RIVERS STATE UNIVERSITY, PORT HARCOURT

THE MORE WE LOOK THE MORE WE SEE AND THAT IS HOW IT IS.

AN INAUGURAL LECTURE

By

PROFESSOR EBIRIEN-AGANA SAMUEL BARTIMAEUS

PhD, KSC, JP, FWAPCMLS.

Professor of Chemical Pathology

Department of Medical Laboratory Science

SERIES NO. 78

Wednesday, 29th June, 2022

RIVERS STATE UNIVERSITY
DEPARTMENT OF MEDICAL LABORATORY SCIENCE
Nkpolu-oroworukwo, Port Harcourt

THE MORE WE LOOK THE MORE WE SEE AND THAT IS HOW IT IS.

An
Inaugural Lecture
by

PROFESSOR EBIRIEN-AGANA SAMUEL BARTIMAEUS
PhD, KSC, JP, FWAPCMLS.
Professor of Chemical Pathology
Department of Medical Laboratory Science

SERIES NO. 78

Wednesday, 29th June, 2022

DEDICATION

It is with Great Joy that I Dedicate this
Inaugural Lecture to the Memory of my
LATE GRAND PARENTS

TETE MICHAEL
OTOKPOM EBIRIEN-AGANA

AND

MRS SABAINAH
MICHAEL EBIRIEN-AGANA

I am Confident that
the Lord Will Graciously Reward Them
(Though Posthumously)
for their Loving and Faithful Commitment
and Deep and Enduring Dedication in Laying
a Strong Foundation for

"The Ebirien-Agana Family"

TABLE OF CONTENTS

		PAGE
Title Page		- i
Dedication		- ii
Table of Contents		- iii
List of Figures		- vi
List of Acronyms & Abbreviations		- viii
PROTOCOL		- 1
PREAMBLE		- 2
1.1	INTRODUCTION	- 5
2.1	WHAT IS MEDICAL LABORATORY SCIENCE?	- 5
2.2	WHO IS A MEDICAL LABORATORY SCIENTIST?	- 8
2.3	WHAT MEDICAL LABORATORY SCIENTIST DO.	- 9
2.4	WHAT PEOPLE DO NOT KNOW ABOUT MEDICAL LABORATORY SCIENTISTS?	- 9
2.5	SOME MEDICAL LABORATORY SCIENCE EQUIPMENT	- 11
2.6	SOME MICRO-ORGANISMS THAT MEDICAL LABORATORY SCIENTISTS SEE IN THE LABORATORY	- 13

3.1 MEDICAL LABORATORY SCIENCE AND CHEMICAL PATHOLOGY - 15

3.2 WHY CHEMICAL PATHOLOGY IS IMPORTANT - 16

3.3 THE CHEMICAL COMPONENT OF THE HUMAN BODY - 17

3.4 SOME CHEMICAL PATHOLOGY TESTS - 18

3.4.1 Measuring Electrolytes and Ions - 18

3.4.2 Measuring Small Molecules and Metabolites - 19

3.4.3 Measuring Enzymes - 20

3.4.4 Measuring Tumor or Cancer Markers - 20

3.4.5 Measuring Proteins - 20

3.4.6 Measuring Other Special Proteins - 21

3.4.7 Measuring Lipids and Lipoproteins - 21

3.4.8 Calculation of Atherogenic Indices - 22

3.4.9 Measuring Clotting Proteins - 22

3.4.10 Measuring Immunoglobulins - 23

3.4.11 Measuring Complement - 23

4.1 WHAT IS DISEASE? - 24

4.2 WHAT IS DIAGNOSIS? - 24

4.3 THE CRUX OF THE MATTER- THE WE LOOK THE MORE WE SEE - 25

4.4 ROLE OF LIPOPROTEINS AND ATHEROGENIC INDICES IN THE DIAGNOSIS OF CARDIOVASCULAR DISEASE IN NIGERIA - 28

4.5 ROLE OF ALCOHOL BEVERAGE IN THE AETIOLOGY OF DISEASES - 34

4.6 ROLE OF SELENIUM IN PROSTATE CANCER PATIENTS - 36

4.7 HERBAL REMEDIES IN THE AMELIORATION AND MANAGEMENT OF DISEASES - 38

4.8 CONTRIBUTION TO THE INFERTILITY CONUNDRUM - 46

4.9 BIOSAFETY OF ORGANIC COSMETICS - 52

4.10 BIOSAFETY OF NIGERIAN HOME GROWN FOOD ITEMS - 54

4.11 EVIDENCE ON THE USE OF VITREOUS HUMOR IN DEATH DIFFERENTIATION - 57

4.12 HEPATITIS B VIRUS CARRIERS AMONGST VOLUNTARY BLOOD DONORS IN NIGERIA - 61

5.1 CONCLUSION AND RECOMMENDATIONS - 64

ACKNOWLEDGEMENTS - 68

REFERENCES - 75

CITATION - 87

LIST OF FIGURES

Figure	Title	PAGE
1:	A Medical Laboratory Scientist in a Medical Laboratory	- 8
2:	Logo of the Association of the Association of Medical Laboratory Scientists of Nigeria (AMLSN)	- 10
3:	Some Medical Laboratory Equipment	- 12
4:	Some Micro-organisms that Medical Laboratory Scientists see in the Laboratory	- 14
5.	The Elements Essential for Life	- 17
6:	Trace Elements in the Body	- 18
7:	Organs of Diagnostic Importance to the Chemical Pathologists	- 27
8:	Selenium Rich Foods	- 37
9:	Almond Seeds	- 40
10:	*Garcinia kola* (Bitter Kola) Seeds	- 40
11:	*Occimum gratissimum* (Scent Leaf)	- 41
12:	*Xylopiaaethiopica* (Uda Seeds)	- 41
13:	Cucumber Fruit	- 42
14:	Water melon Fruit and Seeds	- 43
15:	Garlic Bulbs	- 44
16:	*Vernonia amygdalina* (Bitter Leaf)	- 45

17: *Gongrenema latifolium* (Utazi Leaf) - 45
18: *Hypoestesr osea* plant in its Natural Habitat - 46
19: Association between Antimullerian Hormone (AMH) and Age - 47
20: Normal Sperm Structure - 50
21: Abnormal Sperm Shapes - 50
22: Examples of Organic Cosmetics Made from Plant Sources - 53
23: Sniper Rat and Insect Killer - 57
24: Dichlorvos (Sniper) Intoxicated Death Victim - 58
25: Distribution of HBsAg in Three Geo-Political Zones in Nigeria - 62
26: Distribution of HBsAg in Three Geo-Political Zones in Nigeria by Sex of Voluntary Donors - 62

LIST OF ACRONYMS AND ABBREVIATIONS

ACRONYMS		MEANING
AC	-	Atherogenic Coefficient
AFP	-	Alpha-Fetoprotein
AIMLS	-	Associate, Institute of Medical Laboratory Science
AIMLT	-	Associate, Institute of Medical Laboratory Technology
AIP	-	Atherogenic Index of Plasma
ALP	-	Alkaline Phophatase
ALT	-	Alanine Aminotransferase
AMH	-	Anti-mullerian Hormone
Apo A1	-	Apolipoprotein A 1
Apo B	-	Apolipoprotein B
AST	-	Aspartate Aminotransferase
B	-	Boron
BUN	-	Blood Urea Nitrogen
C	-	Carbon
C3	-	Complement C 3
C4	-	Complement C 4
CA-125	-	Cancer Antigen 125
CEA	-	Carcinoembryogenic Antigen
CHD	-	Coronay Heart Disease
CK	-	Creatine kinase
CK-MB	-	Creatine kinase, Muscle, Brain
Cl	-	Chlorine

CLS	-	Clinical Laboratory Scientist
Co	-	Cobalt
CO_2	-	Carbon Dioxide
Cr	-	Chromium
CRR-I	-	Cardiac Risk Ratio I
CRR-II	-	Cardiac Risk Ratio II
CSF	-	Cerebrospinal Fluid
Cu	-	Copper
CVD	-	Cardiovascular Disease
F	-	Fluorine
Fe	-	Iron
FSH	-	Follicle Stimulating hormone
GGT	-	Gamma GlutamylTransferase
H	-	Hydrogen
HBsAg	-	Hepatitis B Surface Antigen
HDL-C	-	High Density Lipoprotein Cholesterol
HsCRP	-	High Sensitive C-Reactive Protein
I	-	Iodine
IgA	-	Immunoglobulin A
IgE	-	Immunoglobulin E
IgG	-	Immunoglobulin G
IgM	-	Immunoglobulin M
IMLT	-	Institute of Medical Laboratory Technology
K	-	Potassium
LDH	-	Lactate Dehydrogenase
LDL-C	-	Low Density Lipoprotein Cholesterol
LH	-	Luteinizing hormone

Mg	-	Magnesium
MLS	-	Medical Laboratory Science or Scientist
MLSCN	-	Medical Laboratory Science Council of Nigeria
Mn	-	Manganese
Mo	-	Molybdenum
N	-	Nitrogen
Na	-	Sodium
NH_4	-	Ammonia
O	-	Oxygen
P	-	Phosphorus
PAD	-	Peripheral Artery Disease
PSA	-	Prostate Specific Antigen
RHD	-	Rheumatic Heart Disease
S	-	Sulphur
Se	-	Selenium
Si	-	Silicon
Sn	-	Tin
T3	-	Triidothyronine
T4	-	Thyroxine
TC	-	Total Cholesterol
TG	-	Triglycerides
Tn-I	-	Troponin I
Tn-T	-	Troponin T
TSH	-	Thyroid Stimulating Hormone
VH	-	Vitreous Humor
VLDL-C	-	Very Low density Lipoprotein Cholesterol
WHO	-	World Health Organization
Zn	-	Zinc

PROTOCOL

The Vice Chancellor and Chairman of this Occasion,

The Deputy Vice Chancellors (Academic and Administration)

Members of the University Governing Council

The Registrar and Other Principal Officers

The Provost, College of Medical Sciences,

The Dean, Post Graduate School,

Deans of Faculties

Directors of Institutes and Heads of Departments

Distinguished Professors and Members of Senate

Visiting Academics and Colleagues

My Lords Spiritual and Temporal

All Academic Staff, Administrative Staff and Technical Staff

Family Members and Friends

Members of the Press

Graduate and Undergraduate Students of this Great University

Distinguished Ladies and Gentlemen

PREAMBLE

In the words of the Holy Spirit through His servant, Apostle Paul as recorded in the Epistle of Paul to the Corinthians in First Corinthians Chapter 15:10 …..**But whatever I am now, it is all because God poured out His special favor on me and NOT without results (NLT**). This is my story and my song. I sincerely thank the Almighty God for making this day a reality. I am grateful to God for giving me life, sound health and this opportunity to present my inaugural lecture today **Wednesday**, the 29th June, 2022. The Bible says in Ecclesiastes 3:1-2 that "**to everything there is a season, and a time to every purpose under the heaven: A time to be born……..**" For this reason, Vice-Chancellor, permit me to join the choir to sing few verses of the Hymn, Ancient and Modern Revised (AMR 443) composed by Jane Taylor (1783-1824) entitled **"Lord I would own Thy Tender Care".** We shall sing the Tune popularly known as **"St Leonard**".

1. Lord, I would own thy tender care,
   And all thy love to me;
   The food I eat, the clothes I wear,
   Are all bestowed by thee.

2. Tis thou preservest me from death
   And dangers every hour;
   I cannot draw another breath
   Unless thou give me power.

3. Kind angels guard me every night
   As round my bed they stay;
   Nor am I absent from thy sight
   In darkness or by day.

4. My health and friends and parents dear
   To me by God are given;
   I have not any blessing here
   But what is sent from heaven.

5. Such goodness, Lord, and constant care
I never can repay;
But may it be my daily prayer
To love thee and obey.

Amen.

Vice-Chancellor, Sir, it is pertinent for me to sing this song because it tells the story of the benevolence of God upon my life. My journey of life began on that glorious **Wednesday** morning of **1st January, 1964** when I was born to into the family of Mr. and Mrs. Samuel Bartimaeus (all of blessed memory) of Ayama Agana in Andoni Local Government Area of Rivers State. Life in its simplest definition for me as a growing child was tough but the Lord preserve my life from death and dangers every hour and today I am here representing the testimony of what only God can do…… **A Professor of Chemical Pathology, yet on a Wednesday**. May His name alone be praised in Jesus name, Amen.

I attended Primary School at Odidim Central School, Agana in Andoni Local Government Area of Rivers State and had my Secondary School Education at the prestigious Government Secondary Ngo, Andoni. I was gifted in both arts and science subjects and have strong intuitive and reasoning power. In 1981, I was in the team of students who represented my school at a Quiz competition organized by the Rivers State Government at Bonny, the Headquarters of Bonny Local Government Area. As at then, my ethnic nationality, the Obolo people were in Bonny Local Government Area. The Chairman of the Quiz Competition Panel of Judges, one Dr. Ogan as he was mentioned to me manipulated us out of the competition and declared that we had lost. I was very unhappy and sad because I believed that we actually won the competition. I made inquiries about the said Dr. Ogan and was told that he was a lecturer from the University of Port Harcourt. The pain of the loss midwifed by Dr. Ogan was so heavy on my heart that from that day I

vowed that I must become a University Lecturer one day in life when I grow up.

I had thought that I will study Medicine or Law but in 1983, when the then Rivers State University of Science and Technology, Port Harcourt advertised for admissions into their undergraduate programmes, I found myself preferring to do Medical Laboratory Science even though I did not know what the course was all about. I was actually offered admission to study Haematology and Blood Transfusion Science but fate twisted my focus and I ended up with a Bachelor of Science Degree in Medical Laboratory Science in Clinical Biochemistry (Chemical Pathology) option in 1987. After my Master of Science (M.Sc.) Degree, I was employed into the Department of Biological Sciences where Medical Laboratory Science was a unit in 1991 with Professor Sam. D. Abbey as the Unit Coordinator. However, in 1998 Medical Laboratory Science was made a full-fledgedDepartment made up of four (4) principal specialties namely Chemical Pathology (Clinical Biochemistry), Haematology and Blood Transfusion Science, Histopathology and Medical Microbiology with Chief (Dr.) O. U. Osuoagbaka (of blessed memory) as the pioneer Head of Department. My training and practice in Medical Laboratory Science spanned through the Rivers State University of Science and Technology (now Rivers State University), Port Harcourt, University of Port Harcourt Teaching Hospital, Port Harcourt and University of Port Harcourt. The journey so far as a Medical Laboratory Scientist and a Professor of Chemical Pathology has taken a total of 35 years of my life.

I worked under the tutelage of Prof. T. J. T. Princewill and Chief (Dr.) O. U. Osuoagbaka (all of blessed memory), Professors Sam D. Abbey, I. K. E. Ekweozor and T. G. Sokari. The challenging environment in the Department of Medical Laboratory Science, Rivers State, Port Harcourt played prominent role in my career and enhanced my determination to aspire higher in my calling. The Bible says that God makes everything beautiful in His time (Eccl. 3:11a). Surely, in His

time on Thursday, 15th July, 2021, I was elevated to the rank of a Professor of Chemical Pathology with effect from 10th September, 2020. Indeed the Shepherd of my soul, the Good Lord has shown me Love, Mercy and Kindness. My story is an affirmation of the fact that what God cannot do does not exist.

1.1. INTRODUCTION

Vice-Chancellor, Sir, I am here as a Professor of Chemical Pathology, a Medical Laboratory Scientist, to tell usa little about my profession, and what I have been professing. In this lecture, I will tell you about what Medical Laboratory Science is and why Medical Laboratory Scientists are regarded as the unseen detectives and oracles of modern diagnostic medicine. The popular parlance in life is "**the more you look, the less you see**". Vice Chancellor, Sir, in this lecture I will unravel the mystery of why in my Profession the paradigm shift is **"The More We Look, the More We See".**I will also inform us about **what I have looked and seen in the field of Chemical Pathology** as part of my humble contributions in trying to provide solutions and insights into the some of the myriads of medical problems affecting Nigerians and make it possible for us to understand why **in modern diagnostic medicine it has to be like that.**

2.1. WHAT IS MEDICAL LABORATORY SCIENCE?

Medical Laboratory Science is one of the leading professions in the health industry the world over. According to "The Medical Laboratory Science Council Act 11 of 2003, No.11, Federal Government Official Gazette means "the practice involving the analysis of human or animal tissues, body fluids, excretions, production of biological, design and fabrication of equipment for the purpose of laboratory diagnosis, treatment and research. It is also known as Biomedical Science in Britain, Clinical Laboratory Science in Canada, United States of America and some parts of the world. In Nigeria, Medical Laboratory Science is a highly skilled profession charged by Act 11 of

2003 Laws of the Federation of Nigeria. The initial qualification awarded graduates of the programme, like some other medical programmes, was Associate of the Institute of Medical Laboratory Technology/Science (AIMLT/AIMLS) The Medical Laboratory Science Council of Nigeria, which was established by Act. 2004 Cap 114 Laws of the Federation of Nigeria, regulates the practice of Medical Laboratory Science in Nigeria. In Nigeria, the Medical Laboratory Science programme is regulated by the Medical Laboratory Science Council of Nigeria (MLSCN).

Medical Laboratory Science as a distinct profession is endowed with the mandate of applying the methods of scientific experimentation, observation and interpretation for diagnostic and therapeutic accuracy by the medical practitioner. An enhanced practice of the profession has the enormous prospect and capacity to strengthen the healthcare system. Laboratory tests play an indispensable role in the early detection and accurate diagnosis of disease, monitoring of treatment, disease surveillance and prevention. The tools of science and technology have revolutionized healthcare practice. Medical laboratory science is one of the fundamental tools used in making decisions in the practice of medicine and healthcare delivery. Modern healthcare practice is a multi-disciplinary endeavour involving many professions and professionals. It has grown beyond the scope, training and competence of any single profession. The introduction of science into medical practice stopped hunches, intuition and guesses in the art of medicine. Modern health care delivery is evidence-based; it thrives on the provision of empirical data as a basis for diagnostic and therapeutic decisions. Medical laboratory science provides 60-70% of these empirical data and medical laboratory science contributions affect 95% of a health systems costs. It is therefore a vital and major component of preventive, curative and promotive health care services (Hallworth, 2011).

At the inauguration of the first Governing Council of the Institute of Medical Laboratory Technology of Nigeria on 10th March, 1970, Dr. S.L. Adesuyi, an eminent surgeon and Chief Medical Adviser to the Federal Military Government of Nigeria declared:

> "***Medical laboratory technology constitutes a key profession in the medical fraternity. It provides prompt and accurate diagnosis in most conditions, thus allowing scientific and effective treatment to be instituted. It also forms the back-bone of medical research. It is therefore fitting and proper that the profession be placed on the right footing by this timely establishment of our Institute. In regard to training, we shall ensure standards comparable to any. In regard to registration, the public will be fully protected by ensuring that only technologists (scientists) that meet the requisite standards are registered for the practice of medical laboratory technology in the country. In regard to discipline, we shall exercise our jurisdiction without fear or favour. In this way we hope that we shall fully justify your expectations and that the profession of medical laboratory technology (science) will make greater and greater contributions to the health and welfare of our people"*** (IMLT, 1974)

Medical Laboratory Science play a pivotal role in the promotion, curative and preventive aspects of a nation's health delivery system and gives a SCIENTIFIC FOUNDATION by providing accurate laboratory information and services to those with the responsibility for:

- ❖ Treating patients and monitoring their response to treatment,
- ❖ Monitoring the development and spread of infectious disease and dangerous pathogens (disease causing agents),
- ❖ Deciding effective control measures against major prevalent disease,
- ❖ Deciding health priorities and allocating resources.

