THE NIGERIAN ACADEMY OF SCIENCE

2nd NAS Scientific Conference

Theme:

Applied and Translational Research in National Development

BOOK OF ABSTRACTS

26th-27th January, 2021 9.00am

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Contents

About the Nigerian Academy of Science

The Nigerian Academy of Science (NAS) is the foremost independent scientific body in Nigeria which was established in 1977 and incorporated in 1986. NAS is uniquely positioned to bring scientific knowledge to bear on the policies/strategic direction of the country and is also dedicated to the development and advancement of science, technology, and innovation (STI) in Nigeria. The aims and objectives of the Academy are to promote the growth, acquisition, and dissemination of scientific knowledge, and to facilitate its use in solving problems of national interest. The Academy strives to do this by:

- Providing advice on specific problems of scientific or technological nature presented to it by the government and its agencies, as well as private organizations
- Bringing to the attention of the government and its agencies problems of national interest that science and technology can help solve
- Establishing and maintaining the highest standards of scientific endeavours and achievements in Nigeria, through the publication of journals, organization of conferences, seminars, workshops, and symposia, recognition of outstanding contributions to science in Nigeria, and the development of a working relationship with other national and international scientific bodies and academies.

As with national academies in other countries, NAS is a not-for-profit organization with a total membership (since inception) comprising 258 Fellows (who have distinguished themselves in their fields both locally and internationally), elected through a highly competitive process. Some of her members have served as vice-chancellors of universities, directors-general of government parastatals, and ministers in federal ministries. The Academy, given its clout, also has the ability to attract other experts from around the country and internationally when needed. NAS is Nigeria's national representative on such bodies as the International Science Council (ISC) – the umbrella body for all science associations and unions - , and the InterAcademy Partnership (IAP) – the umbrella body for all national science academies globally. The Academy is a member of the Executive Committees of IAP for Science, IAP for Policy, and IAP for Health and a member of the Network of African Science Academies (NASAC).

About the Conference

The 2021 Nigerian Academy of Science Scientific Conference is the second in the series. The focus of the conference is on research and its application to national development. Applied or translational research is key to the development of 'practical solutions' if science, engineering, and allied fields are to make the desired impact, especially for economic growth and the development of any society. Scientific research needs to be advanced rapidly from basic core research findings that can be patented, to the development of practical models and new and more advanced techniques, in order to create value for the society at large.

It is recognized that the key aim of applied research therefore is to provide practical solutions based on core research findings and innovations. As new ideas and concepts continue to be generated from the nation's academic institutions and government agencies, there is need to integrate them into national development plans and policies. If properly defined and implemented, this can be a key driver for the much-desired growth of Nigeria's economy.

The overall objective of the conference is to create a platform for effective networking and collaboration amongst research groups, industry, government and technology hubs. The aims of the NAS 2021 conference are:

- To bring together stakeholders from government, academia, and industry to discuss how scientific research findings can be transformed into new innovations that would be of value to the society
- To showcase new research findings and innovations from Nigeria's tertiary institutions and relevant government agencies
- Create opportunities for collaboration amongst stakeholders, and engender knowledge sharing for more broad-based research and innovation.

The NAS, through its initiatives and international links, is uniquely positioned to ensure that applied and translational research can be well embedded in order to create the right impact on national growth and development. With the right strategies and support, the unique knowledge base and skills in Nigeria's institutions, access to funding, and leveraging of global interfaces can help to unleash the latent capabilities and drive even greater dimensions in knowledge development and innovation.

Draft Conference Agenda

Time	Activity
DAY ONE: TUESDAY 26TH JANUARY, 2021	
8:30am	Arrival
Opening Ceremony Session Chair: Professor K. Mosto Onuoha FAS – President, the Nigerian Academy of Science (NAS)	
9:00am	Welcome/Introduction of Special Guests Dr. M. Oladoyin Odubanjo – Executive Secretary, NAS
9:05am	Opening remarks Professor K. Mosto Onuoha FAS
9:15am	Goodwill messages • Dr. Dan-Azumi Mohammed Ibrahim - Director-General, National Office for Technology Acquisition and Promotion (NOTAP) • Mr. Hakeem Fahm - The Honourable Commissioner, Lagos State Ministry of Science and Technology • Ms. Olufunke Baruwa - Program Officer, Ford Foundation • Professor Mojisola Adeyeye FAS – Director-General, National Agency for Food and Drug Administration and Control • Professor Oluwatoyin Ogundipe FAS - Vice-Chancellor, University of Lagos • Professor Yakubu Aboki Ochefu - Secretary-General, Committee of Vice-Chancellors of Nigerian Universities • Mr. Jean Bakole - Director and Country Representative, United Nations Industrial Development Organization (UNIDO) • Mr. Prince Abangwu - Regional Business Manager, West Africa, Schlumberger • Professor Eli Jidere Bala – Director-General/CEO, Energy Commission of Nigeria (Representative, Honourable Minister of Science and Technology) • Professor Akin Abayomi – Honourable Commissioner, Lagos State Ministry of Health • Dr. Osagie Ehanire - Honourable Minister, Federal Ministry of Health
9:30am	Keynote Address 1: **Applied and Translational Research in National Development** Dr. Umar Bindir - Director, Research and Innovation, Air Force Institute of Technology (AFIT), Kaduna
9:55am	Question and Answer
10:00am	Poster Session and Adverts/Exhibitions
Sub-theme 1: Research for Policy and Practice Session Chair: Professor Olatunde Farombi FAS – Public Affairs Secretary, NAS	
10:10am	Lead Presentation: **Research for Policy and Practice** Engr. Simbi Kesiye Wabote - Executive Secretary, Nigerian Content Development and Monitoring Board (NCDMB)
10:30am	Oral Presentation 1: **Wading through the Policy Process in a Multi-governance Context - A Framework Analysis of a Maternal, Neonatal, and Child Health Policy in Nigeria**

	Enyi Etiaba - Health Policy Research Group, College of Medicine, University of Nigeria
11:45am	Oral Presentation 2: **Examination of Fungi Responsible for the Bio-Deterioration of Stored Groundnuts** Hassan Bamidele - Department of Science Laboratory Technology, Federal Polytechnic Kaura Namoda, Zamfara
12:00pm	Oral Presentation 3: **Effects of a Multifaceted Intervention on Utilization of Primary Health Care for Maternal and Child Health in Rural Nigeria** Loretta Ntoimo - Women's Health and Action Research Centre (WHARC), Benin City
12:15pm	Discussion
LUNCH BREAK (1 HOUR 15 MINUTES)	
Afternoon Session	
Sub-theme 2: Translational Research in Medicine Session Chair: Professor Sunday Atawodi FAS – Academic Secretary (Biological Sciences), NAS	
2:00pm	Lead Presentation**: Translational Research in Medicine** Professor Babatunde Salako FAS - Director-General, Nigerian Institute of Medical Research (NIMR)
2:20pm	Oral Presentation 1: **Differential Expression of Suppressor of Cytokine Signalling 3 (SOCS3) Modifies Disease Phenotypes in Asymptomatic Hyperuricemia and Gout** Oliver Orji - Department of Medical Laboratory Sciences, College of Medicine, University of Nigeria
2:35pm	Oral Presentation 2: **Target Amplification for the Detection of Anaerobic Pathogens in Vaginal Specimen of Women of Reproductive Age** Francisca Nwaokorie - Department of Medical Laboratory Science, College of Medicine, University of Lagos
2:50pm	Oral Presentation 3: **Comparative Study of the Predictive Power of First Trimester and Second Trimester Uterine Artery Doppler in Predicting Adverse Pregnancy Outcome** Obinna Abonyi - Department of Medical Radiography and Radiological Sciences, University of Nigeria
3:05pm	Discussion
3:45pm	Closing Remarks / End of Day One Professor Sunday Atawodi FAS
DAY TWO: WEDNESDAY 27TH JANUARY 2021	
8:30am	Arrival
Opening Session Session Chair: Professor Oluwole Familoni FAS – Academic Secretary (Physical Sciences), NAS	
9:00am	Keynote Address 2: **Research, Innovation and Economic Development Nexus in Nigeria: Concepts, Challenges, and Way Forward** Professor Peter Onwualu FAS - Director, Academic Planning, African University of Science and Technology, Abuja
9:25am	Question and Answer
9:30am	Poster Session and Adverts/Exhibitions
Sub-theme 3: Industry-Academia Partnership and Collaboration Session Chair: Dr. Kehinde Ladipo FAS – Representative, Physical Sciences, NAS	

9:40am	Lead Presentation**: Industry-Academia Partnership and Collaboration** Professor Akii Ibhadode FAS – Immediate Past Vice-Chancellor, Federal University of Petroleum Resources, Effurun
10:00am	Oral Presentation 1: **Comparative analysis of piezoelectric properties of a Nigerian quartz and Lead zirconate titanate (PZT) in manufacture of ultrasound transducer** Nwadike Uchechukwu - Department of Medical Radiography and Radiological Sciences, University of Nigeria
10:15am	Oral Presentation 2: **Collaboration of Industry with Academia: An Imperative as the Engine of Industrialization and Development** Adegbola Akinola - Department of Mathematics, Obafemi Awolowo University, Ile-Ife
10:30am	Oral Presentation 3: **Growth Performance and Carcass Characteristics of Finishing Broilers Fed Varying Levels of Sun-Dried Cassava Peel Meal (SDCPM) as Replacement for Maize in Humid Tropics** Stanley Ilo - Department of Animal Science, University of Nigeria, Nsukka
10:45am	Discussion
11:10am	Closing remarks / Vote of thanks Professor Ekanem Braide FAS – President-Elect, NAS
11:20am	Poster Session
12:20pm	End of Scientific Conference

Speakers' Profiles

Keynote Speakers

Engr Umar Buba Bindir (PhD) graduated from the University of Maiduguri with a first class honours degree in Agricultural Technology in 1983. He has masters (1987) and doctorate (1991) degrees from Cranfield University, UK in Agricultural Machinery Design and Development.

Engr. Bindir is a Chartered Engineer (CEng) UK; COREN; Fellow of the Nigerian Academy of Engineering; Fellow of the Nigerian Institution of Agricultural Engineers; Fellow of the Solar Energy Society of Nigeria; and National Productivity Order of Merit (NPoM).

He has a wide technical working experience in Nigeria, UK, and Oceania. He was the immediate past Director General/CEO of the National Office for Technology Acquisition and Promotion (NOTAP), the main institution regulating and promoting industrial property and technology transfer in Nigeria. Dr. Bindir's last public engagement was as Secretary to the Government of Adamawa State. Engr. Bindir is a thorough technology penetration expert and an accomplished engineer. His ingenuity and exquisite skills in ideas generation and innovative project development and implementation easily stands him out in all his places of primary assignment. As the then Director General/CEO of NOTAP, he was the driving force behind the National Policies and Strategies aimed to link academia and industry. He is still the champion on the strategy to develop science and technology parks in Nigeria.

Engr. Bindir is the Founder/Chairman of the Bindir Knowledge Centre (BKC) in Yola, Adamawa State. BKC is a non-governmental organisation established to support children and youth to acquire modern knowledge in both education and entrepreneurship. Dr. Bindir currently is the Director, Research and Innovation (TETFUND Center of Excellence Intervention), Air Force Institute of Technology (AFIT), Kaduna. His passion mainly lies in solving poverty challenges through the deployment of technology-based empowerment.

Engr. (Prof.) Azikiwe Peter Onwualu FAS started his career as a Graduate Assistant in Agricultural Engineering, in 1983, at University of Nigeria, Nsukka (UNN), rising to the rank of Professor in 1999. He was Head, Agricultural Engineering Department, UNN (2000-2003); Director, Engineering Infrastructure, National Agency for Science and Engineering Infrastructure (NASENI), Abuja (2003-2005), and Director-General, Raw Materials Research and Development Council (RMRDC), Abuja (2005-2013). He was Visiting Professor at the National Universities Commission, Abuja (2014-2015); Coordinator, Science Technology, and Innovation (STI) thematic group of Vision 20-2020; Chairman, Committee of Directors of Research Institutes of Nigeria (CODRI) (2010-2013). From 2015 to date, he is Head, Materials Science and Engineering Programme, African University of Science and Technology (AUST), Abuja, where he is also Director, Academic Planning. He is Co-Centre Leader, World Bank sponsored Pan African Materials Institute (PAMI), Africa Centre of Excellence in Materials and Focal Point, World Bank Sponsored Partnership for Skills in Applied Sciences, Engineering and Technology (PASET), AUST, Abuja. He is also a member, Board of Directors of African Technology Policy Studies (ATPS) network, Nairobi, and member, National Research Fund (NRF) Committee of Tertiary Education Trust Fund (TETFund).

Lead Speakers

Professor Babatunde Lawal Salako FAS is the Director-General of the Nigerian Institute of Medical Research, Yaba, Lagos. He obtained a Bachelor's degree in Medicine and Surgery from the University of Ibadan in 1986 and Fellowship of the West African College of Physicians in 1994. He was elected Fellow of the Royal College of Physicians of Edinburgh and London in 2014/2016. Professor Salako was the Provost of the College of Medicine, University of Ibadan between 2014 and 2016 and also President of the Nigerian Association of Nephrology from 2016 to 2018.

He has worked on hypertension and kidney diseases with grant support from the University of Ibadan, the MacArthur Foundation, and 5 NIH grants as both site Principal Investigator (PI) and multiple PI on the H3Africa Kidney Disease Research Network Consortium. He is a Temporary Adviser to the World Health Organization (WHO) and a member of the General Assembly of the EDTCP, the TDR Standing Committee, and WHO/TDR Joint Coordinating Board. He chairs the Disease Endemic Country Committee of the TDR.

