that teach on research should be set up and made accessible to every academic staff.

The university has already taken a proactive step towards creating awareness of the importance of conducting quality research by insisting on a specific minimum number of publications in Impact Factor journals for every academic staff before he can be promoted. That is laudable.

However, quality research requires funding. The university should support research by providing sufficient funds and conducive environment for that.

DEDICATION

I wish to use this opportunity to dedicate this professorial chair to the Lord Almighty by whose Grace I am what I am today.

APPRECIATION

- Once again, I thank the Vice chancellor, Prof Benjamin Chukwuma Ozumba, the University Senate, the Chairman and members of the Senate Ceremonial Committee for giving me the opportunity to deliver this 88th inaugural lecture

The journey to the professorial chair may have been bumpy but it was not lonely at all. I had many companions, spiritually and physically. I wish to appreciate these people who contributed to my success in various ways.

- My family has been very supportive.

I want to specially appreciate my parents, late Justice Michael Akunwafo Ekwerekwu and Mrs. Christiana Atamunotorudikiari Ekwerekwu(she's still alive and here today).

They set me on the path to greatness. They sincerely believed that when you train a woman you train a nation.

To my father: Papa, I will never forget how, in 1978, you travelled from Enugu to WAEC office in Lagos to collect my WASC result when it was not released with others in QRC, Onitsha. I will never forget how you accompanied me to Anambra state in 1979 when I went to take my JAMB. My centre was in Oba, Idemmili, Anambra state You escorted me to the examination hall and stayed with me until it was time to enter the hall and sit for the exams. You prayed with me just before I finally went in and even when I had sat down, through the window you asked me what I would like to take for lunch after the exams. Papa, you were very fond of me; you were very proud of me; everybody in the family knew that.

Daddy, you believed so much in me; you always advised me to get to the peak of my profession.

Akunwafo, I have reached the peak of my profession but you are not here to witness the celebration of my professorial chair. How would it have been if you were here? I know you would've been here with that your double barrel gun to shoot into the air; I know you would've been here with your elephant tusk to blow to this achievement. You would've seen this achievement as yours and indeed, it is.

Papa, by the grace of God, I have not disappointed you. God has caused me to justify your confidence in me. Papa, thank you

To my mother: A virtuous woman, a mother par excellence, Ezinne, I will never forget how as a child you sat beside me teaching me addition and subtraction that time we still wrote on that small blackboard called 'slate'. The Mams, I will never forget how you took very good care of my children when I travelled to England for eighteen months for my MSc degree programme and clinical attachment. If I did not have a solid support at home, how would I have been able to concentrate? I came out with a distinction....mama, it was your achievement. Nnem oma, I will never forget how you always encourage me. Your unending fastings and prayers for me gave me confidence even when mountains stood in my way. Sweet mum, your solid support, physically and spiritually 'sili m obi ike' to aim for the sky in spite of all odds. Mama, your prayers have not been in vain. Thank you very much, mama. Thank you, nnem oma.

- To my children, Izuchukwu and Chimfumnanya, I remain ever grateful.

The Boy(as I fondly address my son), you are my constructive critic. You always tell me 'Mummy, you can do better than this'. That statement always spurred me on.

Any time you felt I was taking life a bit too seriously, you would put on a core traditional igbo music and start dancing to its tune for me. That alone always made me burst into laughter. Having achieved your aim, gladly you would now pat my back and say 'Mummy, take it easy. This advice is from The Boy.'

Chuzu, Chuchu, you are a precious gift. You are now a medical doctor. May you have a fulfilling career; may you get to the peak of your profession. Don't settle for less no matter the obstacles you meet on the way....they will not last forever. Nnam, above all, stay close to God for in Him alone is your strength. The Lord shall prosper you in whatever you set your hands to do and in every aspect of your life, in Jesus Name.

