LIVINGSCIENCE FOUNDATION, ILE-IFE

"Science for life more abundant (John 10:10)"

The aim of the *Living*Science Foundation is to enhance public health in Nigeria by facilitating and promoting sound evidence-based, comprehensive and holistically-derived, home-grown environmental-health policies and practices; undergirded by a conviction that an all-wise benevolent Creator designed the world to run sustainably.

The Specific Objectives of the Foundation are to

i. provide an authoritative voice showing that studying and doing Science from a creationist perspective will not only make best sense of our world, it will also yield abundant life for people and the entire ecosystem. This will entail a direct standing up to, and scientific refutation of the currently prevalent evolution theory of origins.
ii. seriously engage in the business of identifying peculiar traditional and modern hazards in the Nigerian environment; scientifically evaluate attendant health risks particularly to identified susceptible, vulnerable and sensitive subpopulations; and widely communicate the findings in society, while advocating for remedial actions as may be necessary.
iii. provide information, education, and advisory services on health and environment to the general public, various tiers of government, and other stakeholders. This may involve undertaking resourced projects and contract works that support the vision of the Foundation.

We welcome your inputs as Partners, Collaborators, and Sponsors. For more details, kindly contact us on +234 701 290 4373, or visit our website at: www.lsfnigeria.org

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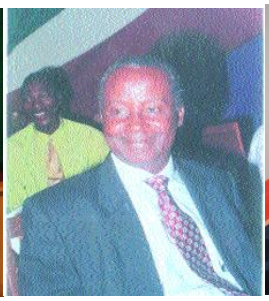
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Welcome

Chairman, LSF Board of Trustees

It is my great delight to welcome all participants to the first National Conference on Environment and Health. This is our first major public initiative as a faith-based non-governmental organization and we are grateful that you share our vision that this is a Conference worth doing.

Though our world in its current fallen state is a far-cry from the original Paradise created by God, we believe that the original charge given to us to keep and work the Garden of God is still applicable, and must be carried out.

We appreciate the vastness of the subject matter of Environment. At the LSF, our focus is on those aspects of the environment that directly impacts on human health; particularly those areas which being largely beyond the control of individuals, need concerted collective action from relevant stakeholders to manage.

The theme of this our first National Conference is "Prevention is better than Cure". Our conviction that no single Sector can successfully address the complex issues involved in managing the environment for optimal health, explains the inclusive nature of this Conference. We are glad to note that several distinguished participants are coming from various Sectors including the academia, government, industry, NGOs, and the Civil Society. Another unique aspect of this Conference is the emphasis on looking inwards for local custom-made solutions to our peculiar national problems. As the saying goes, acting local even while thinking global.

It is our desire and prayer that this Conference will not just be an event, but the beginning of a glorious journey to "life more abundant" for all. I wish you pleasant and fruitful deliberations at this Conference and look forward to an enduring partnership with you as we jointly seek to enhance public health in our beloved country to the glory of the Almighty God.



Pastor Ezekiel A. Odeyemi
(Fellow, the Institute for Supervision and Leadership (ISL); Fellow, the Chartered Institute of Commerce of Nigeria (CICN); Fellow, the Chartered Institute for Management and Leadership (CIML))
Chairman, Board of Trustees, LivingScience Foundation

Welcome: From Chairman, Organizing Committee

Sincere welcome to all delegates at this very unique meeting dedicated to a comprehensive and holistic discussion of the environment-health nexus in Nigeria.

This Conference has been made possible by the grace of God, and dedicated commitments of an Organizing Committee (working literally with a zero budget), comprising of 24 thoroughbred academics drawn from 20 different Departments and Institutions in the country. We appreciate the invaluable collaboration offered by the Redeemer's University, Ede; and supports from the Institute of Public Health, OAU, Ile-Ife and (in kind) from the Nigeria Field and Epidemiology Laboratory and Training Program, Abuja, and the Institute of Public Health, OAU, Ile-Ife. Now that the table is set, we look forward to a robust and fruitful interaction among delegates from virtually all sectors of society and the generation of customized innovative solutions for our peculiar, apparently hopeless environment-health situation in Nigeria.

As is evident going through this Book of Abstracts, the works being presented at this Conference are of very high academic quality. And while many of these presentations would be prepared in journal format and published in the highly reputed Ife Journal of Science, this time around the journey will not end with academic publications alone. Already, plans are being concluded with our official media partner for this Conference, the Nigerian Television Authority, Osogbo to commence a weekly public enlightenment programme on Environment and Health, leveraging on presentations to be made at this Conference. This is in addition to the fact that participation of major stakeholders across multiple sectors – government, industry, academia, NGOs, and the general civil society - opens up the exciting possibility of a new dawn of cooperation and mutual respect between these key sectors, thereby breaking barriers previously instituted by traditional mutual distrusts.

Once again, I welcome you to the 1st National Conference on Environment and Health, 2016. Please enjoy the interactions.



Prof Joshua Ojo
President, LSF and Chair, Organizing Committee

Members of the Organizing Committee

Prof Joshua Ojo (Dept of Physics and Eng. Physics, OAU, Ile-Ife/ Dept of Physical Sciences, RUN, Ede)
Mr Stephen Olukotun (Dept of Physics and Engineering Physics, OAU, Ife)
Dr Omolaja Osoniyi (Dept of Biochemistry and Molecular Biology, OAU, Ife)
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Dr Dele Oketayo (Dept of Physics, Federal University, Oye Ekiti)
Dr Mohammed Kanoma Bashir (Zamfara State Ministry of Health, Gusau)
Dr G.C. Ezeh, Centre for Energy Research and Development, OAU, Ile-Ife
Dr Obinna Ogbonna (Dept of Dietetics, OAUTHC, Ile-Ife)
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Dr (Mrs) Aderonke Okoya, Institute of Ecology, OAU, Ile-Ife

1ST NATIONAL CONFERENCE ON ENVIRONMENT AND HEALTH, REDEEMER'S UNIVERSITY, EDE, OSUN STATE
PROGRAMME SCHEDULE

Day 1: Tuesday 17th May, 2016 *Venue: University Auditorium*

09.00 – 10.00	Pre-Opening Activities: Mount Posters and Exhibitions. **Free Health Screening and Medical Tests by The Institute of Public Health, OAU, Ile-Ife**.
10.00 – 12:00	Formal Opening Ceremonies
10.00 – 10.10	Welcome Address: Prof Debo Adeyewa, Vice Chancellor, Redeemer's University, Ede
10.10 – 10.20	Welcome Address: Pastor Ezekiel Odeyemi, Chairman, Board of Trustees, LivingScience Foundation, Ile-Ife
10.20 – 10.30	Opening Remarks – Chairman, Prof A.F. Oluwole [Retired Prof, OAU and MD, SEEMS (Nigeria) Ltd, Lagos]/Represented by Prof L.B. Kolawole
10.30 – 10.40	Special Address: Mrs Amina Mohammed, Honourable Minister of Environment, Federal Ministry of Environment, Abuja
10.40 – 10.50	Special Address: Dr Akinyinka Esho, Permanent Secretary, Osun State Ministry of Health, Osogbo
10.50 - 11.00	Special Address: Prof Kayode Ijadunola, Director, Institute of Public Health, Obafemi Awolowo University, Ile-Ife
11.00 – 12:00	Keynote Address: – Dr Lawrence Anukam , DG NESREA, Abuja. Setting and Enforcement of standards and regulations for the Nigerian environment
12:00 – 12:10	Closing Remarks – Chairman, Prof L.B. Kolawole
12:10 – 12:15	Vote of Thanks – Dr Foluso Agunbiade, Dept of Chemical Sciences, RUN, Ede
12:15 – 12:20	Group Photograph
12:20 – 13:30	Refreshments /Lunch
13:30 – 15:30	Special Symposium: **Improving Health in Nigeria through more responsible care of the Environment** Chairman: Prof Timothy A. Bamiduro , Dean, College of Natural Sciences, RUN, Ede Discussants: Prof Olayinka Ogunkoya, Dept of Geography, OAU, Ile-Ife Prof A.A. Onayaade, Department of Community Medicine, OAU, Ile-Ife Mr Taiwo Oki, Chemist, Fola Gold Edge, Lagos (makers of Value Paints) Prof Fatai Balogun, former Director, National Institute of Radiation Protection and Research, U.I. Ibadan, and Research Professor, Centre for Energy Research and Development, OAU, Ile-Ife Dr John T. Ayoola. Department of Management and Accounting, OAU, Ile-Ife
15:30- 15:45	Tea Break. Refreshments
15:45 – 16:40	Special Lecture 1: **Think Global, Act Local: Overview of Cogent Environment issues today.** Ambassador Ayo Olukanni
16:40 – 17:35	Plenary Lecture 1: **Pollution sources in the Nigerian Environment and their Health Implications** - Prof Bode Asubiojo
17:35 – 18:30	Special Lecture 2: **Recommended Lifestyle and Nutritional Habits to counter Peculiar Stressors in the Nigerian Environment**. Rev Tony Akinyemi

Day 2: Wednesday 18th May, 2016 *Venue:* Mass Communication /Foundation Lecture Theatre

09:00 – 09:40	Invited Lecture 2: **Proscribed elsewhere, Dangerous chemicals that are still widely used in Nigeria's Agro Business**. Prof D.J. Oyedele
09:40 – 10:10	Invited Lecture 3: **Continued Use of Thimerosal-Containing Vaccines in Nigeria: How justifiable?** Prof J.O. Ojo
10:10 -10:25	Invited Lecture 4: **An Overview Of Environmental Sustainable Mechanisms In Osun State, The NESREA Approach (Process)** – Maike, S.M.A.
10:25 – 10:35	Plenary Paper 1: **Prevalence of and risk factors associated with childhood lead poisoning in Zamfara State, northern Nigeria, 2012**. Muhammad B.A.
10:35 – 10-45	Plenary Paper 2: **Case series report on the outbreak of food borne disease caused by *clostridium perfringens* in Saburi 1 community, Abuja Municipal Area Council (AMAC), 2nd February 2016 in Nigeria**. Adama A. Ahmad et al
10:45 – 11:10	Tea Break
11:10 – 13:40	Parallel Sessions [Venues: LR 9, LR10 AND LR 11]
13:40 – 15:10	Lunch
	[Venue: Mass Communication /Foundation Lecture Theatre]
15:10 – 16:40	Plenary: Oral Summaries and Discussion of Poster Presentations
16:40 – 17:40	Plenary: Communique
17:40 – 17:50	Closing Cocktail
17:50	Departure

Excursion: Thursday 19th May, 2016
i. Historic Places/Mining in Awo-Ede/Osogbo; or
ii. Mt Carmel; Ife Museum; Artisanal Mining Sites in Ile-Ife, Ifewara, Iperindo, Igun axis
Which, if any, of the trips is organized will depend on number of people indicating interest.
Cost: N1,000 including refreshment.

DAY TWO SCHEDULE AT A GLANCE

Time	Venue for Plenary*:* Mass Communication /Foundation Lecture Theatre		
09:00–09:40	Invited Lecture 2: **Proscribed elsewhere, Dangerous chemicals that are still widely used in Nigeria's Agro Business**. Prof D.J. Oyedele		
09:40–10:10	Invited Lecture 3: **Continued Use of Thimerosal-Containing Vaccines in Nigeria: How justifiable?** Prof J.O. Ojo		
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10:35–10:45	Plenary Paper 2: **Case series report on the outbreak of food borne disease caused by clostridium perfringens in Saburi 1 community, Abuja Municipal Area Council (AMAC), 2nd February 2016 in Nigeria**. Adama A. Ahmad et al		
10:45-11:10	Tea Break		
	SESSION 1: PHYSICAL AND CHEMICAL STRESSORS (Venue: LR 9)	**SESSION 2: EPIDEMIOLOGY AND FIELD STUDIES (Venue: LR 10)**	**SESSION 3: BIOLOGICAL STRESSORS AND OTHERS (Venue: LR 11)**
	A comparative analysis of Animal Blood lead levels in two exposed communities in Rafi LGA, Niger State, Nigeria, 2015 Daniel E.Okomah	Prevalence and factors associated with tobacco use among adolescents in Abuja, Nigeria, 2015. Abiodun Oladejo	Analysis of Fuel Utilisation for Household Food Cooking in Kumbotso, Kano, 2011 Saude A. Ibrahim
	Lead, Mercury, and Selenium in blood and milk of women of child-bearing age in Nigeria **Joshua Ojo**	Plasma activity levels of acetycholinesterase and lactate dehydrogenase among Farmers exposed and un exposed to pesticides in Oyo State, Nigeria Nurudeen. A. Adebisi	Fuel Wood Usage And Environmental Pollution Reduction In Selected Rural Areas Of Nigeria Jesuleye O.A
	An Evaluation Of The Phytoremediation Potential Of Aqueous Extract Of Some Plants On Heavy Metals In Contaminated Water (Cd, Cu And Pb) Ayodeji Saheed Abolore	Physiologically-Based Kinetic Model For The Transfer Of Lead In Lactating Nigerian Women With High And Low Exposure To Lead. T.E. Karokatose	Diurnal and Daily Characteristics of Ionospheric Total Electron Content Signatures at an Equatorial Station of Ile-Ife using Geodetic GNSS Measurements Owolabi T. P.1 and Olabode A. O
11:10	Assessment Of The Levels Heavy Metals In Vegetables From Metal Recycling Companies In Osun State, Nigeria.Oketayo Et Al	Consumer Knowledge And Attitude Regarding Use Of Pesticides As Food Preservative In Ogbomoso, South Western, Nigeria. S.Olarewaju et al	Meteorological Parameters in Regulatory Air Pollution Dispersion Models: An Overview of Near Surface Measurement in a Dense Plume Environment Olawale E. Abiye[a],
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13:40	Exposure Assessment of Breastfed Infants to Lead, Mercury, and Selenium in Three	Risk Factors Associated with Outbreak of Methanol Poisoning in Southern Districts of	Trace elements in particulate matter of ambient air at Nigerian megacities G. C. Ezeh et al

	Gold Mining Areas in Nigeria J.O. Ojo et al	Ondo State Nigeria – May 2015 Adefisoye O. Adewole	
	Correlations between toxic and essential elements in Blood and in Milk of female residents of a lead contaminated community in Zamfara state, Nigeria. Ojo J.O et al	Outbreak of methanol poisoning and its Environmental Determinants in Rivers State, Nigeria, May-June, 2015 Bountain W. Tebeda et al	Distribution and Dosimetery of Radionuclides in Airborne Dust of Two Communities around Stone quarrying sites in Southwestern Nigeria Emmanuel Gbenga Olumayede
	Comparative Study Of The Effects Of Organic And Conventional Systems Of Farming On Chemical Composition Of Plants' Foods Olumuyiwa S. Falade	Environmental Health Officers and Urban Environmental Protection in Selected LGAs in Osun State: Issues and Perspectives **Olutoyin IKUTEYIJO**	Characteristics of Size Segregated Aerosols of Lagos Nigeria. G. C. Ezeh
	Environmental Factors and Cancer Prevalence in SW Nigeria. Part I: Impact of environmental radioactivity in soil, air, and water Mary Adeola	Preliminary investigations of lead dynamics in blood and milk of lactating Nigerian subjects Joshua O. Ojo	Determination Of Infant Milk Intake And Mother's Body Composition In Breastfeeding Mothers From Ile-Ife, Using Stable Isotope Technique Danjuma Maza
	Environmental Factors and Cancer Prevalence in SW Nigeria. Part II: Impact of toxic and essential elements in soil Teniola	Management Of Lead And Mercury In The Nigerian Environment – Issues And Options. Joshua Ojo And Maza Danjuma	Correlations Between Trace Elements In Blood A Some Physiological/Biochemical Parameters A Influenced By Nutritional Status. Oketayo O.O et al
	Development of a Human PBBK Model for the Mixture of Lead, Mercury, and Selenium. **D. D. Maza**	Analyses and Distribution of various types of Cancers recorded in Ife-Ijesha Cancer Registry in the Five year period 2010 -2014 Olawale O.Awe	A study of the anti diabetic potential of whole fuit and extracts of some selected Abelmoschus esculentus. Sanni Adedayo M.
13:40 – 15:10	**Lunch** (Affordable decent meals available at the University Cafetaria (Manna Place)		
15:10 – 16:40	Plenary: Oral Summaries and Discussion of Poster Presentations		
16:40 – 17:40	Plenary: Communique		
17:40 – 17:50	Closing Cocktail		
17:50	Departure		

POSTERS [

***P1: Pterocarpus osun* lectin: A Protein with Unique Physicochemical and Biological Properties**
*ADEWUYI Oluwafemi Joseph, OLODUDE Samuel Opeoluwa and **ODEKANYIN Oludele Olayemi

P2: Trends and Determinants of Mortality from Congenital Malformations among Children Presenting at the National Hospital, Abuja, Nigeria
Authors: Abiodun J. Oladejo[1,2], D. Osunkwo[1], A. Muhammed[1,2], S. Gidado[1], P. Nguku[1]