Without Medical Laboratory Services:

- The source of a disease may not be identified correctly,
- Patients are less likely to receive the best possible care,
- Resistance to essential drugs may develop and continue to spread and
- Epidemic diseases may not be identified on time and with confidence.

2.2 MEDICAL LABORATORY SCIENTISTS

A Medical Laboratory Scientist (MLS) (also referred as a Biomedical Scientist or Clinical Laboratory Scientist (CLS)) is a healthcare professional who performs chemical, haematological, histopathological, cytological, immunological, parasitological, and bacteriological diagnostic analyses on fluids such as blood, urine, sputum, stool, cerebrospinal fluid (CSF), peritoneal fluid, pericardial fluid, tissue samples, and synovial fluids as well as other specimens. Medical Laboratory Scientists work at hospitals, clinics, reference laboratories, Public Health laboratories, Molecular Diagnostic Laboratories and Biotechnological Laboratories. A licensed medical laboratory scientist who has generated and prepared a laboratory report or supervised its generation will be liable for the accuracy of its content under the law (Hallworth, 2011).

Fig. 1: A Medical Laboratory Scientist in a Medical Laboratory

2.3. WHAT MEDICAL LABORATORY SCIENTISTS DO

Medical laboratory science provides clues that are key in the diagnosis and treatment of disease or injury, assist in the maintenance of healthy lifestyles and laboratory professionals are the **detectives of the healthcare world**. **Clues to solving the mysteries of diseases are found in our own bodies**. Laboratory tests monitor the composition of our blood, urine, and other body fluids and tissues for early warning signs of disease. Laboratory professionals perform tests that are crucial to our health and well-being. Although they spend less time with patients than physicians and nurses, laboratory scientists are just as dedicated to patients' health. As vital members of the healthcare team, they play a critical role in collecting the information needed to give the best care to an ill or injured patient. They find great satisfaction in their work, knowing that they are helping others and are saving lives. It is the medical laboratory scientist, not the nurse or physician, who measures blood cholesterol and blood sugar, tests for anaemia, checks the urine for protein, identifies strep throat bacteria, prepares blood for transfusion etc.

2.4. WHAT PEOPLE DO NOT KNOW ABOUT MEDICAL LABORATORY SCIENTISTS

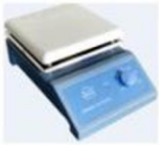
- ❖ Most people do not know what happens to their blood or urine samples once it is taken. They assume the doctor tested the samples in the laboratory.
- ❖ Medical Laboratory Science is one of the least informed occupations in the healthcare industry; hence the general population is embroiled into much ignorance and confusion to their job responsibilities.
- ❖ They continue to watch over your health while you are away from the hospital or clinic.

- They are the most reliable member of the health care team. The services they render are consistent, trustworthy and dependable.
- They are trained to be skillful and knowledgeable in procedures that yields the same results on repeated trials.
- The process of determining the nature of a disease or disorder and distinguishing it from other possible conditions largely depends on them.
- Meaning they are trained to be DIAGNOSTIC. Diagnosis comes from the Greek *gnosis*, meaning knowledge
- They are trained to discern and distinguish the nature of a disease, disorder or injury
- Literally they are trained to "to know thoroughly"and provide a scientific evidence for the nature and cause of a disease process.
- They do not depend on observation or experience but are evidence and fact based in their practice

Fig.2: Logo of the Association of Medical Laboratory Scientists of Nigeria

This is the logo of the Association of Medical Laboratory Scientists of Nigeria (AMLSN). It demonstrate the fact that **Medical Laboratory Scientists continue to** watch over your health while you are away from the hospital. We are the Searchlight of Health in the Healthcare system and the more we search into the myriads of health challenges confronting our nation, the more we see what the problems are. Therefore, Health Care Services without a robust Medical Laboratory Service is nothing less than a shrine and the practitioners involved in such a practice may not be better than witches and wizards.

2.5. SOME EQUIPMENT USED IN MEDICAL LABORATORIES

			
MICROSCOPE	CENTRIFUGE	WATER BATH	HOTPLATE
			
STIRRER HOTPLATE	INCUBATOR	WATER DISTILLER	AUTOCLAVE
			
SPECTROPHOTOMETER	REFRACTOMETER	POLARIMETER	AAS SPECTROMETER

Some Medical laboratory Equipment

PCR Machines

Elisa Reader

Elisa Reader

Electropheresis Machine

Microtome

Hot Air Oven

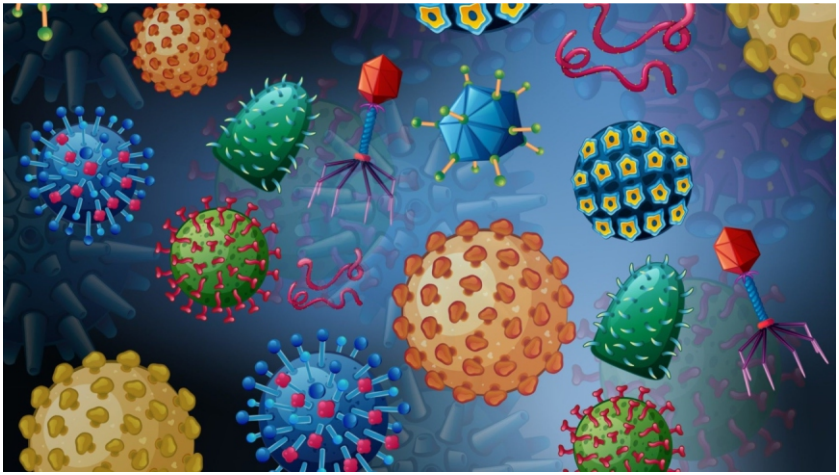
Fig.3. Some Medical Laboratory Equipment

HPLC Machine

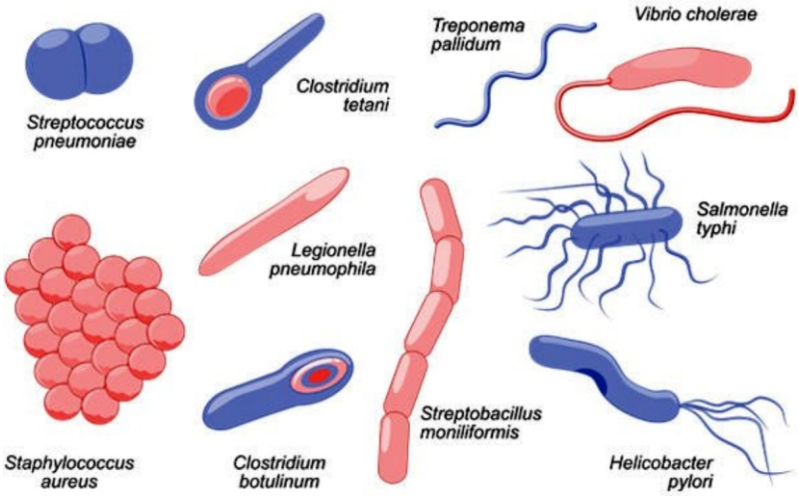
Automatic Tissue Processor

Fig.3: — contd.

2.6 SOME MICRO-ORGANISMS THAT MEDICAL LABORATORY SCIENTISTS SEE IN THE LABORATORY



Images of Viruses



Images of Bacteria

Images of ova of Parasites

Fig. 4. Some Micro-organisms that Medical Laboratory Scientists see in the Laboratory

3.1. MEDICAL LABORATORY SCIENCE AND CHEMICAL PATHOLOGY

Chemical pathology is the study of chemical and biochemical mechanisms of the body in relation to disease, mostly through the analysis of body fluids such as blood or urine. It seeks to understand the physiologic and biochemical processes operant in normal and abnormal states. Utilization of analyses performed on body fluids or tissue specimens provides important information for the diagnosis and treatment of disease. This involves advising clinicians about the appropriate tests for the investigation of a particular clinical problem, the interpretation of results and follow-up, and the effect of interferences e.g. by therapeutic drugs on test results although in Nigeria this inter-relation does not exist in most cases. In many diseases, there are significant changes in the chemical composition of body fluids such as the raised blood enzymes due to their release from heart muscles after a heart attack, or a raised blood sugar in diabetes mellitus due to lack of insulin (Kaplan *et al.,* 1998).Tests are designed to detect these changes qualitatively or quantitatively compared to results from healthy people.

Chemical Pathology includes:

- General or routine chemistry - commonly ordered blood chemistries, e.g. electrolytes, blood gases, lipids, liver and kidney function tests
- Special chemistry - elaborate techniques such as electrophoresis, and manual testing methods
- Clinical endocrinology - the study of hormones, and diagnosis of endocrine disorders
- Toxicology - the study of drugs of abuse and other chemicals
- Therapeutic drug monitoring - measurement of therapeutic medications blood levels to optimize dosage

- Urinalysis - chemical analysis of urine for a wide array of diseases, along with other fluids such as CSF and effusions
- Faecal analysis - mostly for detection of gastrointestinal disorders (Crowley & O'Shoughnessy, 2018).

3.2. WHY CHEMICAL PATHOLOGY IS IMPORTANT?

Many illnesses are reflected in a disturbance in the body's chemistry. Chemical pathology brings together science and medicine. By understanding the chemistry of body fluids and monitoring these, laboratory professionals can tell whether a patient's organs are working properly, diagnose diseases and recommend treatment. Most chemical pathology tests entail measuring the concentration of a particular constituent (the analyte) in the fluids, primarily blood plasma, or serum. It is, however, not easy to interpret what is happening at the cellular level when the concentration of an analyte is abnormally high or low; additional informationa is needed. An elevated concentration could be caused by excessive intake, excessive body synthesis, deficient utilization, deficient excretion or severe dehydration. The reverse is true for a low concentration. Information derived from the physical examination and patient's history helps to elucidate the problem, but additional selected tests may be necessary. Gross abnormalities always indicate that something is wrong, but diagnosis is difficult to make in disease when symptoms are obscure or absent and changes in concentration is minimal. **In a simple sentence, the contributions of chemical pathologists are essential for good patient care (***Kaplan et al.***, 1988).**

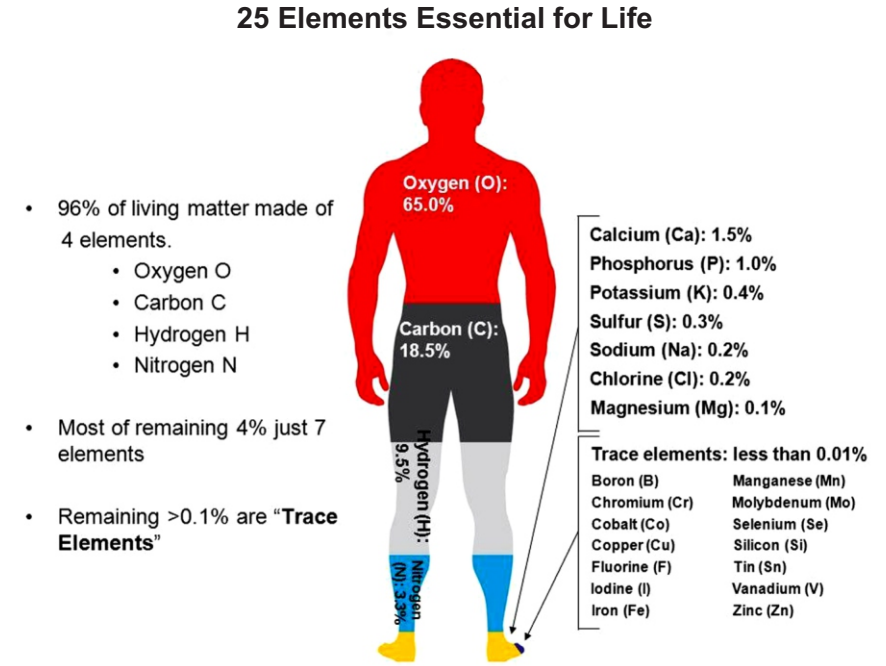


Fig.5: The Elements Essential for Life

Source: Pope & Nizielski, 2018

3.3. THE CHEMICAL COMPONENTS OF THE HUMAN BODY

A human body is made up of 25 chemical elements. The elements that are needed by the body in very small amounts are called **Trace Elements**. When they are present in food or nutritional supplements, they are called **Minerals**. Although they may not be as abundant in the body as are carbon, hydrogen or oxygen, they are still essential.

Trace minerals have vital roles in the body,

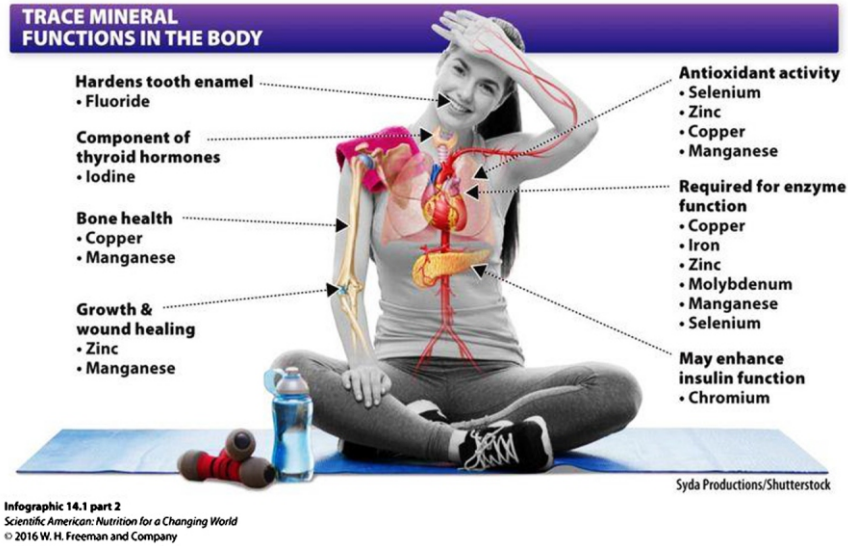


Fig.6: Trace Minerals in the Body (Pope & Nizielski, 2018)

3.4 SOME CHEMICAL PATHOLOGY TESTS

3.4.1 Measuring Electrolytes and ions

The tests described below constitute the group commonly referred to by the terms "**electrolyte panel**". "Electrolytes help regulate water balance and acid-base balance in the body. These tests are most often ordered together to assess overall electrolyte balance – often in critical care settings as well as in routine settings. Some conditions in which electrolyte balance is of concern include edema, weakness, confusion, cardiac arrhythmias, high blood pressure, heart failure, liver disease and kidney disease. Electrolyte panels often include a calculated value termed "anion gap" that may indicate the presence of unmeasured anions in the blood. The tests include sodium (Na^+), potassium (K^+), chloride (Cl^-), carbon dioxide

(CO_2) and anion gap. Other commonly measured ions include calcium (Ca^{++}), phosphorus (phosphates (PO_4^{-3}), magnesium (Mg^{++}), Iron (Fe^{++}), etc.

3.4.2 Measuring Small Molecules and Metabolites

Formation (**anabolism**) and breakdown (**catabolism**) of biologic molecules is central to life. Every living organism uses molecules as sources of energy, as building blocks for cells and tissue, and as metabolic sensors to control metabolism.

Thousands of small molecules are created and destroyed in metabolic processes every day. Those that circulate in blood or that are excreted in urine can be useful indicators of how well the body is functioning – whether the patient is using and storing energy efficiently, eliminating waste products, and is healthy. Several commonly measured small molecules include those that reflect nutritional status, those that reflect the elimination of waste products and those that reflect metabolic control. Some examples of each type are glucose, vitamin B_{12} folic acid, total bilirubin, direct bilirubin (Conjugated bilirubin), indirect bilirubin (unconjugated bilirubin), neonatal bilirubin, lactic acid, uric acid, creatinine, urea nitrogen (BUN), ammonia (NH_{4+}).

Also, some hormones (chemical messengers) are also measured and they include thyroid stimulating hormone (TSH), thyroxine (T_4), Triiodothyronine (T_3), estrogen, testosterone, Beta-human chorionic gonadotropin (β-HCG), prolactin, progesterone, follicle stimulating hormone (FSH), luteinizing hormone (LH), antimullerian hormone (AMH), cortisol, aldosterone and a host of others.

3.4.3 Measuring Enzymes

Metabolic reactions in the body are regulated by biological catalysts called enzymes. Enzymes function primarily in cells. Their presence in blood is usually the result of enzymes leaking from damaged cells. Examples include Alanine Aminotransferase (ALT), Aspartate Aminotransferase (AST), Alkaline Phosphatase (ALP), Gamma Glutamyl-transferase (GGT), Lactate Dehydrogenase (LDH), Creatine Kinase (CK), Amylase, Lipase, Pseudocholinesterase or cholinesterase activity

3.4.4 Measuring Tumor Markers

Tumor markers are proteins that are selectively produced by and released from cancer (tumor) cells, but not typically from normal cells. The presence of these proteins can be used for screening, helping with diagnosis, staging of disease, monitoring effectiveness of therapy and providing evidence of recurrence. Not all tumor markers can be used for all of these purposes. Relatively few tumor markers are useful for screening asymptomatic populations. Most are used primarily for monitoring treatment and watching for evidence of recurrence. Tumor markers are typically measured using immunoassays and reference intervals are method specific. Examples include Prostate Specific Antigen (PSA), Carcinoembryonic Antigen (CEA), Cancer Antigen 125 (CA 125), Cancer Antigen 15-3 (CA 15-3), Alpha-fetoprotein (AFP).

3.4.5 Measuring Proteins

Proteins are macromolecules – polymers that are formed from essential amino acids. Most proteins are large – with molecular weights ranging from 30,000 to more than 500,000. They are integral parts of every cell, fluid and organ in the body.

Proteins that are the focus of clinical chemistry analyses are primarily those that circulate in the blood. These include plasma proteins, transport proteins, defense proteins and clotting proteins, which function primarily in the circulation and extracellular fluid. Most of these proteins are made by the liver, with the exception of immunoglobulins, which are made by immune cells (specifically B lymphocytes).

Other proteins sometimes found in blood are proteins whose primary functions are intracellular. They may have leaked from the inside of the cells where they were made and their presence in blood often reflects some kind of damage to the cell. Examples include total protein,

serum/plasma, urine protein, cerebrospinal fluid (CSF) protein, albumin (serum/plasma), albumin urine (micro-albumin), globulins, prealbumin (transthyretin), Ferritin, transferrin, total iron binding capacity (TIBC), unsaturated iron binding capacity (UIBC), haptoglobin, ceruloplasmin.