Nana, nnenne, baby girl, sweet angel, my darling, my daughter, my true friend, you always encourage me. Anytime I come home sad over an experience, you would sit beside me speaking soothing words to me. You would never leave until you are sure I have returned to normal. You are such a bundle of joy. Each time you came home from school, the difference was clear....you would liven up the house, take care to find out how everyone had fared in your absence. If you felt there had been some form of maltreatment or injustice, you would speak out to condemn it.

Nnem, you are a symbol of love.

Baby girl, peace and joy will never elude you, in Jesus Name. You shall soar like the eagle. You shall excel in all you set your hands to do and in every aspect of your life. In your legal profession you shall excel. As your name CHIMFUMNANYA states, in all things in your life the unending love of God will always speak for you, in Jesus Name. Above all, stay close to God for in Him alone is your strength.

- To my siblings I say a very big THANK YOU
Amaka Nsonwu, my immediate younger sister, has been a true friend as well. I am just one year older than her. Each time I shared a problem with her she

would tell me ‘Don’t worry, we’ll take it to God in prayers’. Amaks baby would set up a prayer squad and persevere in prayers until something happened. I will not forget how, as children growing up, we always wore the same type of clothes; people, because of that now took us to be twins. We have remained close in spite of marriage and motherhood. Makas, thanks for always being there for me.

- Through the twists and turns of life I have run to my priests for counseling, prayer support and encouragement. Not for one day have they turned deaf ears to me. I want to extend my special gratitude to:

Ven Prof Ernest Ukaejiofo and his lovely wife, Mrs. Ayo Ukaejiofo. Mum and dad, I will never forget how you persevered in prayers for me those years my promotion was delayed. You haven’t stopped praying for me. Thank you;

Rev Emeka Onyema, vicar in charge, All Souls’ Church, Ugboghe, Abakpa Nike, Enugu

Ven Christian Onyeka Onyia, St. Marks Anglican church, Emene

Rt Rev Alex Ibezim, the Bishop of the Anglican diocese of Awka

Rt Rev Daniel Olinya, the Bishop of the Anglican diocese of Ehamufu

Rev Barr Silver Onyejekwe: Daddy, you are more than a pastor to me. We met in Onitsha Ado Council of Christians, Enugu Chapter. You edit my books; you support me with prayers; you advise me; you encourage me;

Ven NNPC Aghadi-Ghamzi and his wife, Nwogo, who was my classmate in medical school;

The current clergy of the church where I worship, Christ Redemption Church, Anglican Communion, WTC compound, Ogui New Layout, Enugu: **Ven Chuka Orah, Ven JC Agbo, Rev Ononiwu, Rev John Uchendu, Rev Agoziem.** I can count on your prayers all the time. Thanks a lot.

Very Rev Lawrence Ulu Ogbonnaya, Methodist church and Associate Professor/Consultant, Department of Community Medicine, Federal Teaching Hospital, Abakaliki(FETHA), Ebonyi State, Nigeria' and his adorable wife, Chimdia, a Consultant Ophthalmic Surgeon/Senior Lecturer, Ophthalmology Dept, FETHA

Rev G Israel, Assemblies of God church, Jos: Daddy visits each time he comes into Enugu from Jos; he never forgets to send a text on the first day of every new month praying for us.

Rev Fr Chetanna Chukwuneke, Nnewi

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In primary school: Mrs. Onuigbo(late); Mrs. Nwogu; Mrs. Ugwuegede(late).

In secondary school: My principal, Mrs. Erinne. She made me catch a glimpse of heaven through her prayers that worked miracles in the school

My teachers in the university;

- **My classmates** in the university(**the 1985 class**):
- **Residency(postgraduate training)and beyond:**

Dr. PB Nworah, Senior Lecturer /Consultant Ophthalmic Surgeon rtd. Sir, when you were still working, as a head of department, you were very supportive. You never stood in

anybody's way to progress. Thank you very much.