Professor Salako was appointed Foundation Fellow of the Nigerian Academy of Medicine (FNAMed) in 2019 and elected a Fellow of The Nigerian Academy of Science (FAS) in 2020. He is the Chairman National Health Research Committee and Co-Chairman National COVID-19 Research Consortium. He has to his credit more than 160 published articles in both local and international journals, including two books.

Akii Ibhadode FAS is a distinguished Professor of Manufacturing Engineering and former Shell Professor of Lightweight Automobile Engine Development. He was the Vice-Chancellor of the Federal University of Petroleum Resources Effurun (VC/FUPRE) from 2015 -to2020. He has B.Sc., M.Eng, and Ph.D degrees. He has pioneered a number of researches leading to patents and industrial products.

He was the winner of the Nigeria Prize for Science (2010) of the Nigerian Academy of Science and sponsored by the

NLNG; and the winner of the Edwin Walker Prize for 1988 of the Institution of Mechanical Engineers, United Kingdom. Since 2013 till date, he has mentored student teams which design and build Shell Eco-marathon Competition vehicles. He has supervised over one hundred MSc/Ph.D. students.

Prof. Ibhadode is a Fellow of the Nigerian Academy of Science and others, a Chartered Engineer (COREN), editor and reviewer of a number of journals among which is the International Journal of Engineering Research in Africa (JERA), published by Trans Tech Publications, Switzerland, which he founded in 2009 and is the Editor-in-Chief.

As VC/FUPRE, he forged a great number of industry-university partnerships and established the culture of annual registration of patents by researchers and their commercial exploitation.

Oral Presenters

Abonyi, Everistus Obinna was born in Nsukka, Enugu State. He is married with four kids. His primary and secondary education was at Ogboebor National Primary School, Opi and St. Joseph Special Science School Abakaliki respectively. He obtained his B.Sc. and M.Sc. from the Department of Medical Radiography and Radiological Sciences, University of Nigeria, Enugu Campus in 2004 and 2015 respectively. He also obtained a PGD in echocardiography at Cleno Health Institute, Uyo in 2017. He is currently a Ph.D. student in the same department and institution.

Mr. Abonyi joined academics as a lecturer in the Department of Medical Radiography, University of Nigeria, Enugu Campus, in 2016 where he works till date. He has published many articles in both local and foreign journals.

He enjoys research and watching football.

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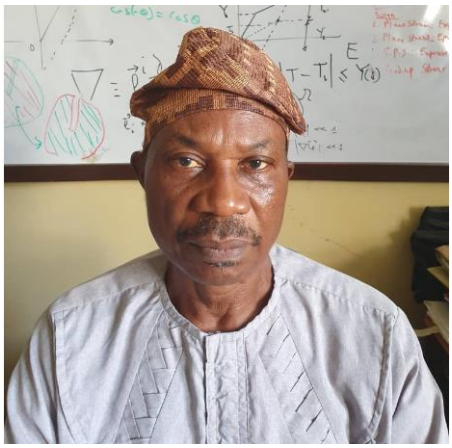

Adegbola Akinola is a Professor of Applied Mathematics. He obtained his Ph.D. in 1985 from the Moscow State (Lomonossov) University, Moscow, and has been a tenured academic at the Obafemi Awolowo University, Ile-Ife since 1986, teaching various aspects of applied mathematics, amongst other engagements. He is one of the very few scientists in Nigeria, indeed Africa, whose works are regularly accepted for presentation since 2000 at the ICTAM, a quadrennial event, termed Olympics of the field, that brings together who-is-who in mechanics/applied mathematics every four years. He is a Governing Board Member, since 2018, of the International Conference on Mechanics of Advanced Materials and Structures (ICMAMS), related to Taylor & Francis Mechanics of Advanced Materials and Structures (MAMS) Journal, and supported by the European Union. He is also a member of the Nigeria Mathematical Society (NMS) and the Materials Science & Technology Society of Nigeria (MSN).

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Enyi Etiaba is a medical doctor, who trained and worked as a family physician in the United Kingdom. Since return to Nigeria, she has been working as a Public Health Doctor and has been employed in the Department of Health Administration and Management, Faculty of Health Sciences and Technology, College of Medicine, University of Nigeria, since February 2012. She is also a Senior Health Policy and Systems Researcher (HPSR) at the Health Policy Research Group (HPRG), College of Medicine, University of Nigeria, with an interest in Health Policy Analysis.

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Francisca Oby Nwaokorie (Ph.D., MBA, FMLSCN) is a Medical Laboratory Scientist with 25 years' experience covering diagnostics (Medical Microbiology), research, laboratory management, and teaching. She started her career as a Research Fellow with the Nigerian Institute of Medical Research before her current employment as a Senior Lecturer at University of Lagos. Her research focus is on microbial biodiversity and functionality of anaerobes - the key microbes in Human Microbiome. She has over 50 publications to show for her works. Francisca balanced her career as a scientist with a Master's degree in Management. She is a member of WHO-AFRO SLIPTA/SLMTA Program for Strengthening Laboratory Management Towards Accreditation in Africa, aimed to build in-country capacity to strengthen medical laboratories and accelerate their preparedness towards ISO 15189 and ISO 17025 accreditation. She is a mentor with three programs; 1000Girls 1000Futures, STEM U and Junior Academy of the New York Academy of Science. She is happily married with children.

Hassan Adebayo Bamidele was born in August, 1980. He holds an ND in SLT, HND in Biology/Microbiology, PGD in Microbiology, PGD in Education, and M.Ed in Science Education.

He is currently a Senior Technologist at the Department of Science Laboratory Technology, Federal Polytechnic Kaura Namoda, Zamfara State. He is also Chairman, Association of Science Laboratory Technologists of Nigeria (ASLTON), Federal Polytechnic Kaura Namoda Branch, Zamfara State. His hobbies include research, meeting people, and human capital development. He is married with children.

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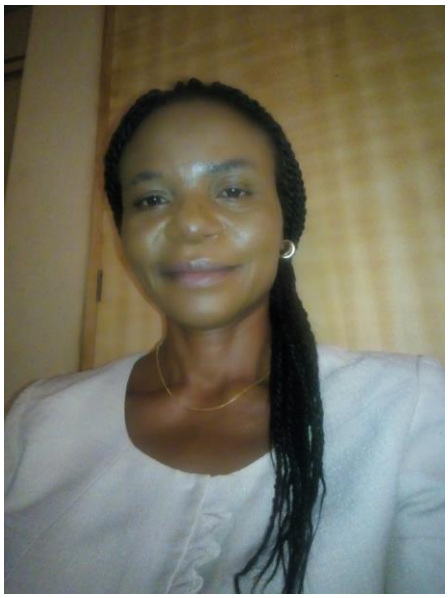

Lorretta Ntoimo is a Sociologist/Demographer at the Federal University Oye-Ekiti, Nigeria where she teaches in the Department of Demography and Social Statistics. She also has an appointment as an Associate of Women's Health and Action Research Centre (WHARC), a leading non-governmental organization in Nigeria where she actively contributes to research planning, data collection and management, and writing for publication. Lorretta is a highly motivated and result-oriented researcher whose goal is to make substantial contribution to family and household research, maternal, child, and adolescent health in Africa. She has participated in various capacities in maternal, child, adolescent health and family research projects. Lorretta has over 10 years research experience and has published multiple articles, book chapters and one co-edited book. She serves on the Editorial Board of three journals.

Oliver Chukwuma Orji is a lecturer at the College of Medicine, University of Nigeria Nsukka, and a doctoral researcher in brain genomics in the Division of Cells, Organisms, and Molecular Genetics, Faculty of Medicine and Health, the University of Nottingham, United Kingdom.

His background is Clinical Biochemistry and Molecular Genetics. He has been part of cross-cutting research projects in clinical biochemistry and pharmacology using human subjects and animal models, and has completed projects in mammalian gene regulation as well. This has given rise to about twenty publications in peer-reviewed journals.

Currently, his research involves using cellular biology techniques and RNA transcriptomics to understand the role of N6-methyladenosine modification of mRNAs in synaptic plasticity and brain function.

His interests include life sciences research, music, and reading.

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Stanley Ilo obtained his Bachelors in Agricultural Science Education in 2000, a postgraduate diploma in Animal Production and Management in 2005, and a Masters in Animal Reproductive Physiology in 2009. He received his PhD in Animal Reproductive Physiology in 2015.

He worked at the Federal College of Agriculture, Ishiagu, Ebonyi State from 2008 to 2017. He is currently a Lecturer at the Department of Animal Science, Faculty of Agriculture, University of Nigeria Nsukka, Enugu State. His hobbies are travelling, reading, and playing lawn tennis.

Abstracts

Keynote Speakers

Applied and Translational Research in National Development: Industry-Academia Partnership and Collaboration

Umar Bindir *- Director, Research and Innovation, Air Force Institute of Technology, Kaduna*

The generic justification of applied and translational research in national development in any developing country first revolves around addressing the challenges of absolute poverty that would ensure all citizens have access to basic needs of life. This is followed by the deployment of strategies to unleash opportunities for all citizens to lead a safe, happy and fulfilling life if they acquire skills & competences to have a job and/or create wealth. The third and ultimate justification is to ensure that the country emerges as a knowledge based, and dynamically innovative society.

Based on the above value chain, the world today is segregated into countries that are fully developed (first world), emerging strong economies (second world), and developing /underdeveloped (poor or third world) countries. These classifications are based on clear development indices that include global technology visibility, high productivity, global enterprises and a display of quality products through dynamic creativity and innovation.

Nigeria (a developing country) is the main focus of discussion in this paper. The paper dwells on briefly tracking the Nigerian efforts to develop, and systematically submit to its inability to succeed, due to its weakness to take advantages of Science, Engineering, Technology and Innovation (SETI).

With a SETI system made of about 200 accredited Universities; over 600 accredited technical institutions including an estimated 140 Polytechnics & Monotechnics; nearly 100 Colleges of Education; over 300 scientific research institutions/centres; many world-class foreign industries; thousands of Professors, PhD holders; many scientific and engineering professional bodies; a large pool of diaspora capacity; and large numbers of other local & global technical networks; the paper attempts to present vast research, development and innovation outputs that could easily propel Nigeria to higher levels of socio-economic development. A brief analysis is then made to identify why the Nation's development is not tied to these outputs, which include the failure of the SETI activities to be applied and translated to economic development; weak policies to consistently tie knowledge to economic development; and the weakness to realize the merits of connecting in-house academia to industrial development.

The paper concludes with some practicable recommendations including the need for Nigeria to intensely and proudly promote its relevant and quality technology outputs; aggressive deployment of a firm technology transfer policy that would enable the local knowledge system to effectively adapt foreign experiences to industrialize; ensure a strategic platform is created to build a critical mass of creative and innovative manpower to serve Nigeria; directly link academia to socio-economic development needs, and take firm steps to make sure that the existing national SETI policy is well grounded to sustain the effective and measurable connection between the academia and industry.

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Research, Innovation and Economic Development Nexus in Nigeria: Concepts, Challenges and Way Forward

Azikiwe Peter Onwualu, FAS *- Director, Academic Planning, African University of Science and Technology, Abuja*

In Nigeria, while the national Science, Technology and Innovation (STI) system is impressive in terms of numbers, it has not resulted into significant impact on industrial activities and hence economic development. This is because of little of no interaction and collaboration among the actors (academia, industry, government) in the triple helix, technological gap between the researchers and industries, weak infrastructure and insignificant fund appropriation, thereby limiting technological, industrial and economic growth. Many potential research results which would have led to innovations that can drive economic growth have been drowned by the so called "valley of death" in the commercialization value chain.

The global literature on the role of research in driving economic development of nations is rich with case studies of how research has helped to drive innovation and hence industrial and economic development. On the American continent, good examples can be found in the Silicon Valley in the United States of America and Blackberry technology, quantum startups, and quantum valley laboratory in Canada and AgTech, AgFunder in Brazil. In Europe, similar examples can be found in the United Kingdom, Germany and Netherlands. For Asia, good case studies can be found in China, South Korea, India and Singapore. The success stories above in other continents have not happened in the same magnitude in Africa except isolated cases in South Africa and North Africa.

The paper identifies and discusses the status and challenges facing research and innovation ecosystem in Nigeria. In particular, the institutional framework for research and innovation is examined. Drawing extensively from experiences from successful nations, a strategy is proposed for using research and innovation to drive economic development in Nigeria through bridging the gap between research and development, and a functional academia-industry collaboration facilitated by an enabling environment created by government. The

roles of emerging Centres of Excellence in research and innovation in specific areas of national interest and a functional National System of Innovation (NSI) that uses the triple helix concept to drive research, innovation and economic development are discussed.

Lead Presentations

Translational Research in Medicine

Babatunde Salako FAS *- Director-General, Nigerian Institute of Medical Research*

Translational medicine or research may be described as the process of applying new knowledge from basic biology, clinical trials, techniques and tools that address critical gaps in medical practice to improve health outcomes. It is an effort to build on basic scientific research to create new therapies, medical procedures, diagnostics or preventive measures moving basic science discoveries into clinical applications from bench to bedside. However, there is a substantial gap between the healthcare that patients receive and what is recommended as global best practice. There is therefore, a research-practice or knowing-doing gap; this is why translational research has produced only small to moderate impact on the global health status.

Successful translational research has continued to change the face of medical practice in many areas, such as the discovery of antiretroviral agents from basic medical research, which has produced significant reduction in HIV morbidity and mortality and therefore longevity on the part of people living with HIV. Of recent is the development of candidate vaccines for SARS COV-2, a pandemic that caught the world by storm, ravaging several countries of the world with unexpected morbidity and mortality. Yet, there are several other discoveries that have not made such impact on the global health status. For a successful translational medicine, research utilization in daily practice often depends on the individuals, the new knowledge, and the actual context in which the evidence is to be operationalized. More importantly, is implementation science which is the study of methods that promote integration of research findings and evidence into healthcare policy and practice.