3.4.6 Measuring Other Special Proteins

These include HbA1c (glycated haemoglobin), Troponin I and Troponin T, Rheumatoid Factor (RF), High sensitivity C-Reactive Protein (hsCRP), B-Type Natriuretic Peptide (BNP) and NT-pro BNP.

3.4.7 Measuring Lipids and Lipoproteins

Lipids and lipoproteins are measured primarily as an indicator of risk of cardiovascular disease. Interpretation of risk is based on a number of different lipids. Some of the analytes in the lipid risk profile may be elevated as a result of other underlying diseases like hypothyroidism, diabetes or kidney disease. It is important to rule out these possible causes of lipid abnormalities before treating these solely as cardiovascular

risk factors. Examples include Total Cholesterol (TC), High Density Lipoprotein (HDL) Cholesterol, Low Density Lipoprotein (LDL) Cholesterol, Very Low Density Lipoprotein (VLDL) Cholesterol, Triglycerides (TG), Lipoprotein(a) Lp(a), Apolipoprotein A1(Apo A1) and Apolipoprotein B (Apo B).

3.4.8 Calculation of Atherogenic indices

The Atherogenic ratios are calculated as follows:

Atherogenic Index of Plasma (AIP) = logTG/HDL-C (Dobiasova, 2004);

Cardiac Risk Ratio-1 (CRR-I) = TC/HDL-C (Stampfer *et al.,* 1991; Ridker *et al.,* 2001);

Cardiac Risk Ratio-11 (CRI-II) = LDL-C/HDLC (Stampfer *et al.,*1991; Ridker *et al.,* 2001);

Atherogenic Coefficient (AC) = (TC– HDLC)/HDL-C (Brehm *et al*., 2004).

3.4.9 Measuring Clotting Proteins

Most clotting proteins are measured in functional assays that detect how well plasma supports clot formations when triggered by a specific agent. These tests, which do not measure specific molecules involved in clotting, though usually not performed in the clinical chemistry section of the lab, but rather the coagulation laboratory have now been included as tests for cardiovascular risk factors. However, there are a few tests that measure specific proteins in the clotting cascade. They include fibrinogen and D-dimer.

3.4.10 Measuring Immunoglobulins

Immunoglobulins are circulating antibodies essential for defense against foreign substances. They recognize specific antigenic structures on proteins, viruses or bacteria, bind to these and initiate a series of reactions (termed immune response) designed to disable and destroy the antigen. Immunoglobulins are termed monoclonal and polyclonal. Monoclonal immunoglobulins are produced by a single line of white blood cells (B-cells) and all have exactly the same chemical composition, sequence and structure. Polyclonal refers to the aggregate collection of monoclonal immunoglobulins produced by many different B-cells lines. Increased levels of polyclonal immunoglobulins are found in infections and inflammations, reflecting a widespread immune response to the infecting agent. Increased monoclonal proteins are seen in malignancies like multiple myeloma, Waldenstrom's macroglobulinemia and some lymphomas. In these conditions, a single clone of B-cells has become malignant and produces excessive amounts of a single version of an immunoglobulin molecule. Monoclonal immunoglobulins may be IgA, IgG, IgM or IgE.

3.4.11 Measuring Complement

The complement system is a set of circulating blood proteins that function together to promote immune responses that attack and destroy foreign substances like bacteria. The two components most frequently measured are C3 and C4. Complement tests are usually ordered to determine the possible cause of frequent infections or high levels of autoimmune activity. Examples include complement C3 and Complement C4 (Reed, 2017).

4.1 WHAT IS DISEASE?

Disease is an abnormal condition that negatively affects the structure or function of part of an organism, and that is not due to external injury (The American Heritage Stedman's Medical Dictionary, 2002). This disorder of structure or function in a human can present with specific symptoms. The Medical Laboratory Scientist/Chemical Pathologists in a hospital does not consult with the patients. It is the attending physician or medical officer that have the privilege to meet with the patients, observe the signs and symptoms, perform physical examination on the patient and obtain the patient's history to help elucidate the problem.

4.2 DIAGNOSIS

The **prefix dia-** can mean "through," "during," or "across," so diagnosis can be thought of as a recognition of a disease during examination or observation or the act of identifying a disease, illness, or problem by examining someone or something (https://www.miriam-webster.com>dictionary>diagnosis). . In other words it refers to an identification of a disease via examination . The things we examine in this case could include blood, serum or plasma, cerebrospinal fluid, excretions, urine and a host of others. What follows after **diagnosis** is a **prognosis**, which a **prediction** of the course of a disease as well as the treatment and results. A helpful trick is that a **diagnosis** comes before a **prognosis** and diagnosis is before prognosis alphabetically. ***Additionally, diagnosis and detection both start with a "d" whereas prognosis and prediction both start with "p".*** (https://www.dictionary.com>browse>diagnosis).

4.3 THE CRUX OF THE MATTER- THE WE LOOK THE MORE WE SEE

Generally, "**Looking**" means to caste a glance at something but it does not have the focus of "**seeing**". **Looking** lacks the intensity which **seeing** has. They have same difference which hearing and listening have. So if you only look around, it means you are not watching the things closely and might be missing the minute details of things around you. But if you are seeing, it means you are not looking with absent mind but paying attention to the things around you also. The more you look at, examine, or observe a person, place, thing or situation, the more you realize its complexity. And when you become aware of the complexity and how much to it there is and the more stuff you notice about it- the more observations you make, the more opinions you have. In Medical Laboratory Science, with the microscope, spectrophotometers, Polymerase Chain Reaction (PCR) machines, Haematological Analyzers and a host of other equipment we are always looking for the causative agents of diseases and as new technologies are developed, and we continue to look, observe, examine, determine and assess the minute details of how these diseases come about, the more we understand their complexities and thus see and evaluate them more and more.

The process of "**Looking More and Seeing More**" as it applies to Medical Laboratory Science is divinely designed. In the Gospel according St Matthew Chapter 13:13, it is recorded "So they show that what Isaiah said about them is true: 'You people will listen and listen, but you will not understand. You will look and look, but you will not really see". But in Verse 16, Jesus said "**But God has blessed you. You understand what you see with your eyes.**" ***This prophecy as it applies to understanding the mysteries of diseases and providing evidence-based guides and solutions that are beneficial to the patients refers to the Medical Laboratory Scientists because the more we look at these agents of death, the more we understand what we see.***

The prophecy is being fulfilled in our time because without controversy it is estimated ***that 70% of all health care decisions affecting diagnosis or treatment involve a laboratory investigation. Decisions on an individual's diagnosis, treatment and subsequent therapeutic monitoring are often dependent on a range of laboratory-based results.***

I have spent most of my life trying to investigate aspects of some human diseases and medical conditions prevalent within our environment and in the body. These conditions affect the kidney, liver, heart, gastrointestinal tract, gonads as shown in fig. 6. In the course of my study, many academic publications, concepts and assertions have been put forward based on experimental evidence. For the purpose of this inaugural lecture, I will focus on some of the experimental evidences published within the **period of my assessment for Professor of Chemical Pathology** and reserve the other publications for **my Valedictory Lecture**. It is my humble intention not to encumber this august gathering. I will straightway discuss these contributions in the most simple and less technical manner that would not require your being a Chemical Pathologist or a Medical Laboratory Scientist to understand.

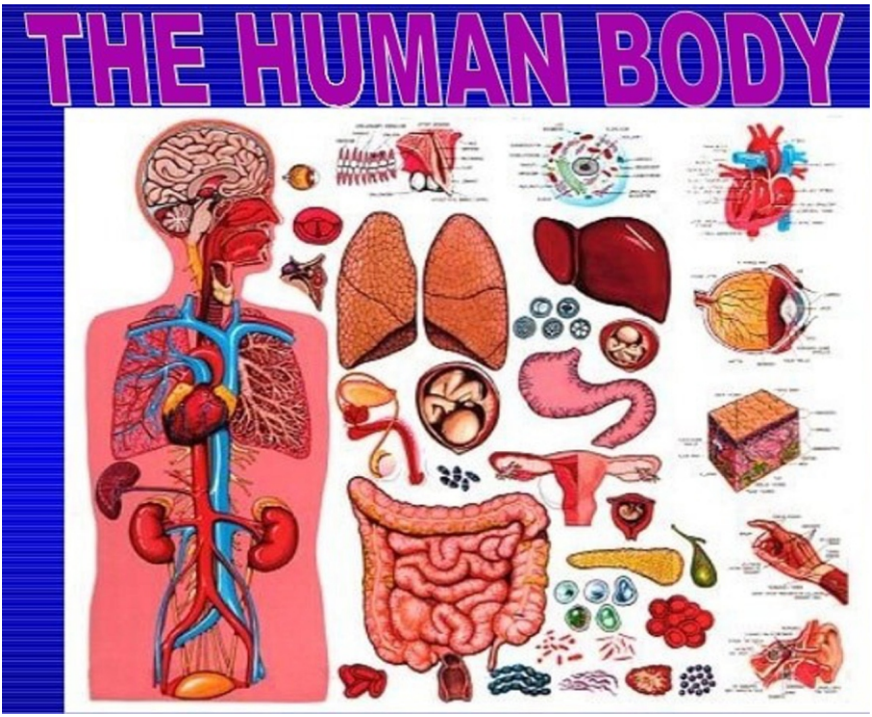


Fig.7: Organs of Diagnostic Importance to the Chemical Pathologists

4.4 ROLE OF ATHEROGENIC INDICES IN THE DIAGNOSIS OF CARDIOVASCULAR DISEASE IN NIGERIA

Cardiovascular disease (CVD) is a general term for conditions affecting the heart or blood vessels. It's usually associated with a build-up of fatty deposits inside the arteries (atherosclerosis) and an increased risk of blood clots. It can also be associated with damage to arteries in organs such as the brain, heart, kidneys and eyes. Examples of cardiovascular diseases include:

- ❖ coronary heart disease (CHD)– a disease of the blood vessels supplying the heart muscle;
- ❖ cerebrovascular disease – a disease of the blood vessels supplying the brain;
- ❖ peripheral arterial disease (PAD)– a disease of blood vessels supplying the arms and legs;
- ❖ rheumatic heart disease (RHD) – damage to the heart muscle and heart valves from rheumatic fever, caused by streptococcal bacteria;
- ❖ congenital heart disease – birth defects that affect the normal development and functioning of the heart caused by malformations of the heart structure from birth; and
- ❖ deep vein thrombosis and pulmonary embolism – blood clots in the leg veins, which can dislodge and move to the heart and lungs.

Heart attacks and strokes are usually acute events and are mainly caused by a blockage that prevents blood from flowing to the heart or brain. The most common reason for this is a build-up of fatty deposits on the inner walls of the blood vessels that supply the heart or brain. Strokes can be caused by bleeding from a blood vessel in the brain or from blood clots (Boon *et al.,* 2002).

Cardiovascular disease (CVD) is the leading cause of death worldwide (Vilahu *et al*., 2014). The prevalence of CVD has been shown to be on the increase since the 19th century. In 2001 it was responsible for 16 million deaths worldwide with an estimated global mortality of 17.5 million documented in 2005 to be due to CVD (WHO, 2002). It has also been estimated that by 2030, 23.3 million people will die from CVD annually which is a major public health concern (Mathers & Loncar, 2006). Recently, the prevalence of CVD has been on the increase in Nigeria (Nwaneli, 2010). Some risk factors are responsible for this rising trend of CVDs in Nigeria. These can be classified as modifiable risk factors, non-modifiable risk factors, and emerging risk factors. Worldwide, CVDs are largely driven by modifiable risk factors. In Nigeria, these modifiable risk factors were listed by the WHO (in 2016)(WHO, 2018) in the order of occurrence. These lists include the harmful use of alcohol (22%), physical inactivity (22%), tobacco use (11%), hypertension/raised blood pressure (18%), salt/sodium intake (8%), diabetes mellitus and dyslipidaemia (4%), obesity (4%), ambient air pollution (1%), and household pollution (<1%).The World Health Organization (WHO) in 2016 revealed that in Nigeria, non-communicable diseases were estimated to account for 29% of all deaths, of which CVDs contributed 11% (WHO, 2018). CVDs which have been found to be on the increase over the past 20 years in Nigeria include hypertension, heart failure, and stroke (Ike & Onyema, 2020).

Vice-Chancellor, Sir, the above brief highlight on cardiovascular disease has shown that it is indeed a very serious disease burden. It is this burden I think that prompted the Executive Governor of Rivers State to decide to build the Cardiovascular Hospital in Port Harcourt. There are competent cardiologists and physicians in Port Harcourt who are dedicated to the treatment of cardiovascular diseases. Vice-Chancellor, Sir, the trend in the diagnosis of cardiovascular disease in our laboratories currently lies in measuring the total cholesterol (TC), high density lipoprotein cholesterol (HDL-C) (good cholesterol), low density lipoprotein cholesterol (LDL-C) (regarded as the bad

cholesterol), very low density lipoprotein cholesterol (VLDL-C) and triglycerides (TC). Elevated (increase) levels of total cholesterol increase the risk for coronary heart disease (CHD). Cholesterol is measured to help assess the patient's risk status and to follow the progress of patient's treatment to lower serum total cholesterol concentrations.

Vice-Chancellor, Sir, my observation in the years of my practice reveal that in most cases, individuals may have what is usually referred to normal levels of these lipoproteins and still suffer from CVD especially stroke and heart failures. Our studies on lipids and lipoproteins thus reveal that better prognostic approach in the management of CVD in our hospitals today could be achieved by computing what is generally referred to as **atherogenic indices or risk ratios. These indices or ratios include Cardiac or Castelli Risk Index/Ratio 1 (CRI-1 or CRR-1), Castelli Risk Index/Ratio-11 (CRI-2 or CRR-2), Atherogenic Index of Plasma (AIP) and Atherogenic Coefficient (AC).** These ratios are calculated thus:

1. Atherogenic index of Plasma –[log (TG/HDL-C)] (Dobiasova, 2004)
2. Atherogenic Coefficient – (TC-HDL-C)/HDL-C (Brehm *et al.,* 2004)
3. Cardiac or Castelli Risk Index/Ratio 1-(TC/HDL-C) (Stamper *et al*., 1991; Ridker *et al.,* 2001)
4. Cardiac or Castelli Risk Index/Ratio 2- (LDL-C/HDL-C) (Stamper *et al*., 1991; Ridker *et al.*, 2001).

Vice-Chancellor, Sir, in a study to assess the lipoprotein levels in normotensive and hypertensive pregnant women in Port Harcourt, we observed that the atherogenic indices reveal higher cardiovascular risk in the hypertensive and normotensive pregnant women than the values of total cholesterol, high-density lipoprotein (HDL-C), low density lipoprotein cholesterol (LDL-C), very low density lipoprotein cholesterol (VLDL-C) and triglycerides levels (Oladapo-Akinfolarin

et al., 2018).This indicates that while measurement of the lipoprotein levels are of paramount importance in the assessment and monitoring of cardiovascular disease, the **use of atherogenic indices can and does reveal better cardiovascular risk status** than the individual lipoprotein levels.

Vice-Chancellor, Sir, several reports have suggested an association of the ABO blood groups with the risk of developing severe manifestation of atherosclerosis (Meade *et al.,* 1994). Saha *et al.* (1973) and Nydegger *et al.* (2003) found that myocardial infarction are predominant in patients of O and B blood groups indicating that blood groups may play a role in the pathogenesis of myocardial infarction. Mitchell (1977) also reported that higher rates of cardiovascular mortality in towns in Britain occurs among people with a higher prevalence of blood group "O". In Nigeria, the common blood group types often determined in people is the ABO blood group. We designed a study to investigate the relationship between ABO blood groups and lipoprotein profiles of adult residents in Rivers state, with a view to establish an association between the blood groups and CVD risk in Nigeria. Vice-Chancellor, Sir, this study **revealed that the prevalence of CVD risk is highest in blood group AB, followed by blood group A, B and O respectively with the females exhibiting higher prevalence than the males in each blood group**. The implication of this finding is that since blood group has a genetic component, family history may play an important role in the development and pathogenesis of cardiovascular disease risk factors. Similarly, because the prevalence of CVD is on the increase worldwide and in Nigeria, it is our opinion that diagnosis, management and treatment of CVD in Nigeria should take into **consideration the blood group status of the subjects** (Bartimaeus & Waribo, 2017).

Vice-Chancellor, Sir, C-reactive protein (CRP) is a blood test marker for inflammation in the body whose levels rise in response to inflammation. The elevation has been linked to atherosclerosis. Because of the inflammatory component of atherosclerosis, elevated CRP levels have been linked with cardiovascular disease (Tuomisto *et al.*, 2006). Clinical data linking inflammation with incident hypertension are scarce (Yudkin *et al.*, 1999). We, therefore, designed a study aimed at assessing C-reactive protein levels in normotensive and hypertensive pregnant women in Port Harcourt, Nigeria. A total of 300 women were registered for the study after obtaining informed consent. One hundred of them were pregnant hypertensives, 100 were pregnant normotensives and 100 non pregnant normotensives as control. All relevant information was recorded on a predesigned questionnaire. HsCRP level was measured in the 200 normotensive and 100 hypertensive pregnant women. **Our results indicate that hypertension in pregnant women is associated with elevated CRP levels** (Oladipo-Akinfolarin *et al.,* 2017). According to Garovic *et al.* (2010), hypertensive pregnant women had a 1.9 fold increased risk of having a subsequent diagnosis of hypertension and a 2.1 fold increased risk of stroke in later life, compared with women who had a history of normal blood pressure in pregnancy. Among the women in this study, CRP levels were twice increased in hypertensive pregnant women (HPW) when compared with non- hypertensive pregnant women (NPW) and normal non-hypertensive pregnant women (NNPW). **This implies that measurement of CRP is a sure guide for detecting pregnant women at risk for CVD disease** (Oladipo-Akinfolarin *et al.,* 2017). Also, we discovered that when pregnancies are not properly managed, it could predispose the women to developing hypertension **implying that pregnant women are potential future candidates of cardiovascular disease** (Oladipo-Akinfolarin *et al.,* 2022).

Vice-Chancellor, Sir, atherosclerotic cardiovascular diseases have been reported to occur more in men than in premenopausal women. Premenopause means the period around menopause and refers to the time the body of a woman makes the natural transition to menopause marking the end of the reproductive years in a woman. However, after menopause, this incidence steeply increases, resulting in no difference between men and women in individuals older than 70. Menopause is therefore, regarded as one of the risk factors for cardiovascular diseases (Kannel *et al*., 1976; Stevenson *et al.,* 1993). The levels of total cholesterol and low density lipoprotein (LDL) cholesterol have been shown to increase after menopause (Kim *et al*., 2000; Ushiroyama *et al.,* 1993). Variations in the distribution of serum lipids and lipoproteins have been implicated in the aetiology of arteriosclerosis and cardiovascular diseases but the extent to which these variations occur in the transition from premenopausal to menopausal in women in Port Harcourt has been poorly .investigated. Thus, we set out to investigate these variations in the serum levels of total cholesterol (TC), triglycerides (TG), high density lipoprotein cholesterol (HDL-C), low density lipoprotein cholesterol (LDL-C), very low density lipoprotein cholesterol (VLDL-C), and atherogenic index of plasma and Castelli risk index 1 and 11 and the effect of body mass index index and to ascertain how best to predict the cardiovascular risk of menopausal women in Port Harcourt using these lipoproteins. **We discovered that dyslipidaemia, blood pressure and body mass index are significantly associated with menopausal transition in our population**. The lipid profile of the post-menopausal women in our study was very unfriendly. Most significantly, computation of lipoprotein ratios and triglycerides based index (atherogenic index of plasma; AIP) reveal the atherogenic status of post-menopausal women much better than the lipoprotein profile (Bartimaeus & Ken-Ezihuo, 2017).