P3: DESIGN, CONSTRUCTION, AND EVALUATION OF A CLEAN ROOM FOR BIOLOGICAL TRACE ELEMENTS RESEARCH
Joshua Ojo, Oyedele Oketayo, Akinjide Akintunde, Bamidele Olaniyi and Jide Afolabi

P4: Characterization and Fabrication Of Dye Sensitized Solar Cell (DSSC)
Odu Oluwafemi Daniel ; Obafemi Awolowo University
phemyodu58@gmail.com

P5: Determination of toxic and essential elements in soils, drinking water, and saliva samples from a lead-polluted gold mining village in Zamfara state.
Tosin, Tolu, Ojo

P6: Radioactivity In Some Foods And Soils From Jos Tin Mines, Nigeria
Joshua Olufemi Ojo

P7: Gamma radioactivity in soils from some Mines from Nigeria – radiological and forensic potentials.
Ojo J.O., Salewa, Awilojuoloro Omolola, Tajudeen, Donald

P8: Risk Assessment of Microwave radiation from Telecommunication Masts and GSM phones in Ile-Ife
Ojo, Olorunfemi, and Mathew,Aboyeji:

P9: Bioavailability of Cu and Zn from Foods from the Jos Plateau
Boakye, Ojo, Falade, Adewusi

P10. Perceived Health Influence of homestead sanitation among people in Mowe, Ogun State
Emmanuel Adenuga, Department of Human Kinetics and Health Education, Olabisi Onabanjo University, Ago-Iwoye, Ogun State

P11. Calibration of a Bioelectric impedance Facility for body composition determination Using the Isotope dilution technique O. C. Ogbonna

PROFILE OF SPECIAL GUESTS AND SPEAKERS

PROF ABIODUN F. OLUWOLE

Prof A.F. Oluwole was born in September 1939 at Ijare, Ondo State. He joined the services of the then University of Ife (now Obafemi Awolowo University), Ile-Ife in 1969 as a Lecturer I and rose to become a Professor in 1978. Between 1975 and 1976 he served as the acting Head, Department of Physics, after which he became the Coordinator of the University's Nuclear Technology Programme (1976 – 1980). The Programme gave birth to the Centre for Energy Research and Development (CERD), where Prof Oluwole served as the pioneering Director (1980 to 1983). Prof Oluwole not only raised the profile of research on the Nigerian environment by attracting several multi-million dollars international fundings for pioneering original research, he also spearheaded the introduction of the Health Physics and Environment option into the postgraduate programmes at the Obafemi Awolowo University, Ile-Ife.

Outside the Obafemi Awolowo University, Prof A.F. Oluwole held various teaching and research positions at several academic institutions including the University of California, Berkeley, (1964/65, 1969), University of Heidelberg FRG (1971), University of Sussex (1970), University of Washington, Seattle, (1972), Columbia University (1974), McMaster University, (1977).Federal University of Technology, Akure, (1984/85), Nuclear Research Center, Washington State University, Pullman (1985, 1991), University of Surrey, (1989, 1990, 1992, 1993, 1994) and University of Stuttgart, FRG (1989, 1990, 1992, 1993, 1994)

Apart from teaching and research, the meritorious services of Prof A.F. Oluwole include membership of**:** Federal Panel on Ionising Radiation (1970 to 1990); Natural Sciences Research Council Committee on the National Institute of Nuclear Sciences (1975); FMST's Review Panel on National Policy on Science and Technology (1983). National Panel on Integrated Energy Policy for Nigeria by Ministry of petroleum and Energy 1984, Energy Panel on National Nuclear Centre and Science village, Abuja by FMST, 1987., Energy Commission of Nigeria (2001). Prof Oluwole was also a member of the International Atomic Energy Agency (IAEA) Committee on Nuclear Information Services (1982), and Nuclear Data (1993).

Prof Oluwole was inducted a fellow of the Nigerian Institute of Physics in 1996. He is a member of several professional bodies, including the Tau beta Pi-American National Honour Engineering Society (1964), American Physical Society (1968), American Association of Physics Teachers (1968), Science Association of Nigeria (1970), West African Science Association (1970), Nigeria Institute of Physics (1974), New York Academy of Sciences (1980), and the American Nuclear Society (1982), American Association for the Advancement of Science (1996).

He has authored/edited several important books and Monographs, including

- Twenty five years of Nigerian History – Volume XI: Science and Technology – Heinemann Press, 1990 eds. A.F. Oluwole & O. Awe, 587 pp. (Prof. Tamuno-General Editor.)
- "National Inventory of Greenhouse Gases and Toxic Air Pollutants in Nigeria" Eds. Obioh I.B., Oluwole A.F.., Akeredolu, F.A. and Asubiojo, O.I. 300pp Ilupeju Press. (1995).

Additionally he has over eighty scholarly articles in reputable local and international journals. Among the several important Special Reports authored/co-authored by Prof Oluwole are:

- Ogunseye, Olaniyan C.I., Oluwole A.F., Emovon, E.V., et al. Outline of Science and technology Policy for Nigeria". Federal Ministry of Science and Technology (1980-83).
- Oluwole, A.F. and Adegoke, O.S. "The Structure of the Federal Ministry responsible for Energy Mineral Resources and Technology" 15pp. Commissioned by SHQ. (1983).
- Oluwole, A.F. "Structure of National Nuclear Centre and Science Village, Abuja" 30pp commissioned by the Head of State (1987)
- Adegoke O.S., Iya Abubakar, Oluwole A.F. et al (2008) Presidential Committee on the Actualization of the Proposed Science & Technology Research Development Fund" 110pp.

An accomplished scholar, Prof Oluwole was awarded the Nigerian National Order of Merit (NNOM) for Science in 2004. Among over a dozen other prestigious awards received by Prof A.F. Oluwole are the Doctor of Science *(Honoraris Causa)* from the Federal University of Technology, Akure (2006) and the Adekunle Ajasin University, Akungba, Ondo State (2008).

Lawrence Chidi Anukam, PhD

Dr. Lawrence Chidi Anukam was the most senior Director and the Acting Director General of the National Environmental Standards and Regulations Enforcement Agency (NESREA) before his appointment as the substantive Director General of the Agency. Until the appointment, he was the Director of Planning and Policy Analysis at the NESREA Headquarters. His responsibilities included the development and coordination of short-, mid-, and long-term strategic action plans of the Agency; coordination of policy analysis and research; data and information management system, including public education and awareness; development and implementation of environmental regulations and standards; identifying and building partnerships at local and international levels; coordination of public/private sector engagements, including civil society involvement; liaising and following up activities on inter-governmental and inter-ministerial matters at federal and state levels; organization of special seminars, workshops and conferences; and any other special duties assigned from time to time by the Director General.

Before joining NESREA, Dr. Anukam was the Head of the Department of Programme Development and Implementation at the National Office of the New Partnership for Africa's Development (NEPAD), in the Presidency. And before that, he was the Special Assistant to the Senior Adviser to the President on NEPAD and the Head of NEPAD Nigeria. He was deeply involved in the development, promotion, domestication and operationalisation of the implementation of NEPAD programmes in Nigeria.

Dr. Anukam was a management staff of Nigeria's Federal Ministry of Environment in the Department of Environmental Assessment, where he assisted in the development and updating of national environmental guidelines and standards, including environmental indicators and environmental management tools such as Environmental Management System and Environmental Auditing. He was a member of the Core Secretariat of the National Committee for the Implementation of Nigeria's Environmental Action Plan (the National Agenda 21) and Follow-up on the Activities of the United Nations Commission on Sustainable Development (CSD). He assisted in coordination and facilitation of bilateral and multilateral activities between Nigeria and the international community in the area of environment and sustainable development. He was the National Focal Point of the water component of the Global Environmental Monitoring System (GEMS/Water) of the United Nations Environment Programme (UNEP).

Dr. Anukam served as the Chief Facilitator and Deputy Coordinator of the Nigeria's Preparatory Committee for the Ten-Year Review of the United Nations Conference on Environment and Development (UNCED), and for the World Summit on Sustainable Development (WSSD) held in Johannesburg, South Africa in August/September 2002. He coordinated the preparation of Nigeria's Country Reports to various sessions of the United Nations CSD. He chaired the first international meeting of all National Focal Points of the United Nations CSD National Environmental Reporting Programme held at the United Nations Headquarters in New York in February 2002.

Dr. Anukam has served in various intergovernmental and United Nations processes and initiatives. He was a Research Fellow and an Associate Adviser to the Under-Secretary General of the United Nations and Secretary-General of UNCED. He served in the UNCED Secretariat in Geneva, Switzerland during the preparation for the Earth Summit, held in Rio de Janeiro, Brazil in 1992. He assisted in the preparation of the global Agenda 21 and other UNCED documents in the freshwater and health sectors. He was actively involved in the organization and facilitation of international meetings and negotiations during the UNCED process, including the Preparatory Committee (PREPCOM) sessions held in Nairobi, Geneva, and New York, and at the Earth Summit in Rio de Janeiro in 1992. He acted as UNCED Liaison

Officer for the Nigerian Government, and as a Personal Assistant to a former President of Nigeria during the Earth Summit. (The former President was then a member of the UNCED Eminent Persons Group). He was also a Special Assistant to the President of the 12th Session of the United Nations Environmental Programme (UNEP) Governing Council.

Dr. Anukam served in the Secretariat of the United Nations International Conference on Water and the Environment (ICWE) at the Headquarters of the World Meteorological Organisation (WMO), in Geneva, Switzerland. He coordinated the participation of Intergovernmental and Non-governmental Organisations at the ICWE held in Dublin, Ireland in January, 1992. The ICWE provided input to the freshwater component of the UNCED process. He was a member of the World Health Organisation (WHO) Expert Group on the Review of Global Water-drinking Quality Standards in 1993.

Dr. Anukam also had some stint in academics. He was a Lecturer at the College of Environmental Studies, Kaduna Polytechnic, Kaduna, Nigeria. He was part of the team that pioneered the development of Ordinary National Diploma (OND) and Higher National Diploma (HND) programmes in Environmental Management at the Polytechnic. He was Chairman of the Committee for Restructuring of the National Diploma and Higher National Diploma Programmes of the Department of Environmental Science, Kaduna Polytechnic, and Departmental Nominee to the Accreditation Process at the National Board for Technical Education (NBTE). He was a Graduate/Research Assistant and Part-time Lecturer at the Wilfrid Laurier University under the Joint Graduate Programme of the University of Waterloo and Wilfrid Laurier University, Waterloo, Ontario, Canada.

Dr. Anukam has served as Technical Expert to some international organisations, including the United Nations Environment Programme (UNEP), World Health Organisation (WHO), World Meteorological Organisation (WMO), and the United Nations (UN). He is a member of various professional bodies, including the American Chemical Society (Environmental Science and Technology Division); Institution of Environmental Science, London; Nigerian Environmental Society; Institution of Water and Environmental Management, London; and International Water Resources Association. He serves on the Board of the Commonwealth Human Ecology Council (Nigeria Chapter).

Dr. Anukam has travelled widely. He has participated and presented many technical papers in various international meetings, conferences and workshops. He has represented the Federal Government of Nigeria at various national, sub-regional, regional and global fora. He was Head of the Nigerian Delegation to the First Preparatory Meeting (PrepCom) of the United Nations Rio+20 Summit. He has served on several National and International Committees on environment and environment-related matters. He is a member of the Governing Board of the Environmental Crime Programme of the International Criminal Police Organisation (INTERPOL). He is very experienced and has vast knowledge on national, regional and global environmental and sustainable development issues.

Dr. Anukam hails from Owerri, Imo State, Nigeria. He had his primary education at Christ Church School, Owerri, and his secondary education at Government Secondary School, Owerri, and Government College, Umuahia. He has a Bachelor of Science Degree (B.Sc.) in Chemistry from the University of Lagos, Lagos, Nigeria; and a Master of Science Degree (M.Sc.) in Environmental Pollution Control from the University of Leeds, Leeds, England. He has a Doctor of Philosophy Degree (PhD.) in Applied Geography (Natural Resources Management) from the Wilfrid Laurier University, Waterloo, Canada, under the joint programme with the University of Waterloo, Ontario, Canada; and a Certificate in Strategic Management of Regulatory and Enforcement Agencies from the Harvard University, Cambridge, Massachusetts, USA. He has attended many professional courses on environment and environment-related issues.

Ambassador Ayoola Olukanni



Ambassador Olukanni graduated from the University of Ife (now OAU) in 1979 with a first degree in B.Sc. Social Sciences (Political Science). He joined the Nigerian Diplomatic service in July 1980 after his National Youth Service in Jos Plateau State. His first diplomatic posting from 1982 to 1983, was to the Nigerian Embassy Brussels Belgium, which also serves as the Nigerian Mission to the European Union between. In 1984 he returned to school for postgraduate studies in International Law and graduated with Post Graduate Diploma in International Law from the University of Lagos.. Between December 1986 and April 1989, he served in the Permanent Mission of Nigeria to the United Nations New York, covering among others the work of the 2nd 3rd 4th and 6th Committees of the UN as well as the Security Council. He was thus involved in the work of the UN spanning Economic and Financial matters; Social, cultural and humanitarian and Legal affairs as well as Peace and Conflict Resolution and UN Peace Keeping operations.

He returned to Nigeria in 1989 and in line with his insatiable quest for knowledge he enrolled for another Postgraduate studies at the University of Lagos. He graduated from UNILAG in 1991 with Masters of International Law and Diplomacy(MILD) with focus on International Environmental Law.

Between 1991 and 1994, he worked at the Bilateral Economic Cooperation Division (BECD) at the Headquarters, (the Ministry of Foreign Affairs) and was in Tel Aviv Israel from 1994-1998 where he functioned as Counsellor Political, Culture and Information following closely the implementation of the Oslo Peace Accord. He also served in the Embassy as Pilgrims' Liaison Officer.

In January 2000 he returned to the Permanent Mission to the UN in New York to strengthen the Mission when Nigeria was unanimously elected as the Chairman of the New York Chapter of the Group of 77 and China. During the period he was closely involved in the UN Millennium Summit and the negotiation of the UN Millennium Development Goals(MDGs).

From 2003-2007, Ambassador Olukanni was in Nairobi and served as Acting High Commissioner to Kenya with concurrent accreditation to Seychelles and Ag Permanent Representative to United Nations Environment Programme(UNEP) and the United Nations Human Settlement Programme(UNHABITAT). On his return to Nigeria, in April 2007, he was appointed Director Public Communications and Spokesperson of the Ministry of Foreign Affairs. In August 2010, he moved to the Embassy/Permanent Mission of Nigeria to the UN in Vienna to serve as Charge D'Affaires and Acting Permanent Representative to the International Atomic Energy Agency (IAEA,) His other duties include overseeing Nigeria's interest in the following Organisations based in Vienna.OPEC, The Comprehensive Test Ban Treaty Organisation(CTBTO), United Nations Industrial Organisation(UNlDO); United Nations Office on Drugs and Crime(UNDOC); UN Committee on Peaceful Uses of Outer Space(COPOUS); United Nations Office on International Trade Law(UNCITRAL).

He was appointed Ambassador in February 2011 while serving in Vienna and posted to Canberra, Australia. From July 2011 to March 2015, he was Nigeria's High Commissioner to Australia with con-current accreditation to New Zealand, Fiji Papua New-Guinea and Pacific Island of Vanuatu. He returned home from Australia in mid March 2015 to retire from the Foreign Service on attainment of age 60. He is married to Mrs Oluyemisi Olukanni and they have three daughters and a grandson. He is a passionate environmentalist, a cultural enthusiast who loves poetry and the theatre. He is also an avid golfer.

REV TONY AKINYEMI



Tony Akinyemi is a man of many parts. He is an Engineer, a Theologian, a Pastor, a Radio & TV Presenter, an Author, a Teacher, a Health Coach, and an Entrepreneur. He is the founder of the **RAPHA HEALTHY LIVING INSTITUTE** in Lagos Nigeria, the founder and chairman of **HAVILAH HEALTH HAVEN LTD**, the founder and promoter of the **Rev. TONY AKINYEMI SCHOLARSHIP FOUNDATION (rTSF)**, as well as the Founder & Senior Pastor of **THE SHEPHERD'S FLOCK INTERNATIONAL CHURCH (TSF)** all in Nigeria.

Tony Akinyemi is the host of **FIVE-MINUTES-WITH-REV-TONY** on Radio (OGBC-2) and EXTREME MAKEOVER on television (**LTV-8, OMEGA TV,** and **ABN**), where he teaches on HEALTHY LIVING. He is arguably Nigeria's pioneer teacher on HEALTHY LIVING on air. He has been teaching Healthy Living on Radio and TV since 2004. His teachings on healthy living have helped many to recover from so-called incurable diseases and many others to improve their health. He believes that there are no incurable diseases; there are only incurable people.