Developing nations like Nigeria have poor capacity to engage in translational medicine as research infrastructure to support the process is not fully on ground. Where research efforts have led to innovations and discoveries, research findings are not used by policy makers; this may be because there is often lack of communication between researchers, policy makers and members of the community where research results will eventually be used. There is also a need for private sector participation from the inception and planning of research projects to catalyze buy in making the gown to meet the town.

Generally, high income countries investigators secure most funding for research in developing nations and often dictate the research agenda which values and objectives may be different from that of local partners and sometime unrelated to national research priorities. For Nigeria, peculiar factors like instability, insecurity and political uncertainty

often rub the nation of capacity to participate in translational research. Poor funding of health research is the greatest albatross thus most research done in Nigeria remain donor driven.

Engaging the decision makers in identifying and defining the research problem greatly increases translation of study results as they need to operate in an evidence based environment. Furthermore, research reports need to be produced in form of briefs that are easy to understand and devoid of medical jargons to aid policy formulation and translation.

Responsible advocacy to policy makers is required to promote or reinforce a change in policy, program or legislation creating a supportive environment in which influential networks, opinion leaders, and ultimately, decision makers take ownership of new research ideas, evidence and subsequently act upon them.

Industry-Academia Partnership and Collaboration

Akii Ibhadode, FAS *- Department of Production Engineering, University of Benin*

Industry-academia partnership and collaboration is a sine-qua-non in producing organic national growth. It ensures that industry is grown, kept afloat and makes profit using the academia to solve its operational problems. This also ensures that academia deploys its philosophical findings into practical endeavours useful for national development.

Industry-academia partnership and collaboration may occur in the following ways: (i) academic research deployed for establishment of new businesses (ii) commissioning of academia by investor/sponsor to conduct research on a particular problem that could lead to the establishment of a new business, and (iii) commissioning of academia to conduct research by industry in order to improve operations or extend existing business.

The benefits of industry-academia partnership and collaboration are legion and include: (i) helps the organic development of a nation – national development that grows out from direct actions of the citizens with or without external assistance (ii) leads to the establishment of new businesses from time to time (iii) strengthens local businesses /organizations (iv) creates employment (v) generates income for universities and research institutes making them to be self-sustaining (vi) gives fulfilment to academics.

Methods of initiating and building industry-academia partnership and collaboration are discussed which include aggressive outreach to industry by academia, verifiable track record of performance of past research activities, meeting delivery dates, accountability, etc.

The case-study presented in this lecture shows elements of the benefits of industry-academia partnership and collaboration.

Oral Presentations

Collaboration of Industry with Academia: An Imperative as the Engine of Industrialization and Development

Adegbola Akinola
Department of Mathematics, Obafemi Awolowo University, Ile-Ife Nigeria

There is no gainsaying in the declaration that the heart and brain of industrial production and development of a nation reside in the ability to do science and convert this to technology and beneficiation of materials through aggressive innovation.

More so, in a world today ruled by knowledge in science and technology and dominated not just by ICT (information and computer technology) but now largely by AI (artificial intelligence), it is only fit and proper to ensure a sustainable seamless aggressive collaboration between industry and academia. This is crucial since the bedrock of any industrialization and development is science and technology innovation. Professor Abdus Salam (1926 – 1996), a Pakistani, Nobel laureate in Physics (1979), put it in context in his book, Ideals and Realities: "The difference between the rich and the poor, the north and the south or the 1st and the 3rd world is that one has science and technology while the other does not". Definitely, for this to occur and thrive, the symbiotic partnership of industry-academia is imperative.

But a silicon valley does not come by happenstance in a nation. It requires leadership intellect, political will, policy focus and investment, persistence and discipline to walk-the-talk to make this happen. A key component in this is creating the environment for Industry and Research Institution to collaborate intensely. Only a pregnant woman looks forward to give birth. The world today is migrating to electric vehicles as the means of road transportation. The question is, has Nigeria a worthy road-network for even its gasoline-powered vehicles presently?

This paper examines and illuminates with examples the ways and means of creating the environment for science and technology research to flourish. It underpins the creation of virile industrial production base as the trigger for research to plume; and consequently prescribes the key to a sustainable research funding and mutually benefiting collaboration and symbiotic partnership between the industry and academia.

It is shown, using comparative analysis, that a sine qua non for the creation of sustainable industrial base is urgent completion of Ajaokuta, NIOMCO, ALUMCO and making other iron, steel and machine tools companies functional; as this ensures beneficiation of local raw materials and thereby create wealth to fund government budget and hence, research. It is

further established that having correct policies, institutional and governmental, which include pertinent tax regime with rebate rights; and getting every company of specified grade to have a Research Unit locally in the country, provides needed framework for research and collaboration. It is also revealed the effect in reducing cost and saving forex for infrastructures (e.g. rail lines); as such, freeing money to fund intensive research, education, health and municipal services. Hence, the benefits accruing to Industry, Academia, citizens; and consequence on human development index (HDI) and the country at large.

In conclusion, the issue with Nigeria is not dearth of proficient researchers to do quality cutting-edge research, but lack of environment, wherewithal: industrial production base, policy, legal framework, weak political will and discipline to drive any policy. Ways to obviate these barriers to engender research and collaboration with industry beyond the usual concept of local content are digested and benefits of doing so well elucidated in the paper.

Keywords: Sustainable industrial base, Intensive research funding and collaboration with industry, Policy framework.

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Comparative analysis of piezoelectric properties of a Nigerian quartz and lead zirconate titanate (PZT) in manufacture of ultrasound transducer

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The study is a comparative analysis of the piezoelectric properties of a Nigerian quartz and Lead zirconate titanate (PZT) for use in ultrasonic transducers. Quartz is in abundant supply in Nigeria, though its piezoelectric charge and voltage constants have not been determined. These constants in quartz were determined with and compared with PZT.

Quartz crystals were cut from raw quartz samples. These samples were polished and purified, thereafter were measured and weighed using micrometer screw gauge and electronic weighing balance. The capacitance of the specimen was determined with capacitance bridge. The frequency of minimum and maximum impedance was determined using the standard circuitry with AC Millivoltmeter. The result showed that the mean weight of the crystals was 3.8gm. The mean frequency of minimum and maximum impedance was 7.61MHz and 5.45MHz respectively. The piezoelectric charge and voltage constants were $1.54\ X\ 10^{-7}\ C/M\ and\ 657.17\ v/m^2$ respectively.

The piezoelectric constants from the present study were compared with values for PZT by APC which are $-125 \times 10^{-12} C/M^2$ *and* $-11 \times 10^{-3} v/m^2$ for both charge and voltage constants. Comparative analysis shows that PZT has a higher inherent charge constant than quartz, while the piezoelectric voltage constant of quartz is higher than PZT. These piezoelectric materials will be suitable for ultrasound transducer.

Keywords: Quartz, Piezoelectricity, Transducer

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Comparative Study of the Predictive Power of First Trimester and Second Trimester Uterine Artery Doppler in Predicting Adverse Pregnancy Outcome

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Background: Globally, maternal and neonatal mortality and morbidity from pregnancy complications have been on increase, with 99% of maternal mortality occurring in developing countries. Also, 800 women die every day from pregnancy or complications related to pregnancy while 2.6 million babies die annually as stillbirth. Nigeria is ranked 4th in the world in terms of maternal mortality rate. Early detection of patients at risk of complications of pregnancy such as preeclampsia, fetal growth restriction, placenta abruption, and stillbirth is imperative for better management outcome. Uterine artery Doppler (Ut-AD) examination is effective in predicting women at risk of pregnancy complications, although, there are conflicting reports on its sensitivity. This study is aimed at (1) determining the predictive power of Ut-AD indices at 11-14 weeks and 21-23 weeks in predicting women at risk of adverse pregnancy outcome. (2) Determining the mean of Ut-AD indices at 11-14 weeks and 21- 23 weeks gestation in pregnancy with the normal outcome and (3) correlating Ut-AD indices with maternal age, parity, and BMI.

Methodology: This clinical-based, longitudinal and unpaired cohort design was carried out at the antenatal clinic of St Patrick Hospital and Maternity, Enugu from May 2017 to December 2019. A convenient sampling technique was used to recruit 500 pregnant women (250 for each group) who registered for the antenatal clinic within the study period. Inclusion criteria are singleton pregnancy within 11-14 weeks and 21-23 weeks of gestation, no previous history of hypertension, renal disease, preeclampsia, and placenta abruption. Those with recognized fetal anomaly and those who decline to participate were excluded. Ethical approval was obtained from the Enugu State Ministry of Health. Equipment used includes Mindray digital color Doppler ultrasound; model DC-N3 Pro, and a stadiometer with weighing scale, model ZT-160. Patients were scanned in a semi-recumbent position with the

abdomen barred and acoustic gel applied. The transducer was placed in the midline to obtain the image of the cervix. The transducer was tilted to either side to demonstrate the uterine artery on either side of the internal Os. Pulse wave Doppler sample gate was set at 2mm while the angle of insonation was kept at less than 300. Data were analyzed using SPSS software version 20.

Results: In first trimester screening, the sensitivity and specificity of Pulsatility index (PI), Resistive index (RI) and Systolic/Diastolic (S/D) ratio were 97% and 76.5%, 98.5% and 82.4%, 96.3% and 70.6% respectively. In second trimester screening, the sensitivity and specificity of PI, RI, and S/D ratio were 57.5% and 63.3%, 89.2% and 53.6%, 87.5%, and 53.3% respectively. Mean PI, RI and S/D ratio for normal pregnancy outcome during first-trimester screening were 0.95 ± 0.12, 0.46 ± 0.08, and 1.76 ± 0.35 respectively while that of second-trimester screening were 0.97 ± 0.17, 0.63 ± 0.19, and 2.14 ± 0.51 respectively. There were positive but weak relationships between maternal age, parity and BMI, and Ut-AD indices

Conclusion: First-trimester screening is more sensitive in predicting adverse pregnancy outcome when compared to second-trimester screening.

Keywords: Uterine Artery Doppler, Predictive power, Pregnancy outcome

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Differential Expression of Suppressor of Cytokine Signalling 3 (SOCS3) Modifies Disease Phenotypes in Asymptomatic Hyperuricemia and Gout

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Background: The progression or stability of inflammatory arthritis is subject to the regulation of intracellular cytokine signalling which is induced in the presence of danger signals. Until now, how the regulation of this signalling impacts gout pathogenesis had not been studied. We aimed to investigate the hypothesis that the differential expression of SOCS3, an inducible negative regulator of the JAK/STAT signalling, could modulate the

pathogenesis of gout from the asymptomatic hyperuricaemic state to the resolution of observable clinical symptoms.

Methodology: 120 consenting male adults (aged ≥18 years) grouped according to their serum uric acid (SUA) levels and clinical diagnostic symptoms as normal SUA, high SUA, MSU crystal deposit, acute gout and inter-critical gout participated in the study and provided clinical and biometric data. Total RNA was extracted from whole blood, and 500 ng of RNA was reverse transcribed using the RT2 First Strand method. SOCS3 gene expression in all subjects was assessed using RT-qPCR. Data were normalized against the reference gene, RPLPO, and differential amplification thresholds (ΔCTs) calculated as CT (SOCS3) – CT (RPLPO) for fold changes using the 2-ΔΔCT method.

Results: Results show that SOCS3 was upregulated three-folds in acute gout and two-folds in the inter-critical stage but remained constant at low levels in subjects with normal SUA and asymptomatic hyperuricaemia with or without MSU crystal deposition ($p<0.001$). An association between SOCS3 expression and the duration of gout flares was found to follow an inverse pattern ($p=0.039$, $r= -0.49$), indicating that as gene expression increased, the duration of flares reduced. Further correlation analyses also showed that the expression of SOCS3 reduced as body mass indices in gout patients increased ($p=0.03$, $r= -0.5$) but was raised as age increased ($p=0.001$, $r=0.7$). The current finding shows that SOCS3 differential expression may modify disease phenotypes in gout.

Conclusion: The current finding shows that SOCS3 differential expression may modify disease phenotypes in gout. Hence, SOCS3 could serve as a potential biomarker to aid gout prognostication and diagnosis.

Keywords: Gout, SOCS3, hyperuricemia

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Effects of a Multifaceted Intervention on Utilization of Primary Health Care for Maternal and Child Health in Rural Nigeria

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Background: Although several studies have reported low utilization of primary health care for skilled maternal and child care in Nigeria, limited empirical research has addressed this challenge. The objective of this study is to determine the effectiveness of a set of multi-faceted interventions designed to increase the access of rural women to antenatal, intrapartum, postpartum, and childhood immunization services offered in primary health care facilities.

Methodology: The study was a separate sample pre-test - post-test quasi-experimental research conducted in 20 communities in Esan South East and Etsako East Local Government Areas in Edo State, Nigeria. A mixed-method research which includes a household survey with 1, 408 randomly selected women of reproductive age was conducted at baseline to identify the prevalence and determinants of use and non-use of PHCs for skilled maternal and child care. Using the results of the baseline studies, community-led intervention activities were designed and implemented over 24 months. The interventions included a memorandum of understanding with transport owners, community health fund, drug revolving fund, community health education, rapid SMS, staff & retraining, and advocacy. Subsequently, an endline household survey was conducted with a separate sample of 1411 women of reproductive age. The baseline and end-line data were analysed and compared using univariate, bivariate and logistic regression statistical methods.