4.5 HOW USEFUL AND BENEFICIAL IS REGULAR ALCOHOLIC CONSUMPTION

Vice-Chancellor, Sir, an **alcoholic drink** (also called an **alcoholic beverage**, or simply **drink**) is a drink that contains ethanol, a type of alcohol produced by fermentation of grains, fruits, or other sources of sugar that acts as a drug. The consumption of alcoholic drinks, often referred to as "drinking", plays an important social role in many cultures including ours. Alcoholic wines (fermented beverages) existed at least as early as the Neolithic period c.10.000 BC (Charles & Durham, 1952).The fundamental role wine plays within Christianity cannot be overemphasized. The Gospel of John recorded the first miracle of Jesus: making copious amounts of wine at the wedding feast at Cana (John 2:1-11). Jesus, while instituting the ritual of the Last Supper during a Passover celebration, says that the "**fruit of the vine**" is a "New Covenant in [his] blood (Mt 26:26-29; Mk 14:22-25; Lk 22:17-20; 1 Co 10:16; 11:23-25).

Vice-Chancellor, Sir, it is important to remind this gathering that Christian views on alcohol are varied. Throughout the 1800 years of church history, Protestant Leaders such as Martin Luther, John Calvin, the Leaders of the Anglican Church and even the puritans did not differ substantially from the teachings of the Catholic Church: that alcohol was a gift of God and created to be used in **moderation for pleasure, enjoyment and health; and DRUNKENNESS was viewed as a SIN.** Christians generally consumed alcoholic beverages as a common part of everyday life and used **"the fruit of the vine"**(Matthew 26:29; Mark 14: 25; Luke 22:18) in their central rite-the Eucharist or Lord's Supper.

Vice-Chancellor, Sir, the central issue in alcohol consumption lies in its ability to produce addiction and tolerance and the unhealthy implications of its intoxication. Despite its popular acceptance and use, we venture to investigate the effect of alcohol on regular and irregular alcohol consumers who were mainly males with history of gouty arthritis and those without history of gouty arthritis by

measuring the level of a substance called uric acid. The main alcoholic beverages consumed by the subjects in this study was mainly assorted beer and ethanol (**Khai khai or ogogoro**). Our study showed that **subjects with history of gouty arthritis who romances with alcohol precipitate significant increases in serum uric acid level**. Saver *et al*. (1967) and Gibson and Graham (1974) had reported high prevalence of gouty arthritis amongst regular alcohol consumers and populations with a high prevalence of gouty arthritis have a high population of excessive drinkers. In our study **we observed that subjects with history of gouty arthritis who are involved in consumption of alcoholic beverages of any type risk the chances of precipitation of the disease due to increase in the precipitation of uric acid level** (Bartimaeus & Eno-Eno, 2002)

Vice-Chancellor Sir, since excessive alcohol consumption especially lager beer is fast becoming a part of the Nigerian society, the effect of alcoholic consumption (lager beer) on some renal indices of consumers was further investigated. Lager beer brands such as Star, 33, Grand, Heineken, Gulder, Stout, Harp and Legend Extra smooth were included in the study. The study showed that **individuals who regularly drink more than one bottle of any of the beer brands showed significant ($p<0.05$) increase in the levels of serum uric acid, creatinine and urea when compared with individuals who drank only water. The increase was also more in subjects with longer years of exposure to beer drinking** (Bartimaeus & Ken-Ezihuo, 2017). Similar, observation was also made when the effect of these beer brands was investigated **on some liver function parameters such as alanine aminotransferase (ALT), aspartate aminotransferase (AST), alkaline phosphatase (ALP) and total protein and albumin** where lower levels were observed. (Bartimaeus & Otuokwala, 2017).

Vice-Chancellor, Sir, these findings are pointers to the fact that although enormous enjoyment and merriment are derived from the daily consumption of these products, there is need to pay heed to the warning that "there is a way that seems right to a man but the end

could lead to death" (Proverbs 16:25 KJV). **Heavy consumption of beer and other spirits could cause serious kidney and liver damage and worsen arthritic pains over time.**

4.6 ROLE OF SELENIUM IN HELPING PATIENTS WITH PROSTATE CANCER

Prostate cancer is a health concern for men over the age of 45 years world – wide and the most common neoplasm and the second most common cause of cancer death in men (Magoha, 1997). Reports show that the incidence of prostate cancer is on the increase with a prevalence of 13.7% (Ogundele & Ikuerowo, 2015). Vice-Chancellor, Sir, in Nigeria, prostate cancer is the most commonly diagnosed malignancy among men and a hospital prevalence of 182.5 per 100,000 male admissions was recorded in 2010 in Osun State (Mohammed *et al.,* 2008; Badmus *et al.,* 2010). The older you are the most likely you are to be diagnosed with prostate cancer, although only 1 in 10,000 under 40 years of age actually get diagnosed. The rate shoots up to 1 in 38 for ages 40 – 59 years and 1 in 4 for ages 60 – 69 years. In fact, more than 65% of all prostate cancers are diagnosed in men over the ages of 65 years (Carter *et al.,* 1992).The clinical laboratory plays vital role in the screening, diagnosis, management and monitoring of prostate cancer, through the determination of prostate specific antigen which is a useful biomarker for the assessment of prostate carcinoma (Stenman, 1997; Witherspoon, 1997; Oesterling *et al.,* 1993).In Rivers State, there is paucity of accurate data on the prevalent rate of prostate cancer. Despite its ravaging impact, it has been reported that selenium can play a palliative and ameliorating role in the management of prostate cancer.

Selenium is a trace mineral that is essential for good health but required only in small amounts (Thomson, 2004). Vice-Chancellor, Sir, the good news is that **many whole grains and dairy products, including milk and yogurt, are good sources of selenium**. Some ready-to-eat breakfast cereals are fortified with selenium, and some fruits and vegetables contain selenium. Pork, beef, turkey, chicken,

fish, shellfish, and eggs contain high amounts of selenium. Owing to its importance in the management of prostate cancer, we investigated the effect of age on selenium and prostate specific antigen (PSA) levels of prostate cancer patients. We observed that selenium levels decrease as the age of the patients increase. Also, we observed an inverse relationship of serum prostate specific antigen (PSA) and selenium concentrations in patients diagnosed with prostate carcinoma. Vice-Chancellor, Sir, **we recommend that men from the age of 45 years and above should make fruits, vegetables, yogurt and shell fishes major components of their daily diet to help protect them against prostate cancer** (Bartimaeus *et al.,* 2017).

Fig. 8: Selenium Rich Foods

4.7 HERBAL REMEDIES IN THE AMELIORATION AND MANAGEMENT OF DISEASES

The kidney is a sensitive and dynamic organ responsible for homeostasis and regulation of the extracellular environment. It is also involved in detoxification and excretion of toxic metabolites and drugs (Inui *et al.,* 2010; Parazella & Mockel, 2010). Drugs can exert their toxic effects by inducing nephrotoxicity by one or more common pathogenic mechanisms. Most people suffer from drug induced nephrotoxicity because of the presence of dangerous factors that increases their susceptibility to the damage caused by drugs (Tiong *et al.,* 2014). Drug-induced nephrotoxicity is an important cause of renal injury (Padmini & Kumar, 2012) and has been found to cause approximately 20% of community and hospital acquired episodes of acute kidney injury (Nash *et al.,* 2002; Bellomo, 2006).

The liver plays a vital role in regulating various physiochemical functions of the body and is always the first target organ for the metabolism of drugs and toxic chemicals (Sahreen *et al*., 2015; Salama *et al*., 2015). The liver has the ability to convert xenobiotics to compounds with low toxicity and also excrete them due to the high concentration of toxin-metabolizing enzymes they possess. Although, sometimes hepatic damage can be induced due to conversion of toxic substances to active metabolites during metabolism (Cullen, 2005). Mitochondrial dysfunction has been reported as one of the major mechanisms of drug induced hepatotoxicity. Severe mitochondrial dysfunction in the liver as a result of drugs can induce hepatic necrosis, cystolytic hepatitis and eventually liver failure (Gopi *et al.,* 2010). Damage to the liver causes accumulation of toxins in the body faster than it can process.

Vice-Chancellor, Sir, in the Book of Genesis Chapter 1, it is recorded that God created the heaven and the earth. *And the earth brought forth grass and herb yielding seed after his kind, and the tree yielding fruit, whose seed in itself , after his kind: and God saw that it was good* (Genesis 1:12). Several herbs were mentioned in the Bible

among which are Aloes (John 19:39), Anise (Matt. 23:23), Balm or Balsam (Gen. 37:25), Bitter Herbs (Exodus 12:8), Cassia (Ezekiel 27:19), Cinnamon (Exodus 30:23), Cumin (Isaiah 28:25), Figs (II Kings 20:7), (Frankincense (Matt. 2:11), Garlic (Numbers 11:5), Hyssop (Psalm 51:7), Mint (Matt. 23:23), Mustard (Luke 17:6), Myrrh (Gen. 43:11) and Saffron (Songs of Solomon 4:14) and a host of others. In the Bible, there are mentioned cases related to the use of plants for medicine, for example, the use of balm in the treatment of sores (Jeremiah 8:22; 46:11; 51:8) and how King Hezekiah was treated with a fig (II Kings 20:7). In the Book of Ezekiel 47:12 God said "*And on the banks, on both sides of the river, there will grow all kinds of trees for food. Their leaves will not wither, nor their fruit fail, but they will bear fresh fruit every month, because the water for them flows from the sanctuary. Their fruit will be for food, and their leaves for healing*" (ESV). Also, in Revelation 22:1-2 ESV John said "Then the angel showed me the river of the water of life, bright as crystal, flowing from the throne of God and of the Lamb through the middle of the street of the city; also, on either side of the river, the tree of life with its twelve kinds of fruit, yielding its fruit each month. The leaves of the tree were for the healing of the nations".

Vice-Chancellor, Sir, the Bible is full of verses that clearly show that God created the green plants for food and for the healing of the nations (Gen.1:29; Revelation 22:2). These biblical revelations prompted us **to look more deeply in order to provide experimental evidence** on the benefits derivable from some common herbs, seeds and plants in our locality in an attempt to provide evidence based information on the therapeutic efficacy of these herbal remedies. The results of our findings are not only revealing but further goes to confirm the biblical truths that green plants were ***indeed*** given for the healing of the nations. In our study on Almond seed, we discovered that it has the potential to ameliorate acute kidney injury. Almond seeds also have the potential to protect the liver and the kidney from damage. This is made possible by its rich phytochemicals and vitamin E content (Worlu *et al.,* 2020).

Fig 9: Almond Seeds

We also discovered that ***Garcinia kola*** (bitter kola), ***Ocimum gratissimum*** (scent leaf) **and** ***Xylopia aethiopica*** (Uda Seed) possesses potential prophylactic hepato-protective effect when given as a pretreatment before exposure of the liver to hepatotoxic agents in experimental animals. This observation in experimental animals lend support to the traditional prophylactic use of bitter kola in hepatotoxic disorders, hepatitis and jaundice (Waribo *et al.*, 2017; Chuks-Oguine *et al.*, 2020).

Fig. 10: *Garcinia kola* (Bitter kola) Seeds

Fig. 11: *Occimum gratissimum* (Scent leaf)

Fig. 12: *Xylopia aethiopica* (Uda Seed)

Our quest into the therapeutic usefulness of plants and fruits also prompted us to investigate into the potential evidence-based usefulness of Cucumber also known as ***Cucumis sativus.*** We demonstrated that cucumber ***(Cucumis sativus)*** have anti-hyperglycaemic effect on blood glucose concentration of humans when higher quantity of the juice was consumed. We also confirmed that if reasonable quantity of cucumber is consumed over a long period of time, it could lower blood pressure considerably (Bartimaeus *et al*., 2016).

Fig. 13: Cucumber Fruit

Vice-Chancellor, Sir, the fruit *Citrullus lanatus* (**Water melon**) is one of the most popularly consumed fruits in our locality. A lot of benefits has been reported to be derived from watermelon. We noticed that people usually prefer to consume the red pulp of the fruit and do away with the seeds and bark. Thus, we ventured to find out whether the seeds of the watermelon fruit has any useful health benefit using animal experimental model. Vice-Chancellor, Sir, our observation in this study showed that the seeds of watermelon fruit has the potential to significantly decrease the activities of some cardiac (heart) enzymes (cardiac markers) which are usually released when the heart muscle is damaged. They are usually found in the blood. Such enzymes include lactate dehydrogenase (LDH), creatine kinase (CK-MB), aspartate aminotransferase (AST) and troponin I and T (TnI Tn T). ***The implication of this finding is that consumption of seeds of watermelon has the potential to protect the heart from damage by maintaining cardiac cells integrity and reducing cardiovascular risk and therefore is good to human health*** (Karikpo *et al.,* 2018).

Fig. 14: Watermelon Fruit and Seeds

Vice-Chancellor, Sir, the bulbous flowering plant, garlic (*Allium sativum*) is claimed widely to be used for several conditions linked to the blood system and heart, including atherosclerosis (hardening of the arteries), high cholesterol, heart attack, coronary heart disease, diabetes mellitus, and hypertension (Soffarand & Mokhar, 1991).Garlic is also used today by some people for the prevention of lung cancer, prostate cancer, breast cancer, stomach cancer, rectal cancer, and colon cancer. It is also reported to be used in the treatment of worm infections, cough, wounds, asthma, digestive disorders and lots more (Kafaru, 1994; Perez *et al*., 1994).

Despite the enormous claims on its use, a lot of research is still required to authenticate these claims. Arising from this stand point, we decided to investigate the toxicological effects of garlic (*Allium sativum*) on some haematological and biochemical parameters using experimental animal model. Our observation showed that at high doses, garlic could exhibit some toxic effects on blood parameters such as haemoglobin, packed cell volume, total white blood cell counts, neutrophils and lymphocytes. However, it was also noticed that at the same concentration, it showed palliative and protective potential in protective some body organs such as the liver, heart, skeletal muscle and kidney but it is our opinion that the full potential of garlic in the prevention and treatment of diseases and its inherent effects are not fully known (Bartimaeus & Agbor, 2003).

Fig. 15: Garlic Bulbs

Vice-Chancellor, Sir, the use of herbs in the management of diabetes mellitus and its complications has been reported. A chronic hyperglycaemic condition, stemming from the decreased supply of insulin, its action or both, resulting in a cluster of metabolic disorder is termed diabetes mellitus (DM) (Ozuogwu *et al*., 2013). Mainly two types of diabetes mellitus occur, such as type I and II. The former is also called juvenile diabetes or insulin-dependent diabetes mellitus, as it occurs mainly in the young, characterized by destruction of beta cells which may be due to an autoimmune process or accident, usually leading to absolute deficiency of insulin (Kumar & Clark, 2002). Patients with this type of diabetes will require insulin therapy to maintain normal blood glucose concentration, while the latter is called maturity on-set diabetes or non-insulin dependent diabetes mellitus, representing ninety percent of all cases of diabetes mellitus (Gonzalez *et al*., 2009), and may be due to insensitivity of target tissues to insulin (Ozuogwu *et al*., 2013). Vice-Chancellor, Sir, we also ventured into investigations involving the use of some herbs in the management of diabetes mellitus using animal experimental models. Examples of such herbs includes *Vernonia amygdalina* (Bitter leaf),*Gongronema latifolium* (commonly called Utazi) and *Hypoestes rosea*.

In Nigeria, herbs are normally taken naturally even in the absence of known disease with the belief that it can prevent and protect the body organs against organ failure. Thus our focus was to investigate on the prophylactic and therapeutic efficacy of the herbs before and after diabetes mellitus has been induced in the experimental animals. ***Our findings show that the extracts from the leaves of these plants have the potential to reduce glucose and lipid levels of rats exposed to various concentrations of the extract either singly or in combination. The effects were more in rats that were exposed to these extracts after diabetes mellitus has been induced (therapeutic efficacy) than in rats that received the rats before induction (prophylactic efficacy)*** (Bristol *et al.,* 2019; Africa *et al.*, 2020).

Fig. 16: *Vernonia amygdalina* (Bitter Leaf)

Fig. 17: *Gongrenema Latifolium* (Utazi)

Fig.18: *Hypoestes rosea* Plant in its Natural Habitat

Mr. Vice-Chancellor, Sir, it is necessary to state that our studies on these herbs and plants also demonstrated that they are rich in antioxidants which explains why they are effective in the management of diabetes, cardiovascular diseases, cardiac problems and dyslipidaemia. **The lesson here is that most of the vegetables that are consumed locally in our communities have scientifically proven beneficial usefulness to our health.**

4.8. MY CONTRIBUTION TO THE INFERTILITY CONUNDRUM IN OUR SOCIETY

Infertility is the inability of couples to accomplish conception or pregnancy after regular sexual intercourse for a period between one or two years (NGCF,2010). One of the main desires of couples in Nigeria is procreation (Menuba *et al.*, 2014). Evidence shows that infertility is a major problem linked with reproductive health in sub-Saharan Africa (Okonofua & Obi, 2009). As a result of poor documentation and lack of well-designed studies, an accurate prevalence of inability to be pregnant in developing countries

especially Nigeria has not been fully ascertained (Ombelet *et al.*, 2008). In one of my visit to a fertility centre in the South Eastern Nigeria, I observed that the facility was flooded with young married women who naturally are expected not to be found in such places at such times. This observation moved me to endeavor into investigating on the role of maternal age on infertility amongst Nigerian women using married women from and around Umuahia, Abia state as a test case. Mr. Vice-Chancellor, Sir, it is pertinent for me to share in simple steps aspects of the findings from that study. I will succinctly illustrate it with the graph below:

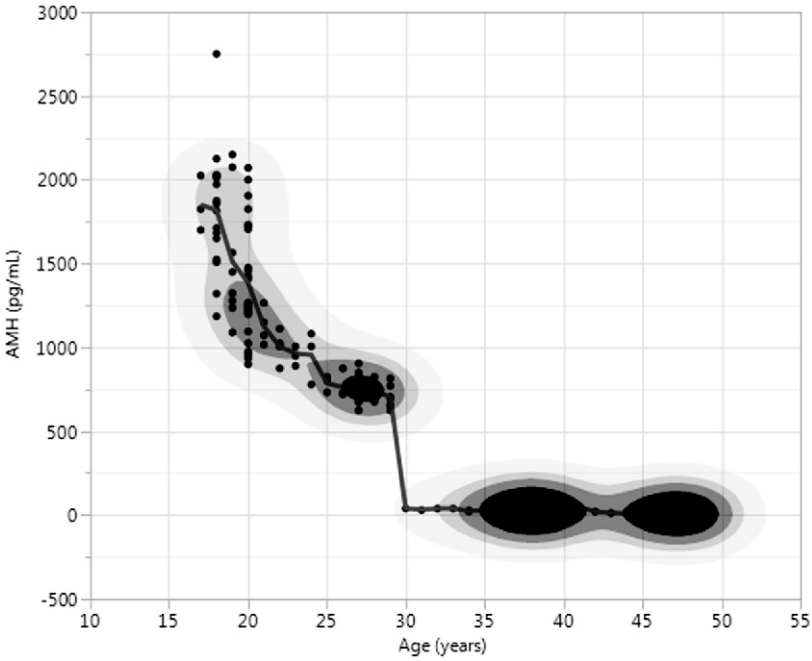


Fig. 19: Associations between AMH and Age Showing the mean (red line) and contour regions of data density

Basic explanation of some facts about infertility as it relates to the above figure are as follows:

There is a hormone (chemical messenger) called **Anti-Mullerian Hormone (AMH)** which is one of the most important hormones related to fertility because it serves as a proxy for the woman's **ovarian reserve** (aka how many eggs a woman has).