Tony Akinyemi is a product of St. Joseph's College, Ondo where he obtained his West African School Certificate in **1982**. He holds degrees in Computer Engineering (**1987**) and Theology (**1998**) from the University of Ife (now Obafemi Awolowo University) and the L.I.F.E Theological Seminary, Ikorodu respectively. He became a NOVELL Certified Netware Engineer (**CNE**) in the USA in **1992**. He also became a Hallelujah Acres Health Minister in **2004**, having been trained in Shelby, North Carolina, USA. Tony is also an alumnus of the Jack Hayford School of Pastoral Nurture, Van Nuys, California, having trained under the legendary Jack Hayford.

The **Rev. Tony Akinyemi Scholarship Foundation (rTSF)**, a pet project of Rev Tony, offers full scholarship from resumption to graduation from Primary School through university for over 100 students in Nigeria that are current beneficiaries of the scheme. The Foundation caters for brilliant but indigent pupils and students from all walks of life, without prejudice for their ethnicity, nationality, race, gender, or religion.

Rev Tony has authored fifteen published books to date, of which three are on HEALTH and HEALTHY LIVING. He has equally published 27 editions of his quarterly HEALTHY LIVING NEWSLETTERS. He is the author of over 500 DVD, CD, and MP3 video and audio recordings on various aspects of HEALTHY LIVING.

Rev Tony believes that what we need to improve our health profile and statistics in this country is not more MEDICATIONS, but more EDUCATION.
(Rev Tony Akinyemi is an International Honorary Adviser to the LivingScience Foundation, Ile-Ife)

Prof. Francis Olabode I. ASUBIOJO



Prof. Asubiojo obtained his Bachelors degree in Chemistry from the University of Ife (now Obafemi Awolowo University), Nigeria in 1972 and the Ph.D degree in Chemistry from Stanford University, U.S.A in 1977.

For about 35 years, Prof. Asubiojo has taught several generations of Nigerian undergraduate and postgraduate students in general, organic and environmental Chemistry. In the course of this, he has supervised 8 Ph.D and several Masters degree candidates. He has also authored/co-authored 2 books, and over 80 articles in scholarly journals worldwide. An expert in Environmental Control and Management, Prof. Asubiojo has co-ordinated more than 50 Technical Reports on Environmental Impact Assessment and Environmental Audit for Industrial and Construction companies. He has also delivered about 20 public lectures on Environmental Management and lately, Distance education matters.

Prof. Asubiojo is a member of various professional bodies among which are: Member, Royal Society of Chemistry, American Chemical Society; Chemical Society of Nigeria; Nigerian Society for Environmental Management; New York Academy of Sciences; American Association for the Advancement of Science, Member, Advisory Group, Wolfson Foundation on OpenScience Laboratory, United Kingdom.

PROFESSOR DURO J. OYEDELE

Prof Duro Oyedele is a distinguished Professor in the Faculty of Agriculture at OAU, Ile-Ife. He was at various periods the Head of the Department of Soil Science and Land Resources Management. He specializes in soil conservation, spatial variability of soil physical properties, organic matter and soil aggregation, carbon sequestration and global climate change. Professor Oyedele currently leads a multi-institutional, multi-disciplinary, multi-million dollar research project promoting indigenous vegetables and organic farming in Nigeria. Apart from teaching and research, Prof Oyedele is engaged in service to the local community at several levels, including being a member of the Board of Advisers of LivingScience Foundation. He is happily married with children.

PROF FATAI AKINTUNDE BALOGUN

Born in May 1956, Prof Fatai Balogun was educated at the University of Ife (now OAU), Ile-Ife and the University of Surrey in Guildford, England. He was among the first generation of Medical and Health Physicists in Nigeria. He was Director, at the National Institute of Radiation Protection and Research, (University of Ibadan, Ibadan), under the Nigerian Nuclear Regulatory Agency Abuja from November 2006 to August 2012. Currently he serves as a Research Professor at the Centre for Energy Research and Development, OAU, Ile-Ife and is a key resource person in teaching the Engineering Physics curricula at the Department of Physics and Engineering Physics of the Obafemi Awolowo University. He is equally actively engaged in teaching Physics to Residents in Radiology from several University Teaching Hospitals in Nigeria. He is married with children.

Prof Adeyinka Adesina , Faculty of Social Sciences, OAU, Ile-Ife

Mr Taiwo Oki, Chemist, Fola Gold Edge, Lagos (makers of Value Paints)

~~Mr A.A. Adegboye~~, South-West Zonal Coordinator, Industry Development Centre, Federal Ministry of Industry, Trade, and Investment, Osogbo

PROFESSOR OLAYINKA O. OGUNKOYA

Prof Olayinka Ogunkoya is a Nigerian fluvial geomorphologist specializing in the hydrology of low-order catchments (<25 km^2). He lectures at the Department of Geography, Obafemi Awolowo University, Ile-Ife, Nigeria. He has B.Sc. (Honours) (1973) and Ph.D (1980), and spent one year as a Visiting Scholar at the Institute of Hydrology (now Centre for Ecology and Hydrology), Wallingford, Oxon, England (1989-90). He more recently (2007-11) worked at the Shell Petroleum Development Company of Nigeria as the University Liaison Coordinator, where he was responsible for using Shell largesse to strengthen Nigeria's tertiary education capacity.

At various times, Prof Ogunkoya was the Head, Department of Geography, Obafemi Awolowo University, Ile-Ife (1990-92), Representative of the Federal Government of Nigeria on the Governing Council of the United Nations Economic Commission for Africa (UNECA) Regional Centre for Training in Aerospace Surveys (RECTAS), Ile-Ife, Nigeria (1990-92). He continues to be a member of the Committee of the UNESCO Humid Tropics Programme (IHP) and also of the College of Research Associates, Institute for Natural Resources in Africa (INRA), United Nations University, Legon, Ghana, here he was a founding member.

Prof Ogunkoya has considerable experience in his field of study and also in Environmental Science. He has worked extensively on catchment and 'plot' scale hydrological processes, coastal geomorphology, environmental sensitivity, and environmental impacts of anthropogenic phenomena. The studies include:-

- ✓ Stream flow and water quality monitoring and analysis
- ✓ Soil erosion monitoring; pollutant transport and hydrological pathway analyses. Land use conversion, soil degradation and hydrological implications
- ✓ Flooding and flood control measures in the River Niger delta in central southern Nigeria
- ✓ Environmental, socio-economic and health impact of water resources development projects
- ✓ Environmental sensitivity index mapping of Nigeria's entire coastline (800km) using ground-truthed, classified, remotely-sensed imageries
- ✓ Environmental sensitivity categorization of some oil fields in the Niger Delta
- ✓ Environmental Assessment Reports (EARs) and desktop Environmental Impact Assessment (EIAs) for some of Nigeria's offshore petroleum exploitation leases
- ✓ Baseline study and EIA for a gas-reinjection project offshore Nigeria's coastline
- ✓ Ecological (including tidal history) and hydrocarbon finger printing studies
- ✓ A Niger Delta Environmental Survey
- ✓ Climate change and its effects

Part of the information from these studies have been presented in numerous papers published in reputable international and local journals. Prof Ogunkoya has also contributed chapters in five scientific books, and is the author and/or joint-editor of twenty-eight technical reports on the same subject matters. He has presented papers at local and international conferences, seminar and symposia, and has been variously, member and chairman of Federal Ministry of Environment Panel Review Meetings for Environmental Impact Assessments of various projects.
Prof Ogunkoya was born in 1951 and is married with three children.

PROFESSOR ADEDEJI AYODEJI ONAYADE

Professor Adedeji Ayodeji Onayade was born in Lagos sixty years ago. He attended the prestigious King's College, Lagos, and in 1973, was one of the 30 students admitted through concessional examination to study Medicine at the College of Medicine, University of Lagos, Akoka, Lagos. He graduated in 1979.

After graduation, Professor Onayade did his internship at the Obafemi Awolowo University Teaching Hospitals Complex (OAUTHC), Ile-Ife from 1979-1980 and proceeded for National Service at the Department of Morbid Anatomy, Lagos University Teaching Hospital, Idi-Araba from 1980 – 81. Professor Adedeji Onayade was one of three Nigerians who won the highly competitive John Holt's Scholarship to study for a diploma in Tropical Medicine and Hygiene at the Liverpool School for Tropical Medicine and Hygiene in January 1988. He also attended the Management course for Primary Health Care in the same institution. In 1991, he again won the World Health Organisation's Fellowship to attend the Regional Epidemiology Course in Nairobi Kenya. He obtained Fellowship of the West College of Physicians in 1994 and that of the National Postgraduate Medical College in 1998. Professor Onayade joined the services of the Obafemi Awolowo University, Ile-Ife as Lecturer I in 1995 and was promoted to the rank of Professor in 2007.

Professor Onayade has provided technical support to the Federal Ministry of Health as well as to several corporate organisations, Bilateral and International Development partners including the World Health Organisation, UNAIDS, British-American Tobacco Company, PATHS II (Ekiti) and the Save the Children.

Some of the contributions include:

- *The development of Draft Standard of Practice and Service Protocol for Child Survival Strategies in Nigeria on behalf of COMPASS Project, Nigeria*
- Co-Investigator in the clinical trial of mono-specific anti-snake venom "Echitab" in Nigeria.
- The development of the National Environmental Sanitation Policy and Policy Guidelines on Sanitary Inspection of Premises, Solid Waste Management, Excreta and Sewage Management, School Sanitation, Market and Abattoir Sanitation and Pest and Vector Control.
- Adaptation and updating of training manuals for the Integrated Management of Childhood Illness (IMCI).

Professor Onayade has investigated several disease outbreaks in Ile-Ife and published over 60 papers in reputable national and international scientific journals. He is currently Faculty Secretary, Faculty of Public Health, National Postgraduate Medical College and Editor of the Journal of Community Medicine and Primary Health Care. He is happily married with children.

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45. Federal Ministry of Health, Abuja. Nigeria
46. Federal Ministry of Industry, Trade, and Investment, Osogbo
47. Fola Gold Edge, Lagos (makers of Value Paints)
48. Ghana Atomic Energy Agency, Legon, Accra, Ghana
49. Havilah Health Haven Ltd
50. Ile-Ife Cancer Registry, OAUTHC, Ile-Ife
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56. Medicines sans Frontiers, Anka-Zamfara
57. NESREA, SW Zone, Osogbo
58. Niger Ministry of Environment, Minna
59. Niger Ministry of Health, Minna,
60. Niger Ministry of Livestock and Fisheries Department, Minna,
61. Nigeria Field Epidemiology and Laboratory Training Programme, Abuja, Nigeria
62. Nigerian Centre for Disease Control, Abuja,
63. Osun State Ministry of Health, Osogbo
64. RAPHA HEALTHY LIVING INSTITUTE, lagos
65. Rev Tony Akinyemi Scholarship Foundation
66. The Institute of Public Health, Obafemi Awolowo University, Ile-Ife
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68. The Shepherd's Flock International Church
69. UN Regional Centre for Training in Aero Survey, RECTAS, OAU, Ile-Ife
70. Zamfara Environmental Sanitation Agency, Gusau,
71. Zamfara State Ministry of Health, Gusau, Nigeria

INVITED PAPERS

Think Global, Act local: Cogent issues of the Environment

Ambassador Ayo Olukanni

Abstract

Since the dawn of time man has been been faced with the challenges arising out of the forces and processes of the natural environment. Strategies have thus always been adopted and elaborate rules and regulations enacted for a harmonious existence and creative solutions to the problems of the natural environment.

Various environment related Organisations such as the International Union for the Conservation of Nature(IUCN) World Wide Life Fund (WWF) The Green peace movement have emerged along the line to help draw attention to the need to care for our environment and need for practical Programmes and less destructive and more environment friendly production pattern. However in the contemporary history, the 1972 Stockholm Conference on the Human Environment easily stands out amongst the efforts at global and national levels to deal with issues of the environment. It was not just an important event for the UN and its Agencies, according to a publication by Stanley Johnson "UNEP the first 40, A Narrative" the Stockholm Conference was a "transforming event…. for the world" and "The outcome of the Stockholm Conference was truly the beginning of a new narrative on the issues of the Environment and a paradigm shift in the field of International Environmental Governance. Notably that Conference, on 22nd June 1972, gave birth to the United Nations Environment Programme (UNEP) which rapidly evolved to be the leading global environmental authority. Since then, The organisation has been at the centre of the efforts of the international community to set the global environmental agenda, promote the coherent implementation of the environmental dimension of sustainable development within the United Nations system and functioning as an authoritative advocate for the global environment.

UNEP has played and continues to play very significant role in the protection of the environment and environmental sustainability. Such is its impact that it has played critical role in the drafting and implementation of over 500 Multilateral Environmental agreements at national regional and international levels and in all region of the world.

The current trajectory and continuous expansion of the frontiers environment issues can also be traced to the Report of the World Commission on Environment and Development. That Report also known as the Brundtland Report, named after the Former Prime Minister of Norway Mrs Harlem Gro Brundtland who was the Chair of that Commission was presented to the United Nations General Assembly at its 43rd Session in September 1988. The Brundtland Report drew attention to the alarming degradation and damage to our home common home, planet earth and identified cogent environmental issues facing us all and recommended a paradigm shift towards SUSTAINABLE DEVELOPMENT. The report also inspired the 1992 United Nations Conference on Environment and Development (UNCED)

held in Rio Brazil. Also referred to as "The **RIO EARTH SUMMIT" it was another epoch making event that brought world leaders and other stakeholders together and helped to identify cogent problems and issues of the environment including the following:** protection and Conservation of Biodiversity; Air Pollution, Climate Change, land degradation, Desertification, protection of the Ozone layer, Regional Seas Programme, Management and disposal of Sold Wastes, Hazardous and electronic Wastes, and of course impact of chemicals on the environment and human health.

At Rio, Agenda 21 was adopted and there was a paradigm shift towards Sustainable Development on a global and local, to come to grips with problems and issues of the environment. And such was the success of the RIO earth summit that three major Conventions , known as the RIO Conventions were adopted, namely , THE CONVENTION ON BIODIVERSITY, (CBD)UN FRAMEWORK CONVENTION ON CLIMATE CHANGE(UNFCC) AND CONVENTION ON DESERTIFICATION(UNCCD) . In subsequent years the three major chemical and Wastes Conventions ,the Basel Convention; the Rotterdam and Stockholm Conventions all dealing with wastes and problems arising from the use of chemicals and their impact on human health and the environment. Also worth mentioning is the Strategic Approach to International Chemicals Management(SAICM) adopted in Dubai in 2006 to address the challenges of negative effects of chemicals on human health and the environment. In addition to this the international community has also taken action to come to grips with the negative impact of mercury, through the Minamata Convention on Mercury to minimize the negative effect of Mercury on human health and the environment.

Certainly, the 1992 RIO Earth the Summit also helped to popularize the idea that while it is desirable to think Global there was the need for action at local level. Hence the recommendation from Rio that countries should set up relevant institutions including . Ministry of Environment at national level to address the issues of environmental sustainability and embark on sustainable development. Nigeria which was woken up to the reality of environmental problems by the Koko Waste saga of 1988. took action in this respect by setting up the Federal Environment Protection Agency (FEPA) which was subsequently upgraded to the Federal Ministry of Environment and subsequent establishment of the National Environment Standards Regulation and Enforcement Agency. (NESREA)

The Global Environment Outlook (GEO), published at regular intervals by UNEP has proved to be a useful strategy of drawing attention to the global dimension of contemporary environmental issues and encourage action at local or regional level. First published in 1995, five has been produced so far and GEO 6 is due for release in mid 2017). The various GEOs has helped to draw attention to the scientifically credible assessment of the state of the global Environment with policy recommendations and action at global and local level by stakeholders.

Overall, view of close observers is that it is clear that the due to an unsustainable production and consumption pattern and inadequate attention to other environmental challenges, the state of the world environment is being pushed towards what has been described as its "biophysical limits" and indeed in some situation that limit had been exceeded. This development is resulting in tremendous negative impact not just on the environment but on human health as reflected in increasing cases of cancer and other diseases.

Today Nigeria is described as a Digital Dump. This is as a result of dumping of electronic wastes traceable to about 500 containers of used computers and electronic equipment reportedly imported to Nigeria most of which are junk and end up on dump site where they burnt and end up polluting the environment and air. The view is that implicitly, this is a looming public Health crisis and there is an urgent need for urgent action through collaborative work involving relevant stakeholders including Environmental Health officers under the coordination of the Federal Ministries of Environment and Health. The goal should be elaboration of a comprehensive Plan of Action on Environmental Health and this Conference presents a unique opportunity in that direction. Fortuitously, the WHO among other relevant UN Agencies can serve as useful partner in this regard, and can also be seen in context of implementation of UN Sustainable Goals.