Results: The results showed a high-level effectiveness of the interventions in improving the uptake of antenatal, delivery, and postnatal care, and childhood immunisation services. After controlling for possible confounding variables, the likelihood of using PHCs for antenatal care increased nearly four-folds, delivery care three-folds, postnatal care nearly four folds, and childhood immunization nearly three-folds, as compared to the baseline. However, a few women still reported cost of services, and gender related issues as reasons for non-use.

Conclusion: We conclude that community-led interventions that address the specific concerns of women related to the bottlenecks they experience in accessing care in primary health centres are effective in increasing demand for skilled pregnancy and child care in rural Nigeria.

Keywords: Interventions, Primary Health care, Maternal and Child Health

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Examination of Fungi Responsible for the Bio-Deterioration of Stored Groundnuts

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Background: A study on the bio-deterioration of stored groundnut by fungi species from four different species obtained from various Crop Research Institutes in Nigeria was carried out.

Methodology: The percentage frequency occurrence of the species was determined by Pour Plate Method. The isolates obtained were identified and characterized by microscopic assessment and organoleptic evaluations. Five fungal species namely Aspergillus flavus, Aspergillus parasiticus, Aspergillus ochraceus, Aspergillus versicolor and Penicillium expansum were isolated from the analyzed samples.

Result: The result showed all the four samples had high number of mould occurrence with the sample nut from the National Cereals Research Institute (NCRI), Badeggi, Bida – Niger State having the highest occurrence of 59.82%, followed by the sample from the Bauchi State Agricultural Development Project (BSADP), Bauchi with 55.27%, the Institute of Agricultural Research (IAR) Samaru, Zaria, Kaduna State has 52.74% while the International Institute of Tropical Agriculture (IITA), Kano had the least occurrence of 35.53%.

Conclusion: The results obtained showed that these fungal species are capable of surviving in the infected stored groundnuts. Deterioration, otherwise known as spoilage during storage is as a result of the absorption of atmospheric moisture and inadequate drying before storage.

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Growth Performance and Carcass Characteristics of Finishing Broilers Fed Varying Levels of Sun-Dried Cassava Peel Meal (SDCPM) as Replacement for Maize in Humid Tropics

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Background: The need to reduce production cost of livestock has necessitated the use of unconventional feed ingredients that is capable of minimizing the influence of expensive conventional feedstuffs leading to profit maximization and provision of cheap animal protein

for the teeming population. This study was conducted to determine the growth performance and carcass characteristics of finishing broilers fed varying levels of sun-dried cassava peel meal (SDCPM) as replacement for maize in humid tropics.

Methodology: A total of ninety-six (96) four-weeks old Anak broiler chicks were used for the study that lasted for twenty-eight 28 days. The birds were assigned to four treatment diets with twenty-four (24) birds. Each treatment group was replicated three (3) times with eight 8 birds per replicate in a completely randomized design (CRD). Four graded levels of diets were formulated. T1 diet was the control (0% SDCPM), while SDCPM replaced 5%, 10% and 15% of maize in T2, T3 and T4 diets respectively at finisher phase. During the period of study, feed and water were given ad-libitum and similar management protocols were put in place for the animals. The birds were weighed at the beginning of the experiment and weekly thereafter. Also daily feed intake was monitored while feed conversion ratio (FCR) was calculated. At the end of the twenty-eight days feeding trial, two birds were selected and were slaughtered. Different cut parts of the carcass were measured.

Result: The result of the study showed that significant ($P<0.05$) differences were observed in dressed weight, dressing percentage, drumstick and wing, while the other carcass parameters were not affected ($P<0.05$) by the dietary treatments. In dressed weight and dressing percentage, T2, T3 and T4 respectively were significantly (<0.05) higher than T1 (control). The study also showed that the dietary treatments influenced ($P<0.05$) all the growth parameters except the initial body weight of birds that showed no significant ($P>0.05$). The final body weight and total weight gain of birds in T2 and T3 were significantly ($P<0.05$) higher than T4 and T1 (control). On the FCR T1 (control) and T4 were significantly ($P<0.05$) higher than other treatments. Birds on T2 had the best FCR with the least value.

Conclusion: The results indicated that sun-dried cassava peel meal (SDCPM) can be better utilized by finisher broilers. The inability of the cassava peel to support carcass characteristics of finisher broiler could be as a result of high HCN and fiber contents. Finally, sun-dried cassava peel meal can replace 15 percent maize in the finisher broiler diet without adverse effect on performance.

Keywords: Sun-dried cassava peel meal, growth performance, and carcass characteristics

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Target Amplification for the Detection of Anaerobic Pathogens in Vaginal Specimen of Women of Reproductive Age

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Background: Alterations in vaginal flora by "difficult to culture" anaerobic species are a global health problem for women of reproductive age. These species are implicated in bacterial vaginosis a condition associated with an imbalance in vaginal microbes. This disorder has been associated with increased risk of getting other sexually transmitted diseases, preterm labour and delivery of infants with low birth weight and congenital abnormalities.

Methodology: This study used a target amplification molecular diagnostic method to screen for the presence of anaerobic pathogenic species on chromosomal DNA. The DNA was primarily extracted from high vaginal swabs obtained from women presenting for a routine medical check in Obstetrics and Gynaecology Clinic, for antenatal and family planning in two states in South-East Nigeria. The DNA samples were analysed by the target Polymerase Chain Reaction (PCR) amplification technique for the presence of five anaerobic species.

Results: A total of 33 DNA samples analysed were from Imo 19/33 (57.57%) and Abia 14/33 (42.42%). The mean age of women is 38.2 years. Majority of them fell between the age bracket of 26-30 (27.3%), same as 46- 49 (27.3%), followed by 36 – 40 (18.2%) and 31-35 (15.2%) respectively. Only 2 (6.1%) of the DNA samples had none of the 5 species evaluated. The rest showed species-specific gene amplification for *Atopobium vaginae* 23 (69.7%), *Mycoplasma hominis* 5 (15.2%), *Prevotella* sp. 27(81.8%), *Prevotella bivia* 10(30.3%) and *Gardnerella vaginalis* 10(30.3%). In addition, more than one species were detected in combination. Thus, 2 different species were detected in 51.1%, 3 in 21.2%, and 4 species in 12.1% of the total DNA samples evaluated respectively.

Conclusion: Target amplification detected the anaerobic pathogens directly from the vaginal specimen. The study observed that anaerobic pathogens implicated in bacterial vaginosis are harboured by women of reproductive age presenting at the clinics in studied sites. There is a need to test more women so as to justify the need to promote a review of related laboratory diagnostic protocol and promote early detection for women at risk of this disorder. In addition, the use of target amplification as a molecular laboratory diagnostic tool for screening and testing of anaerobes involved in vaginal infections should be encouraged.

Keywords: Anaerobes, Vaginosis, PCR

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Wading through the policy process in a multi-governance context - A framework analysis of a maternal, neonatal and child health policy in Nigeria

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Background: Maternal, neonatal and child health (MNCH) is prioritised in Nigeria but despite multiple policies and costly interventions, indices remain poor. This study synthesises the MNCH journey by analysing the key strategic policy which aimed to integrate MNCH implementation in a decentralized health system, towards better outcomes.

Methodology: The IMNCH strategy gave rise to three selected programmes which were developed at the national level, adopted and implemented at sub-national levels (state and local government). Two states were also selected to explore sub-national implementation experiences. A case study qualitative approach was used to allow for in-depth analysis in context. Information from review of documents and interviews were iteratively triangulated to provide a rich description. Data was organised with the help of NviVo 11 and thematic content analysis carried using a framework approach.

Results: The parent policy, the IMNCH strategy was inclusive of all government levels during the design, but the programmes spun off from the strategy were more top-down and hence lacked sub-national commitment due to perceived and actual interference from national level actors, such that it appeared to override sub-national contextual variations. Changing actors as a result of the country's 4 year political cycle also constrained scale-up. An emergent finding is that the third programme which was considered bottom-up also suffered similar challenges in that sub-national levels also deviated from programme design and intent.

Conclusion: The IMNCH strategy was a positive paradigm shift with a vision for holistic and integrated approach towards delivering evidence-based cost effective interventions to improve MNCH. Events that occurred over a decade of its implementation impacted on the fidelity and outcomes. Policy design and characteristics were not adequately inclusive of subnational actors.

Poster Presentations

(Videos of Poster presentations can be viewed at nas.org.ng/conference)

Anti-cancer Potential of Moringa oleifera on BRCA1 gene: Systems Biology

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***Background*:** Breast Cancer has always been a global challenge that is prevalent among women. There is a continuous increase in the high number of women mortality rates as a result of breast cancer and affecting countries at all levels of modernization. Women with high-risk factors including family history, obesity, and menopause have the possibility of developing breast cancer cells. With the advent of radiotherapy, chemotherapy, hormone therapy, and surgery in the treatment of breast cancer, there have increased in the number of breast cancer survivors. Also, the design and development of drugs targeting therapeutic enzymes are helping to effectively treat the tumor cells at an early stage. However, long term use of anti-cancer drugs has been linked to severe side effects. This research aims to develop potential drug candidates that could serve as anti-cancer agents by utilizing phytochemicals from *M.oleifera*.

Methodology: Glide tool from Schrodinger molecular drug discovery suite (version 2017-1) was used in this research for protein and ligand preparation, receptor grid generation, and molecular docking. Also, SWISS ADME was used to compute the pharmacokinetic parameters, drug-like properties, and toxicity study of the phytochemicals from *M. Oleifera*.

***Results*:** In silico analysis of the bioactive agents from *M. oleifera* shows high binding affinity with the active site of BRCA1. Furthermore, there are favorable hydrogen-bonding interactions. Rutin, Vicenin-2, and Quercetin-3-O-glucoside have the highest binding energy of -7.522, -6.808, and -6.635kcal/mol respectively. The M. oleifera compounds demonstrate low toxicity and their drug-like properties predicted that they are promising hit drug candidates.

Conclusion: The binding affinity, protein-ligand interaction, and drug-like properties of compounds from *M.oleifera* confirm it has a high inhibitory effect against breast cancer. Thus, we proposed that *M. oleifera* may be a potential BRCA-1 inhibitor.

Keywords: *Moringa oleifera,* breast cancer, in silico

Anti-hyperglycemic and Anti-hyperlipidemic Evaluations of an Antioxidant Active Fraction from *Daucus carota* Linn. Seed Extract

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Background: *Daucus carota* L. is used both as food and in traditional medicine for management of diseases. The seed is used in the management of diabetes mellitus, which is known to be associated with oxidative stress and hyperlipidemia. Hyperlipidemia is a risk factor in other disease such as cardiovascular disease. The present study investigated an active antioxidant fraction from aqueous seed extract of *D. carota* for its glucose lowering activity and antihyperlipidemic properties.

Methodology: *Daucus carota* seed (78.83g) was pulverised and dissolved in 400 ml of distilled water for 24 hours. The crude extract obtained (16.40g, 20.8% yield) was partitioned in water/ethyl acetate (3:1) to yield ethyl acetate fraction (6.20g, 37.8% yield) and aqueous ethyl acetate fraction (7.6g, 46.3% yield) which was fractionated on silica in a column chromatography using hexane, ethyl acetate and methanol.

Results: Thirteen (13) fractions were collected, from which fractions 4 – 8 expressed promising in vitro antioxidant activities with IC50 comparable with that of vitamin C and butylated hydroxytolene and are thus used in the present study. Following oral administration of glucose (2 g/kg bwt.), distilled water, metformin (14.2 mg/kg bwt.) and *D. carota* seed fractions at 20 and 40 mg/kg bwt. to mice, the untreated mice had an average of 11.09% increase in glucose, while metformin, aqueous seed fractions of *D. carota* had an average of 17.05%, 14.74% and 32.78% glucose reduction respectively. The active fractions expressed no significant alterations in total cholesterol (CHOL), triglyceride (TRIG), high-density lipoprotein cholesterol (HDLc), low-density lipoprotein cholesterol (LDLc) and cardiovascular indices (CI) after seven days of administrations when compared to control mice.

Conclusion: The study concludes that the active antioxidant fractions from aqueous seed extract of *D. carota* similarly possess antihyperglycemic properties and no adverse effects on cardiovascular indices in experimental mice at the doses and duration tested.

Keywords: *Daucus carota*, Antihyperglycemic, Antihyperlipidemic, Fractionation, Seeds

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Assessment of Contaminants and Quality of Cassava Chips Dried in Akufo Farm Settlement

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Background: Poor hygienic practices are common among processors of cassava chips in Akufo - a town in the southwestern part of Nigeria. Many local processors are used to traditional methods of drying cassava chips on the roadside; a method that exposes the chips to various contaminants such as pebbles, sand, rain, animal droppings and heavy metals from the road side. The aim of the study was to sensitize the Akufo processors to adopt the hygienic technology for drying the cassava chips.

Methodology: Contaminants such as lead deposit, animal dungs, stones in cassava chips purchased from Akufo processors were evaluated by counting and weighing contaminants per 100g of representative samples, and compared with the chips dried using NSPRI dryer.

Results: The percentage stones contained in the Akufo chips dried on the direct floor, chips dried on the nylon spread on the floor and NSPRI dried chips were 2, 0.8 and 0% respectively. The goat dung found in the Akufo chips dried on the direct floor, chips dried on the nylon spread on the floor and NSPRI dried chips were 4, 6 and 0 % respectively. The percentage pebbles and stick found in the Akufo chips dried on the direct floor, chips dried on the nylon spread on the floor and NSPRI dried chips were 5, 8 and 0% respectively.

Conclusion: NSPRI dried cassava chips had the best quality when compared to the Akufo dried chips.