As you get older, AMH also declines (reflecting the decrease in ovarian reserve with age). Here's what you should know about your AMH over the years:

- A woman is born with 1-2 million eggs — that's more than enough to populate the entire city of Port Harcourt.
- More than half of the eggs disintegrate by **the time a woman goes through puberty** (sounds alarming, but this is normal).
- 800-1,000 eggs undergo natural cell death each month — but only one makes it to the finish line (**ovulation**). If it's fertilized, it may result in a pregnancy — if not, the woman will get a period (**menstruation**).
- AMH generally **peaks at age 25**, and then **AMH (and egg count, antral follicle count, AFC) begin to gradually decline.**
- **Around age 35** (it's different for every woman), **ovarian reserve decline becomes more rapid**.
- By menopause, egg count and AMH drop to undetectable levels.

Observation from our study:

1. AMH peaked rather too early (**between 15 to 20 years**)
2. AMH and by implication total egg count declined too early (**around 28 to 30 years**) (Bartimaeus *et al.,* 2020).

Lessons from the study

There is need for women to marry early since the reproductive age as observed in our study is greatly becoming shortened. We all know why nowadays the girl child does not get into marriage early – the need to acquire education and support the home and also equally participate in roles that are hitherto considered reserved for the males. Just a Caution

Vice-Chancellor, Sir, we also observed that this disturbing observation is not limited to our women. We as men are also involved. Male infertility is the condition in which a male is unable to establish pregnancy in a viable woman over a period of 12 months of unprotected sexual intercourse. In a study involving 192 men, out of which 100 were fertile, normospermic subjects and 92 were infertile males recruited randomly at fertility centres across Port Harcourt, a disturbing observation was also seen. The observed percentage of the various categories of sperm abnormalities seen were normospermia (normal values of all ejaculate parameters (52%), azoospermia (absence of motile and hence viable sperm cells in the semen (20.8%), and Oligoospermia (low sperm count (27.2%).

Normal sperm have an oval head with a long tail (fig. 15). Abnormal sperm have head or tail defects — such as a large or misshapen head or a crooked or double tail (see fig. 16). These defects might affect the ability of the sperm to reach and penetrate an egg. Vice-Chancellor, Sir, we also observed a number of sperm abnormalities among the infertile males such as asthenozoospermia, 23.91% (reduced sperm motility), oligoasthenozoospermia, 28.26% (a combination of reduced sperm motility and low sperm count), teratozoospermia, 15.22% (presence of sperms with abnormal morphology), asthenoteratozoospermia, 19.57% (low sperm motility and

abnormal sperm morphology) and oligoasthenoteratospermia, 13.04%(low sperm count, low sperm motility and abnormal sperm morphology) based on the morphology of the sperm cells following WHO, (1992) guidelines.More so, our study also revealed that sperm proteins such as heat-shock protein 70 (HSP70), Protein Kinase A (PKA) in the seminal plasma were significantly elevated in infertile subjects while osteopontin (OPN) in the seminal plasma was observed to be significantly reduced in the infertile subjects (Aworu *et al.*,2022).

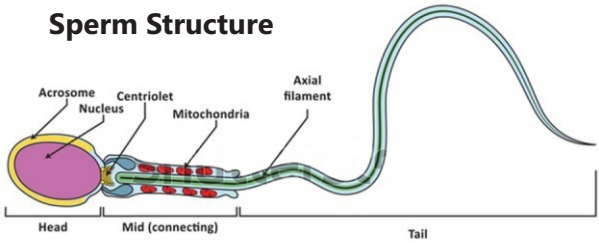


Fig. 20: Normal Sperm Structure

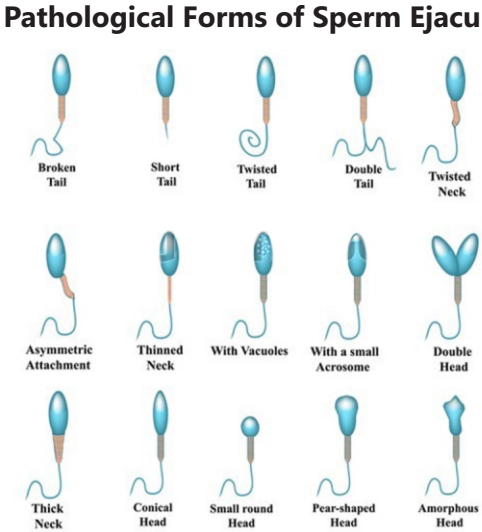


Fig. 21: Abnormal Sperm Shapes

Lessons from the study:

Most of our young men walking the streets and making good money may be having infertility problems meaning they may have difficulties impregnating their wives after marriage.

Way forward: If you are present at this Inaugural lecture and you have been married for over a year and having unprotected sexual intercourse with your wife, and yet she has not attained conception, be the first to step forward for full **SEMEN ANALYSIS**. You may be the problem and excluding you is a major step in resolving the infertility conundrum. I know you are still believing God but remember that "the things that are revealed are for the sons of men" (Deut.29:29 KJV). It is still possible to help you medically.

Vice-Chancellor, Sir, in our quest to further **LOOK MORE** into the infertility problems in order to provide a scientific foundation and evidence based explanation, we **SAW** that oxidative stress is one of the major factor associated with male and female infertility in Nigeria (Bartimaeus & Sewu, 2017; Olofinshawo *et al.,* 2019; Aworu *et al*., 2022).

Good News:

As a way of contributing to solving the problem of infertility in the female, Bartimaeus and Colleagues are developing a herbal remedy that has the potential of stimulating oocyte production by the ovaries and restoring abnormal reproductive hormonal profiles. In a crude experimentation, attempts to use the crude extract on infertile women who have had unsuccessful cycles of *in vitro* fertilization had their cycles corrected and subsequently got pregnant Studies are ongoing to fully provide a scientific basis for the chemical composition and mechanism of actions of the herbal remedy to enable it to be fully patented and commercialized.

4.9. BIOSAFETY OF ORGANIC COSMETIC PRODUCTS IN OUR MARKETS

Vice-Chancellor, Sir, the assessment of the toxicological potential of cosmetic products is a crucial step in the hazard evaluation of cosmetics and it consists of a series of distinct toxicity studies. Scientists have discovered that contamination due to poor manufacturing practices from biotoxin or corruption of the plant material with heavy metals are the reasons why herbal cosmetics are toxic (Merlin *et al.*, 2019). Heavy metals are a group of metals and metalloids that have relatively high density and are toxic even at parts per billion (ppb) levels. Examples include lead (Pb), arsenic (As), mercury (Hg), cadmium (Cd), zinc (Zn), silver (Ag), copper (Cu), iron (Fe), chromium (Cr), nickel (Ni) etc. These metals are released into the environment by both natural and anthropogenic sources such as industrial discharge, automobiles exhaust, mining and petroleum exploitation and exploration activities. The degree of toxicity of heavy metals is directly related to their daily intake. This is because once heavy metals enter the body, they tend to accumulate over time (Baird & Cann, 2012).Castro-Gonzalez and Mendez-Armeta (2008) stated that daily exposure to heavy metals from cosmetics when compared with other sources like food, water and air is negligible but due to the cumulative characteristics of heavy metals in the body during a human lifetime, cosmetics can be regarded as a substantial source of exposure in the body. The claims by most manufacturers of organic cosmetic products is that since these products are derived from plant sources within our environment, they are thus very safe and non-toxic. Heavy metal contamination in herbal cosmetics is usual because of the absorption of these metals by plants, even if in minute quantities that lead to bioaccumulation of them in plant parts. When such plants are used in the manufacturing of cosmetic products without removal of the heavy metals, its poisonous and toxic effects can be experienced.

Vice-Chancellor, Sir, there has been a paradigm shift in the manufacturing of organic cosmetics in Nigeria. Quite a number of privately owned companies and individuals are now involved in organic cosmetic production without recourse to its heavy metal contents. Some examples of organic cosmetic products in the Nigerian market are shown below.

Fig. 22: Examples of Organic Cosmetics Made from Plant and Other Sources

We randomly purchased three (3) organic herbal hair oils with **NAFDAC Reg. Nos**. from a Supermarket in Port Harcourt and determined the concentration of some toxic heavy metals that have been implicated in severe health problems and cancer in humans. These heavy metals are cadmium, lead, arsenic, copper and zinc. Our findings on the heavy metals content of the hair oils showed that they **contain reasonable amount of lead, cadmium, copper, zinc and arsenic at concentrations far exceeding the maximum allowable concentrations stipulated by the World health Organizations (WHO) and the United States Environmental Protection Agency (USEPA) with the exception of zinc** (Thompson *et al*., 2021).

The incremental lifetime cancer risk associated with the use of these cosmetics was above the allowable limit of normal for all the cosmetics surveyed indicating that there are chances of cancer resulting from the use of these cosmetic products due to the build-up of the heavy metals contained in the products (Thompson *et al.,* 2021). The implication of this study is that there is need to carefully choose between the organic cosmetics you may prefer to use. ***Carefully check whether information on heavy metals extraction from the plant source before it was used in the production of the product is indicated on the container.***

Vice-Chancellor, Sir, we also investigated deeply into the systemic impact of these organic cosmetics on the integrity of internal body organs such as the kidney and liver using experimental animal model through topical application of the creams on the body of the animals. Rabbits were used as the modelling animals in this instance. Vice-Chancellor, Sir, we observed remarkable derangement in the integrity of kidney and liver of the experimental animals. ***The implication of this finding is that continuous usage of Organic Cosmetic products whose heavy metal contents are not ascertained has the potential to adversely affect internal body organs especially when the products are used continuously over a prolonged period of time*** (Thompson *et al.*, 2021).

4.10 BIOSAFETY OF COMMONLY CONSUMED FOOD ITEMS SOLD IN OUR MARKETS.

Vice-Chancellor, Sir, it is on record that the Nigerian agricultural sector employs about two-thirds of the entire labor force and is presumed to be the largest sector of the economy. The sector contributed about 25.2 % (N10.50 trillion) to the nation's GDP as of 2019. Despite this status as being the largest employer of labor, it is estimated that Nigeria has lost over USD 10 billion in annual export opportunities from groundnut, palm oil, cocoa, and cotton and other food items such as yams, cashew nuts in shell, frozen shrimps, ginger,

fish, crustaceans, mollusks, aquatic invertebrates, oilseed, grain, seed, and fruits. It has also been reported that some of the limitations in the agricultural export system are a result of several factors, such as the presence of **mycotoxins** in some agricultural products exported by Nigeria. This observation grossly affected the acceptability of many Nigerian grown edible food items abroad although these food produced are steadily consumed in the country. Vice-Chancellor, Sir, ***mycotoxins are secondary metabolites produced by microfungi that are capable of causing disease and death in humans and other animals.*** Examples of common mycotoxins include ***aflatoxin, citrinin, fumonisins, ochratoxin A, patulin, trichothecenes, zearalenone, and ergot alkaloids such as ergotamine***.

Vice-Chancellor, Sir, it is on record that Nigerian farmers use dangerous chemicals to control weeds and pests in their farms. It would be recalled that some years ago, some Nigerian stable food items were returned back into the country from the United States of America and the United Kingdom because they were considered unsafe for human consumption. This episode prompted us to investigate into the safety of some common stable food items commonly sold in Port Harcourt markets knowing that these foods were grown in this country and that the farmers used prohibited herbicides to control the weeds during cultivation. The food items include tomatoes (*Lycopersicon esculentum*), pepper (*Capsicum spp*), yam (*Dioscorea spp*), maize (*Zea mays*), rice (*Oryza sativa*), cucumber (*Cucumis sativus*), beans (*Phaseolus vulgaris*), watermelon (*Citrullus lanatus*), groundnut (*Arachis hypogaea*), and cabbage (*Brassica oleracea*). Vice-Chancellor, Sir, we can scientifically report that these food items contain very high amount of a poisonous substance called **CYANIDE.** The cyanide content of the food items ranged between **0.05-0.18 mg/L** in the raw food items. Knowing that some of these food items are usually boiled or cooked before consumption, we therefore decided to boil some of these food items for 60 minutes and further determine the cyanide concentration in them. The result of our findings shows that the cyanide content of

the cooked food ranged between **0.02 to 0.06 mg/L.** Vice-Chancellor, Sir, we are the first to boldly report that most cooked food items consumed in Nigeria contain the poison **CYANIDE** (and possibly other substances) at concentrations between **0.02 to 0.06 mg/L** which is far above the level of **0 to 0.0005mg/L** regarded by the United State Environmental Protective Agency (USEPA) as being safe for humans as a result of the use of dangerous herbicides to control and kill weeds during cultivation. ***This finding provides one of the singular evidence why some Nigerian food items were regarded as unsafe and thus returned back to the country. The lesson from our study is that farmers should as much as possible avoid the use poisonous chemicals in the control of insects and weeds in their farms. This re-echoes the need for organic farming methods. Our grandparents ate organic foods which were relatively safe to their health.***

Vice-Chancellor, Sir, realizing the poisonous effect of cyanide on the human biological system, we further probed into the effect of prolonged exposure of **sodium cyanide** to experimental rabbits at concentration observed in the food items to mimic the amount to which humans are exposed to through the consumption of food items. The investigations was aimed at observing whether prolonged exposure to this substance in an animal experimental model could have effect on some vital body organs such as kidney, liver, lungs, and heart. The approach attempted to establish causal relationship between consumption of some Nigerian food items and the occurrence of unexplained uncommon manifestation of kidney, liver, heart and other diseases in the general population especially among younger generation. ***Our findings using experimental animal model indicates severe toxicities to the kidney, liver and heart.*** Vice-Chancellor, Sir, the findings in the study revealed that even though the ***experimental rabbits did not show visible signs of disease, the biochemical findings and the effect on organs such as kidney, liver and heart were indicative of organs toxicity*** (Elleh *et al*., 2021).

4.11 EVIDENCE ON THE USE OF VITREOUS HUMOR IN DEATH DIFFERENTIATION

Vice-Chancellor, Sir, Vitreous Humor (VH) is the most investigated body fluid for estimation of post mortem interval (time that has elapsed since an individual's death) (Byrd & Castner, 2009) and has become an integral part of postmortem investigations (Harper, 1989). It is a fluid that is protected from postmortem degradation and contamination and has high utility in forensic analysis due to its postmortem stability for determining postmortem metabolic status and serum concentrations (Baniak *et al.,* 2015). It is produced in the posterior segment and fills the vitreous chamber which takes up about 80% of the eye. It is collected by inserting an 18- or 20 gauge needle attached to a 10 mL into the globe of the eye. The vitreous humor is usually withdrawn very slowly. In the recent past in Nigeria, reports of alleged homicide or suicide cases involving the use of poisonous chemicals have been reported severally in the media. Some of the chemical poisons implicated in these reports include the rat poison and insect killer popularly called snipper (**2, 2-Dichlorovinyl dimethyl phosphate**), sodium cyanide and a host of others.

Fig. 23: Sniper Rat and Insect Killer

Fig. 24. Dichlorvos (Sniper) Intoxicated Death Victim

Reports of cases of corpses being found floating in swimming pools in notable hotels or dead bodies seen in hotel rooms or University hostels have been on the news for some time now. In some cases, some residue of the poison have been seen beside the deceased or even in the mouth of the deceased. Investigations in most cases have failed to establish a relationship between the poison and the cause of death. In our quest to **look deeper** into how we can provide scientific evidence on biochemical parameters which can be adequately used to differentiate putative death from actual death, we decided to mimic these scenarios by employing some common poisons which have in most cases been implicated as agents of dead in these circumstances. Examples of such agents are sodium cyanide and sniper (**2, 2-Dichlorovinyl dimethyl phosphate**) using animal experimental models. Vice-Chancellor, Sir, in the our experimentation, we actually caused death in the experimental rabbits using heavy concentrations of the poisonous chemicals on the one hand and also caused death in the rabbits naturally and deliberately introduced the poisonous substance into the rabbits later. We also caused death in the rabbits naturally without introduction of any poison after death. Vitreous humor was then collected from the eyes of the rabbits after elapsed time of death to examine for biochemical parameters which could be of help in differentiating death from these three scenarios.

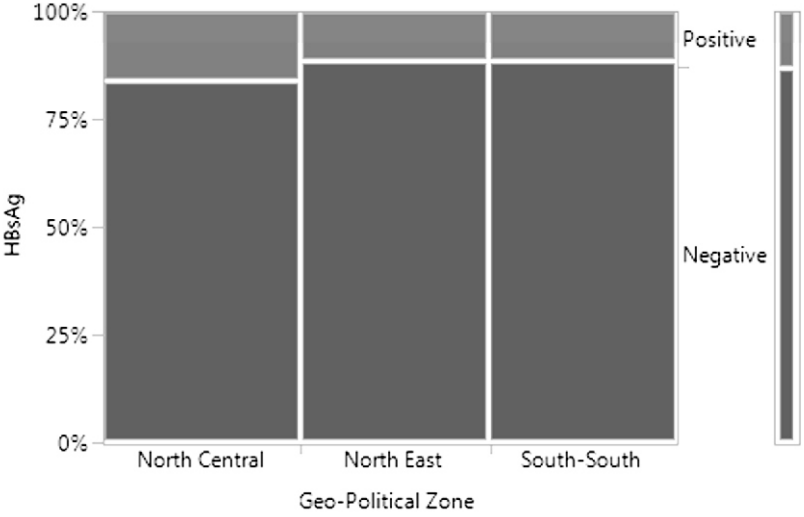
Vice-Chancellor, Sir, in the differentiation of death caused by sodium cyanide and snipper using vitreous humor, we are the first to report that measurement of **biochemical parameters such as glucose, total cholesterol, low density lipoprotein cholesterol, computation of atherogenic indices such as cardiac risk index I and II, measurement of liver function parameters such as aspartate aminotransferase, alanine aminotransferase, alkaline phosphatase, total bilirubin, conjugated bilirubin, total protein, albumin, and renal parameters such as potassium, chloride and calcium ions and kidney injury molecule 1 could differentiate death caused by actual deliberate administration of sodium cyanide from those arising from forcing the poison into the deceased after death has occurred as the values of these substances are significantly increased in the vitreous humor of the rabbits in the actual death when compared to the groups that died naturally and those into which the poison was introduced after death has occurred.** In fact, determination of **acetyl cholinesterase enzyme activity in the vitreous humor clearly differentiates actual death arising from sniper from those in whom death was imputed** (Elleh *et al.*, 2021; Elleh *et al.,* 2021; Ozoemena *et al.,* 2021). Vice-Chancellor, Sir, the relevance of this finding in the field of forensic toxicology and crime detection is **that it has offered scientific evidence that can easily be used to exclude putative death from actual death in cases of homicide or suicidal death differentiation.**

Vice-chancellor, Sir, Sniper which is also a popularly used in our houses to kill insects and rats has also been found to cause **kidney and liver toxicity in experimental animals after repeated exposure** (Ozoemena *et al.*, 2021). The implication of this finding is that caution is required in the use of this insecticide in our homes. Enough elapsed time should be allowed before entering into rooms or spaces where Sniper has been applied.