Pollution sources in the Nigerian Environment and their Health Implications

O.I. Asubiojo, Department of Chemistry, Obafemi Awolowo University, Ile – Ife

ABSTRACT

In this paper, the various sources of environmental pollution and their implications for health are discussed. All sectors of the environment – air, water, and soil are impacted via a combination of natural and anthropogenic sources. The parameters of major concern in the Nigerian environment are discussed as well as their health impact pathways.

Among the natural sources are soil dust, radioactive – containing geologic materials, sea spray and decaying vegetation, while anthropogenic sources include industries, vehicular activities, mining, agricultural practices, municipal waste disposal, radiation exposure, bush burning, domestic practices, even churches and mosques.

The most common route of exposure to air pollutants is by inhalation, but direct absorption through the skin or via food and water are also important pathways. Among the health hazards identified are respiratory disease, cardiovascular problems, brain damage, cancer and others. Water is the ultimate environmental sink, hence it receives the most environmental abuse from all sectors. The major source of health impairment from water pollution is via contaminated drinking water and some of the diseases resulting therefrom are cholera, bacterial and amoebic dysentery, typhoid fever, neurological impairment, cancer, brain damage, kidney damage, polio, infectious hepatitis, and schistosomiasis.

A few specific examples of incidents of environmental pollution – induced health problems in the country are discussed.

Recommended Lifestyle and Nutritional Habits to counter Peculiar Stressors in the Nigerian Environment

By Tony Akinyemi, B.Sc. (Ife); B.Th. (L.I.F.E., Ikorodu); HM (North Carolina), Nutritional Consultant [in view] (California)

ABSTRACT

Even though humans have the genetic potential to live up to **120 years** or thereabout in relatively good health, yet average life expectancy in Africa leaves much to be desired. Sub-Saharan Africa is even worse. According to the latest data provided by the **World Health Organization**, there is no single African country among the best **50** countries in the world in terms of longevity. Japan currently ranks Number 1 in the world with national average life expectancy of **83.7 years**, closely followed by Switzerland and San Marino at **83.1 years**. In Africa, Tunisia has the highest national average life expectancy at **76.1 years** and ranks **57th** in the world, a position she shares with Oman. Libya, the second highest in Africa, ranks **72nd** at **75.3 years** while Nigeria, the **8th** most populous country in the world, ranks **183rd** at **54.5 years**. Sierra Leone, a West African country, has the lowest national average life expectancy in the world at the moment at **46 years**. This may not be unconnected with the recent EBOLA pandemic that engulfed the country.

What could be responsible for this huge disparity in life expectancy between developed and developing countries? What is responsible for this poor showing in Africa in general and Nigeria in particular? Are the factors genetic or environmental? Is there anything we can do to mitigate the impact of both genetic and environmental factors on our health and longevity and to improve our health statistics and scores in this part of the world? Nigeria generally shares the environmental stressors common to humanity everywhere. What is peculiar to Nigeria is in its combination of stressors, which show a higher concentration of the types that are easily controlled in well-planned and orderly societies. In Nigeria, the latent features of underdevelopment worsen this general position. Government's failure to manage the (social and physical) environment appropriately compounds the ability of the average Nigerian to cope. Generally, as man moves further and further away from nature and natural living, he exposes himself to increasing stressors and stress. Modernity, technology and commerce have seen to that.

However, man is the super mastermind of the state of the planet. He can seize the initiative with disciplined commitment to directing science towards more nature-friendly use of the planet or choose not to do so to his own peril. Nigeria is just in the rudimentary stages of technology adoption but suffers the misfortune of reaping the same degree of miseries found in technologically advanced nations without the tools to mitigate its effect on the population. This places the onus on the individual to seek ways to protect himself from the ravaging effects of environmental stressors. The ideal would have been for governments at various levels and Nigerians in general to collaborate to keep the environment safe. Where this is not happening, the individual needs to take steps in his own interest. The good news is that each

one of us can exercise substantial control over all forms of stressors through a disciplined and sensible application of knowledge. This includes knowledge of the stressors, preventive steps that can be adopted through lifestyle modifications and dietary adjustments, understanding how to change our perception of issues and challenges, and so on. Similarly, there are several natural nutritional remedies for keeping the impact of stress at the barest minimum. These are readily available and should be exploited.

The simple Do-It-Yourself steps that individuals can take by themselves to protect themselves from the negative impacts of environmental (and even genetic) stressors are what we seek to explore in this presentation. What we now know is that the external environment of a person can impact on his internal environment in significant ways. The internal environment then becomes conducive for the expression of genetic time bombs that had remained dormant all along.

Proscribed Dangerous Chemicals in use in Nigeria Agriculture

Prof. D.J. Oyedele

Department of Soil Science and Land Resources Management,

Obafemi Awolowo University, Ile-Ife.

ABSTRACT

The gradual move towards mono-cropping and intensive agriculture in Nigeria among others have increased weed, pests and crop diseases infestations requiring their control with chemicals. Thus over the years, agrochemicals have been used to protect crops and animals against diseases and pests in order to ensuring increased food production. While the use of agrochemicals is critical to raising crops and animals, many of them however cause substantial environmental and ecological damages, moreso many of these chemicals remain in the soil environment for many years. Thus reducing the overall benefits of synthetic agrochemicals. Agrochemicals are however now indiscriminately being used in Nigeria either to control weeds, pests and diseases and in the post-harvest storage of agricultural products. This presentation reviewed the different groups of agro-chemicals in use in Nigeria and the existing regulations guiding their use. It compares this with what obtains in the developed nations. A move towards the use of non-chemical methods for enhancing with soil fertility and dealing with weeds and pests is advocated in this paper.

Continued Use of Thimerosal-Containing Vaccines in Nigeria: How justifiable?

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ABSTRACT

Even though it could be argued that vaccines (particularly when they must be administered *en masse*) are somewhat over-rated, nobody could doubt that they are life savers and one of the most important healthcare interventions available. Issues with vaccines include over-emphasis for instance at the expense of providing better [e.g.sanitary] conditions that could reduce adverse health risks and need for vaccines in the first place. This fact is suggested by the statistics that the countries with the heaviest mass vaccination schedules (e.g. the USA) are not the ones with the best health indices. However, the focus of this paper is the discriminatory use of Thimerosal-containing Vaccines (TCVs), which has led to the situation of strident, oft times emotional, campaigns insisting that products proscribed in developed nations must continued to be used in the developing ones, without any room for critical assessment.

Thimerosal (or Thiomersal) is a compound that comprises 49.6% ethyl mercury. In the early days of vaccine discovery, in the 1930s, it was soon discovered that administering vaccines to several people from the same bottle (multi-dose format) inevitably leads to catastrophic cross-contamination of the vaccine. So, to put several doses of vaccine in the same bottle, it is absolutely necessary to add some preservative. The candidate chosen for this preservative was thimerosal. With the subsequent establishment of mercury (in all its forms) as an extremely toxic and persistent neurotoxin, several countries in the First World began to proscribe its use in vaccines. The last to do so, the USA proscribed TCVs, ostensibly on "precautionary grounds" way back in 2001! Particularly affected are vaccines against diphtheria, tetanus and pertussis (DTP), diphtheria and tetanus toxoids (DT), tetanus toxoid (TT), hepatitis B, *Haemophilus influenzae* type b (Hib), and influenza. These vaccines are administered to children (or fetuses through their pregnant mothers), who are not only specially vulnerable, but must get several doses in their early years. Following the proscriptions, the developed countries simply switched to the use of single-dose format, which does not require any chemical preservative for the vaccines.
.
Ironically multiple millions of doses of multi-dose format vaccines continued to be produced in the developed countries, for use in the developing countries. Efforts to halt this situation have always been vigorously resisted by a strong and aggressive Vaccine Lobby, comprising of vaccine manufacturers and distributors, which is able to undermine the weak UN structures to its advantage. A recent demonstration was the series of UNEP meetings (June 2010-January 2013) which reviewed the use of mercury in drugs, foods, and common household products. Despite strong representations by African countries, the Vaccine Lobby convinced the global body, that mercury should remain in vaccines, even though proscribed (effective 2020) in virtually every other product discussed at the meetings.

The argument for the continued use of thimerosal-containing vaccines in resource-challenged countries is based on three levels of considerations. Each of them, considered alone, is obviously unacceptable; but when combined together, the Lobby argues that the overall cost-

benefits assessment renders the discriminatory use of vaccines not only justified, but compelling.

The first consideration is based on the toxicology of ethyl mercury. Since most of the extensive work and recommended safety standards on mercury were based on methyl mercury, the Lobby argues that possible minor reduction in toxicity might make the overall risks to using ethyl mercury somewhat justifiable. In particular, some studies have suggested that the half-life of ethyl mercury in blood is much shorter than that of methyl mercury, and therefore the doses do not accumulate in people to cause as much adverse effect as would have been caused by methyl mercury. Obviously this could not be a good justification for the continued administration of mercury into people, and the argument is never extended to other products. Moreover there are other authoritative works showing that the faster clearance of ethyl mercury from blood is not actually due to excretion from the body alone, but rather it includes enhanced transfer to the brain!

The second level of consideration is programmatic issues. It has been argued that vaccines packaged and distributed in multi-dose formats are lighter and easier to distribute, and in particular requires smaller cold-chain volume for storage. Supposedly, these are very serious constraints for third world countries with poor infrastructure and all that. Some even add the reduced amount of medical waste volume generated as a reason to justify the use of TCVs in third world countries. Again, stand-alone, nobody thinks these good enough reasons. But, supposedly, in the final risk analyses, these swing the scale.

The third consideration – Finance and Economic - is indeed the most strongly-touted reason used to vehemently advocate for the continued use of TCVs in Africa and other resource-challenged countries. The argument is that the cost of thimerosal-free single-dose formatted vaccines will push the vaccine beyond the affordability of these countries and many people (particularly poor vulnerable children) will remain unvaccinated. Shred of technicalities, the argument is that the established risks of neurodevelopment impairment, including possibly autism, is a better alternative than leaving the subjects unvaccinated.

At the end of the day, the issue boils down to a question of risks. However, risk evaluation is evidently a subjective exercise and the final conclusions depend heavily on the perspectives of the evaluator. In this paper, we argue that from a local perspective, deliberately loading ethyl mercury into our most vulnerable population group, shunning other available options, on account of logistics and economic considerations, does not appear justifiable. As a matter of fact, when other known factors, such as vaccine wastage, loss of coverage (as in when a health worker is reluctant to open a 20-dose vial for only few presenting children) etc attending the use of multi-dose format for vaccines are considered, the position of the pro TCV-Lobby becomes clearly even more untenable.

In the meantime, from data obtained from our Laboratory, in conjunction with the Biokinetic model we are building for the co-occurrence of mercury, lead, and selenium, we are able to offer suggestions to mitigate the deleterious impact of mercury-laden vaccines in vulnerable populations, essentially via co-administration of selenium. This could provide succour to individual subjects whilst the nation arouses from her current state of anomie and induced mass national apathy to a very serious issue.

Urban planning, downstream petroleum industry and human health

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ABSTRACT

Current urban growth trends in Nigeria has been marked by apparent non-enforcement of zoning controls and land use regulations, and thus a significant degree of lawlessness. This is most manifested by the unfettered location, construction and operation of petrol filling stations with absolute disregard to regulations governing their site, situation and operations.
Zoning controls and urban planning/land use regulations describe among others, the restrictions on land uses in specific locations and deter or segregate emergent land uses that may not be compatible with existing ones. The goals are environmental sustainability, sustenance of human health, and protection of the integrity and sustainability of existing land use.

Apart from the fire hazards and traffic delays and accidents posed, a consequence is the potential loading of urban air with high levels of volatile organic compounds, particularly the carcinogenic benzene. Ground water aquifers could also be and in reality are already being polluted by leakage from petrol station underground tanks. Nigeria's federal and state regulations guiding site and situation of petrol filling stations include:

- ✓ The total number of petrol stations within 2km stretch of a station on both sides of the road will not be more than four
- ✓ The distance between an existing station and another will not be less than 400 meters
- ✓ The distance from the edge of the road to the nearest pump will not be less than 15 meters
- ✓ The distance of the pump from the centre of the adjoining road must be a minimum of 25m for local/street roads, 40m for Trunk "A/B" roads, and 50m for limited access express roads.
- ✓ Petrol filling stations must be located at a minimum of 150 m from any public building such as school, place of worship, and hospital
- ✓ The drainage from the site will not go into a stream or river.

It was observed in Murcia, Spain that volatile organic compounds, particularly the carcinogenic benzene, have ambient air concentrations (37.3 $\mu g/m^3$) near filling station pumps and tanks far in excess of background levels (1.16 $\mu g/m^3$) at 100m away from the station. Concentrations however depend on the number of petrol pumps, the frequency and volume of sales, the structure of the surroundings (whether there are tall buildings surrounding the filling station and the area closed up as to restrict pollutant dispersion), and weather conditions. The situation may be much worse at busy petrol stations along major

road sections densely populated with such stations in Nigeria where urban planning regulations are unenforced. For example, there are nine stations on a 1.74 km stretch of road between Mayfair Roundabout and Famia Junction in Modakeke, Ile Ife. Two pairs of stations located across the single-carriage road from each other in flagrant disregard to regulations. Only one pair of these nine station have distance separating them greater than 400 m. Even then, their nearest neighbours are 73 and 46 m away, respectively. The others have separating distances ranging from 29 to 398 m. Petrol dispensing pumps are all within 20m from the centre of the Trunk "A" road while diesel dispensing pumps are sited at the edge of road such that trailer-trucks and other diesel operated vehicles are re-fueled while virtually parked on the road. There are no ambient benzene concentration data for the Ile Ife area. However, ambient benzene concentration at a 3rd East Circular, Benin City, Nigeria bus stop/intersection is significantly higher (9.35 µg/m^3) than in Murcia, Spain. If the Murcia pump-side/background benzene concentration ratio is adopted for Benin City, filling station pump-side concentrations in Benin, could attain 300.65 µg/m^3. A petrol attendant at such station would be inhaling ~1.08 ppm of benzene per 8-hour work shift. This is higher than the stipulated safe maximum levels. The maximum allowable amount of benzene in workroom air during an 8-hour workday, 40-hour workweek is 1 ppm. It is recommended that all workers wear special breathing equipment when they are likely to be exposed to benzene at levels exceeding the recommended (8-hour) exposure limit of 0.1 ppm.

High concentrations (1.197 mg/L or 1.197 ppm) of benzene have been observed in deep groundwater aquifers of Okrika Mainland, Rivers State. It is believed that the aquifer contamination originated from improperly treated effluent discharges of the nearby Port Harcourt Refinery Company Limited (PHRCL) production lines. In general, water from many boreholes in Port Harcourt have strong petrol aroma, which is believed to be due to contamination from leaking underground petrol filling station underground tanks. These waters pose grave danger to human health. The United States Environmental Protection Agency has set a maximum contaminant level (MCL) for benzene in drinking water at 0.005 mg/L (5 ppb).

It should be noted that exposure to volatile organic compounds (VOCs) promotes health effects including asthma, headaches, mucosal symptoms, and in the case of benzene, increased risk of cancer, mainly aplastic anaemia, acute leukaemia, and bone marrow abnormalities. Some women who inhaled high levels of benzene for many months had irregular menstrual periods and a decrease in the size of their ovaries. Benzene exposure has been linked directly to the neural birth defects - spina bifida and anencephaly. Men exposed to high levels of benzene are more likely to have an abnormal amount of chromosomes in their sperm, which impacts fertility and foetal development.

There is thus a need for enforcement of such controls and regulations if the nation is to avert mass mortality in the near future.

Improving Health in Nigeria through more responsible care of the Environment

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ABSTRACT

The relationship between man's health and the environment is bi-directional. While environment related factors are estimated to account for up to a quarter and a third of the causes of illnesses and deaths globally and in developing countries respectively, over-exploitation of the environment by man is responsible for the development of several of these deleterious environmental factors. Exposure to unsafe water, in-door smoke and urban air pollution, exposure to hazardous chemicals, unintentional poisoning and climate change are some of the anthropogenic environmental factors that have significant impact on man's health. Undoubtedly related to the effect of climate change, a recent alert from the Federal Ministry of Health drew attention to possible health implications of the 2016 Seasonal Rainfall Prediction presented by the Nigerian Meteorological Agency highlighting water shortages, inadequate crop yield and consequent malnutrition, flash flooding with possible loss of lives and damage to properties as some of the expected consequences. Other concerns include increase incidence of water-related diseases such as malaria, dengue haemorrhagic fever, cholera, etc. In the light of these, the need for more responsible action to care for our environment is not only urgent but requires the involvement of all if the immediate and future catastrophes are to be averted.