Keywords: cassava chips, contaminants, dryer

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Characterization and Elucidation of the Pharmaceutical Excipient Potentials of the Inner Peels of the Ripe and Unripe *Musa parasidiasca* (Banana) fruit

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Background: There is an increasing quest for the utility of natural plant parts as pharmaceutical excipients. The peels of ripe and unripe *Musa parasidiasca* (banana) fruit constitute domestic waste and potential source of environmental pollution. There is a need to manage this waste and explore its economic value and potential utilization in the pharmaceutical industry. This study sought to characterize the inner peels of ripe and unripe *Musa parasidiasca* for their pharmaceutical excipient potentials

Methodology: The ripe and unripe *Musa parasidiasca* respectively MUSP-R and MUSP-UR were sourced from Jakande fruit market, Lagos state and authenticated at the Department of Botany, University of Lagos. Fruits were thoroughly washed with water and the respective inner scrapings of the peels carefully removed. The scrapings were oven dried for 24 h at 45°C, powdered and subjected to aqueous maceration for 6 h followed by filtration. The filtrates were oven dried at 60 °C for 48 h, triturated and stored in appropriately labeled air-tight containers until ready to use for characterization. MUSP-R and MUSP-UR powdered extracts were characterized for physiochemical, pharmacognostical, microbial and toxicological profiles using established methods and protocols. Ethical permission was obtained from the Health Research and Ethics Committee of the College of Medicine, University of Lagos (HREC-CMUL). Triplicate determinations were undertaken and results were statistically analyzed using analysis of variance (ANOVA) using SPSS version 23 with, significance was set @ $p \leq 0.05$.

Results: They both had acceptable organoleptic properties .The physicochemical properties for MUSP-R and MUSP-UR respectively were : Angle of repose (13.50 ±° 1.15and 15.37±°1.25); Hausner's ratio (1.14±0.12 and 1.30± 0.15); Compressibility Index % (12.28± 1.2 and 22.84±1. 5);Flow rate g/sec (2.0 ±0.1 and 2.5 ±0.2);pH (6.7±1.2 and 6.5±1.4); Carbohydrate content %(58.80±2.3 and 58.85 ±1.8); Protein % (8.75 ± 1.1and 8.73 ±1.1), Lipid % (23.0 ±1.3 and 20.5±1.8); Fibre % (2.3 ±0.3 and 4.02±0.5);Ash content % (7.1± 0.4and 6.8±0.5) and moisture content % (0.13± 0.03and 0.10± 0.01). They both contained reducing sugars, phenols, steroids, terpenoids, cardiac glycosides and flavonoids and didn't contain alkaloids and anthraquinones. MUSPR also contained saponins, while MUSPU contained tannins. The microbial load (bacterial and fungal) of MUSP-R and MUSP-UR were within the Pharmacopoeia specified limits and they both did not contain obnoxious organisms (salmonella and shigella spp).The toxicological profiles of the two extracts were good as there were no significant changes /differences in the haematological and biochemical parameters of the tested and the control animals. Furthermore, there was no pathological changes in the liver, kidney and heart tissues of the tested animals and no morbidity and mortality was recorded.

Conclusion: MUSP-R and MUSP-UR are suggested to have potential excipient utility as diluent and binder in pharmaceutical formulation systems because of their high carbohydrate contents. MUSP-R is also suggested as a glidant or lubricant because of its

good flow properties. Their phytoconstituents also suggest their potential usefulness in phytomedicine / herbal formulations.

Keywords: *Musa parasidiasca*, inner peels, pharmaceutical excipients

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Comparative Study and Evaluation of Microbes on Selected Commercial Dry White and Water Yam at Two Popular Ibadan Markets

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Background: Yams are subjected to several diseases, some of which are caused by micro-organisms. Microbial infections of yam could be at any stage in its growth, from seedling stage through to postharvest. At post-harvest stage, some fungal species have been associated with deterioration of yam tubers during storage. Thus, this research study has been designed to investigate and evaluate various microbes (bacteria and fungi) that may be present on and associated with selected commercial dry white and water yam at two popular Ibadan markets.

Methodology: Yam flour samples were purposively obtained from two markets (Oja Oba and Bodija) while the control samples were obtained from IITA, Ibadan. From the samples, different species of bacteria and fungi were isolated for identification using standard methods. Some of these isolated micro-organisms were *Bacillus sp, Rhizopus stolonifer, Aspergillus niger, Penicillum oxalicum, Monillia, Mucor, Aspergillus sp, Aspergillus flavus, Pythium*. Apart from the already milled flour that was purchased from the markets, different dried white yam samples, namely Gbararo, Ipokoro, Kiayomo and ewura (wateryam) were also purchased and milled in the laboratory using a sterile milleing machine.

Results: The result of the first collected white yam samples showed that Oja Oba samples had the highest total viable bacterial count ranging from 2.9 x 104 to 1.7 x 104 compared to Bodija samples which had the total bacteria count ranging from 1.3 x 104 to 7 x 103. Result of second analysis of the white yam showed that Oja Oba samples had the highest total bacterial counts ranging from 2.9 x 104 to 1.4 x 104 than Bodija samples with 1.8 x 104 to 7 x 103. In the third analysis result, white yam of Bodija samples had less bacteria count ranging from 3.6 x 104 to 9 x 103 compared to Oja Oba of 8.1 x 104 to 1.5 x 104. For water yam samples analysis, Bodija samples' experiment 1, 2 and 3 showed the result of total bacteria variable counts of 4.2 x 104, 4.4 x 104 and 1.02 x 105 respectively while Oja Oba samples showed total bacteria variable counts of 5.4 x 104, 6.3 x 104 and 1.62 x 105

respectively. Thus, result of this study has shown that dried yam flour samples from Oja Oba had a higher total viable microbial count compared to the samples from Bodija while the prepared control samples had low microorganism population compared with all the collected market samples.

Conclusion: The safety of flour-containing foods has been compromised over the years, not only by pathogenic bacteria but also by fungal contamination, and all of these have various acute and chronic effects on human health, by representing another important risk associated with yam product consumption. The adverse effect of fungi and bacteria in plants and tubers has resulted in shortage of yam tubers for consumption. Hence, this study have further shown that commercially processed and marketed yam products are susceptible to micro-organism contamination and may constitute a means of health hazard to human if consumed without being properly cooked.

Keywords: Yams, Microbial Infections, Ibadan Markets

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Comparison of the In-Vitro Growth Rates of Two Vigna Species with *Glycine max* and *Arachis hypogaea* Using Embryo/Seed Culture

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Background: Plant tissue culture technology is widely used for large scale plant multiplication and has become a major industrial importance in the area of plant propagation, disease elimination, plant regeneration, plant improvement and production of secondary metabolites. In vitro studies of two Vigna species of Vigna subterranean and Vigna unguiculata were subjected to various modifications of Murashige and Skoog (MS) medium and varying concentrations of plant regulators (auxin and cytokinin), which decided their growth rate compared with Glycine max and Arachis hypogea respectively.

Methodology: The embryonic axes of the Vigna subterranean, Vigna unguiculata, Glycine max and Arachis hypogea were micro-propagated under aseptic conditions of Murashige and Skoog 1962, (MS) medium supplemented with varying concentrations of plant growth hormone of 0.010.09mg/L BAP (6-Benzylaminopurine) and 0.01mg/L IBA (Indole-3-butyric acid) for a period of four (4) weeks of incubation. The basal medium used was a modified MS medium with a half-strength and full strength of salts. The plant cultures were incubated MS medium containing 3% sucrose with pH value adjusted at 5.7 in a culture room with recommended adequate light intensity, relative humidity and temperature respectively.

Results: Vigna subterranean showed a slow response in the emergence of the shoot until the ninth (9th) day. Though the hard seed coat of Vigna subterranean are impermeable to water and oxygen for germination process, full grown plantlets were observed at the end of the fourth (4th) week indicating utilization of maximal nutrient from the sterile soil. Arachis hypogea showed an increasing number of leaves and branching throughout the growth period. Vigna unguiculata and Glycine max showed a reduction in their growth response in terms of number and branching throughout the four weeks of germination. This could be as a result of the uncertainty of the seeds. The results show that in-vitro regeneration and growth rates of the two Vigna species resulted in the reduction in proliferation of root when low concentration of auxin was added. A significant growth response of full strength MS media can only be seen in Arachis hypogea than in half strength medium. Vigna subterranean, Glycine max and Vigna unguiculata showed a significant growth in full strength media than in half strength.

Conclusion: This study has shown that there is significant difference in the growth pattern of the in-vitro cultured explants of each plant varieties in the modified Murashige and Skoog medium used. Thus, this study affirms that plant tissue culture is an effective technique for effective in-vitro propagation and regeneration of all plant varieties studied except that some tends to respond faster than others.

Keywords: Plant Tissue Culture; Murashige and Skoog (MS) Medium; Plant Growth Hormone

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Contamination of Retailed Yam products at two popular markets in Ibadan (Bodija and Oja Oba) with *Pseudomonas sp* and *Flavobacterium sp*

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Background: Micro-organisms are known to destroy yam, thereby reducing the quality and quantity of the crop for consumption and profit from growth to postharvest stage. The deterioration of most crops is often associated with bacteria and fungi infection. The presence of these bacteria on yam products could cross-contaminate food items during food handling which pose adverse and chronic effect on health. This study reviews the existence of microbial communities on yam product contaminated with *Pseudomonas sp* and *Flavobacterium spp* at two different popular markets in Ibadan.

Methodology: Yam flour samples were purposively obtained from two markets (Oja Oba and Bodija) while the control samples were obtained from IITA, Ibadan. From the samples, different species of bacteria and fungi were isolated for identification using standard methods. Some of these isolated micro-organisms were *Bacillus sp, Pseudomonas sp, Flavobacterium sp, Rhizopus stolonifer, Aspergillus niger, Penicillum oxalicum, Monillia, Mucor, Aspergillus sp, Aspergillus flavus, Pythium*. Apart from the already milled flour that was purchased from the markets, different dried white yam samples, namely Gbararo, Ipokoro, Kiayomo and ewura (wateryam) were also purchased and milled in the laboratory using a sterile milling machine.

Results: In Bodija, the total viable bacterial count of first and second experiment ranges from 1.3 x 104 to 7 x 103 and 3.6 x 104 to 9 x 103 respectively. The genera of the bacteria isolated and their percentage of occurrence include; Bacillus subtilis (40%), Bacillus cereus (15%), Pseudomonas sp (40%), Flavobacterium (5%) while in Oja Oba, the total bacterial count ranges from 2.9 x 104 to 1.7 x 104 and 8.1 x 104 to 1.5 x 104. The percentage of occurrence include; Bacillus subtilis (40%), Pseudomonas sp (35%), Flavobacterium (5%), Bacillus cereus (20%). Some fungi such as *Rhizopus stolonifer, Aspergillus niger, Penicillum oxalicum, Monillia, Mucor, Aspergillus sp, Aspergillus flavus, Pythium* were also isolated. The prepared control samples had no *Pseudomonas sp* or *Flavobacterium sp* population compared with all the collected market samples.

Conclusion: However, production and handling methods have not been standardized resulting in a product with varying quality and safety indices hence varying public health concern. The study shows that the contamination level of *Pseudomonas spp*. and *Flavobacterium spp*. was not significantly different in diverse area of market sites. Regardless of the status and grades of the market, they have the same likelihood to introduce spoilage bacteria like Pseudomonas spp. from yam to food if they neglect correct food handling measures. Hence, this study has further shown that commercial yam products are susceptible to micro-organism contamination and may pose health treat to human if not cooked properly.

Keywords: Yams; Microbial Infections; Ibadan Markets

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Detection of methicillin-resistant Staphylococcus aureus and extended-spectrum beta-lactamase producers from ready-to-eat roasted beef in Ibadan north, Nigeria

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Background: Ready-to-eat roasted beef popularly called 'Suya' in Nigeria is a highly nutritive food and hence prone to microbial contamination when handled in an unhygienic manner by the vendors. Extended-spectrum beta-lactamase (ESBL) producers and methicillin-resistant *Staphylococcus aureus* have been reported in both community and hospital settings in Nigeria. This study investigated their occurrence as microbial contaminants in ready-to-eat roasted beef in Ibadan north local government area (LGA) of Oyo state, Nigeria.

Methodology: Fifty samples, were purposively collected randomly in four different locations in Ibadan north LGA from 1st to 31st of November, 2019. Aerobic and coliform bacterial counts, isolation, identification and antibiotic susceptibility testing was done using standard microbiological techniques. Phenotypically Methicillin resistant Staphylococcus aureus was detected by cefoxitin-disc-diffusion and ESBL-producers by double-disc synergy. MecA/C and selected ESBL (TEM, SHV and CTX-M) genes were detected by PCR technique.

Results: The mean total aerobic and coliform bacterial counts ranged from 1.5 × 106 to 7.8 × 106 cfu/g and 0.8 × 102 to 1.3 × 103 cfu/g respectively. Thirty eight bacteria were isolated: *Staphylococcus aureus* (15.8%), *Pseudomonas spp.* (42.1%), *Klebsiella spp*. (36.8%) and *Bacillus spp*. (5.3%). Four (66.7%) of the *Staphylococcus aureus* were MecA mediated methicillin-resistant strains and 20 (66.7%) of the Gram-negatives were ESBL-producers with 9 (30%) harbouring TEM and SHV and 15 (50%) CTX-M genes.

Conclusion: Occurrence of MRSA and ESBL-producers in ready-to-eat roasted beef in Ibadan north is of serious public health concern and thus required urgent intervention by the government to monitor and control the sales of ready-to-eat roasted beef in the LGA.

Keywords: Ready-to-eat beef, ESBL, MRSA, MDR

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Developing a Digital Application for Patient's Health Care and Safe Record Keeping for Local Government Primary Health Care Centers in Oyo State

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Association of Medical Laboratory Scientists of Nigeria

Background: I have seen the need to develop a digital application that will effectively keep patients records and health care services efficiently in the local government primary health centers in Oyo state.