4.12 HEPATITIS B VIRUS CARRIERS AMONGST VOLUNTARY BLOOD DONORS IN NIGERIA

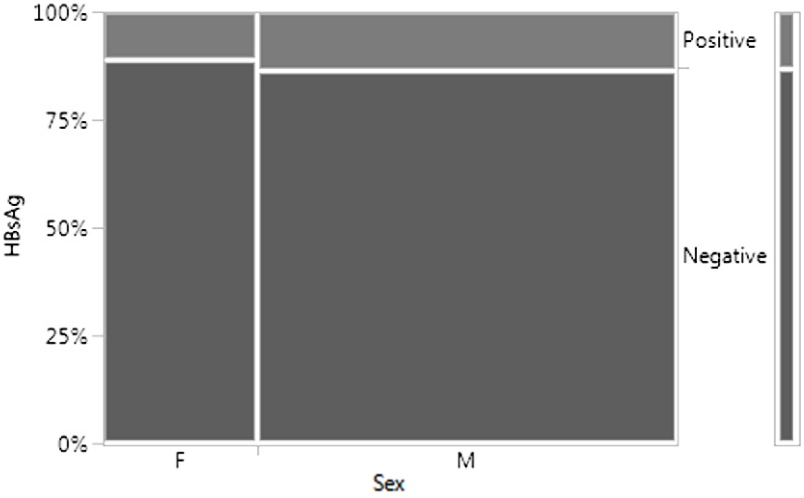
Vice-Chancellor, Sir, the reduction of public health burden is one of the goals of many intervention strategies in the health sector of our country Nigeria. Several infectious agents such as hepatitis B virus (HBV) constitute major public health problems particularly in Sub-Saharan Africa and other developing countries of the World. Hepatitis B is a viral infection which causes acute and chronic hepatitis leading to thousands of deaths per year and it is considered one of the major public health issues worldwide (WHO, 2015; Souza *et al.,* 2014).The risk of hepatitis B virus infection through unsafe blood is exceptionally high particularly in sub-Saharan Africa (WHO, 2019).

The provision of safe blood is of paramount importance and it is the responsibility of the National Blood Transfusion Service and indeed all Units in both public and private health institutions to ensure that safe blood is made available for the purpose of transfusion to patients. However, in Nigeria advocacy on the impact of the danger of hepatitis B is very poor despite the fact that good spirited individuals are generally encouraged to freely donate blood for the purpose of saving lives in the country. We thus decided to determine the status of hepatitis B carriers among voluntary blood donors in some geo-political zones in the country such as North Central, North East and South-South. Vice-Chancellor, Sir, **we are the first to report that about 20% of healthy voluntary blood donors in the North central zone and 15% in the North East and South South zones respectively tested positive for hepatitis B virus**. We also found out that within the three geo-political zones studied, **15% of the male voluntary donors tested positive for hepatitis B virus antigen while only 10 % of the female volunteers were positive**. Chi square analysis of the variation between male and female volunteers was not significant (P=0.4585; X^2 value = 0.550) (Odiabara *et al.*, 2020). These donors are often referred to as **asymptomatic carriers**. This distributions are shown on the next page.



X^2Value = 2.049; p=3590ns

Fig. 25: Distribution of HBsAg in the three Geo-political zones



F= Female, M = male, X^2Value=0.550; p=0.4585ns

Fig. 26: The distribution of HBsAg in the Three Geopolitical zones by Sex of Voluntary Blood Donors

Vice-Chancellor, Sir, ***these findings indicate that the percentage of asymptomatic hepatitis B virus carriers in the population is high implying that progression of these carriers into the full hepatitis B infection in the event of interactions between host and environmental factors is a possibility***. We also probed further to assess whether these observed presence of hepatitis B antigens in the volunteer donors could cause any risk of cardiovascular disease considering the variation in the eating habits, diet, stress and life styles of the individuals in the respective zones.

We found out that the mean values of total cholesterol, high density lipoprotein cholesterol, low density lipoprotein cholesterol, and triglycerides did not vary significantly ($p > 0.05$) between the hepatitis B positive carriers and hepatitis B negative subjects across the geo-political zones studied. Although in some of the subjects the values of the parameters were on the high normal range between the male and female subjects. The atherogenic indices of plasma (AIP) and Cardiac risk ratios (CRR-I) and (CRR-II) of the blood donors in the zones in both the HBsAg positive and negative subjects were within the reference range. The atherogenic coefficient value of >3.0 was obtained forsome HBsAg negative and positive subjects in some of the zones. The findings indicate **that asymptomatic HBV infection may be associated with low risk of dyslipidaemia in the population over time** (Odiabara *et al*., 2020).

5.1 CONCLUSION AND RECOMMENDATIONS

The Rivers State University, Port Harcourt was established for Excellence and Creativity. It was conceived and designed to be a Centre of Quality Research in Science and Technology. However, as the years go by, this vision has eroded adversely because of the inability of Government to fully fund and support integrated innovative research that has the potential to transform the state and the nation especially in the Health Sector. More so, emphasis on Medical Laboratory Services has been poor because of lack of awareness of the pivotal role the service plays in the healthcare system. As more and more challenges arise in the healthcare system, the need to adequately train health care personnel and indeed Medical Laboratory Scientist becomes imperative.

The Health care system was designed to work as a team that has interdependent functions. Vice-Chancellor, Sir, for the health sector to meet up with the challenges of emerging and re-emerging infections and epidemics, there must be a robust Medical Laboratory Services fully equipped and supported with modern medical laboratory equipment and adequately trained professionals saddled with the responsibility to continuously search and look more deeply into the "revealed mystery of diseases". How can Health services in Nigeria be improved without improved Medical Laboratory Services? How can the Rivers State University plan to be among the best 500 Universities in the world without cutting edge research in science and technology? How can the citizens of this great country benefit from the great potentials that are endowed in Medical Laboratory Scientists if Medical Laboratory Services is relegated to the background by those saddled with the responsibility to prioritize health policies? Indeed, the moment the government realized the importance of a robust Medical Laboratory Service and indeed the role of Medical Laboratory Scientists in the health care system of this country, the enormous financial allocations in both Federal and State budgets will begin to bear fruits on the health of the citizenry.

Vice-Chancellor, Sir, let me finally conclude this Inaugural Lecture by re-echoing and paraphrasing the divine truth that is recorded in the Scripture that although the ***secret mysteries of diseases and health belongs to the Lord our God; those things that are revealed belong unto the Medical Laboratory Scientists forever and the MORE THEY LOOK FOR THESE MYSTERIES, THE MORE THEY WILL CONTINUE TO SEE THEM and that is how it will be forever for them and the generations after them forever.***

RECOMMENDATIONS

Vice-Chancellor, Sir, following from this Inaugural Lecture, the following recommendations are validly made:

1. The Rivers State should adequately support and finance research in this University. The stride towards infrastructural development in the University is highly commendable. Physical structures are good but when the research minds that drives and dwells in them are poor; the physical structures becomes agents of poverty because the earnest expectation of the manifestations of these minds would be lost and the minds that would have been molded by them would also be lost. No nation can become great if it depends on external borrowing and aids and in the same vein, no University can become listed in the first 500 worldwide that only rely on Internally Generated Revenue and TET Fund but cannot sacrifice its own earnings to fund research. There is no type of Research and Laboratories that the Rivers State Government cannot fund and build. Let us demonstrate our commitment to the realization of the dreams of the founding fathers of this great University. A university without strong and well-funded research activity is having NO activity at all but going by name and just talking to be heard and of course we all can understand why we are where we are today.

2. The Healthcare Sector is a multi-disciplinary one. There is need for greater collaboration between the players within the sector. Each discipline should mutually respect the integrity and dignity of the other because the sector though has many members, each member is working for the same purpose. Though they are many, the health of the citizenry is the primary focus. Each of the discipline within the Healthcare Sector should work together perfectly in order to make the sector function and grow for the benefit of the citizenry. There is need for greater research cooperation of the various units since the activity the units is interconnected and diverse. Every unit is peculiar, distinct and individually important. When this fact is appreciated, each discipline within the health sector will be able to make its very specific contribution to the growth of the sector.

3. There used to be in this University the Department of Medical Laboratory Science Diagnostic Centre. The Laboratory was a major source of internally generated fund for the University in its operational days and also offered assistance in providing clinical laboratory specimens utilized in laboratory practical sessions for our students. I am urging the Vice-Chancellor, Sir to consider the option of re-opening the Diagnostic Centre especially now that the University is interested in sourcing for ways that the internally generated revenue base of the University will improve.

4. Vice-Chancellor, Sir, it would interest you to know that the Department of Medical Laboratory Science has a lot of staff that are fully trained in Molecular Diagnostic techniques. This, therefore, strengthens the need to speed up effort in establishing the Molecular Genomics Laboratory for the Department. Establishing this

Laboratory will make it easy for the University to be recognized as a center for Molecular Research in the country. The establishment of a COVID-19 laboratory in this University would also be possible. The financial benefit that the COVID-19 Laboratory and Molecular Genomics Laboratory will generate for the University is indeed enormous.

5. The Department of Medical Laboratory Science has commenced a Master of Sciences (MSc) degree in Biorisk Management. There are also plans to commence programmes in Forensic Science at a Post graduate level in the Department. The need for expansion of the infrastructural base of the Department of Medical Laboratory Science is therefore being advocated since these efforts will yield strong financial benefits to the University.

ACKNOWLEDGEMENTS

In His own time, God has made it possible for me to be alive to present this Inaugural Lecture. It is His faithfulness, protection, provisions, sustenance and preservation that has made this day possible. To him who is immortal and invisible, the only wise God who dwells in light inaccessible, most blessed, most glorious, the Ancient of Days, Almighty, victorious, be all praise and glory forever and ever, Amen.

It is a known fact in this University that for three whole years some lecturers in this University were sacked and taunted for standing by the truth and refusing to deny their Union, the Academic Staff Union of Universities (ASUU). I was one of the affected lecturers. On May 29, 2015, when the Executive Governor of Rivers State, Chief (Barr.) Nyesom Ezebunwo Wike, CON, GSSR, POS (Africa), was sworn in as the Governor of Rivers State, one of the projects he started and completed on that same day was the restoration of all the staff that were sacked by the then management of this University. That singular event changed the course of my academic career. This day is made possible because Governor Nyesom Ezebunwo Wike gave me back my job. Therefore, I want to thank him immensely for giving me this second chance which today has culminated into the birth of a Professor of Chemical Pathology, who is now standing before you all to deliver his Inaugural lecture. My God fearing and loving Governor, God will continue to bless and keep you and your family in Jesus name. Amen.

My unreserved and candid appreciation to our quiet-spirited, gentle and amiable Vice-Chancellor of this great "University of the year 2021", Distinguished erudite Professor of Law, Prof. Nlerum Sunday Okogbule. My contact with you has been life changing. I became a Professor in your tenure and your confidence in me made you appoint me the Head, Department of Medical Laboratory Science of this University. As Head of Department, you have supported me greatly to

achieve the much that we have done so far. Your staff friendly style of administration made you approve and give me this singular opportunity to be the 78th Inaugural Lecturer. My God will continue to bless you and prosper your tenure as Vice Chancellor of this University.

I heartily appreciate the Deputy Vice-Chancellor (Adminis-tration), Prof. N. S. Okoroma for his special love for me. He is one person who fondly refer to me as the "seeing Bartimaeus". My former Dean, and now Deputy Vice-Chancellor, (Academic), Prof. Valentine Omubo Pepple, words are not enough for to express my heart felt gratitude to you. In my times of travail, you were always there to encourage and support. You are a beacon of encouragement to me. I appreciate you, Sir.

Most humbly, I appreciate my former Vice-Chancellor, Prof. Blessing Chimezie Didia. When "we" returned from exile, he was the vessel God used to perfectly heal all the wounds that were inflicted on us. He personally ensured that I was allowed to defend my PhD Thesis which was deliberately kept in the cooler for 5 good years in the Post Graduate School. I am most grateful, Sir. I also appreciate our former Acting Vice-Chancellor, my Mummy, Prof. (Mrs.) Opuenebo Binya Owei for her caring support. She it was that gave me the opportunity to leave the University for Sabbatical Leave at the Nnamdi Azikiwe University, Awka, Anambra State.

It is also important for me to sincerely appreciate the present Registrar of this University, my friend of many years, Dr. Sydney C. Enyidah, the present and former University Librarians, Dr. (Mrs.) Jennifer Ngozi Igwela and Prof. (Mrs.) Blessing Ahiauzu and my personal person, the Acting Bursar of the University, Mr. James Orji Ebere, the University Orator and immediate Past President of the University Senior Staff Club, my dear friend and paddy man, Prof. Zep Obipi for their contributions to the development of this great University.

It is pertinent to appreciate all members of the University Governing Council especially the Chairman, Hon. Justice Iche N. Ndu (Rtd), and all members of Senate for their untiring support to the University Management. The giant and unprecedented strides and accolades the University is known for in recent times is traceable to their contribution.

Let me also thank my academic Project Supervisors and mentors, Prof. P. A. Uadia (MSc), Late Prof. Solomon Amabraye Braide, Late Prof. E. O. Ayalogu and Prof. Ibibia F. Uruambo (PhD) for patiently supporting and guiding me through the tortuous journey of PhD supervision. It is with a grateful heart that I am thanking you, Sir, Prof. I. K. E. Ekweozor, Chairman of the University Lectures Committee, Prof. Sam Abbey my academic Daddy and mentor and Prof. T. G. Sokari. You had been with me from the beginning when I was an undergraduate student and has been there abiding and guiding even up till today that I am presenting this Inaugural Lecture. I am eternally grateful to you all.

My own Dean, Prof. Confidence Kinikanwo Wachukwu, I cannot thank you enough. Also, Prof. Gloria Ngozika Wokem, Dr. (Mrs.) Edna Ogechi Ibegbulem, my past heads of Department and Prof. Zacchaeus A. Jeremiah my brother in the Department. Your influence and contributions to my life are greatly appreciated. Together we have moved our dear Department of Medical Laboratory Science to this enviable height. To God be the glory.

I am especially thanking my colleagues in the Department of Medical Laboratory Science who have been my pillar of support and encouragement through thick and thin. Your contributions has immensely made this day a reality. They include Dr. D. G. Tamunoemine, Dr. D. Onwuli, Dr. (Mrs.) Adline. E. Ben-Chioma, Dr. Holy Brown, Dr. Ibioku Elekima, Dr. (Mrs.) Helen A. Waribo, Mrs. N. Brisibe, Dr. (Mrs) Ibitoroko M. George-Opuda, Dr. Kemzi N. Elechi-Amadi, Dr. Ojoye N. Briggs, Dr. Uche. A. Obisike, Dr. (Mrs.) Evelyn M. Eze, Dr. (Mrs.) Stella U. Ken-Ezihuo, Dr. (Mrs.) Beatrice Moore-

Igwe, Dr. (Mrs.) Beauty Echonwere Fred Uwuikor, Dr. Serekara G. Christian, Dr. Smart E. Amala, Dr. Christian U. Mbata, Dr. Easter G. Nwokah, Dr. Ollor A. Ollor, Dr. Tombari P. Monsi, Dr (Mrs.) Lynda K. Giami, Dr. (Mrs.) Vivian Agi, Dr. Obioma Azuonwu, Dr. Rhoda Nwalozie, Dr. (Mrs.) Constancy P. Aleru-Obogai, Mr. Chiladi. J. Isomah, Dr. (Mrs.) Chidinma A. Azike, Mr. Raphel E. Teme, Dr. Evis. Tam, Mrs. Ibinabo Matthias, Mrs. Miebaka L. Ian-Gobo, Mr. Baribefe D. Koate, Mrs. Orokwu Chukwuigwe, Mr. B. S. Mbeera, Mr. Ranson B. Jacob, Mrs. Priya H. Chukwu, Mrs. Tarila Didia-Wosu, Mrs. Eberechukwu. O. Iroegbu, Dr. (Mrs) Tomaziga T. Oladapo-Akinfolarin, Mrs. Uchechukwu Collins, Ms. Ngozika Enyindah, Mr. Emmanuel D. Dee, Mrs. Chinyere David-Omereji, Mrs. Kate C. Ibe-Atako, Mrs. Ogechi Oluowhor, Mr. Moore I. Mike-Ogburia, Mr. Felix E. Konne, Mrs. Joy Lawson-Ndu, Mrs. Token O.M. Lawson-Jack, Mr. Onyemaechi Collins, Mrs. Iminabo Wokoma Paul, Mrs. Cecilia Nnokam, Mrs. Sandra T. Mgbamoka, Mr. Simon M. Ogbo, Mr. Didia Wisdom and Mrs Fyne Okpara.

I am especially indebted to my Colleagues, the Medical Laboratory Science "**Class 87**", Dr. Kingsley Kalawari Odiabari, High Chief (Dr) Solomon Ederi, Mrs. Makimba Ogamba, Mr. Peter Okuba, Mr Iwo Lawson, Mrs. Felicia Danka, Mr. Isdore, Mr. Robert Inyang and Mr. Christopher Enyidah. My association with you all has been a wonderful blessing.

Special thanks to my friends and Colleagues, Prof (Mrs.) Emylia T. Jaja, Prof. (Mrs.) Onome Davies, Prof. Erema Ransome Daka, Prof. David N. Ogbonna, Prof. Friday B. Sigalo, Prof. Sodienye Abere, Prof. Adolphus J. Toby, Prof. Kenneth S. Ordu, Prof. J. B. Vipene, Prof. Godwin B. Okon, Prof. D. I. Hamilton, Prof. Edith Chukwu, Prof. Adaobi Ugbomeh, Dr. (Mrs.) Boma I. Dambo, Prof. Akuro E. Gobo, Prof. Precious Ede, Prof. Patrick Youdowei, Prof. C. L. Eze, Prof. Sebastine Ngah, Dr. Awajiokiche D. Ngerebara, Prof. Chigozie Israel Cookey, Prof. Richard N. Amadi, Prof. John Onwuteaka, Prof. Hilkiah A. Igoni, Prof. Ndokiari Boisa, Prof. Felix Igwe, Prof. J. G.