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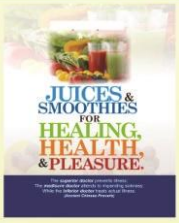


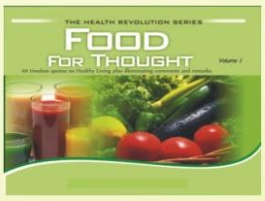


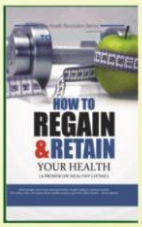




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SUBMITTED PRESENTATIONS

AN OVERVIEW OF ENVIRONMENTAL SUSTAINABLE MECHANISMS IN OSUN STATE, THE NESREA APPROACH (PROCESS).

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ABSTRACT

The National Environmental Standards and Regulations Enforcement Agency (NESREA), is an agency of the Federal Ministry of Environment that had been empowered by the NESREA ACT to enforce all environmental laws, guidelines, policies, standards and regulations in Nigeria. The Agency had been saddled with other responsibilities, such as prohibition of processes and the use of equipment or technology that undermine environmental quality; enforce compliance with the provisions of International Agreements or Multilateral Environmental Agreements (MEAs), to which Nigeria is a signatory.

Environmental challenges and mitigation, require the collaboration of other bodies like NGOs, and related Federal and State MDAs in Osun state. Such synergies had in the past brought fruitful results that need to be sustained for the benefit of the citizenry. These institutions and their members serve as watch dogs of the Agency wherever they may be.

Effective mass education of the populace by the Agency on issues that bordered on the subject matter is essential. So, the Agency started with public awareness, using the media and travelling to the countryside to stage town hall meetings. Different parts of the state were covered in the process. Official (compliance monitoring) visits were also paid to some industries that are operating in the state.

Institutions of learning were not left out in the exercise, like the Institute of Ecology, Obafemi Awolowo University, OAU, Ile-Ife. Both private and public schools were visited on awareness campaign. NESREA school club was established in some of them. The NESREA CDS was also established to enable the Agency carry its message to all and sundry. In a like manner, the school outreach was affected by the restructuring that took place in Osun school system, though, the state Ministry of Education has been of assistance in ensuring that the programme comes alive again.

From time to time, the Agency embarks on empowerment of environmental enforcement officers in all the states, by enhancing their capacities. In Osun state, apart from NESREA staff, staffs of Federal Ministry of Environment, NSCDC, OWMA, RUWESA, etc participated, in 2014.

In her earnest effort to spread the message of safe and sustainable environment, the Agency had taken the message to the hinterlands, through the institution of Town hall Meetings/Awareness Campaigns.

Furthermore, to maintain an healthy and safe environment, the Agency has been and will continue to be in constant policing of the facilities, locations and/or sites of environmental concerns. The main objective of occupational safety and health is to protect workers' health, prevent and reduce accidents, injuries, occupational and work-related disease by improving on working conditions and environment as prescribed by International Labour Organization (ILO). This aspect of industrial life is being ignored, most cases by the employers.

In exercising the mandate of the Agency, the Public Affairs Unit of the Field Office is well positioned to treat all complaints, which are usually given priority attention. The field office had intervened in a number of disputes that would have resulted into full scale community crises.

To ensure a cleaner and healthier environment, technical staff of the Agency and some of our accredited consultants are working on the affordable, sustainable and efficient methods to adopt in converting the saw dusts at the various saw mills across the state into wealth. The success of this process will check the carbon emission, and hence control the Ozone layer depletion.

The Agency places high premium on occupational safety and health to protect workers' health, prevent and reduce accidents, injuries, occupational and work-related disease by ensuring that firm management does not treat the former with levity.

It is time too, the three tiers of government placed high premium on conservation of our forest reserves, to discourage rampant illegal logging, and thereby save the environment. The state government and interested entrepreneurs can harness the abundant saw dusts in different parts of the state as raw materials for furniture and construction industries, thereby creating employment opportunities and revenue source.

Environmental Reporting and Accounting Research in Nigeria: Current Practices, Prospect and Future Direction

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Abstract

Concerns for the environment have led to the emergence of environmental accounting and reporting that will account for human and industrial impact on the environment. There is a widespread acceptance that organisations should provide accounts of their social and environmental performance in addition to financial performance. This study therefore provides a review of environmental reporting practices by companies in Nigeria; assess current research status, prospect and future direction with implications for chartered accountants. This was with a view to shedding more light on the development and implementation of environmental accounting and reporting in Nigeria. The results found an absence of a standardised guideline and a lack of commitment towards environmental reporting system in Nigeria which has resulted in haphazard disclosure of environmental data; a deficient corporate environmental reporting that is not of international standard to satisfy the information needs of various classes of shareholders; and a failure of organisations to recognise the economic value of natural resources as assets as well as the business and financial value of good environmental reporting. Additionally, the study found out that the volume and quality of published research on environmental accounting in Nigeria is low and the methodology is largely descriptive in nature. Majority of the studies are focused on the oil and gas sector to the neglect of other industries. The study concluded that there is a need for measurement system that will assess industries' impact on the environment and organisations should disclose their environmental performance to stakeholders as part of the discharge of their stewardship function.

DETERMINATION OF INFANT MILK INTAKE AND MOTHER'S BODY COMPOSITION IN BREASTFEEDING MOTHERS FROM ILE-IFE, USING STABLE ISOTOPE TECHNIQUE

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We have determined milk intake and lactation performance in 20 baby-mother pairs from Ile-Ife using the 'gold standard' technique for such measurements – the deuterium-dose-to-mother technique, currently being promoted by the International Atomic Energy Agency (IAEA), Vienna. Ages of the mothers recruited into the study ranged from 19 – 32 years while those of the babies ranged from 1 to 10 months. Thirty milligram of sterile deuterium oxide was orally administered to each mother irrespective of body weight; and saliva samples were obtained from both mother and baby over a two-week period on days 0, 1, 2, 3,4, 13 and 14 following the dose. Deuterium enrichment in saliva was determined using Fourier-Transform Infra Red spectrometry at the Centre for Energy Research and Development of our University, with deuterium being determined in the FTIR spectra in the range 1800–2800 cm^{-1},. An IAEA-supplied software, Isotope.exe, facilitated the accurate determination of deuterium peaks at low enrichment levels. The transfer of deuterium from mother to baby through milk intake was modeled by a multi-exponential function, and the simultaneous solution of this function with the mono-exponential decay of deuterium from mother body pool was achieved using the SOLVER function in Microsoft Excel environment though a customized Spreadsheet supplied by the IAEA. Reasonable adjustments to justify assumptions used in the model were effected as recommended in literature. Average milk intake over two weeks in the babies ranged from 387 to 1045 g/day. There was a significant inverse correlation ($p<0.02$) between Milk intake in babies and the percentage body fat of mothers. Water intake from other sources apart from human milk (reflecting exclusiveness of breastfeeding in these babies) ranged from nil to 420g/day in the same period. These figures not only provide accurate data on these important nutrition parameters, but they could be used together with other figures to determine levels of nutrients and pollutants transferred to babies both through breast milk and non-breast milk sources. Comparison is made with results from Zamfara state and Ethiopia using identical technique.

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Exposure Assessment of Breastfed Infants to Lead, Mercury, and Selenium in Three Gold Mining Areas in Nigeria

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ABSTRACT

Mercury and lead are the key elements associated with neurotoxicity, and infants are the most susceptible sub-population. Selenium is known to moderate the toxic effects of both elements. In this work, we have evaluated the exposure of babies to lead, mercury, and selenium through breastmilk intake in some gold mining areas of Nigeria.

One hundred and six volunteer Mother-Baby pairs were recruited from three communities with different levels of gold mining activities in Nigeria. These comprised of twenty-seven pairs from Yargalma, Zamfara State, NW Nigeria (one of the villages at the epicenter of one of the world's worst lead pollution cases reported in recent history); thirty-one pairs from Iperindo in Osun State, SW Nigeria, (a city with a history of very extensive gold mining in the past, but now with only pockets of on-going artisanal gold mining); and forty-eight pairs from Ile-Ife, Osun State, a city with long history of artisanal gold mining.

In the first aspect of the study, levels of Pb and Se in the breast milk samples from all 106 mothers were determined using ICP-MS while Hg levels in the same samples were determined using an AAS-based Direct Mercury Analyser, In the second aspect of the study, carried out on the subjects from Ile-Ife, breast milk intakes in babies were determined over a two-week period using the deuterium dose-to-mother stable isotope technique currently being promoted by the International Atomic Energy Agency, Vienna. This involved the oral administration of 30g of sterile deuterium oxide to each mother, and the monitoring over two weeks the transfer of deuterium to her breast-fed baby. The monoexponential decay of deuterium in mother's body pool and its subsequent appearance in the baby's pool were monitored via saliva samples collected from both mother and baby on days 0, 1, 2, 3, 4, 13 and 14. Deuterium enrichment in saliva samples was determined by FT-IR spectrometry.

For babies from Ile-Ife, exposure evaluation was carried out by directly combining elemental levels in mother's milk with baby's intake of milk. For the other two locations, assuming that babies' milk intakes are similar as for Ile-Ife babies, exposure evaluation was based on combinations of highest and lowest intake values (from Ile-Ife) with highest and lowest elemental levels measured in milk at each location. Thus, at Ile-Ife, the daily exposure of babies to lead, mercury and selenium was evaluated as ranging from 0.11 – 0.65 μg/kg b.w., 0.03 – 0.48 μg/kg b.w., and 1.37 – 9.20 μg/kg b.w. respectively. At Iperindo and Yargalma, respectively, the values were 0.06 – 2.34 μg/kg b.w. and 0.13 – 22.6 μg/kg b.w. for lead; 0.01 – 0.28 μg/kg b.w. and 0.01 – 0.23 μg/kg b.w. for mercury, and 0.88 – 29.8 μg/kg b.w. and 0.38 – 10.2 μg/kg b.w. for selenium. Compared with the benchmark dose for lead

suggested by the European Food Safety Authority for developmental toxicity in infants (0.50 μg/kg b.w.) and FAO/WHO daily tolerable intake of 0.57 μg/kg b.w. for mercury, it can be concluded that the intakes of these two neurotoxic elements by babies through breastmilk do not constitute excessive risks at Ile-Ife and Iperindo. Mothers from Yargalma may however require personalized counseling to keep intakes of lead within acceptable risk limits while optimizing the well-established benefits of breastfeeding.

Correlations Between Trace Elements In Blood And Some Physiological/Biochemical Parameters Are Influenced By Nutritional Status.

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Abstract

This work determined the levels of As, Cd, Cu, Hg, Pb, Se and Zn in the blood of sixty-two Nigerian women roadside workers in Ile-Ife using Inductively-coupled plasma Mass Spectrometry (ICP-MS) and Direct Mercury Analyzer, and investigated the correlation of the toxic metal levels with some physiological / biochemical parameters in the subjects. Body fat was estimated using bioelectrical impedance and isotope dilution methods. The results showed that arsenate correlated ($p \leq 0.05$) with Total Cholesterol (TC) and Plasma Creatinine (P.Cr) in underweight subjects, P.Cr in obese subjects, and with Creatinine Clearance and Urinary Creatinine in all the subjects. Cd correlated with Low Density Lipid–Cholesterol (LDL-C) and TC in underweight, waist and waist/hip ratio in overweight, and Packed Cell Volume in obese subjects; while Hg had a high correlation factor with LDL-C in overweight, and Triglycerides and TC in obese subjects. These indicated that interactions between trace elements and these parameters are influenced by the nutritional status of the individual subjects and could possibly provide a basis for altering the susceptibility of people to toxic elements.

Keywords: Correlation, Blood Trace Elements and Nutritional Status

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Correlations Between Toxic and Essential Elements in Blood and in Milk of Female Residents of a Lead Contaminated Community in Zamfara State, Nigeria

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ABSTRACT

Occurrence of lead poisoning associated with gold mining and processing was reported around March 2010 in some communities of Zamfara state, Nigeria leading to hundreds of fatalities, especially among children. We have evaluated the levels of lead and other elements (both toxic and essential) in human milk and whole blood samples obtained from 27 subjects at the village of Yargalma, in Anka Local Government Area of Zamfara State. Elemental analyses were carried out at the Josef Stefan Institute, Ljubljana, Slovenia for determination of Pb, Cd, As, Se, Zn, and Cu by ICP-MS; and Hg by Direct Hg analyser.

The significant contamination of the environment leading to the reported cases of Pb-poisoning in Zamfara gold mines have been confirmed by elevated levels of Pb measured in samples of blood and human milk. The levels of Pb in blood ranged from 7.9–86.8 µg/dL (geometric mean 50.7 µg/dL) while levels of this toxic element in human milk ranged from 2–140 ng/ml (geometric mean 30 ng/ml). By comparison, the 'action level' for blood lead recommended by the US-CDC is 10 ug/dL while the WHO has previously reported a mean value of 4.1 ng/ml for lead in human milk from subjects from another part of Nigeria.

Correlations between pairs of elements could indicate association or interactions between such elements. In this work, Pearson product moment correlation coefficients were determined for all possible elemental pairs, both in milk and in blood. A mild correlation ($r = 0.373$, $p < 0.1$) was observed between levels of lead in milk and in blood. More elemental pairs with statistically significant correlation coefficients ($r > 0.388$, $p < 0.05$ or better) were observed in milk (13 pairs) than in blood (3 pairs). All the significant correlations in blood were negative, signifying competition/antagonism between the elements. The pairs involved are: Pb/Se, Pb/As, and As/Hg. Significant correlations were also observed between these same three pairs of elements within milk, but they are all positive correlations. Indeed all the 13 pairs of significant correlations observed in milk are positive. Antagonism was also observed between Pb in milk and Se in blood. Furthermore, a number of interesting correlations between elemental levels in milk and blood of mothers, and the age of mother and period after birth have also been demonstrated. Levels of the essential element Zn in both blood and milk of mother significantly correlate negatively with the time after parturition as is reported in the literature. Also, significant correlations between levels of some elements (Cu, Zn, Se and Pb) in milk were found with parity of the mother.

Correlations between elements and also with time periods as observed in this work give insight into the dynamics of these elements into milk; and could provide a basis for devising measures to reduce the susceptibility of babies to toxic elements ingested through human

milk intake in contaminated communities. For instance, these results show that higher levels of Se in blood is associated with lower levels of Pb in both blood and milk. Calcium is known to reduce the release of Pb from bones into blood - although its increased uptake is also known to lead to increase absorption of dietary lead. Dietary supplements of Ca has therefore been previously suggested for pregnant and lactating women as a way of achieving low blood Pb, and consequently low milk Pb. From the inverse association between blood Se and milk Pb in this study, perhaps a combination of Se with Ca supplement might result in more benefit than Ca ingested alone.

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Lead, Mercury, and Selenium in blood and milk of women of child-bearing age in Nigeria

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Lead and Mercury are the two most potent neurotoxic elements widely occurring in the environment, and children and babies are obviously the most vulnerable group to their toxicity. Blood Levels of these elements too low to have adverse effects in an adult pregnant woman might however lead to highly damaging effects in the foetus via placental transfer. Likewise, significant amount of the elements might be transferred to babies through breastfeeding. Selenium is known to play major modifying role in the toxicity of the two elements. In this work, we report on the levels of Pb, Hg, and Se in blood and milk of women from three different regions of Nigeria with expected different levels of environmental contamination of Pb and Hg.

The subjects, one hundred and six in all, comprised of twenty-seven lactating women (aged 18 – 38 years) from the gold-mining community of Yargalma in Zamfara State, (NorthWest Nigeria); thirty-one (aged 18 – 50 years) from the once active gold-mining town of Iperindo in Osun State, (SouthWest Nigeria); and forty-eight (aged 14 – 41 years) from Ile-Ife, also in Osun State, with a history of only pockets of artisanal gold mining.