Methodology: Seek the services of available digital consultancy services, and discuss with relevant stakeholders and solicit for sponsorship and support in cash or kind.

Results: A developed digital application.

Conclusion: Efficiency is enhanced in the local government primary health care.

Keywords: local government, primary health centers, digital application

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Ear Morphology and Morphometry as Potential Forensic Tools for Identification of the Hausa, Igbo and Yoruba Populations of Nigeria

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Background: The human external ear is unique in every individual in terms of shape, size and dimension making it suitable in forensic anthropology for sex estimation and personal identification purposes. The study aimed to evaluate sexual dimorphism and ethnic specificity of the external ear in major Nigerian groups.

Methodology: Three hundred and seven (89 Hausa, 112 Igbo, and 106 Yoruba) individuals participated in the study, with 131 of them males and 176 females aged 0 – 44 years. Measurement of ear landmarks was taken directly with a standard digital Vernier caliper while morphological features were observed from a photograph of each participant taken with a Nikon Z6 Body camera. Descriptive statistics of the studied variables was performed for both sexes across the three ethnic groups. Differences in means were examined by One-way ANOVA analysis. Sex discrimination capacities of the variables were also determined.

Results: Results showed that there was variation in the morphological features of the external ear of the sampled subjects. The external ear features vary in the right and left ears in both sexes of the ethnic groups. All variables were statistically significant ($p<0.05$) except ear width. Univariate discriminant function gave sex prediction accuracies between 56.4 and

57.3% for left and right ears, respectively. Population-specific sex prediction accuracy using stepwise discriminant analysis of left ear variables ranged 58–69.7% and 57.5–74.2% for right ear.

Conclusion: The ear parameters showed potential for sex estimation, but cannot be solely relied upon for personal identification.

Keywords: Discriminant analysis, Morphology, Sexual dimorphism

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Effective Industry-Academia Partnership and Collaboration in Science, Technology and Innovations in Nigeria

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Background: Nigeria is striving to sustain her economic growth for sustainable development to end poverty, enjoy peace and robust livelihood. The creativity, knowhow, technology and intellectual resources needed are incoherent and non-purposeful, resting the struggle more on the academia. The absence of private donors and corporations in setting agenda for research, limits research innovations, breakthroughs and publications.

Methodology: A literature review to study the current situation, challenges to partnerships, case studies of successful programmes funded for academia-industry collaboration in Nigeria and various options for impactful academic-industry partnership was conducted.

Results: Nigerians published 5,602 articles annually from 2003 to 2018 come up No 54. Also, the paper review the current situation, challenges and case studies of programmes funded for academia-industry collaboration in Nigeria. Expected stakeholders' benefits in promoting University-Industry Partnership and Collaboration, entrepreneurial development, and enabled environment for a successful and an effective Industry-Academia Partnership and Collaboration in Science, Technology and Innovations in Nigeria were also highlighted. Industry-academia network is expected to set national research agenda for the successful implementation of the National University Commission-entrepreneurial, centre of excellence and TETFund research & development agenda.

Conclusion: This paper has shown the need for an inclusive alliance of academia-industry network bringing together academia, industry, alumni, professionals and government that should be facilitated by the Nigerian Academy of Science (NAS).

Keywords: Industry, Academia, Partnership, Collaboration, STI

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Effects of Palm Kernel Oil, Olive Oil, Crude Oil and Honey on Renal Function of Male Albino Rats

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Background: This study investigated the effects of palm kernel oil, olive oil, crude oil and honey on renal function of male albino rats. These chemical substances are used in traditional medicine for various purposes, including as antidote for poisons.

Methodology: Thirty healthy male albino rats were purchased and used in this research study. The animals were randomly placed into five groups (n=6). The animals were administered the corresponding chemical substances for a period of three weeks. They were later sacrificed and their blood samples and kidneys collected for biochemical and histological analysis respectively.

Results: Urea increased in all the groups administered the different chemical substances compared to the control. The increase is statistically significant ($p<0.05$) in groups 4 and 5, and non-significant ($p>0.05$) in groups 2 and 3 when compared to the control (group 1). Creatinine increased non-significantly ($p>0.05$) in all the test groups compared to the control. Sodium decreased non-significantly ($p>0.05$) in group 2, but increased non-significantly ($p>0.05$) in groups 3, 4 and 5 compared to the control. Potassium increased non-significantly ($p>0.05$) in group 2, but increased significantly ($p<0.05$) in groups 3, 4 and 5, while chloride increased significantly ($p<0.05$) in groups 2, 3 and 5 and non-significantly ($p>0.05$) in group 4 compared to the control. Photomicrographs of histoarchitectural state of the renal tissues showed some forms of alterations in some parts of the tissues of the test animals when compared with the control.

Conclusion: This study showed that long term administration of palm kernel oil, olive oil, crude oil and honey, as used in this study could cause certain alteration to renal functions. The order of renal intoxication caused by the administration of the chemical substances is crude oil > honey > olive oil > palm kernel oil.

Keywords: Histology, oil, renal function

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Effects of quality of care enhancement interventions on maternal and fetal outcomes in Nigerian referral hospitals

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Background: Along with India, Nigeria currently accounts for one-third of the annual maternal deaths in the world. Among several other factors, poor quality of care has featured prominently as a key determinant of the high rate of maternal deaths in Nigeria. With technical support from the WHO, a multifaceted intervention was implemented by the Women's Health and Action Research Centre (WHARC) in referral hospitals. The intervention was designed to improve the quality of care, and patient satisfaction and to reduce maternal and neonatal mortality and morbidity in Nigeria. The objective of this paper is to present the effect of the intervention on thirty-one maternal and fetal outcome indicators.

Methodology: Data were collected on the outcome indicators for 21 months from October 2017 to June 2019 by trained data collectors and a supervisor in four secondary hospitals (two experiment and two control sites). The mean difference between the sites in the various outcomes was tested with t-test where the variable is normally distributed, and non-parametric equivalent (Mann-Whitney test) where the assumption of normality is violated. Further analysis was conducted using Poisson regression to determine the effects of the intervention on the various indicators. Each indicator was a dependent variable whereas the site (experiment and control sites) was the independent variable. The month of data collection was controlled in each estimation. The results of the Poisson regression analyses are presented as incidence rate ratio (IRR), and the 95% confidence.

Results: The expected count of women who delivered, and the total number of births in the facilities was significantly higher in the experiment sites compared to the control sites. In mode of delivery, the incidence rate ratio in the experiment sites was 1.39 times higher for normal vaginal delivery, and 0.58 times lower for booked emergency CS compared to the control sites. The incidence rate of all forms of obstetric complications was significantly lower in the experiment hospitals (IRR 0.68 CI:0.52-0.91) compared to the control hospitals.

In the management of the specific complications, the incidence rate for the number of women who received oxytocin immediately after birth and before birth of placenta (irrespective of mode of delivery) was significantly higher in the experiment sites than the control sites (IRR 1.31 CI:1.18-1.47); and the number of women in labour who were managed with partograph was significantly higher in the experiment sites compared to the control sites (IRR 1.45 CI:1.28-1.63). In fetal outcomes, the incidence rates for the total number of births of infants weighing >1000 g was higher in the experiment sites (IRR 1.60 CI:1.29-1.98) as well as for the number of stillborn infant weighing >1000 g (IRR 1.19 CI:1.03-1.37)), and the number of neonatal deaths (IRR 1.68 CI:1.33-2.11). The incidence rate for the number of infants with fetal heart rate absent on admission was lower in the experiment than the control sites (IRR 0.58 CI:0.36-0.93).

Conclusion: Evidence from this study indicates that the multifaceted interventions were effective in improving the quality of care obstetric care in secondary facilities.

Keywords: Interventions, Maternal and Fetal Outcomes, Referral hospital

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Enhancing the Contribution of Higher Education in Fourth Industrial Revolution

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Background: Global society is changing because of the shifts in technological capacity; higher education must change with it. This paper explores the contribution of higher education in fourth industrial revolution; the societal changes from the fourth industrial revolution will require higher education to develop greater capacity for ethical and intercultural understanding, placing a premium on liberal arts-type education with modifications to adapt to the particular issues raised by fourth industrial revolution technologies and their disruptions to society.

Methodology: The literature and analysis presented show a new approach of enhancing the contribution of higher education in fourth industrial revolution and help the universities in considering some changes in its restructuring in delivering four industrial revolution agenda. The study used the data for the 35 respondents of higher education institutions. The study collected secondary data and diagnostic test was done on study variables which included the test of normality and reliability test.

Results: The test of normality showed that data was a little skewed and kurtotic and did not differ significantly from normality. Based on the results obtained from the analysis of the study, the study recommends that more studies to be done on the topic so as to establish unknown factors that enhance higher education in fourth industrial revolution. Out that all the independent variables the study found out they have a positive correlation with the dependent variable

Conclusion: The study recommends adoption and implementation of higher education in fourth industrial revolution as a continuous process of creating, acquiring and transferring knowledge as one or two practices may not yield the desired results. The study also recommends that higher education should embrace fourth industrial revolution so as to enhance efficiency economic growth.

Keywords: industrial, revolution, institutions, fourth

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Estimation of genetic parameters for body weight and some colour traits in index selected Nigeria heavy local chicken ecotype

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Background: The growth and reproductive traits of the Nigerian Heavy Local Chicken Ecotype (NHLCE) have increased appreciably far beyond the indigenous chicken that was gathered from its locality (Vandekiya of Benue state and Obudu of Cross River state) after a decade following continued selection for seven generations. However its performance still falls below the Elite birds. The development of a breed of chicken that can breed true is extremely essential at this critical time in the history, when it is suffering from the greatest recession resulting from overdependence on oil. Genetically improved breeds of chicken have positively affected the economy of many civilized countries. For instance, the value of broilers produced in America during 2019 was $28.3 billion. The total number of broilers produced in 2019 was 9.18 billion. There is no gainsaying that efforts to genetically improve the NHLCE to a standard breed will enhance Nigerian economy. In order to improve its production efficiency the determination of genetic factors contributing to quantifiable economic traits of livestock is pertinent. Heritability estimates and genetic correlations among traits reveal the best selection and breeding methods to be adopted among the NHLCE to enhance predictive accuracy and the most efficient tool available to expedite genetic improvement of this breed.

Methodology: The population used for this study is a fairly selected (seventh generation index selected) population of the NLHCE. A total of 65 NHLEC (5 males and 60 females) was

used as parent stock to generate five sire families. One male was mated to 12 hens which generated 60 progenies. The female progenies of the 5 sire families generated from the mating of NHLEC were used for this study. The study was conducted from the point of lay 20 weeks to 32 weeks. Traits measured included daily feed intake of the birds, Egg number, Egg colour, Beak colour, Feather colour, Body weight. The design was a Paternal half sib analysis. Data collected were subjected to univariate animal model with an inverting dominance relationship matrix of SAS (2003).

Results: Four weeks body weight measurements, egg number; egg, beak and feather colours for 5 sires ranged from 12.50±0.02 to 21.40±0.03, 1.29±0.05 1.54±0.07; 2.55±0.02 to 4.00±0.02; 2.45±0.02 to 4.83±0.02 and 1.73±0.02 to 4.58±0.04 respectively. The study showed that sire families are similar ($p>0.05$) in the body weight and beak colour, but significantly differed ($p>0.05$) in egg number, egg colour and feather colour. The heritability estimates of mature body weight for week 23 was medium, while estimates of heritability for 21, 22 and 24 body weights; egg colour, beak colour and feather colour of NHLCE were low. The study further revealed positive genetic correlations between beak colour and egg colour, negative genetic correlations between beak and feather colour.

Conclusion: The results indicate that although progeny and pedigree selection could be employed for improvement of the egg number, egg colour, beak colour and feather colour of NHLCE. Furthermore no decision should be taken in isolation as the selection of one trait will have consequences on other traits.

Keywords: Heritability, Correlations, Nigerian Heavy local chicken ecotype

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Evaluation of Aminotransferases, Follicle Stimulating Hormone and Estradiol in Perimenopausal women in Enugu metropolis

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Background: Perimenopause is a transition from reproductive to non-reproductive stage in a woman. This transition is associated with many hormonal changes, which possibly affect some biochemical parameters including some liver functions in the body. There is insufficient information on the association between hormonal changes, Aspartase Aminotransferase (AST), Alanine aminotransferase (ALT) and perimenopause. This study investigated follicle stimulating hormone (FSH), Estradiol (E_2), serum ALT and AST levels in perimenopausal women.

Methodology: Ethical clearance was obtained from University of Nigeria Teaching Hospital, Ituku Ozalla Enugu State. About one hundred and twenty apparently healthy women were recruited for this cross sectional study. Sixty perimenopausal women ages 45-55years were used as test subjects while sixty premenopausal women ages 25-35 years as control. This study was carried out from May to November 2019 in Enugu metropolis. Five milliliters of blood sample was collected from the participants for the determination of hormonal and biochemical parameters. Estradiol and FSH were determined using Enzyme immunosorbent assay (ELISA), ALT and AST were determined using Reitman-Frankel colorimetric method. All data were analysed using SPSS version 20 at $P< 0.05$

Results: A comparison of the mean ± SD of the perimenopausal and premenopausal women showed a significant ($P<0.05$), higher values in serum FSH (36.76 ± 7.7, 10.36 ± 8.0 miu/ml), ALT (16.04± 5.9, 10.40 ± 5.0 IU/L), AST (19.93± 6.6, 15.92 ± 5.3 IU/L) and a lower Estradiol value (50.52 ± 8.0, 74.68 ± 11.5 pg/ml). There also exist significant positive correlations between Age vs FSH ($r= 0.373$, $P= 0.018$), ALT vs AST ($r= 0.846$, $P=0.000$) while a negative association exist between Age vs E_2 ($r= - 0.399$, $P= 0.011$), FSH and E_2 ($r=- 0.774$, $P= 0.000$), E_2 vs ALT ($r= - 0.501$, $P= 0.011$) and E_2 vs AST ($r= - 0.482$, $P= 0.002$).