Akpa, Prof. J. I. Onyema, Prof. ThankGod C. Agwor, Prof. (Mrs.) M. E. Akpomi, Prof. M. J. Ahiakwo, Prof. D. B. Kiin-Kabari, Prof. N. H. Ukoima, Prof. (Mrs.) Maureen N. Koko, Prof. S. T. Puyate, Prof. William J. Ubulom, Prof. A. U. Nnodim, Prof. N. P. Okpokwasili, Dr. Nedia Akani, Prof. A. A. Ujile, Prof. Emmanuel O. Ekwulo, Prof. Zacchaeus Adangor, Prof. B. D. Kiabel, Prof. L. C. Obara, Prof. Miebaka D. Tamunomiebi, Prof. I. D. Essi, Prof. S. A. Wemedo, Prof. O. Obire, Prof. C. C. Obunwo, Prof. I. R.Jack, Prof. Faithwin G. Obomanu, Prof. A. B. Nwauzoma, Prof. (Mrs.) E. E. Orlu, Prof. Adol O. Nwaoburu, Prof. N. Ebere, Prof. Tubonimi J. K. Ideriah, Prof Jojn Ohaka, Dr. Promise Elechi, Dr. Dike Harcourt Whyte, Dr. A. R. C. Amakiri, Sir Dr. O. Anugbum, Prof. Uche Jack-Osimiri Prof. O.W. Igwe, Mr. Edmond Osaro and a host of others who impacted positively on my life.

I will not fail to remember all the Men of God whose prayers and labour of love sustained me and my family. Specifically, I acknowledge Rt. Revd. Raph Ebirien, JP, the immediate past Bishop of the Niger Delta Diocese, Late Most Revd. Nglass, former Arch Bishop of Niger Delta Province, Late Ven. J. I. Oyet, Ven. F. I. Dienye, Ven. Dr. Ifeanyi Anagbioso, Ven. Dr. Adubasin, Ven. Ataisi J. Oyet, Ven. P. Orafu (Rtd), Ven. John Ubulom, Evangelist Emmanuel Tukura, Revd. Can. Reuben G. Edeh, Revd. Gad Ryder Ikuru, Revd. Ibieyene Fanyama, Revd. Awajiman D. Elebe, Revd. Can. Kingston Waribo, Ven. Dr. Ebenezer C. Eleazu, Revd. Joseph E. Okpabi, Revd. Peter Gordon and others. My God will surely bless you.

My special friends of the Andoni Friendship League, Sir & Lady Belejit B. Ikuru and Sir & Lady Andrew Nte Ereforokuma are also well appreciated for your years of committed friendship with me and my family. It is pertinent to appreciate all members of the Ntitiin Unwuon Agana, Port Harcourt Branch, the St Paul's Agana Parish Brethren Fellowship, Port Harcourt; especially our leader Sir & Lady Dan Gogo Ukoikpoko, Members of Utono Obolo Worldwide and the Founding Administrator General, Dr Romsan Dressman, Idaa Obolo Organization and Members of Obolo Youth Coalition.

I acknowledge with deep sense of appreciation the unimaginable love and support of the Ebirien-Agana, Enente and Eneyok Families all of great grand Agana. Most particularly though posthumously, I am indebted to Tete Michael Otokpom Ebirien-Agana, Daa Sabainah Michael Ebirien-Agana, Mrs Ogbudi Michael Ebirien-Agana, Pa Peterson Eneyok and Chief Jonah P. Enente for their unfailing discipline that moulded me into who I am today. I appreciate my uncles, aunties, brothers, sisters, counsins, nieces and nephews for being there for me especially Dede Somunu Geoffrey Michael Ebirien-Agana, Mr Gogo Michael Ebirien-Agana, Chief Ngozi Quiz Eneyok, Mr Enereuwu Secondus, Past. Ekeneokot Ene, Mrs Martha Ekeneokot, Ven. E. N. P. Enente, Madam Celestinah P. Enente, Mr Peterson Peterson, Mrs Ataisi Gogo Eneyok, Mrs. Violet Enente, Mrs Salome J. Enente, Mrs. Tammy P. Enente, Past. Enoch M. Ebirien-Agana, Mr. Michael Amakiri Ebirien-Agana, Mrs. Sabainah Ngerebara, Dr (Mrs.) Marion Kingsley, Dr Geoffrey Michael Ebirien-Agana, Mrs Wari G. Ebirien-Agana, Mrs. Chioma Enoch Ebirien-Agana, Engr. Amakiri Michael Ebirien-Agana, Mrs Ibinabo Amakiri Ebirien-Agana, Engr. Prince M. Ebirien-Agana, Mrs Patience Prince M. Ebirien-Agana, Chief Awajiroiso Enente, my parents in-laws Chief Sunny A. Ayagwung and Mrs Immaculata Solomon Nsirem, Mr Owajiochit Edwin Nsirem Edeh, Dr Isotu Edwin Nsirem, Mrs Matildah Owajiochit, and a host of many others. Although your names may not have been mentioned, you mean so much to me.

Most especially, I am sincerely grateful to my parents, HRH Sir Amakiri Michael Edeh-Ogwuile, the Okaan-Ama of Ayama Agana, Andoni and Lady Ethel Michael Ebirien-Agana. Your untiring love and devotion to my future made your dreams for me come true today. You are worthy examples of what genuine parenting means. I am glad that God gave me to you.

Obviously, there are many other persons especially my friends, well-wishers, students (post graduate and undergraduate), admirers, sponsors, relations, my little cousins, nephews, nieces and acquaintants, and groups who in several capacities impacted and assisted me but have not been listed, your immense love, contributions, and care are fully acknowledged.

Finally, I wish to whole heartedly express my unreserved thanks, deep appreciation and love to the woman that God gave me, the wife of my youth, my precious jewel Lady Gwunmijaan and my two lovely birds Esuuk-Awaji and Hephzibah for their belief, patience, understanding and encouragement now and always.

REFERENCES

Africa, P.E., Davies, T.G., Nwachuku, E.O. and **Bartimaeus, E.S.** (2020). Assessment of the antioxidant potential of *Hypoestes rosea* leaf in streptozotocin-induced diabetic albino rats. *Journal of Complementary and Alternative Medical Research* 9(4): 35-43, Article no.JOCAMR.55295 ISSN: 2456-6276

Africa, P. E., Nwachukwu, E. O., Davies, T. G., & **Bartimaeus, E. S.** (2020). Evaluation of the effects of *Hypoestes rosea* extract on some biochemical parameters in streptozotocin-induced albino rats. PhD Thesis, Rivers State University, Port Harcourt.

Aworu, A. M., Ben-Chioma A., Elekima, I., Brown, H. & **Bartimaeus, E. S**.(2022).Pattern of some sperm proteins, anti-oxidants, testosterone and prostate specific antigen of infertile males with sperm cells deformities in Port Harcourt, Rivers State. *Asian Journal of Research in Medical and Pharmaceutical Sciences,* 11(2), 36-47.

Badmus, T. A., Adesunkanmi, A. R., Yusuf, B. M., Oseni, G. O., Eziyi. A. K. & Bakare, T. I. (2010). Burden of prostate cancer in southwestern Nigeria. *Urology*, 76.412-416

Baird, C. & Cann M. (2012). Environmental Chemistry. New York, NY: W.H. Freeman and Company.

Baniak, N., Campos-Baniak, G., Mulla, A. & Kalra, J. (2015). Vitreous Humor: a short review on post-mortem applications. *Journal of Clinical and Experimental Pathology*, 5, 199.

Bartimaeus, E. S. & Agbor, R. E. (2002). Toxicological effects of garlic *(Allium sativum)* on some haematological and biochemical parameters in rat. *Global Journal of Environmental*

Bartimaeus, E. S. & Ken-Ezihuo, S. U. (2017). Effect of beer brands on some renal indices in male adult consumers in Port Harcourt, Nigeria. Presented at the 53rd Annual Scientific and Workshop of the Association of Medical Laboratory Scientists of Nigeria (AMLSN), held at Umaru Musa Yar'adua Hall, Murtala Square, Kaduna on 12th -19th November, 2017. Book of Abstracts page 24.

Bartimaeus, E. S. & Sewu, S. A. (2017). Sperm counts and hormonal profiles of adult males in Aba metropolis, South East, Nigeria. *World Journal of Pharmaceutical and Biomedical Research*, 3(5), 06-13.

Bartimaeus, E. S. & Ken-Ezihuo, S. U. (2017). Evaluation of lipids and lipoprotein levels of premenopausal and post- menopausal women in Port Harcourt metropolis. *European Journal of Pharmaceutical and Medical Research*, 4(7), 55-62.

Bartimaeus, E. S. & Otuokwala, U. J. (2019). Effect of alcoholic beverages (Beer brands) on liver function parameters. An unpublished B.Sc. Project of the Rivers State University, Port Harcourt.

Bartimaeus, E. S. & Waribo, H. A. (2017). Relationship between ABO blood groups and lipid profile level in healthy adult residents in Port Harcourt Metropolis, Nigeria. *Journal of Applied Science and Environmental Management,* 21 (6), 1003-1011.

Bartimaeus, E. S., Holy, B. & Obi, C. E. (2017). Effect of age on selenium and PSA levels of prostate cancer patients. *International Journal of Science and Research*, 6(8), 957-960.

Bartimaeus, E. S., Justice Gbeke Echeonwu, J. G. & Stella Urekweru Ken-Ezihuo, S. U. (2016). The effect of *Cucumis sativus* (Cucumber) on blood glucose concentration and blood pressure of apparently healthy individuals in Port Harcourt. *European Journal of Biomedical and Pharmaceutical Sciences*,3(12), 108-114.

Bartimaeus, E. S., Obi, C. E. J., F. U. Igwe, F. U. & Nwachuku, E. O. (2020). Impact of age on hormonal profiles of sub-fertile women attending fertility clinic in Umuahia, Abia State, South Eastern, Nigeria. *Open Journal of Internal Medicine*, 10, 51-68.

Bartimaeus, E. S., Waribo, H. A. & Nwanjo, H. U. (2018). The antioxidant effect of vitamin E pre- treatment against acetaminophen induced toxicity in albino rats. *World Journal of Pharmaceutical and Life Sciences*, 4(1), 05-13.

Bartimaeus, E.S & Eno-Eno, M. (2002). **T**he effect of alcohol on uric acid level in consumers. *Journal of Applied Sciences and Environmental Management*, 6(1), 5-7.

Bellomo, R. (2006). The epidemiology of acute renal failure: 1975 versus 2005. *Current Opinion on Critical Care*, 12 (6), 557 - 560.

Boon, N. A., Fox, K. A., Bloomfield, P. & Bradbury, A. (2002). Davidson's Principles and Practice of Medicine. 19th ed. Edinburgh, London, New York, Oxford, Philadelphia: Churchill Livingstone.

Brehm, A., Pfeiler, G., Pacini, G., Vierhapper, H. & Roden, M. (2004). Relationship between Serum Lipoprotein Ratios and Insulin Resistance in Obesity. *Clinical Chemistry*,50:2316-2322.

Bristol, I., **Bartimaeus, E. S.** & Brown, H. (2019).Determination of some biochemical parameters in streptozotocin-induced diabetic albino rats pre-treated and post-treated with *Vernonia amygdalina* and *Gongronema latifolium* extracts. *Journal of Applied Life Sciences International,*20(3), 1-12, 2019; Article no.JALSI.48953

Byrd, J. H. & Castner, J. L. (2009). Forensic Emtomology: the utility of arthropods in legal investigations (2nd edition), Boca Raton: Taylor & Francis. ISBN 978-0-8493-9215-3. OCLC 144565878

Carter, H. B, Pearson, J. D., Metter, E. J., Brant, L. J., Chan, D. W. & Andres, R. (1992). Longitudinal evaluation of prostate-specific antigen levels in men with and without prostate disease. *Journal of American Medical Association,* 267, 2227-2228.

Castro-Gonzalez, I. & Mendez-Armeta, M. (2008). Heavy metals: implications associated to fish consumption. *Environmental Toxicology and Pharmacology*, 26(3), 263-271.

Charles, H. P. & Durham, N.C. (1952). Alcohol, Culture, and Society. Duke University Press (reprint edition by AMS Press, New York, 1970) pp.26-27. ISBN 97804040490645

Chuks-Oguine, N. C., **Bartimaeus, E.S.** & Nwachuku, E. O. (2020). Evaluation of Antioxidant Potentials of *Ocimum gratissimum* and *Xylopia aethiopica* in alcohol-induced hepatotoxic albino rats. *Journal of Complementary and Alternative Medical Research,*10(2), 8-16, 2020; Article no. JOCAMR.60337 ISSN: 2456-6276

Crowley, V. & O'Shoughnessy, A. (2018). Higher Specialist Training in Chemical Pathology, Royal College of Physicians of Ireland, pp 45-52

Cullen, J. M. (2005). Mechanistic classification of liver injury. *Toxicologic Pathology*, 33 (1), 6-8.

Diagnosis (Internet). Accessed from http://www.dictionary.com> browse>diagnosis on March 29, 2022.

Diagnosis (Internet). Accessed from http://www.miriam_webster.com > dictionary> diagnosis on March 29, 2022.

Dobiasova, M. (2004). Atherogenic index of plasma [Log (Triglycerides/HDL-Cholesterol)]:Theoretical and practical implications. *Clinical Chemistry*,50:1113-1115.

Elleh, B. I., **Bartimaeus, E. S.,** Igwe, F. U., Tamuno-Emine, D. G. & Agoro, E. S. (2021). Assessment of some biochemical parameters in vitreous humor of rabbits exposed to sodium cyanide. *Ophthalmology Research: An International Journal,* 14(2), 41-47, Article no.OR.67697ISSN: 2321-7227

Elleh, B. I., **Bartimaeus, E. S.,** Igwe, F. U., Tamuno-Emine, D. G. & Agoro, E. S. (2021). Evaluation of biochemical changes in rabbits exposed to sodium cyanide. *International Research Journal of Gastroenterology and Hepatology,* 4(1), 39-47, Article no. IRJGH.67698.

Garovic, V. D., Bailey, K.R., Boerwinkle, E., Hunt, S.C., Weder, A. B & Curb, D. (2010). Hypertension in pregnancy as a risk factor for cardiovascular disease later in life. *Journal of Hypertension*, 28(4), 826-833.

Genest, J., Frohlich, J., Fodor, G. & McPherson, R. (2003). The working group on hypercholesterolemia and other dyslipidemias. Recommendations for the management of dyslipidemia and the prevention of cardiovascular disease: 2003update. *Canadian Medical Association Journal*, 169, 921–924.

Gibson, J. & Graham, R. (1974). Gout and hyperlipidaemia. *Annals of Rheumatoid Diseases*, 33, 298-303.

Gonzalez, E., Johansson, S., Wallander, M. & Rodriguez, L. (2009). Trends in the prevalence and incidence of diabetes in the UK: 1996-2005. *Journal of Epidemiology and Community Health*, 63, 332-336.

Gopi, K. S., Reddy, A. G., Jyothi, K. & Kumar, B. A., (2010). Acetaminophen-induced hepato and nephrotoxicity and amelioration by Silymarin and *Terminalia chebula* in rats. *Toxicology International,* 17(2), 64-66.

Hallworth, M. J. (2011). "The '70% claim': what is the evidence base?". *Annals of Clinical Biochemistry*, 48(6), 487-488. Doi: 10.1258/acb.2011.011177. ISSN 0004-5632. PMID 22045648. S2CID 207193643.

Harper, D. R. (1989). A comparative study of the microbiological contamination of postmortem blood and vitreous humour samples taken for ethanol determination. *Forensic Science International*, 43, 37-44.

Ike, S. O. & Onyema, C. T. (2022). Cardiovascular diseases in Nigeria: What has happened in the past 20 years? *Nigerian Journal of Cardiology*, 17(1), 21-26

Inui, K. I., Masuda, S. & Saito, H. (2000). Cellular and molecular aspects of drug transport in the kidney, *Kidney International*, PMID: 10972658, DOI: 10.1046/j.1523-1755.2000.00251.x

Institute of Medical Laboratory Technology of Nigeria Information Brochure (1974). Pg 35 – 40.

Institute of Medical Laboratory Technology (Internet). Acessed on from http://www.who. int/diagnostic_laboratory/maputo-Declaration-2002.pdf on March 29, 2022.

Jesus Christ. "Matthew 26:29, Mark 14:25; Luke 22:18" "I tell you, I will not drink from this fruit of the vine from now on until that day when I drink it new with you in my father's Kingdom"

Kafaru, E. (1994). Immense Help From Natures Workshop (1st edn). Elikaf Health Services Ltd Publishers, Lagos, pp 50-56

Kamoru, A. A., Japhet, O. M., Adetunji, A. D.,Musa, M. A., Hammed, O. O., Akinlawon, A. A., Abdufatah, O. A., Taofik, A. A., Kabiru, A. A. & Roji, S. M (2017). Castelli risk index, atherogenic index of plasma and atherogenic coefficient: emerging risk predictors of cardiovascular disease in HIV-treated patients. *Saudi Journal of Medical and Pharmaceutical Sciences*;1101-1110.DOI: 10.21276/sjmps.2017.3.10.15

Kannel, W. B., Hjortland, M. C., McNamara, P. M. & Gordon, T. (1976). Menopause and risk of cardiovascular disease: the Framingham study. *Annals of Internal Medicine*;85, 447-452.

Kaplan, A., Szabo, L. L., & Opheim, K. E. (1998). Introduction to Clinical Chemistry. In: Clinical Chemistry: Interpretation and Techniques (3rd Edn), Lea & Febiger Publishers, Philadelphia, USA. Pp 1-4.

Karikpo, C. O. L, **E. S. Bartimaeus,** E. S. & Holy, B. (2018). Evaluation of the cardio-protective effect of *Citrullus lanatus* (Watermelon) seeds in streptozotocin induced diabetic albino rats. *Asian Journal of Biochemistry, Genetics and Molecular Biology;* 1(4), 1-6, Article no.AJBGMB.46342

Kim, C. J., Kim, T. H., Ryu, W. S. & Ryoo, U. H. (2000). Influence of menopause on high density lipoprotein-cholesterol and lipids. *Journal of Korean Medical Science*;15, 380-386.

Kumar, P. J. & Clark, M. (2002). Textbook of Clinical Medicine. Pub: Saunders, London, UK.1099-1121.

Magoha, G. A. (1997): Screening and early detection for prostate cancer. *East Africa Medical Journal*, 74, 664-667.