Determination of ultra low levels of Pb and Hg in biological matrices poses considerable analytical challenges. In this work, we employed the state-of-the-art ICP-MS method to determine Pb and Se, while Hg was determined in the same samples by an AAS-based Direct Hg analyser. Elemental concentrations determined in freeze-dried samples at Slovenia were converted back into elemental concentrations in fresh samples by using the wet-to-dry weight ratios previously determined for each individual sample during preparation, and average literature values for densities of breast milk (1.03) and whole blood (1.054). The accuracy of our methodology was confirmed by good agreements between our values and reference values for four reference materials used for quality control (Whole human blood PT-WB1, Whole Blood L-1, Spiked Skim Milk Powder (lower levels) BCR 150, and Whole milk Powder NIST 8435). The high precision of our measurements confirms that no external contaminations were introduced into the samples during collection, storage, and preparation.
The mean Blood Lead Levels (BLL) obtained reflected the observable/historic level of gold mining in the three regions. In Yargalma, BLL ranged from 7.9 – 86.8 µg/dL (geometric mean 50.7 µg/dL); in Iperindo 5.3 – 53.4 µg/dL (geometric mean 14.5 µg/dL) and Ile-Ife 3.6 – 37.9 µg/dL (geometric mean 9.6 µg/dL). The corresponding levels in milk were Yargalma (2 – 140, G.mean 45 ng/mL); Iperindo (BDL – 8.28, G.mean 17 ng/mL); and Ile-Ife (1.04 – 16.2, G.mean 2.4 ng/mL By comparison world-wide values reported for BLL ranged from 8 – 26.9 µg/dL and MLL from 0.0 – 41.1 ng/mL

Blood Mercury Levels were similar in the three regions: Yargalma , (0.8 – 4.5 ng/mL , Iperindo - (0.99 – 4.56 ng/mL , and Ile-Ife - 0.79 – 3.72 ng/mL. World-wide literature

values ranged from 0.6 – 59 ng/mL. In milk, the range for mercury levels (in ng/mL) were: Yargalma 0.2 – 72.1, Iperindo – 0.1 – 7.6, and Ile-Ife – 0.2 – 1.7. Worldwide reported values ranged from 0.64 – 257.1 ng/mL

Selenium levels, probably reflecting dietary intakes, were significantly lower in Zamfara than in Osun State. In blood the values (in µg/mL) were: Yargalma – 0.06 – 0.10, G.Mean 0.08; Iperindo – 0.13 – 0.41, G.Mean 0.20; and Ile-Ife – 0.13 – 2.8, G.Mean 0.21. Worldwide values ranged from 0.06 – 0.23 µg/mL. Corresponding values in milk (in ng/mL) were: Yargalma – 6 – 63, G.Mean 12.0; Iperindo – 13.7 – 184.3. G.Mean 33.8 and Ile-Ife – 10.3 – 54.4, G.Mean 22.2. Worldwide values ranged from 13.1 – 33.2 ng/mL.

At the high exposure region of Yargalma, blood Se was found to significantly correlate negatively with both blood Pb and Milk Pb, suggesting there could be a role for Se in regulating Pb levels in blood and milk. The picture of high Pb and very low Se makes the impact of Pb poisoning in Zamfara state particularly heightened. Levels of the elements Cd, Cu, and Zn also measured in the blood and milk samples were similar for the three locations.

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MANAGEMENT OF LEAD AND MERCURY IN THE NIGERIAN ENVIRONMENT – ISSUES AND OPTIONS

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It is generally recognized that toxic elements/heavy metals constitute the most serious persistent environmental pollutants in developing countries; and that women and children are particularly vulnerable (Nair G. et al.1994**)**. In our laboratory, we are currently developing a scientific platform to support policy formulation in the management of risks involved in human exposure to a mixture of lead, mercury, and their common antagonist, selenium, with special attention to identified susceptible, vulnerable and sensitive population subgroups in Nigeria.

Lead and mercury should be of particular concern in Nigeria on account of the peculiar historic/on-going exposure to them in the country. Before the eventual removal of tetra ethyl-lead from gasoline in Nigeria around 2003, there had been massive release of lead into the Nigerian biosphere over decades. Considering that lead has a half-life of about 30 years in its main storage compartment in humans (cortical bones), and that this is endogenously released in female subjects particularly during certain periods such as pregnancy and lactation (Gulson et al 1998), it is clear that lead must remain an element of special concern in Nigeria – unlike the USA for instance, where lead phase-out from gasoline had started by 1975 and concluded in 1986. As for mercury, due to hard economic realities, life-saving vaccines produced for use in developing nations, including Nigeria, are packaged as multiple-doses and must therefore be sterilized to prevent cross-contamination of subjects. To date, the medium mostly used for this preservation is thimerosal, a chemical containing 49.6% ethyl mercury. Again this practice has long been discarded in the developed nations like Europe and the United States.

In addition to these peculiar sources and pathways for lead and mercury in Nigeria, there are numerous other identified and yet-to-be identified sources including folk remedies, pottery and toys (for lead); and diet, dental amalgam fillings and energy-saving lamps (for mercury)!

In this work, we present and describe some illustrative results obtainable from the scientific platform we are currently building to help in the formulation of sound evidence-based policies to address the occurrence of lead, mercury, and selenium in the Nigerian environment, based on a risk-assessment and risk management approach. All the relevant parameters including exposure pathways and vulnerability/susceptibility factors are incorporated so the risk associated with exposure to these elements could not only be scientifically evaluated, cost-effective evidence-based actions relevant to identified at-risk population subgroups, could be devised to minimize the impact. The core of the platform is a Physiologically-based biokinetic model describing the Absorption, Distribution, Metabolism and Elimination of the 3 elements of interest (with their interactions also modelled). The model is described in another presentation at this Conference.

REFERENCES

Gulson BL, Jameson CW, Mahaffey KR, Mizon KJ, Korsch MJ, Vimpani G. (1997). Pregnancy increases mobilization of lead from maternal skeleton. J Lab Clin Med 130: 51-62.
Nair G., Parr R.M., and Castelino J. (1994). Health and the Environment: Examining Some Interconnections. IAEA Bulletin Vol 4, pg 10 – 15. [Citing Nriagu J.O. and Pacyna J.P. Nature, Vol 3, 33 (May 1984)]

Development of a Human PBBK Model for the Mixture of Lead, Mercury, and Selenium.

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While lead (Pb) and mercury (Hg) are known to be toxic elements, selenium (Se) has been known to mitigate the toxic effects of both lead and mercury. However, in the health risk assessment of lead and mercury, their interaction with selenium is seldom taken into consideration. There is therefore the need for a model that will be capable of incorporating the interaction of these elements and predict simultaneously the absorption, distribution, metabolism, and elimination (ADME) properties of lead, mercury and selenium in target tissues.

We have developed physiologically-based biokinetic models for predicting simultaneously the ADME properties of lead, mercury, and selenium in a number of target tissues of humans, for three population groups, namely, women of child bearing age (pregnant, lactating and non-pregnant-non-lactating), fetus, and infants/children (0 -5 years of age). This was done with the view of applying the model to environmental health risk assessment. For each of these elements, three independent models were developed for each population group, making a total of 9 models. These models were able to simulate reasonably the results of controlled experiments obtained from literature (O'Flaherty, 1993, Gearheart et al., 1995, Shipp et al., 2000).

The individual models were then integrated to facilitate viewing the interaction between these elements. The integration was done first in pairs (i.e. Hg/Se and Pb/Se) and then the trio of Hg, Pb, and Se (i.e. (Hg+Pb)/Se). Interaction among these elements affects the bioaccumulation of these elements in the respective tissues (Ralston et al., 2008), thus, altering their partition coefficients. Alterations in the partition coefficients of these elements were modelled by incorporating in the models modification factors derived from the result of the study conducted by Ralston et al., 2008 on rats. This enables the integrated models to simulate simultaneously the modulated concentration profiles due to the interaction of these elements. The modulated tissue concentrations were then used in a hypothetical health risk assessment of these elements.

Analyses and Distribution of various types of Cancers recorded in Ife-Ijesha Cancer Registry in the Five year period 2010 -2014

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In this preliminary work, we have retrieved and analysed the available data on cancer incidence from the Cancer Registry located at the Obafemi Awolowo University Teaching Hospital Complex (OAUTHC) Ile-Ife for the five-year period 2010-2014. Thereafter, the data were linked with the Hospital case notes of the subjects retrieved from the library of the Medical Records Department of the OAUTHC. This enabled us to link the records such as types of cancer (available at the Cancer Registry) with other records such as the residence, occupation, marital status, etc of the subjects, which are available only at the Medical Records Department..

The combined records of 830 subjects were exhaustively analysed using R-statistical package to describe the distribution of the various types of cancers among various demographic groupings, occupations, and geographical settings.

The prevalence of 6 types of cancers across the various local government areas in SW Nigeria were grouped into high and low regions. Ifedore (1 case) and Ondo East (3 cases) were classified as the Low Group, while Idanre (12 cases), Akure South (40 cases) and Ondo West (50 cases) were classified as the High Group. Subjects from Ile-Ife and immediate environs were not included in the analyses due to obvious bias introduced by proximity to the Cancer Registry. Overall the major types of cancers in SW Nigeria diagnosed at the Ife Cancer Registry were: Breast Cancer (27%), Prostate Cancer (12.3%), Cervical Cancer (9.5%), Liver Cancer (5.9%), Rectal Cancer (4.0%), Colon Cancer (3.4%), and Others (38%). Fifty-one percent of subjects with breast cancer were within 45 – 64 years age bracket. The figures for the other types of cancer were: Cervical (33% within 55-64 years), Colon (36% within 45-54 years), Liver (24% within 35-44 years), Prostrate (69% above 65 years), and Rectal (52% within 45-64 years). The modal interval for other unclassified types of cancers was 45-54 years, representing 23% of the subjects with those cancers. It is hoped that these preliminary data will stimulate more interests in the possible influences of geographical location and the physical environment on the aetiology of cancer.

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Environmental Factors and Cancer Prevalence in SW Nigeria. Part I: Impact of environmental radioactivity in soil, air, and water

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Studies have shown that exposure to ionizing radiation can damage living organisms and cause health effects such as leukaemia and other cancers in humans. Background radiation levels representing contributions from cosmic radiation and radionuclides in the physical environment, vary with geographical locations. However, possible linkages between incidence of cancer at various geographical locations in SW Nigeria and the background radiation levels have not been reported. Therefore this study intends to correlate cancer incidence at patients region of residence, with both activity concentration of naturally-occurring radionuclides in soil and water, and total gamma radiation dose in air, at five local government areas in SW Nigeria with varying prevalence of cancer.

The SW region of Nigeria was classified into five class-interval groups of registry reported incidences of cancer using geo-spatial technique. Five cities/villages were randomly chosen from each of these Local Government Areas representing each class-interval of incidence, for sample collection. At each city/village, five soil samples and five potable water samples (underground and surface water) were collected and taken to the laboratory for evaluation of gamma radioactivity. Furthermore, a survey meter was used at the point of each sample collection to determine the gamma dose rate in air, attributable to background radiation comprising of both cosmic radiation and radioactivity from soil. Each sample of soil and water was packaged and sealed for a minimum of 28 days to allow the attainment of secular equilibrium among the various daughter radionuclides. Gamma spectrometry was carried out in our laboratory at the Department of Physics and Engineering Physics of the Obafemi Awolowo University using a CsI(Tl) detector and a custom-made Pb-shielding array. Soil samples were counted for 10 hrs while water samples were counted for 100 hours. Radioactivity in samples were evaluated by comparing areas from similar photopeaks in Soil Standard ENV940084 from Rocketdyne Environmental Laboratory.

In our preliminary evaluations of the results, we have collapsed the five class intervals of cancer incidents from geographical locations into two groups, Low and High. For the low region, class mean for K-40 was found to range from 135 Bq/Kg to 169 Bq/Kg while for the high region it ranged from 202 Bq/Kg to 273 Bq/Kg. Similar results for U-238 are 26 Bq/Kg – 61 Bq/Kg for low-incidence region while 53 Bq/Kg – 117 Bq/Kg for the High-incidence region. For Th-232, gamma activity ranged from 5 Bq/Kg - 15 Bq/Kg for the low region and from 8 Bq/Kg - 28 Bq/Kg for the high region. This results suggest that, even at a screening level of investigation, level of gamma activity shows a relationship with incidence of cancers in the region of interest. More detailed analyses focusing on different types of cancers is on-going.

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Environmental Factors and Cancer Prevalence in SW Nigeria. Part II: Impact of toxic and essential elements in soil

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In this study, we investigated association between levels of essential and toxic elements in soil and prevalence of cancer in SW Nigeria, based on data collected from the Ife-Ijesa Cancer Registry, and the Medical Records Department of the Obafemi Awolowo University, Ile-Ife. Same soil samples collected from locations from SW Nigeria as already described in Part I of this paper were also subjected to elemental analyses using the Energy-dispersive X-Ray Fluorescence facility at the Centre for Energy Research and Development of the Obafemi Awolowo University, Ile-Ife. The elements K, Ca, Ti, V, Cr, Mn, Fe, Ni, Cu, Zn, Rb, Sr, Ba, Pb and Th, fifteen in number, were analysed using K- and L-x ray lines. These were compared with IAEA Soil Standards for evaluation of elemental concentrations. The results for the elements are discussed in terms of regions of Low and High Prevalence of 6 types of Cancers.

This study is supported in part by the LivingScience Foundation.

Determination of electromagnetic radiation levels from Cell phones and GSM Towers and Masts in Ile-Ife

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There has been considerable interest and discussion on the possible adverse health effects of non-ionizing radiation, such as is emitted by telecommunication masts and cell phones. However, the more helpful question should be striking a balance between the obvious several benefits of non-ionizing radiation-emitting devices and possible deleterious health impacts. This study investigates the levels of microwaves radiation associated with Global System for Mobile Communication (GSM) at Ile-Ife. It also evaluates human exposure to this radiation and potential impacts on human health.

Using an electrosmogmeter, the instantaneous electric field $\vec{E}$, average maximum of electric field $\vec{E}_{max,av}$, instantaneous power density ($\vec{\delta}$), and average maximum power density $\vec{\delta}_{max,av}$, of microwave radiation were measured around thirty-two GSM masts in Ile-Ife. A minimum of eight measuring points (with their Global Positional System – GPS coordinates recorded) were chosen around each of the masts. Contour maps of the magnitude of these variables at Ile-Ife were thereafter produced using ARCGIS 10.1 software. Furthermore, the same four radiation parameters were measured in four different cell phones (a new Nokia 5130, a 3-year old Nokia 1280, a new Nokia 1280, and a Techno) under various operating and signal receptivity conditions. Finally, questionnaires were administered to 1,000 GSM phone users in Ile-Ife to characterize their usage of phone, thereby estimating their exposure to electromagnetic radiation due to GSM phone.

The results show that in Ile-Ife, $\vec{E}_{max,av}$, ranged from 57 – 480 V/m, the $\vec{E}$ ranged from 85 – 566 V/m, the $\vec{\delta}_{max,av}$ ranged from 25 – 448 μW/m^2 and $\vec{\delta}$ ranged from 527 – 2,106 μW/m^2. The lowest value was at Adegoke area with $\vec{E}_{max,av}$, ranging from 9 – 281 mV/m, $\vec{E}$ ranging from 85 – 285mV/m, $\vec{\delta}_{max,av}$ ranging from 0.1 – 217 μW/m^2 and $\vec{\delta}$ ranging from 0.2 – 225 μW/m^2. Unfortunately, the maximum values were at the OAU Teaching Hospital (around the Male Surgical Ward) with $\vec{E}_{max,av}$, ranging from 145– 708 mV/m, $\vec{E}$ ranging from 173 – 798 mV/m, $\vec{\delta}_{max,av}$ ranging from 65 – 1,361 μW/m^2 and $\vec{\delta}$ ranging from 96 – 1811 μW/m^2.

For the cell phones, $\vec{E}_{max,av}$, ranged from 0.9 – 199 mV/m, $\vec{E}$ ranged from 13 – 20 mV/m, $\vec{\delta}_{max,av}$ ranged from 0.1 – 81 μW/m^2 and $\vec{\delta}$ ranged from 86 – 989 μW/m^2. Phone brand and signal strength significantly affected the radiation outputs from the cell phones. At sites with good signal strength, maximum power density ranged from 86 mW/m^2 for Techno phone to 920 mW/m^2 for Nokia N1280. With poor signal strengths, Tecno phone still had lower power density, but the relative increase was more than the relative increase from the Nokia phones. The age of the Nokia phones did not affect their power outputs.

Though radiation output values obtained in this survey show that the cell phones are in compliance with standards set by bodies like ICNIRP, USEPA, ANSI/IEEE and NCRP, it is noted that such standards were based on thermal effects only. Several non-governmental bodies have persuasively shown that other non-thermal effects are important and should be considered in setting guidelines on exposure to microwave radiation.

Determination of toxic and essential elements in soils, drinking water, and saliva samples from a lead-polluted gold mining village in Zamfara state.

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We have determined the trace elements profile in water, soil, and saliva samples from Yagarma village as part of our characterizing the trace elements profile in the village during the 2010 reported Pb-poisoning incident.

Soil and water samples were collected using our usual protocols. Saliva samples were collected from 28 nursing mothers and their babies. . Saliva samples in mothers were obtained by having them expectorate in a vial, which was later centrifuged to obtain clear supernatants for analyses. For babies, saliva samples were obtained by repeatedly swapping their mouths with sterilized cotton wool, and the saliva squeezed out into sample collection vials using the plunger in hypodermic needles. The saliva samples were initially collected for assessment of breastmilk intake but they could not be used for that purpose due to challenges with other measurements needed for the determination. Since these samples provide invaluable biomonitors linking mother and child in a polluted environment, they were included as biomonitors for the community.