Prof NO Magulike, Professor of Ophthalmology, Department of Ophthalmology, Faculty of Medical Sciences, College of Medicine, UNEC: As soon as I obtained my fellowship qualifying me for appointment as a lecturer he personally travelled to UNN to request for my appointment and followed up my application. I run to him often for advice and his ears are always open to me.

His wife treats me as a daughter. They both believe a lot in me.

Ven Prof UF Ezepue, Professor of Ophthalmology, Department of Ophthalmology, Faculty of Medical Sciences, College of Medicine, UNEC: As a resident doctor when I nearly lost my focus as I delved into the politics of the residents' association he called me to order. Like a father he admonished me saying 'Chimdi, whatever you do don't allow your academic programme to suffer'. Prof sir, I will never forget your thoughtfulness.

Prof JO Ayanru, Professor Emeritus, Department of Ophthalmology, University of Benin Teaching Hospital, Benin: Daddy, will I ever forget how you have been like a father to me, always encouraging me; always spurring me on to succeed no matter the odds? You happily wrote the foreword to my book on refraction;

Dr. Hannah B.Faal: Should I call her ‘Mama Eye care West Africa?’ She coordinated the conduct of the national survey on blindness in the Gambia; she spearheaded the establishment of a structured eye care programme in The Gambia. She is a resilient woman. No obstacle can cause her to give up. She has an exemplary team spirit. Working with her in The Gambia aroused my interest in Community Ophthalmology. Outside office hours, she is my mentor and my adviser. I have drawn a lot from her wealth of experience

Dr Mose Yoloye who painstakingly taught me Ophthalmology when in my desperate search for strategies to pass my fellowship examinations in record time, I ran to Dept of Ophthalmology, UCH, Ibadan for a clinical attachment. She was more than a teacher; she was a big sister too and has remained so till date;

The consultants in Ophthalmology Dept, UCH, Ibadan(from January- April 1990)

- **MSc degree programme in England:**

Prof Gordon Johnson, Oxford, England: He was one of my lecturers at the Institute of Ophthalmology, London. He painstakingly supervised my dissertation. Even when I returned to Nigeria for five weeks for my data collection he continued communicating with me to ensure that I made no mistake. Remember that that time we didn't have mobile phones and internet services like we do now. He supervised with such a personal touch that I was not under any pressure at all;

Dr. John Salmon, Oxford Eye Hospital, Oxford, England: I learnt 'Expert management glaucoma' at his feet.

My teachers: **Allen Foster, Darwin Minnasian, Richard Wormald** and a whole lot of others I say a very big THANK YOU.

- To my **residents**, past, present and future, I can never appreciate you enough. Training you keeps me reading and thus, up-to-date. Your questions sharpen my knowledge; your challenges were mine too because beyond academics you became like my brothers and sisters. Thank you.
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Barr Ike & Dr(Mrs)Nkiru Akaraiwe

Dr. Anselm & Mrs.Chinelo Onyekesi

I cannot count my blessings without mentioning your names. May the good Lord richly reward you, in Jesus Name.

- To members of my local organizing committee for this inaugural lecture, I say a very big THANK YOU for your commitment and dedication to the success of this occasion;
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- Finally, the Lord God Almighty, the Ancient of Days, the Lion of the tribe of Judah; the only true God: You alone are worthy of all my trust, worship, adoration and praise because in all ways you have proven to me that you are faithful, dependable, compassionate, and above all that you love me with an everlasting love. I wonder what the journey through life so far would've been like without you. You give me strength

when I am weak; when I am shaken you do not allow me to be shattered. When the trials of life become overwhelming you take over and lead me through to victory. You prepare a table before me in the presence of my enemies. Your Presence has always been with me. My life is a loud testimony that you are good. When I remember all that you have done in my life, I can only sing:

*What shall I say unto the Lord?
All I have to say is 'Thank You Lord'
Thank you Lord; Thank you Lord;
All I have to say is 'Thank you, Lord'*

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