Conclusion: This study shows that the significantly higher AST and ALT levels in the perimenopausal women in comparison with their premenopausal counterparts could predispose them to higher risks of liver diseases and pathology.

Keywords: Aminotransferases, Follicle stimulating hormone and Estradiol

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Factors Promoting and Inhibiting Town-Gown Collaboration in Nigeria – A Case-study

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***Background*:** In the wake of the COVID-19 pandemic, Techno-Diffusion Limited applied for and won a license to manufacture a novel ventilator designed by the NASA Jet Propulsion Lab at Caltech, USA, in Nigeria. In the prototyping phase, it was discovered that a partnership with a University Teaching Hospital would be required to perform the testing necessary to obtain regulatory certification. Techno-Diffusion eventually formed a partnership with Afe Babalola University, Ado-Ekiti and the Afe Babalola University Multi-Specialist Hospital to design and carry out the necessary testing protocols.

Methodology: We propose to use the ongoing collaboration as a case study to illuminate those factors which may inhibit or promote collaboration between Industry and Academia.

***Results*:** The research is ongoing.

Conclusion: No conclusions have been reached yet as it is an ongoing project.

Keywords: Industry, Academia, Collaboration

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Fatty Acid Composition Of Heterobranchus Geoffroy Saint-Hilaire, 1808 Species From River Galma, Zaria, Kaduna State-Nigeria

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Clarias and *Heterobranchus* species, are widely culture and most readily acceptable in Nigeria among fish farmers and consumers as such command good commercial value The fatty acid profiles of *Heterobranchus* species were investigated from River Galma, Zaria Kaduna State-Nigeria. Fresh samples of *H. bidorsalis* and *H. longifilis* obtained from the water body was subjected to Soxhlet method of oil extraction using n-hexene as solvent and Gas Chromatography Mass Selective Detection (GC-MSD; Agilent Technology) for the detection of fatty acids present in the fish species. The resulting profiles revealed 17 fatty acid in *H. bidorsalis* and 19 fatty acids in *H. longifilis*, whereas monounsaturated fatty acid (MUFA) form the bulk of the fatty acid in both species, saturated (SFA) as well as polyunsaturated (PUFA) fatty acids where also identified. More PUFA was found to be present in *H. bidorsalis* than in *H. longifilis* with the reverse occurring in MUFA. Dominant among the identified and qualitatively measured of fatty acid include: Myristic C14:0, Lauric C12:0, Pentadecylic C15:0, Palmitic C16:0, Margaric C17:0, Palmitoleic acid C16:1(n-7), Oleic Acid C18:1(n-9), Fumaric acid C18:1(n-11) and Linoleic C18:2(n-6). Essential fatty acids which are important sources of nutrients promoting good health as well as prevention and healing of diseases were identified from the species.

Keywords: Fatty acids, Identification*, Heterobranchus* species

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Gene Regulation and *in vitro* Anti-inflammatory Properties of *Cymbopogon citratus* on Normal Albino Rats

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This study determines the anti-inflammatory properties of C. citratus at gene level and in vitro. *C. citratus* was administered to normal rats as aqueous and ethanol extracts at a dosage of 30 and 100mg/kg for 30days; and as fractions of saponins, flavonoids and tannins at 30µg/kg for 7 days. Gene expression analysis of *C. citratus* for anti-inflammatory cytokines; interleukin-1α (IL-1α) and tumor necrotic factor (TNF-α), using isolated mRNA was based on polymerase chain reaction (PCR), and in vitro studies through the determination of 15-lipoxygenase enzyme level. For the in vitro studies, 20 µL each of aqueous and ethanol extracts of *C. citratus* or control was added to 50 µL of 15-LOX.

Results of showed that C. citratus administration for interleukin-1α (IL-1α) and tumor necrotic factor (TNF-α), tested in the kidney of albino rats were not altered by both aqueous and ethanol extract treatments of C. citratus, while aqueous extract up-regulated adipisin and ethanol extract was statistically similar to control. The in vitro studies showed that only aqueous extract of C. citratus exhibited significant anti-inflammatory activities. It can be said that the pharmacology of C. citratus favours its anti-inflammatory activities both at the gene level and in vitro analyses.

It can be concluded that the pharmacology of C. citratus favours its anti-inflammatory properties.

Keywords: Anti-inflammatory, *Cymbopogon citratus*, 15-lipoxygenase

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Impact of Methanol Stem Bark Extract and Fractions of *Uapaca togoensis* (Pax) on Antioxidant Status of *Plasmodium berghei* Infected Mice

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Background: Malaria remains undoubtedly the most serious disease that afflicts mankind throughout the world with the greatest impact in the Sub Saharan Africa. Oxidative stress is

a key factor in malaria pathogenesis, particularly, malaria induced anemia and pathological changes in some organs in the body. The methanol stem bark extract and fractions of the plant *Uapaca togoensis* have been previously reported to possess antimalarial activity. Recent findings have shown that compounds and medicinal plants with antioxidant activity may ameliorate the advancement of malarial infection and probably prevent its sequelae. This research thus aimed at investigating the effect of the plant on oxidative stress in *Plasmodium berghei*-infected mice.

Methodology: Phytochemical screening and acute toxicity studies of the methanol extract and fractions of *Uapaca togoensis* stem bark was carried out using standard protocols. A total of eighty (84) adult albino mice infected with *P. berghei* (NK 65 strain) were randomly allotted to 14 treatment groups containing 6 mice per group. Group A was used as negative control and was given only feed and distilled water (10mL/kg) while group B was used as positive control and was treated with chloroquine (5 mg/kg). Groups C, D, E and F were sub-divided into C1, C2, C3, D1, D2, D3, E1, E2, E3, F1, F2 and F3. The sub-groups were treated with 250, 500 and 1000 mg/kg body weight of methanol extract, ethyl acetate, butanol and residual aqueous fractions respectively for four days. Biochemical assays for glutathione (GSH), superoxide dismutase (SOD), catalase (CAT), and malondialdehyde (MDA) levels were carried on the serum using standard methods.

Results: Flavonoids, triterpenes, glycosides, alkaloids and tannins were present in all the methanol extract and fractions of the plant. Oral median lethal dose of the extract and fractions was estimated to be greater than 5000 mg/kg. At doses of 250, 500 and 1000 mg/kg, the methanol extract, butanol and residual aqueous fractions significantly reversed the effects of the oxidative stress. This was shown by the significant ($p<0.05$) decrease in MDA levels with a corresponding increase in SOD, GSH and CAT levels.

Conclusion: The findings from this study suggests that the antioxidant effects of the methanol stem bark extract and fractions of *Uapaca togoensis* may play a role in the antimalarial activity of the plant.

Keywords: Antioxidants, Malaria, *Uapaca togoensis*

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Interactive Effects of Chlorpyrifos, Lead and Taurine on Neuroblastoma and Glioma Cell Lines

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Background: The ecosystem is subjected to assaults by complex mixtures of environmental pollutants including pesticides and heavy metals. Chlorpyrifos (CPF) is a commonly used organophosphate insecticide and a potent neurotoxicant, while lead (LA) is an insidious heavy metal and ubiquitous environmental toxicant with well documented neurotoxic effects. Taurine (TA) is a sulphur-containing amino acid with bioprotective properties. Neuro2A neuroblastoma is a mouse neuronal cell line and it is used in neurotoxicity and pesticide research for mechanistic and screening purposes. C6 glioma cell line is a cloned rat astrocytoma that is commonly used as a glial cell model. The purpose of the study was to investigate the effects of chlorpyrifos, lead and taurine on cell viability, caspase 3/7 activation and oxidative stress in Neuro2A neuroblastoma (N2A) and C6 glioma (C6) cells.

Methodology: The cell lines were exposed to 4 concentrations of CPF (0.1-100 μM), LA (0.1-100 μM) or TA (0.05-50 mM) for 24, 48 and 72 hrs. Cell viability was determined using the lactate dehydrogenase assay. Cellular apoptosis was measured by caspase 3/7 activity in groups exposed to CPF (10 μM), LA (10 μM) or TA (5 mM) for 24 or 72 hrs. Oxidative stress was evaluated by measuring the change in emitted fluorescence using the cell permeable fluorescent marker, 2′,7′-dichlorodihydrofluorescein diacetate (H2DCF-DA) in both N2A and C6 cells.

Results: There were significant reductions (CPF, $p=0.0003$; LA, $p<0.0001$; and TA, $p<0.0001$) in cell viability in N2A cells. Lead ($p=0.0281$) and TA ($p=0.0354$) significantly reduced cell viability in C6 cells. Significant effects were observed in caspase 3/7 activation by CPF, LA and TA and the xenobiotics interacted directly with purified caspase 7. CPF and LA did not induce marked oxidative stress in the neuronal cells.

Conclusion: The N2A and C6 cell lines were relatively resistant to the environmentally-relevant concentrations of CPF and LA used in this research. In addition, the low concentrations of the toxicants (CPF and LA) did not induce toxicity through indirect mechanisms in either cell line in the time course examined. Taurine did not evoke neuroprotective effects probably due to the lack of induction of marked neurotoxic effects by CPF and LA. Additional studies are required for the elucidation of the underlying intracellular mechanisms of action of CPF, LA and TA in N2A and C6 cells, since humans, animals and the ecosystem are constantly exposed to CPF and LA.

Keywords: Chlorpyrifos, Lead, Taurine, Neurotoxicity

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Knowledge, Attitude, and Practices towards COVID-19: A Cross-Sectional Study among Nursing and Midwifery Students in Jalingo, Nigeria

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Background: The coronavirus disease (COVID-19) infection rate and mortality among Nigerian health care workers appear to be on the increase. Aside from health workers, it has caused millions of infections, and thousands of death worldwide. This study determined the level of knowledge, attitude, and practices (KAP) of nursing and midwifery students towards COVID-19 in a North-Eastern Nigerian state.

Methodology: A total of 156 respondents were involved in this institutional-based cross-sectional study, conducted after the lockdown period. A total of 17 questions were used to assess the KAP with knowledge appraised with 12 questions, attitudes with 2 questions, and practices with 3 questions.

Results: The majority of the students (53.80%) possessed a good level of knowledge regarding COVID-19, while 40.4% had fair knowledge regarding COVID-19 with only 5.80% having poor knowledge of COVID-19. The mean knowledge of COVID-19 in this study was 9.40 ± 1.353 with an overall 78% correct answer rate. A vast majority of the respondent (82.7% and 98.1%) had strong confidence in Nigeria and believed that the pandemic will soon be over, respectively. Only a few avoided large gatherings of people (30.8%) with the vast majority reporting to have worn a mask when going out (84.6%) and washing their hands with running water and soap frequently as recommended (73.1%). In multiple logistic regression analyses, the COVID-19 knowledge score (OR: 0.39-0.40, 95%CI: 0.26 – 0.62, $P<0.05$) was significantly associated with a lower likelihood of negative preventive practices towards COVID-19.

Conclusion: The participants in this study showed good knowledge, positive attitudes, and good practices toward COVID-19. There is still a need to strategize and implement periodic educational interventions and training on infection control practices among healthcare workers including students.

Keywords: Knowledge, Attitude, COVID-19

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Modifying Cooking Banana Starch using Octenyl Succinic Anhydride Improves Amylose-Amylopectin Ratio of the Starch: A Chemometric Approach

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Background: Recently, there had been increase in the onset of degenerating disease especially diabetes mellitus, which had been attributed to rate of starch digestion. To reduce this, there is a need to increase the amylose-amylopectin ratio. This study however, investigated the improvement of amylose to amylopectin ratio of cooking banana starch through modification using octenyl succinic anhydride.

Methodology: The modification was done by varying the concentration of octenyl succinic anhydride (3-5%), reaction time (30-60 min) and pH (8-10) using Response surface methodology experimental design.

Results: The result revealed the accuracy of the RSM model to predict the amylose-amylopectin ratio owing to high coefficient of determinant (R2 = 0.977), high adjusted R2 (0.9477) and low root mean square of error (0.0323). The process parameter obtained after optimization are 3.69% octenyl succinic anhydride, 36 min time and pH of 9.9 which give an amylose-amylopectin ratio of 0.822.

Conclusion: The study revealed the maximization of amylose-amylopectin ratio of cooking banana which when utilized as functional food could serve to manage the onset of diabetes mellitus.

Keywords: Chemometrics; Starch digestibility; modelling

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Nuclear Medicine: Perception of Radiography Students towards the Specialty

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Background: Nuclear Medicine is a specialty which involves the use of radiopharmaceuticals in the diagnosis and treatment of diseases. Over the years, it has been noticed that there are

many vacancies within the nuclear medicine workforce. These vacancies reflect workforce shortfalls and urgent steps need to be taken in order to attract radiographers into the specialty. This is to ensure reduction in morbidity rates of cancer and diseases through early detection. The study aims at ascertaining the perception of radiography students towards specializing in nuclear medicine.

Methodology: A cross-sectional prospective study of radiography students at University of Nigeria Enugu Campus (UNEC) and Nnamdi Azikiwe University (NAU) was conducted from February to June 2019. Subjects were recruited using a convenience sampling technique. A validated, well-structured questionnaire comprising three sections was administered to the students.