Soil samples were submitted for analyses by Atomic Absorption Specrometry at the Central Science Laboratory. Elemental analyses on water and saliva samples were carried out at the IITA following prior sample preparations at OAU. Two millilitres of sub-boiled nitric acid was added to each water sample for stability. Two hundred millilitres of water (filtered through Whatman filter No 41 where necessary) was evaporated off in a water bath at temperatures no higher than 70^{o}C to assure sub-boiling conditions. The residual was then digested with 10 ml of sub-boiled nitric acid using our 23 mL Parr digestion bombs in a microwave oven. At 900 W power level, digestion was accomplished in 45 s. The digested solution was then made up to 20 mL with sub-boiled water and presented for ICP-AES analyses at the International Institute for Tropical Agriculture (IITA), Ibadan, Oyo State, Nigeria. A similar protocol was followed for saliva samples.

The ICP-AES facility was optimized for the detection of Pb, Cd, As, Se, Zn and Cu in both saliva and water samples. Aqueous solutions spiked with known amount of ICP lead standard were also submitted blind (labeled as normal samples) to the laboratory for analyses to provide a basis for judging the accuracy of the analyses for Pb, which was the element of primary interest.

Elements consistently found in the saliva samples of both the babies and mothers groups are: Al, As, Na, Ni, and P. The elements Co, Fe, Mg, Mn, Mo, and Zn were detected in babies' saliva samples but were below detection limits in mothers' samples. On the other hand, Se and Cd were detected in mothers' saliva samples but not in the babies'.
Arsenic in mothers' samples correlated very significantly ($p<0.01$) with Mn in babies samples.**Aluminium in mother's samples correlated with As in babies ($p<0.05$) and also slightly with P in babies ($p<0.1$). Similarly Mg in babies correlates significantly ($p<0.05$) with Cd in mothers' saliva, and marginally ($p<0.1$) with Selenium in mothers.**

Results of the levels of Pb, Cr, Cd,and Ni in 5 water samples and 9 soil samples from Zamfara villages are shown in Table 12. The results confirm high levels of Pb in the samples. Only lead was detectable in the water samples, while Pb and Cr featured in the soil samples. The levels of Pb in the contaminated soil samples, ranging from 150 ppm (at a residence) to 21,100 ppm (at the Processing Mills) are significantly higher than values in IAEA Soil 7 and from the uncontaminated soil being used for remediation at Dareta. The fair accuracy of these results is shown by the values obtained for IAEA Soil -7 for Cr and Pb (76 ppm and 15 ppm respectively), which compares fairly with the certified values of 60 ppm for both elements. Also the precision of the lead values in duplicated samples (DW2A and DW2B, DS1B1 AND DSIB1-2, AND DS1A AND DS1C) is quite fair. The threshold recommended by the US EPA for lead soil levels before remediation is indicated is 400 ppm.

Calibration of a Bioelectric impedance Facility for body composition determination Using the Isotope dilution technique

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The determination of %body fat is very important as it is a major predictor of several important diseases. The "gold standard" procedure for the assessment of body fat is the Isotope Dilution (ID) method, but it is too rigorous to be practiced as a routine protocol. The Bioelectric Impedance Analysis (BIA) method provides a potentially powerful alternative to clinical determination of body fat. It involves the determination of the electrical impedance of the body, taking advantage of the enormous difference in the impedance Z of fatty and non-fatty tissues. However, most commercially-available BIA equipment operate as "black boxes", converting the measured bio-impedance to body fat using undisclosed equations which have been designed specifically for some undisclosed population. Furthermore, BIA results would need to be calibrated before they could be freely compared with measurements from different conditions and methods.

In this study, we have on one hand used a reverse procedure on the parameters Age, Height, Gender and weight to obtain an equation that allows us to determine the actual values of impedance measured by a Tanita BIA scale from the displayed BF values. This was achieved by setting up a total of 300 experimentally-obtained data points, with Z as the unknown, which were fitted to the corresponding displayed values of BF. The Mathematica 8.0 software was used for the least-square fittings. For the actual calibration of our BIA equipment using the ID method, 20 mg of sterile 99.9% deuterium oxide, D_2O was orally administered to twenty five Nigerian women volunteers. Total Body Water in the subjects was assessed using saliva samples. 4 ml saliva sample was collected from each subject before the ingestion of the D_2O dose and another sample 4 hours post dose, after which equilibration of D_2O in body water is assured. Enrichment of deuterium in the saliva samples were determined by Fourier Transform infrared spectroscopy using the vibrational band produced by deuterated water between 2400 and 2600cm^{-1},in the infrared region of the spectrum.

Total body water and consequently %BF was determined using well established assumptions. %BF so obtained were fitted with values obtained for the same individuals by the Bioimpedance method, using the SPSS statistical package. A high regression coefficient (R^2 = 0.925), low Standard Error (3.5774), Pure Error (3.1187) and Root Means Square Error (3.2079) confirm the goodness the fit. Thus, "gold-standard" quality body fat measurements, can now be obtained routinely with this calibrated equipment.

Key words: Body Composition, Bioelectric impedance, Isotope dilution method. Calibration
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Keywords: Calibration, Body Composition, Bioelectric Impedance, Isotope Dilution method.

ANTHROPOMETRY BASED PREDICTIVE EQUATIONS FOR ESTIMATING NIGERIAN WOMEN PERCENTAGE BODY FAT USING STABLE ISOTOPE TECHNIQUE AS REFERENCE

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Abstract

Determination of body composition is required in several settings, ranging from clinical assessment of individual subjects to screening of thousands of subjects, as may be required for instance by the military for recruitment or promotion exercises. The direct and accurate measurement of body composition involves considerable challenges requiring complex sets of measurements over extended periods. Based on costs, time, and complexity, such methodologies can hardly be employed in routine settings. It is useful if some more-easily deployed methods are calibrated by a reference method, for routine applications.

In this study, we first calibrated our Tanita bioelectric impedance body composition analyser by using it to record the body composition of Nigerian women, whose body composition was also determined by the more rigorous Isotope dilution method, which is the "gold standard" technique for such measurements. A simple regression equation to convert the reading from the equipment (previously calibrated for non-Nigerian subjects by the manufacturers) was thus obtained. Next, the calibrated bioimpedance equipment was used to measure body composition of 173 Nigerian women of child-bearing age (aged 18-55 yrs). At the same time, certain anthropometric body circumferences and skinfolds were determined in the same subjects and equations for determination of body composition based on anthropometry were obtained based on correlations between the calibrated bioimpedance facility and the anthropometry parameters.

Skinfold thicknesses at the biceps, triceps, subscapular, suprailiac and abdominal were measured using Lange Callipers while body circumferences at the forearm, wrist, waist, abdominal and hip were measured using a standard tape rule and in accordance with WHO guidelines.

Using forward selection regression procedure, three sex-specific based predictive equations for estimating %BF (incorporating subjects' weight and body circumferences such as hip, abdominal and waist) were developed based on the subjects' ethnic groups (Yoruba, Hausa and Ibos) with high R^2 (0.853, 0.953 & 0.867) and low Pure errors (3.316, 2.791 & 2.324) respectively. These equations provide easy way of measuring percentage body fat and are recommended for use in clinical or epidemiological settings in populations with similar ethnic background and in lieu of isotope dilution method.

The subjects' percentage body fat (%BF) ranges from 8.02 to 48.52. Generally, at 0.01 level of significance (Using Statistical Package for Social Scientists (SPSS), higher positive significant correlations were obtained between % BF by ISD and body circumferences (r=0.503-0.874) than skinfold thicknesses (r=0.503-0.739)

Bioavailability of Pb, Cd, Cu and Zn from Foods from the Jos Plateau

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To determine the fraction of the trace elements content of food that is actually available for uptake into the blood stream, we simulated the digestive process in the human stomach and gut for the toxic trace elements Pb and Cd; and for the essential trace elements Cu, and Zn in eight of the major food and diet items consumed on the Jos Plateau, Nigeria.

Total and bioavailable levels of the essential elements Cu and Zn were determined from Dankali, Soya beans, Acha, Maize, Millet, Groundnut, Riziga and Berom Yam, obtained from reclaimed tin mining sites on the Jos plateau of Nigeria Total mineral levels were determined after acid digestion with Nitric and Perchloric acids, while the bioavailable mineral levels were determined after in vitro enzyme digestion under simulated physiological conditions. Quantitative determinations of the elements were carried out using a Flame Atomic Absorption Spectrometry system at the Central Science Laboratory of the Obafemi Awolowo University, Ile-Ife. Maximum available Zn was found in Acha (14.3 ± 6.0%) while maximum available Cu was found in Maize (6.9 ± 2.1%). Furthermore, we were able to determine that dried Dankali (sweet potato) has the lowest bioavailability for Pb and Cd (below detection limit, and 2.2% respectively). Maximum bioavailability for Pb was found in Groundnut with 73.3% and that for Cd was found in Maize with 38.5%.

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Perceived Health Influence of homestead sanitation among people in Mowe, Ogun State

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Healthy living environment is good while enhancement of this starts from homes, to prevent environmental face-lifting, homestead as a significant source of waste needs undefiled sanitation attention. This study examined the health influence of homestead sanitation among people in Mowe. The descriptive survey research design was used for this study. The population for the study is all people dwelling in Mowe. Residence Pattern was used as a criterion to stratify the study location into 2 groups (Strata) i.e. Estate (Western homestead) and indigenous homestead. 250 respondents were randomly selected from each homestead to make the total number of five hundred (500) respondents for the study. A descriptive survey research design utilizing a self-structured Likert type questionnaire titled Homestead Sanitation Health Influence Questionnaire (HSHIQ) with a reliability index of 0.75 was used for the study. Data collected were analyzed with inferential statistic of chi-square, to determine the acceptance and non-acceptance of the hypotheses formulated at 0.05 alpha level. The three (3) hypotheses formulated by the researcher were tested with chi-square statistical method, the hypotheses were accepted. The data analysis revealed that the poor homestead sanitation pattern and poor home based sanitation were perceived among the homesteads while Health influence of poor homestead sanitation was perceived as same among the homesteads therefore disease like Malaria, Typhoid, Diarrhea and Dysentery still prevail at high incidence are in Mowe. Therefore, the researcher made some recommendations which includes: The government should ensure that environmental laws are made effective by the appropriate law enforcement agents, the health workers should also examine the effectiveness of the environmental sanitation exercise all the time, there should be a constant house to house inspection of conveniences like toilet and kitchen, layout of the homestead should be properly guided by the government, constant refuse collection should be ensured by both the government and nongovernmental organization.

Keywords: Sanitation, Homestead Sanitation, Health Consequences

Radioactivity In Some Foods And Soils From Jos Tin Mines, Nigeria

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The commercial deposit of casseterite (as well as some monazite and zircon) on the Jos plateau of Nigeria has led to extensive tin-mining activity in that region, for well over a century. However the peculiar temperate climate and arable soil associated with the plateau has also made it one of the major food baskets for the whole country. Such extensive farming on mineral-rich soil could result in the transfer of radionuclides into the food chain, in excess of safe limits. To provide an assessment of this situation, the radioactivity in six common food samples, together with six soil samples and two other environmental samples from the Jos Plateau were evaluated by low level gamma spectrometry. Soil samples were counted for 10 hours each on a Na-I (Tl) detector, while the food samples were counted for the same length of time using a high purity Ge detector. Camberra S100 software was used for data analyses. Specific activities of the naturally-occurring radioactive series U-238, Th-232 and K-40 were determined, after the achievement of secular equilibrium, using gamma lines from Ra-226, Ra-228 and K-40 respectively. The effective dose equivalents due to each radioactive series in the food samples were estimated using effective dose conversion factors, and food consumption rates suggested by the International Atomic Energy Agency as well as those obtained with locally-administered questionnaires for comparison. For all but one sample, these were well within the maximum permissible level of 1 mSv/yr limit. The exception was dried maize for which an effective dose equivalent of 1.29 mSv/yr was recorded.

Financial support from the IAEA through RC 11925 is acknowledged.

DESIGN, CONSTRUCTION, AND EVALUATION OF A CLEAN ROOM FOR BIOLOGICAL TRACE ELEMENTS RESEARCH

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There is a vast number of vital applications where it is mandatory that levels of chemical elements existing in the range of parts-per-million or less be accurately determined in the bulk matrices of interest. Of such applications, the field now recognized as Biological Trace Elements Research (BTER), involving the determination of these so-called trace elements in matrices of biological origin is probably the most challenging. The applications in this case span such fields as medicine, nutrition, agriculture, environmental studies, ecology, etc. Often, the analytes to be measured in samples for BTER occur at much higher levels in the laboratory environment or regular reagents than in the sample of interest itself. Careful attention must therefore be invested not only into the analytical methods and instrumentation, but also in the initial sample preparation protocols and facilities. In this report, we present details of the design and performance of the various units providing airlock, HEPA-filtered clean air and also ultra pure acid and water (produced by sub-boiling distillation), in the Clean Room for BTER in the Department of Physics and Engineering Physics at the Obafemi Awolowo University, Ile-Ife.

Dust being the single most significant item contributing to inorganic contamination, the primary design consideration in Clean Rooms, is the provision of a hierarchical arrangement of clean facilities starting with the Regular Laboratory region to the Clean Room region. In our facility, an Air lock is used to present both physical and psychological buffer between these two regions. Our physical Clean Room (3.15m x 3.12m) is further delineated into two regions – Region A which includes the door region, the water sink and the hood hosting the Acid distillation unit; and Region B which comprises essentially of a 1.50m x 0.49 m workbench situated directly under the HEPA-filtered air . The air lock comprises of two corridors set at right angles with a 1 horse power air extractor located at the 90^{o} bend, preventing flow of air from the regular laboratory space into the Cleaner regions. Furthermore, the two doors (between regular laboratory and air lock, and between air lock and Clean Room) both open outwards from Cleaner region to less clean region to maintain a positive gradient for the flow of HEPA-filtered air. The Clean Room is designed into existing laboratory facility, and one side of the walls includes large glass windows which are permanently sealed up, but which provide natural lighting in addition to electric lights installed. Metallic materials are carefully excluded from the Clean room as much as is possible, and the ducts, walls, ceiling, and floors are designed to minimize any inorganic contamination

To evaluate the effectiveness of the facility, our Gent Stacked Filter Unit (PM_{10}) sampler was used to collect the particulate matter from different regions of the Clean Room (near the door/sink, at the hood, and on the sample preparation table, directly under the HEPA filtered air inlet). Air samples were also collected from other laboratory and office spaces outside the Clean Room. Under typical operating conditions ($20^{o}C$ and 161.3 Kpa) the Sampler is able to separate the air particulates into two size fractions – the coarse fraction comprising of particulates with aerodynamic diameter of greater than 2 microns and the fine fraction comprising of those with aerodynamic diameter of less than 2 microns. Typically, sampling was done at a flow rate of 15-16 litres per minute for 4 hours

To guarantee a regular supply of ultra pure acid needed for digestion, we have acquired an acid sub-boiling distillation unit. The same unit is used to produce ultra pure water, with the feed water coming from regularly distilled water that has been passed through our Elgastat de-ioniser and purification unit. Other facilities available in the lab include a Microwave based acid digestion system with 23mL Parr teflon bombs, Certified BCR and NIST reference materials.

Preliminary investigations of lead dynamics in blood and milk of lactating Nigerian subjects

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After decades of extensive use, Nigeria switched from leaded gasoline to unleaded in 2003. Consequently, significant decline in blood lead levels have been reported in the country. However while this has considerable positive implications for health, most of body lead is stored in the bones, and these compartments respond much more slowly to removal of exogenous lead, with half life measured in decades. Rapid turnover from these storage sites is however associated with pregnancy and lactation; and thus could pose considerable health risk to that segment of human population that is most susceptible to lead – fetuses in the womb and breastfed babies.

In this study, we have used Inductively-Coupled Plasma Mass Spectrometry (ICP-MS) to compare levels of lead (and the essential elements copper, zinc and selenium) in the blood of 48 lactating women in Ile-Ife, Nigeria with 62 non-pregnant, non-lactating women of comparable social-economic status in the same city. Furthermore, determination of these elements in the blood and milk of ten of the lactating women was repeated after four months to check the dynamics of lead in maternal blood and milk during lactation. Average Blood Lead Level for non-lactating women was 6.81 ± 2.61 µg/dL while that for lactating women was 9.65 ± 4.77 µg/dL. Blood levels of copper and zinc are similar in the two groups, but that of selenium is lower in the lactating women (0.2 ± 0.04 versus 0.4 ±0.2 µg/mL). The gross average for blood lead in ten lactating women changed from 9.82 (±1.71) to 8.81 (±2.1) µg/dL 4 months after; while milk lead changed from 2.9 (±1.5) to 2.8 (±1.5) ng/mL in the same period. In this preliminary report, the influence of confounding factors (such as mother's age, parturition, and parity) affecting the volume, availability and general dynamics of lead in individual subjects has not been considered. Data from these ICP-MS determinations are being used to calibrate a kinetic model for lead dynamics in blood and milk of Nigerian women, which we are currently developing.

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Key words: ICP-MS, blood lead, milk lead, Lead Kinetic Model

Study of gamma radioactivity in soils from some Mines from Nigeria – radiological and forensic potentials.