Mathers, C. D. & Loncar, D. (2006). Projections of global mortality and burden of disease from 2002 to 2030. *PLoS Med;*3:e442. doi:10.1371/journal.pmed.0030442.

Meade, T. W., Cooper, J. A., Stirling, Y. & Howarth, D. J.(1994). Factor VIII, ABO blood group and the incidence of ischemic heart diseases. *British. Journal of Haematology;* 88(3), 601-607

Menuba, I. E., Ugwu, E. O., Obi, S. N., Lawani, L. O. & Onwuka, C. I. (2014). Clinical management and therapeutic outcome of infertile couples in southeast Nigeria. *Journal of Therapeutics and Clinical Risk Management*;10, 763-768.

Merlin, L. K., Mensah, G. K., Arnold, D. F., Caleb, F., Alexander, K. A. & Dickson, R. A. (2019). Toxicity and safety implications of herbal medicines used in Africa. *Intechopen*, 10, 5772-5773.

Mitchell, J. R. (1977). An association between ABO blood-group distribution and geographical differences in death rates. Lancet, 1, 295 - 297.

Mohammed, M., Anil, M. & Balraj, M. (2008). Evaluation of prostate cancer characteristics in four populations worldwide. *The Canadian Journal of Urology*, 15(3), 4056-4064

Nash, K., Hafeez, A. & Hou, S. (2002). Hospital-acquired renal insufficiency. *American Journal of Kidney Disease*, 39(5), 930-936

National Guideline Clearinghouse Fertility: Assessment and Treatment for People with Fertility Problems (2013). Available at http://www.rcog.org.uk/womens-health/clinical-guidance/fertility-assessment-and-treatment-people-fertility-problems (Accessed May, 14)

Nwaneli, C. U. (2010). Changing trend in coronary heart disease in Nigeria. Afrimedical Jounal; 1, 1-4.

Nydegger, U. E., Wuillemin, W. A., Julmy, F., Meyer,B. J. and Carrel, T. P. (2003). Association of ABO histo-blood group B allele with myocardialinfarction. *European Journal of Immunogenetics;*30, 201-206.

Oesterling, J. E., Martin, S.K., Bergstralt, E. J. & Lowe, F. C. (1993). The use of prostate- specific antigen in staging patient with newly diagnosed prostate cancer. *Journal of American Medical Association,* 269,57-60.

Ogundele, S. & Ikuerowo, S. O. (2015). A survey of the awareness of prostate cancer and its screening among men attending the out-patients clinics of a tertiary health centre in Lagos, Nigeria. *The Nigerian Journal of Surgery*, 21(2), 115-118.

Okonofua, F. E. & Obi, H. (2009). Specialized versus conventional treatment of infertility in Africa, time for a pragmatic approach. *African Journal of Reproductive Health* 13(1), 9-15.

Oladapo-Akinfolarin, T. T., Akinfolarin, O. M., Ken-Ezihuo S. U. & **Bartimaeus, E. S**. (2022). Evaluation of cardiovascular risk markers in hypertensive pregnant women. *Journal of Advances in Medicine and Medical Research,* 34(14), 57-63

Oladapo-Akinfolarin, T. T., **Bartimaeus, E. S.,** Nwachuku, E. O. & Nduka, N. (2018). Assessing lipoprotein levels in normotensive and hypertensive pregnant women in Port Harcourt. Nigeria. *American Journal of Biomedical Sciences*; 10(1),18-27; Doi:10.5099/aj180100018.

Oladapo-Akinfolarin, T. T., **Bartimeaus, E. S.,** Nwachuku, E. O. & Nduka, N. (2017). Assessment of C-reactive protein levels in normotensive and hypertensive pregnant subjects in Port Harcourt, Nigeria. *World Journal of Pharmaceutical and Medical Research*; 3(10), 292-296

Olofinshawo, O. L., **Bartimaeus, E. S.** & Davies, T G. (2019). Evaluation of oxidative stress markers and hormonal profiles in women diagnosed with infertility in Port Harcourt. *Asian Journal of Biochemistry, Genetics and Molecular Biology,* 2(2): 1-11, 2019; Article no.AJBGMB.50494

Ombelet, W., Cooke, I., Dyer, S., Serour, G. & Devroey, P. (2008). Infertility and the provision of infertility medical services in developing countries. *Human Reproduction Update*;14(6), 605-621.

Ozoemena, C. C., Igwe, F. U., Nwachuku, E. O. **& Bartimaeus, E. S.** (2021). Assessment of chronic toxicological effects of 2, 2-dichlorovinyl dimethyl phosphate (Sniper) on the kidneys of New Zealand white rabbits. *International Journal of Advances in Nephrology Research;* 4(1), 92-103, 2021; Article no. IJANR.78085

Ozoemena, C. C., Igwe, F. U., Nwachuku, E. O. & **Bartimaeus, E. S.** (2021). Evaluation of 2, 2-dichlorovinyl dimethyl phosphate (Sniper) induced hepatotoxicity and oxidative stress in New Zealand white rabbits. *International Research Journal of Gastroenterology and Hepatology;* 4(2), 52-65, 2021; Article no.IRJGH.78196

Ozuogwu, J. C., Obimba, K. C., Belonwu, C. D. & Unakalamba, C. B. (2013). The pathogenesis and pathophysiology of type 1 and type 2 diabetes mellitus. *Journal of Physiology and Pathophysiology*, 4(4), 46-57.

Padmini, M. P. & Kumar, J. V. (2012). A histopathological study on gentamicin induced nephrotoxicity in experimental albino rats. *IOSR Dental and Medical Sciences*; 1(1),14-17.

Perazella, M. A. & Moeckel, G. W. (2010). Nephrotoxicity from chemotherapeutic agents: Clinical manifestations, pathobiology, and prevention/therapy. *Seminars in Nephrology*; 30, 570–581.

Perez, H. A., Rosa, M., Apitz, R. & De-La-Rosa, M. (1994). *In vivo* activity of Ajoene against rodent malaria. *Antimicrobial Agents and Chemotherapy*, 38 (2), 337-339

Reed, R. (2017). Commonly Clinical Chemistry Tests. In: Clinical Chemistry: Learning Guide Series, Abbot Diagnostics Ltd, Chemical Chemistry Series, pp 66-87

Ridker, P. M., Stampfer, M. J. & Rifai, N. (2001). Novel risk factors for systemic atherosclerosis: A comparison of C-reactive protein, fibrinogen, homocysteine lipoprotein(a),and standard cholesterol screening as predictors of peripheral arterial disease. *Journal of American Medical Association,* 285:2481-2485.

Saha, N., Toh, C. C.& Ghosh, M. B. (1973). Genetic association in myocardial infarction. Ethnicity; ABO, Rh, Lea, Xga blood groups, G6PD deficiency and abnormal haemoglobins. *Journal of Medicine and Genetics;* 10, 340-45.

Salama, A. F. (2015). Effect of Egyptian plant Silybummarianum on the kidney during the treatment of liver fibrosis in female albino rats induced by alcohol in comparison to the medical silymarin from China. *International Journal of Current Microbiology and Applied Sciences*; 4 (3), 557–570.

Saver, B. M., Tofler, O. B., Borvil, M. J, & Reily, K. A. (1967). Alcohol consumption and gout. Medical Journal of Australia; 1, 1213 – 1216

Scientific American: Nutrition for a Changing World (2016)

Soffarand, S. A. and Morkhtar, G. M. (1991). Evaluation of the anti-parasitic effect of aqueous garlic *(Allium sativum)* extract in *Hymenolepsis nana* and giardiasis. *Journal of the Egyptian Society of Parasitology*, 21(2): 495- 502

Souza, B.F.D., Drexter, J.F., Santos de Lima, R., Veiga De Rosario, M.O.H. & Netto, E.M. (2014). Theories about evolutionary origins of human hepatitis B virus in primates and humans. *Brazilian Journal of Infectious Diseases*, 18, 535-543. https://doi.org/10.1016/j.bjid.2013.12.006

Stampfer, M. J., Sacks, F. M., Salvini, S., Willett, W. C. & Hennekens, C. H. (1991). A prospective study of cholesterol, apolipoproteins and the risk of myocardial infarction. *New England Journal of Medicine,* 325:373-381.

Stenman, U. H. (1997): Prostate-specific antigen, clinical use and staging: an overview. *British Journal of Urology*, 79, 53-60.

Stevenson, J. C., Crook, D. & Godsland, I. F. (1993). Influence of age and menopause on serum lipids and lipoproteins in healthy women. *Atherosclerosis*; 98, 83-

The Medical Laboratory Science Council of Nigeria Act. 2004 Cap 114, Laws of the Federation of Nigeria

Thompson, I. N., **Bartimaeus, E. S.,** Nwachuku, E. O., Brown, H. & Agoro, E. S. (2021). Evaluation of the effect of some marketed herbal cosmetics in Port Harcourt on renal parameters of rabbits. *European Journal of Medicinal Plants;* 32(2), 70-77, Article no.EJMP.67518ISSN: 2231-0894, NLM ID: 101583475 90.

Thompson, I. N., **Bartimaeus, E. S.,** Nwachuku, E. O., Brown, H & Agoro, E. S. (2021). Assessment of carcinogenic and non-carcinogenic health risk of some marketed herbal oils in Port Harcourt, Nigeria, *International Research Journal of Oncology,* 4(2): 6-11, 2021; Article no.IRJO.67517

Thomson, C.D. (2004): Assessment of requirements for selenium and adequacy of selenium status: A review. *European Journal of Clinical Nutrition,* 58, 391-02

Tiong, H. Y., Huang, P., Xiong, S., Li, Y., Vathsala, A. & Zink, D. (2014). Drug-induced nephrotoxicity: clinical impact and preclinical in vitro models. *Molecular Pharmaceutics*; 11, 1933–1948.

Tuomisto, K., Jousilahti, P., Sundvall, J. & Pajunen, P. (2006). Creactive protein, interleukin-6 and aumor necrosis factor Alpha as predictors of incident coronary and cardiovascular events and total mortality: a population- based, prospective study. *Thrombocytosis Haemostasis*; 95(3), 511-518.

Ushiroyama, T., Okamoto, Y. & Sugimoto, O. (1993). Plasma lipid and lipoprotein levels in perimenopausal women. Clinical research in 1198 Japanese women. *Acta Obstetricia Gynecologica Scandinavica*; 72, 428-433.

Uwikor, F. K., Nwachukwu, E.O., Igwe, F. U., & **Bartimaeus, E. S.** (2020). Effect of aqueous extract of *Hypoestes rosea* on reproductive hormones and oxidative stress of lead-acetate -induced albino rats. PhD Thesis, Rivers State University, Port Harcourt.

Vilahu, G., Badimon, J. J., Bugiardini, R. & Badimon, L. (2014). Perspectives: The burden of cardiovascular risk factors and coronary heart disease in Europe and worldwide. *European Heart Journal* suppl.; 16:7-11.

Waribo, H. A., **Bartimaeus, E. S**. and Nwanjo, H.U. (2017). *Garcinia kola* seed and vitamin E ameliorates acetaminophen-induced oxidative stress in albino rats. *European Journal of Pharmaceutical and Biomedical Research,* 4(11), 130-136.

Witherspoon, L. R. (1997): Early detection of cancer relapses after prostatectomy using very sensitive prostate-specific antigen measurements. *British Journal of Urology,* 29, 82-86.

World Health Organisation. Non-communicable Diseases. Country Profiles; 2018. Available from: http://www.who.int>nga_en. [Last accessed on 2022 March 22].

World Health Organization (2015). Guideline for the Prevention, Care Aid Treatment of Persons with Chronic Hepatitis B Infection. Geneva.

World Health Organization (2019). Blood Transfusion Safety: Blood donor selection: Health Systems and Innovation. WHO 1211 Geneva 27, Switzerland. *World Journal of Gastroenterology*; 20: 7653-7664

World Health Report (2002). Reducing risks, promoting healthy life. Geneva.

Worlu, A O., Holy, B. & **Bartimaeus, E. S.** (2020).Assessment of protective effects of almond seed and vitamin E supplementation on kidney and liver of rats exposed to paracetamol toxicity. *International Journal of Advanced Research,* 8(05), 397-406

Yudkin, J. S., Stehouwer, C.D., Emeis, J. J. & Coppack, S.W. (1999). C-reactive protein in healthy subjects: association with obesity, insulin resistance and endothelial dysfunction; a potential role for cytokines originating from adipose tissue? *Atherosclerosis, Thrombosis and Vascular Biology,* 19, 972-978.

CITATION

ON

PROFESSOR EBIRIEN-AGANA SAMUEL BARTIMAEUS, KSC, JP, FWAPCMLS.

Professor Ebirien-Agana Samuel Bartimaeus was born on January 1, 1964 at Ayama Agana Town, in Andoni Local Government Area of Rivers State. He had a very humble beginning in life. He had his primary education at Odidim Central School, Agana between 1971 -1976. In 1977 he was admitted into the premier and glorious Government Secondary School, Ngo now in Andoni Local Government Area, Rivers State. In 983, he passed the Rivers State University of Science and Technology qualifying entrance examinations to study Medical Laboratory Science in Haematology and Blood Transfusion Science (Option) in the Department of Biological Sciences. However, by the time he got to his final year, most of the foreign lecturers in Medical Laboratory Science had left the University. Bartimaeus led the struggle for the sustenance of Medical Laboratory Science in the University, a move that led to his switching to Clinical Biochemistry as his graduated option in 1987 with a Second Upper Division. He also had his Masters of Science degree in Biochemistry from the University of Port Harcourt in 1991. He became an Associate of the then Institute of Medical Laboratory Science in 1990. He obtained his Doctor of Philosophy (PhD) degree in Chemical Pathology from the Department of Medical Laboratory Science, Rivers University, Port Harcourt.

When the crises of having qualified Medical Laboratory Scientist to teach Medical Laboratory Science hit his Alumni in 1991, the young enterprising Bartimaeus was employed into the Department. He tirelessly taught most of the courses in the Department for a reasonable number of years before the situation improved. He contributed immensely to the training of most Medical Laboratory Scientists in the South South and South East geo-political zones in the country.

As an academic, he possesses highly developed qualitative and quantitative research skills with a strong capacity to conduct independent research. He has demonstrable ability to develop goals, objectives and implement strategies through lesson planning and teaching experience. He has shown proven ability to conceptualize problems and develop well-reasoned and integrated solutions as demonstrated through PhD and Masters Degree research. He is an effective communicator with excellent planning, organizational and negotiation strengths to lead, reach consensus, establish goals, and attain results.

The principal research interest of Professor Bartimaeus focuses on the determination of Cardiovascular disease risk factors amongst the Niger Delta population, the clinical impact of the disease, the socio-economic factors implicated in the prevalence of the disease and attempt on establishing a causal relationship between the occurrence of risk factors of CVD and the environmental factors in Nigeria with emphasis on the Niger Delta Region. His research interest also lie in the investigation of environmental pollutants, drugs of abuse and its devastating and clinical impact on residents in the Niger Delta region of Nigeria.

The academic journey of Professor Ebirien-Agana Samuel Bartimaeus was tortuous and challenging. He patiently rose through the ranks. Employed as an Assistant Lecturer in September, 1991, he was promoted to the rank of Lecturer II, in 1993. In 2000, he was promoted to the rank of Lecturer I and later promoted to the rank of Senior Lecturer in 2003. He became a Reader in Chemical Pathology in 2017 and finally in October, 2020, Ebirien-Agana Samuel Bartimaeus was promoted to the rank of a Professor of Chemical Pathology.

Professor Ebirien-Agana Samuel Bartimaeus is a member of several professional associations amongst which are Association of Medical Laboratory Scientists of Nigeria, Nigeria Environmental Society (NES), Nigeria Biological Safety Association (NiBSA), West African Society of Toxicology (WASOT), Association of Clinical Chemists of

Nigeria (ACCN), African Federation of Clinical Chemistry and Laboratory Medicine (AFCC), International Federation of Clinical Chemistry and Laboratory Medicine (IFCC), American Association of Clinical Chemistry (AACC) and Africa Society for Laboratory Medicine (ASLM).

As an academic who has risen through the ranks in the University system, Professor Ebirien-Agana Samuel Bartimaeus has handled several official positions within the University. He has been a Departmental Examination and Records officer, represented Faculty of Science at the Faculty Board of Faculty of Technical and Science Education, member of Department of Medical Laboratory Science Post Graduate Committee, Chairman of Department of Medical Laboratory Science Welfare Committee, member, Dean Advisory Committee, Faculty of Science, Member, Academic and Graduations Requirement Committee (A&GRC), Member, Faculty of Science Disciplinary Committee, Faculty of Science Representative to the University Senate and currently the Head, Department of Medical Laboratory Science, Rivers State University, Port Harcourt.

Professor Ebirien-Agana Samuel Bartimaeus has also served in various capacities in various administrations in the Rivers State. He was appointed member of the Panel to investigate the Rivers State Transport Company (RTC) Franchise Scheme by the Executive Governor, Dr Peter Odili in 2000. He was also appointed a Commissioner in the Rivers State Independent Electoral Commission (RSIEC) between 2007- 2011 and in between 2016-2020 he was appointed member of the Rivers State Primary Health Care Management Board (RSPHMB).

He has attended several local and international conferences. He has supervised over fifty (50) students at the Masters of Science and thirteen (13) PhDs in Chemical in Pathology. Presently, a total of 10 MSc and 7 PhD students are at the verge defending their thesis under his tutelage and mentorship. He has published over 80 academic publications in reputable international journals and conference

Proceedings. He is currently a peer reviewer to a number of International journals including International Blood Research & Reviews, SCIENCEDOMAIN International, Journal of Advances in Medicine and Medical Research (JAMMR), SCIENCEDOMAIN International and Asian Journal of Research in Biochemistry, SCIENCEDOMAIN International.

In his career, Professor Ebirien-Agana Samuel Bartimaeus has won several awards including Award of Excellence as "Alumnus of the Decade" by the Nigerian Medical Laboratory Science Students Association (NIMELSSA), Rivers State University of Science and Technology, Port Harcourt Branch, Accolade Award of Excellence as "Irreproachable role model for your academic contributions to human empowerment and health care delivery" by the Nigerian Medical Laboratory Science Students Association (NIMELSSA), Meritorious Service Award in "Recognition of your role in Man Power Development" by the Association of Medical Laboratory Scientists of Nigeria (AMLSN) and Rivers State Branch, Excellence Gold Award 2011/2012 in "Recognition of your commitment to excellence and integrity in professional practice and outstanding contribution to the advancement and promotion of biomedical science profession in Nigeria" under the seal and authority of LabNews Crucial Communications Limited, Executive Directorate/Award Board of Trustees.

Professor Ebirien-Agana Samuel Bartimaeus is also a Fellow of the West African Post Graduate College of Medical Laboratory Science (FWAPCMLS), a Knight of St. Christopher (KSC) of the Anglican Communion and a Justice of the Peace (JP) of the Rivers State Ministry of Justice. Married to Lady Gwunmijaan Bartimaeus, he has two lovely children Esuuk-Awaji and Hephzibah Bartimaeus.


ISBN 987-987-975-140-4