Results: A total of 152 students comprising 91 males (59.9%) and 61 females (40.1%) participated in the study. 36 students (23.7%) had a positive perception towards specializing in Nuclear Medicine, while 99 students (65.1%) had a negative perception while 17 students (11.2%) were neutral. Majority of the students that had a negative perception towards specializing in nuclear medicine stated that the high dose of radiation involved in the practice is the main discouraging factor.

Conclusion: Since majority of the students had a negative perception towards specializing in Nuclear Medicine due to the high radiation dose involved, the government should ensure that adequate radiation protection measures are put in place in Nuclear Medicine facilities so as to encourage radiography students to delve into the specialty.

Keywords: Perception, Radiography, Nuclear Medicine

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Phytochemical and Mineral Composition of the Stem Bark Latex of *Ficus sur* Thunb. and *Ficus polita* Vahl.

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Background: Over 20,000 flowering plant species (from over 40 families in multiple lineages) contain latex (Farrell et al., 1991; Hunter, 1994; Lewinsohn, 1991; Metcalf, 1967). The term latex is used loosely by plant anatomists for fluids with a milky appearance due to the suspension of many small particles in a liquid dispersion medium with a very different refractive index (Metcalfe, 1967). It is a milky white, yellow, red or colourless fluid present in specialized plant cells known as lacticifers (Fahn, 1979). Plant latex is known to exhibit growth inhibitory effects on bacteria, fungi, viruses, tumors and cancer cell lines. It shows

toxicity to insects, acts as a growth and reproductive cycle inhibitor. It is widely used in anti-arthritic ointments and as conditioning agents for cosmetic purposes (Ujwala and Karpagam, 2013). This study was aimed at evaluating the phytochemical and mineral composition of the latex present in the stem bark of *Ficus sur* and *Ficus polita*. *Ficus* is the largest genus belonging to the family Moracaceae (Judd et al., 1999).

Methodology: Phytochemical analysis was carried out to determine the presence of active secondary metabolites present in the plant extracts. The phytochemical assays for alkaloids, saponins, anthraquinones, cardiac glycosides, flavonoids, tannins, phlobatanins and steroids were carried out according to established and standard procedures. Minerals were determined by digesting the ash with 3M Hydrochloric acid using the atomic absorption spectrophotometer (Hitachi model 170-10) for Calcium, Magnesium, Zinc, Copper and cadmium while the flame photometer was used for potassium and sodium (Egan et al., 1981). The equipment was run for standard solutions of each mineral. The dilution factor for all minerals was 100.

Results: The qualitative phytochemical analysis showed the presence of alkaloids (Dragendoff and Mayer's test) and absence of alkaloids in *Ficus sur* using Wagner's test. Saponins, cardiac glycosides, flavonoids, tannins, steroids were also present in the stem bark exudate of *Ficus sur* while there was absence of free and combined anthraquinones, phlobatannins in Ficus sur stem bark latex. Alkaloids (Using dragendoff, Mayer's test and wagner's test), cardiac glycosides, tannins and steroids were detected while saponins, anthraquinones, flavonoids and phlobatanins were absent in *Ficus polita* stem bark latex. The result of the mineral analysis showed that the stem bark latex of *Ficus sur* and *Ficus polita* contained potassium, calcium, magnesium, zinc and sodium while copper and cobalt were not detected in both species. The mineral compositions (mg/g) in the stem bark latex of *Ficus sur* decreased in the order K (399.10) > Na (137.0) > Ca (19.52) > Mg (13.21) > Zn (1.54) while that of *Ficus polita* decreased in the order K (362.85) > Na (101.0) > Mg (62.01) > Ca (14.20) > Zn (3.09).

Conclusion: Latex of the tree species can contribute to excellent nutritional and energy requirements of humans. Thus, *Ficus sur* and *Ficus polita* stem bark latexes could be harnessed for their enormous medicinal potentials.

Keywords: Phytochemical, Mineral, Latex

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Policy Dialogue to Support MNCH Evidence Use in Policymaking: Lessons learnt from the Nigeria Research Days First Edition

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Background: The use of evidence in decision-making and practice can be improved through diverse interventions, including policy dialogue. The Department of Family Health, Federal Ministry of Health of Nigeria initiated and organized the Nigeria Research Days (NRD), to serve as a platform for exchange between researchers and policymakers for improving maternal, new-born and child health. The study reports on the conceptualization, organization and lessons learned from the first edition.

Methodology: A cross-sectional study was designed to assess the effectiveness of a policy dialogue during the NRDs. Data were collected from the feasibility and workshop evaluation surveys. A descriptive analysis of data was performed.

Results: As a result, the Nigeria Research Days meets all the criteria for a successful policy dialogue. The participants positively rated the content and format of the meeting and made suggestions for improvement. They were willing to implement the recommendations of the final communiqué.

Conclusion: The lessons learned from this first edition will be used to improve future editions.

Keywords: policy dialogue, evidence use, policymaking, maternal and child health, research days, Nigeria

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Statistical Modelling and Optimization of Hydrolysis Index of Gluten-Free Cookies made from Cardaba Banana Starch using Response Surface Methodology

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Background: The demand for a gluten-free diet with low starch digestibility had increased in recent times owing to high prevalence of celiac disease as well as high blood sugar among the populace. This study however, investigated the optimization of the process variables of gluten-free cookies with low starch hydrolysis index.

Methodology: The production of the cookies was done by varying the baking temperature (150-180 ^{o}C), baking time (10-20 min) and pH (8-10) using central composite design.

Results: The result revealed the model was significant in predicting the experimental model. The high coefficient of determinant (R2 = 0.977) and predicted R2 (0.9477) obtained in this study revealed the accuracy of the model. For minimum cookies hydrolysis index (56.2) the baking temperature is 180 oc while the baking time is 20 min.

Conclusion: The study revealed the production of gluten-free cookies with a low hydrolysis index can help in the management of celiac disease and diabetes mellitus.

Keywords: Celiac disease, Gluten-free diet, Statistical modelling

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Synthesis of Nano-hydroxyapatite with Sodium Alginate Biopolymer for Biomedical Application: Investigating the Polymer Effect

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Background: Hydroxyapatite/polymer composite is a potential material for biomedical applications including drug delivery.

Methodology: In this study, nano-hydroxyapatite (HA) with sodium alginate (SA) has been synthesised by wet chemical precipitation method. The synthesised nanocomposite was characterized with X-Ray Diffraction (XRD), X-Ray Fluorescence (XRF), Fourier Transform Infrared spectroscopy (FTIR) and Scanning Electron Microscopy (SEM), with image analysis. The phases of the HA were identified by matching the patterns obtained with

Crystallography Open Database (COD-Inorg REV173445), and using FullProf program for Rietveld refinement.

Results: XRD identified two apatite phases: HA, (entry number 96-900-2215), and carbonate-HA (entry number 96-900-3553). The result of XRF confirms the elemental composition of the HA to be calcium, phosphorus, and oxygen with Ca/P ratio of 1.72. FTIR study shows peaks characteristics of hydroxyapatite and confirms formation of chemical bond between sodium alginate and hydroxyapatite. Image analysis reveals that the HA are of irregular shape, with size ranging from 24.68 nm to 724.90 nm. Addition of 1%wt of SA to the HA led to increase in particle size from 85.50 nm to 309.41 nm, however, on further addition of SA, the particle size decreased to 109.98 nm (50% SA). There was no significant change in the morphology of the particles with increase in composition of SA as aspect ratio and circularity remained fairly constant. Both the crystallite size and degree of crystallinity also decreased with increasing sodium alginate composition (32.36 nm to 9.47 nm and 72.87% to 1.82% respectively), while the specific surface area and microstrain increased with increasing sodium alginate composition (0.0041 to 0.0139 and 58.99 m2/g to 201.58 m2/g respectively).

Conclusion: Hydroxyapatite with 50% sodium alginate possess excellent characteristics for drug delivery applications.

Keywords: hydroxyapatite, sodium alginate, particle size

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The Role of Ultrasound in the Assessment of Petroleum-Fuel Induced Nephrotoxicity

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Background: Exposure to hydrocarbon is associated with an increased risk of development of chronic kidney disease. Ultrasound, which is a non-invasive imaging modality, provides very important information about kidney morphology. The aim of this study was to evaluate the usefulness of ultrasound in the assessment of the effects of chronic exposure to some petroleum products on the kidney of exposed workers.

Methodology: This was a prospective cross-sectional study involving 415 workers with chronic workplace exposure to petroleum fuel in Enugu metropolis. The study population comprised 164 petrol station attendants, 175 automobile mechanics and 76 petrol tanker drivers aged between 20 and 65 years. Abdominal ultrasound was performed, as well as serum urea and creatinine were measured to assess the kidneys of these workers chronically exposed to petroleum fuels, and the findings were compared to findings in an aged-matched, non-exposed control group.

Results: Increased echogenicity of the kidneys was observed in 21 subjects from the study group and this differed significantly ($p \leq 0.05$) from the findings in the control group.

Conclusion: The study has shown that chronic exposure to petroleum fuel affects renal echotexture and that ultrasound may serve as a useful and affordable non-invasive tool for routine use in the assessment of petroleum-induced nephropathy.

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Therapeutic Radiographers' Perceptions on the Training Needs, Barriers and Facilitators to Effective Smoking Cessation Support in Nigeria

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Background: This study aimed to identify the training needs of therapeutic radiographers as well as the key barriers and facilitators to the provision of effective smoking cessation dialogues in radiotherapy practice in Nigeria.

Methodology: This study adopted a cross-sectional research design and enrolled 13 therapy radiographers in 3 tertiary health institutions in Nigeria. A semi-structured questionnaire was used. Data was analyzed using Statistical Package for the Social Sciences (SPSS) version 25. A cut-off mean of 2.5 was used for decision making. Hence, items with mean (M)>2.5 were judged as a training need of therapeutic radiographer, barrier and facilitators to the effective smoking cessation dialogues in radiotherapy.

Results: The most perceived training needs were that of consistent learning through workshops and seminars for professional skill development on smoking cessation support (4.62±0.65) and provision of a platform for acquiring skills to be excellent communicator and to gain necessary interpersonal skills in relating with patients (4.62±0.65). Lack of system support (4.31±0.75), limited training/knowledge (4.08±1.26) and absence of clear policy/guideline (3.85±0.80) were the prominent barriers to provision of effective smoking

cessation advice/counseling. The most prominent facilitators were the knowledge of health benefits of smoking cessation (4.54±0.66) and knowledge of the association between smoking and radiotherapy treatment toxicity (4.46±0.66).

Conclusion: Further training is essential for therapeutic radiographers to develop knowledge and skills as regards benefits of smoking cessation and cessation strategies.

Keywords: Therapeutic Radiographers, smoking cessation support, Nigeria

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Tuberculosis and Diabetes Mellitus Co-Morbidity among Active Pulmonary Tuberculosis Patients Attending Directly Observed Therapy Short Course (DOTS) Clinics in Cross River State, Nigeria

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Background: Type 2 diabetes mellitus (DM) constitutes a major risk factor for tuberculosis (TB) and may triple the risk of developing active TB disease. This study determined the prevalence of TB-DM comorbidity as well as associated risk factors in the study area.

Methodology: Seven hundred and seventy two TB patients, aged 15 years and above, comprising newly diagnosed and those on continuation phase treatment, were recruited into the study. The study participants were attending 9 Directly observed therapy short course (DOTS) facilities across the 3 Senatorial districts of Cross River state. Sputum samples were analyzed for TB by the GeneXpert MTB/RIF technique. The DM status of each enrolled TB patient was determined for fasting plasma glucose using a glucometer; blood sugar status was classified according to the American Diabetes Association. HIV testing was carried out according to the National HIV algorithm for Nigeria, using Determine kits for HIV 1/2 and confirmed by Chembio HIV1/2 Stat-Pak assay kit. Blood lipids were determined in fasting venous blood samples while anthropometric parameters were assessed according to World Health Organization Step-wise approach to chronic disease risk factors surveillance instruments version 2. Sputa from those participants who were found to have TB and DM comorbidity were collected for culture on thin layer agar (TLA) medium. A logistic regression analysis was performed to identify factors associated with DM.

Results: The distribution of TB participants by Senatorial District were 418 (54.1%) South, 183 (23.7%) North and 171 (22.2%) Central. Of the 772 study participants, 542 (70.2%) were newly diagnosed and 230 (29.8%) were in continuation phase of treatment. The mean age of the patients was 38.3±14.4 years. Prevalence of TB-DM co-morbidity was 9.2% and

highest in the age group 35-44 years, while pre-DM was 44.2% and highest in participants 55-64 years of age (53.2%). Overall TB, HIV and DM co-morbidity was 2.5% (19/772). Risk factors associated with TB-DM co-morbidity included being female (aOR = 4.20; 95% CI 1.91-9.19), low physical activity (aOR = 3.85; 95% CI 1.88 – 7.89) and family history of diabetes (aOR = 3.88; 95% CI 0.86 – 8.01): TB-DM patients were dyslipidemic as evidenced by high levels of triglycerides (1.52 ± 0.50) and very low-density lipoprotein (0.70 ± 0.25). The results from TLA culture were comparable to those obtained with the GeneXpert technique, with the added advantage of not only detecting Rifampicin resistance, but also Isoniazid resistance.

Conclusion: The prevalence of DM among TB patients was higher than the prevalence of DM in Nigeria. Nearly 50% of the study participants had pre-DM. The high prevalence of TB/HIV and DM co-morbidity reflects the association of the three diseases and suggests the need to implement a collaborative central strategy within the existing healthcare delivery system for the three diseases. TLA could be an affordable method for the rapid diagnosis of multi-drug resistant TB.

Keywords: TB-DM co-morbidity, GeneXpert MTB/RIF technique, Cross River Senatorial Districts

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