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In the famous case of Boy Adam, trace elements contents of remaining diet in the gut of a murdered headless corpse was used by detectives in London to identify the victim as having come from Edo state in Nigeria. Another popular way of using stable and radioactive elements in forensic analysis is the identification of the origins of ivories and other materials in East Africa, to combat poaching of wildlife from Games Reserves. All these applications require that unique signatures of various locations, reflected in unique relative abundance of the stable or radioactive elements, be established via prior baseline measurements. Where such characteristic signals are based on radionuclides, it also allows the evaluation of possible radiation risk associated with the radioactivity.

In this work, we present gamma ray spectra obtained from various mines in Nigeria, viz, Awo, Ikogosi, Ile-Ife, Iseyin, Jos, and Zamfara. Csi based hamma spe specialised shieldimg

The spectra are fairly distinct enough to characterize samples from these different locations.

Pterocarpus osun lectin: A Protein with Unique Physicochemical and Biological Properties

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Lectin is a carbohydrate binding protein/glycoprotein which agglutinates or precipitate glycoconjugates and are known for their diverse biological roles.

A mannose/glucose-binding lectin was purified from the seeds of *Pterocarpus osun* and the physicochemical and biological properties determined. Potent hemagglutinating activity was detected in the phosphate buffer saline (PBS) extract of the *P. osun* seeds. The lectin specifically agglutinated erythrocytes of rabbit and did not agglutinate any of the human blood group and other animals erythrocyte used.

The hemagglutinating activity of the lectin was inhibited by mannose, α-D-methyl mannoside and glucose with minimum inhibitory concentrations of 1.56mM, 0.78mM and 3.12mM respectively. The lectin showed maximum activity over the pH range 3 – 9 and was heat stable up to 50^{o}C. EDTA had no effect on its hemagglutinating activity. Chemical modification tryptophan amino acid residues led to complete loss of hemagglutinating activity, while cysteine and arginine amino acid residues slightly affected the protein activity. The lectin strongly inhibited the growth of *Klebsiella pneumonia* and *Bacillus subtilis* while *Staphylococcus aureus*, *Pseudomonas fluorescens*, *Pseudomonas aeruginosa*, *Proteus vulgaris* were also inhibited. The lectin also showed hemolytic activity against human blood erythrocytes.

In conclusion, *P.osun* seeds lectin showed some unique properties of lectin when compared with other lectins from the same genera.

Characterization and Fabrication Of Dye Sensitized Solar Cell (DSSC)

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The aim of this study is to fabricate Dye-Sensitized Solar Cells (DSSC) based on some natural and synthetic dyes as the photosensitizers, using two different methods; Metal Organic Chemical Vapour Deposition (MOCVD) and the Doctor Blade Technique, to deposit the mesoporous semiconductor on our transparent conductive substrates, and to also determine several factors that might influence the long-term performance of the cells.

The natural dyes used were purchased from Ile-Ife Central market, while the synthetic dyes were synthesized in a laboratory at the Department of Chemistry, OAU, Ile-Ife, and the semiconductors were deposited on the glass substrates for use as the anode via the Metal Organic Chemical Vapour Deposition (MOCVD) and the Doctor Blade Technique also. The UV analysis of the Dyes were carried out using the UV-Visible NIR Spectrophotometer at CERD Ile-Ife, and the Department of Chemistry.

Majority of the dyes showed good absorbance in the visible region of the spectrum, while the black henna and black dye didn't. The DSSC prepared based on the natural dyes as photosensitizers showed the better photovoltaic performance, compared to those based on the synthetic dyes, and the importance of the Redox electrolyte and the counter electrode in the long-term performance of the cell was also established.

We concluded from the output photovoltages produced that the Doctor Blade Technique shows a better photovoltaic performance than the MOCVD method, and that the natural dyes can be used as adequate replacements to the more expensive Ruthenium based N3 dyes used by Gratzel.

COMPARATIVE STUDY OF THE EFFECTS OF ORGANIC AND CONVENTIONAL SYSTEMS OF FARMING ON CHEMICAL COMPOSITION OF PLANTS' FOODS

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Background information and objectives: The system of farming (organic and conventional) can affect the levels of chemical compounds in plants' foods and hence the health of the people that consume them. This study investigated the effect of farming system on the chemical composition of some selected plant foods.

Materials and methods: Questionnaires were administered to 180 respondents (10 farmers from 6 selected farm settlements) in Ekiti, Ondo and Osun states, Nigeria. The samples selected include tubers (yam and cassava), cereals (maize and rice) and vegetables (amaranthus and okra). The samples were diced, dried in an air oven at 40 ^{o} C and ground into powder. These samples were screened for phytochemicals compounds using standard method. Mineral elements (Zn, Fe, Cd and Pb) were determined using Atomic Absorption Spectrophotometer. Anti-nutritional compounds - oxalate by redox titration, tannin, phytate and total phenol (TP) were determined spectrophotometrically. Starch was isolated and used for amylose determination using spectrophotometer. Analysis of variance (ANOVA) was conducted on the data using SAS Software (SAS Institute, Cary, NC) and considered significant at 95 % confident level.

Results: The questionnaires revealed that about 47 % of the respondents practiced organic farming. The phytochemical screening showed that all the samples had anti-oxidant activity. The zinc content of all the organic food samples were significantly higher ($p \leq 0.05$) than in conventional. The level of iron varied between 0.12 and 5.31 mg / 100 g and amaranthus was the richest source of iron (2.60 - 5.31 mg / 100g) followed by Okra (0.46 - 2.88 mg / 100g) while yam and cassava recorded the least range (0.12 - 0.41 mg / 100g). Cadmium and lead were observed to be significantly higher in conventional samples. Oxalate for all the samples varied between 0.57 and 12.00 mg / kg and it was consistently significantly higher ($p \leq 0.05$) in conventional vegetables and maize. Phytate ranged between 0.42 and 11.39 mg / g for all the samples and was significantly lower ($p \leq 0.05$) in organic food samples. Tannin varied between 1.92 and 25.72 mg / g and was generally higher in organic foods. TP ranged between 3.04 and 76.56 mg / g and was generally significantly higher ($p \leq 0.05$) in organic samples. The starch content varied between 75.6 and 85.2 % and conventional plant foods were consistently higher in starch compared with organic. Amylose ranged from 113.7 to 204.7 mg / g (equivalent to 11.4 - 20.5 %).

Conclusion: It can be concluded that all the samples had anti-oxidant potential but vegetables (amaranthus and okra) had more comparatively. Organic system of farming accumulated lower levels of the toxic elements analyzed. The effects of location on the levels of the parameters analyzed did not follow a definite pattern. All the anti-nutritional compounds analyzed were not likely to cause any problem but caution should be taken when using okra as food.

Key words: Amylose; anti-nutrients; anti-oxidant; organic farming; phytochemicals
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Title: Case series report on the outbreak of food born disease caused by clostridium perfringens in Saburi 1 community, Abuja Municipal Area Council (AMAC), 2nd February 2016 in Nigeria.

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Introduction

Globally, increases in the incidence of foodborne illnesses often associated with outbreaks and food contamination raise international health concern. The situation is not quite different in Nigeria where populations are particularly exposed to contaminated environments, lack appropriate materials and reagents, equipment to adequately/timely report full data that will be use to estimate the burden of the disease. An outbreak of an unknown disease in a rural community in Abuja Municipal Area council, which was reported to the FCT public health department about children dying from unknown cause. Most of the children were presented with headache, fever, diarrhea, vomiting, abdominal pain and stooling. The symptoms lasted between 2-6 hours before death. The outbreak was laboratory investigated and was linked to the community source of water.

Method

Case series study was conducted. A suspected case was defined as an illness in a person who presented with combination of any three of the following fever, vomiting, abdominal pain, diarrhea, headache within the last 6 hours. A line-list of all the cases reported was made. Samples were taken from individuals with the signs and symptoms of the disease in Saburi I community and were taken to the laboratory for further investigation. Environmental assessment which included the source of water for the community (stream/borehole), drainages, and the surrounding areas within the community was done.

Result

20 cases were line-listed, out of which 14 (70%) died while 6 (30%) survived. The age-group most affected is 10-14 with 4 (20%) followed by 0-4 (10%), 4-15 2 (10%) and adult 2(10%). The least is in the aged group missing with 1 (5%). Females were affected the most with a total number of 14 (70%). Only urine and water sample showed growth on CLED and MacConkey agar. Microscopy showed; gram positive rods with terminal spores and the disease was diagnosed as *food poisoning due to clostridium perfringens*

Conclusion

Food poisoning due to *clostridium perfringens* that was acquired through water contamination was the cause of deaths in Saburi 1 community. It mostly affected children within the age group of 5-9. Awareness campaign at the community leader's house as well as at the community level was equally conducted.

Keywords:

CLED Cystine-Lactose-Electrolyte Deficient media

FCT Federal capital territory

Plasma activity levels of acetycholinesterase and lactate dehydrogenase among Farmers exposed and un exposed to pesticides in Oyo State, Nigeria

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Introduction: Population pressure in most developing countries including Nigeria has stimulated search for better methods of increasing food production. This involves the use of modern agricultural technology and pesticides. In agriculture, pesticides are widely used and their inappropriate application causes impairment (blurred vision, nausea, skin rashes etc.) in farmers. Although studies have shown that farmers are constantly prone to occupational risk due to pesticide exposure, understanding the relationship between exposure and corresponding impairment will help design health education intervention. This study was conducted to compare the plasma activity levels of acetylcholinesterase and lactate dehydrogenase in occupationally exposed farmers to pesticides

Method: This was a comparative cross-sectional study. A systematic random sampling procedure was used to select 70 exposed and 70 un-exposed farmers from reported usage among 320 members of farmers' association in Oyo State. A semi–structured questionnaire was used to collect information on socio-demographic characteristics, practices and some health effects of pesticide use. Five millitres of blood were aseptically obtained from all participants by venepuncture into heparinized bottles. The biomarker of pesticide exposure in blood (reduced acetylcholinesterase) was measured using high performance liquid chromatography while lactate dehydrogenase activity was measured using standard biochemical methods. Data were analysed using descriptive statistics and Student's t-test at 5% level of significance.

Result: The mean ages of the exposed and un-exposed farmers were 33.9±9.1 years and 33.6±9.2 years. The participants were all males and 52.9% Exposed Respondents (ER) and 61.4% Un-exposed Respondents (UR) were married. Majority (71.4%) of exposed farmers had no formal education while 34.3% of the un-exposed farmers had completed secondary education. More than half (60.0%) of ER had experienced pesticide spill on their bodies while spraying and 57.1% always experienced blurred vision after spraying based on reported usage in the last six months. Acetylcholinesterase levels were significant ($P < 0.005$) lower in ER (5.9±1.0 i.u/L) than in the UR (7.9±1.4 i.u/L) while lactate dehydrogenase activity level was high in the ER (429.09±37.13) when compared with UR (402.63±43.40), this was statistically significant ($P < 0.005$).

Conclusion: The significant reduction in acetylcholinesterase level and increased lactate dehydrogenase activity implies that the farmers have been exposed to pesticides. The use of personal protective equipment by farmers may reduce their exposure to pesticides.

Keywords: Pesticide exposure, Lactate Dehydrogenase, Acetylcholinesterase, Health effects

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Abstract Title: Analysis of Fuel Utilisation for Household Food Cooking in Kumbotso, Kano, 2011

Introduction: High cost of modern cooking energy and their cooking stoves are major constrains for household fuel preferences in many developing countries. For sub-Saharan Africa, wood energy provides most of the energy consumed. The depletion of forests is alarming despite many policies implemented to decrease household energy consumption and to substitute it by alternative conventional fuels. The study aimed to identify household energy utilisation pattern and factors associated with choice of energy source.

Methods: Cross-sectional study was conducted among adult men and women in Kumbotso Local Government Area between 2nd to 30th January, 2011. A semi-structured questionnaire was administered to collect information on socio-demographic and household energy utilisation. Data was analysed using Epi Info and SPSS.

Results: We interviewed 100 respondents, most were aged 31-40 years (40%), 60% were female, 45% were illiterate and the main occupation of households' heads was farming. 60% were in polygamous setting, majority (66%) used fuel-wood as energy source, 40% uses fuel-wood because it is cheap. The most abundant tree specie in the area was "Tsamiya" but 80% uses" Marke" as energy source. 50% of the respondents never planted a tree, 40% said lack of water was the main constrain for planting a tree. None of the respondents was willing to change to alternative energy source.

Conclusions: Fuel-wood is a cheaper source of energy especially for large families and most collectors do not plant trees, thus fuel-wood exploitation is unsustainable with resulting deforestation, desertification, erosion and loss of biodiversity. Government should provide cheaper alternative energy source, enforcement of deforestation and afforestation policies.
Key wards: Energy, wood, fuel, household, Kano

FUEL WOOD USAGE AND ENVIRONMENTAL POLLUSION REDUCTION IN SELECTED RURAL AREAS OF NIGERIA

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Abstract

The study examined policy options for fuel wood usage reduction through injection of solar PV usage for low wattage appliances in the rural energy mix. It assessed empirically the current status of Solar PV and other energy sources in selected rural villages in Nigeria. This was done with a view to quantified CO_2 emissions saved as a result of Solar PV intervention into the rural energy mix in the study areas.

Six remote villages that were pilot sites for national and foreign assisted solar electrification programs in the northern, western and eastern ecological regions of the country were purposively selected for the study. Three sets of questionnaire were administered on the Solar PV users, suppliers and government agencies. The first set was administered to 910 Solar PV users to elicit information on alternative energy sources (kerosene, petrol, solar panels, etc.) for provision of energy services such as lighting, ventilation and refrigeration. It also elicited information on technical, socio-economic and demographic characteristics of the users. The second set was administered to major Solar PV suppliers in the country, while the third set was administered to federal and state levels Solar PV regulators. The questionnaire elicited information on key policies impacting on widespread supply and utilization of solar PV to reduce fuel wood usage in the rural areas. Model for Analysis of Energy Demand (MADE-II), adapted for the study was used to carry out energy demand analysis. The output of the model then served as an input into the supply model MESSAGE-V (Model for Energy Supply System Analysis and their General Environmental Impacts) for optimizing the solar PV supply required to meet the desired demand and the associated environmental impacts.

The results showed that the current contribution of solar PV in the energy mix for the study areas was still very low in spite of various government interventions. Its utilization was limited to lighting services. Its usage level constituted an insignificant share of about 14% of the total lighting requirement and less than 2% of the total requirement for energy services in the study areas for the base year 2009.Whereas firewood usage maintained over 80 percent share in the total energy mix in the study areas. Which shows that fuel substitution policy for displacement of kerosene usage for lighting with solar PV, the fuel switches policy in favour of kerosene to displace firewood for cooking and the policy that promoted drastic reduction of firewood usage for cooking through substitution of 3-stone firewood stoves with improved firewood stoves managed to reduce firewood usage share in the total energy mix from over percent by 2004. Thus, the quantified CO_2 emissions saved as a result of solar PV interventions during the study, ranges from 0.1 to 0.7 tons per kilowatt-hour.

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Title: Trends and Determinants of Mortality from Congenital Malformations among Children Presenting at the National Hospital, Abuja, Nigeria

Introduction: Congenital abnormality is a major cause of childhood morbidity and mortality globally, with over half the deaths occurring in low income countries. Detecting birth defects in Africa is associated with challenges such as paucity of comprehensive health care for birth defects, from diagnosis to treatment. We conducted this study to determine trends and factors associated with mortality from congenital anomalies.

Methods: A total of 699 records were accessed from the electronic records system in National Hospital at Abuja, on children with birth defect less than 5 years from 2000 to 2015. Variables extracted for secondary data analysis were age, gender, tribe, state of origin, distance to the health facility, type of anomaly, number and duration of hospital visits, presence of associated diseases and final outcome of the patient(dead or alive). Type of congenital anomaly was pre-classified using International Classification of Diseases (ICD)-10 code. Data was summarized using means and frequencies. The association between other variables and an outcome of mortality was assessed using chi-square and logistic regression.

Results: The number of congenital anomalies reported increased from 1 in 2000 to 74 in 2008. Thereafter a decline was noticed from 2012(70) to 2015(33). The CFR increased from 0%(2012) to 19%(2013) but declined to 12.9%(2015). The mean age was 1 ±1 year. Females were 296(42%) and 549(79%) lived less than 100 km from the hospital. The commonest tribe affected was Igbo. Majority of the cases were from the North Central 226(32.3%) and South Eastern 179(25.6%) zones. Mean total duration of admission was 13 ±21 days and 93(13.3%) stayed in the hospital for a maximum of 24 hours. Of the respondents, 133(19.0%) had nervous system anomalies, digestive 14(16.3%), circulatory 110(15.7%), genital 74(10.6%), other 72(10.3%), musculoskeletal 66(9.4%), cleft lip and cleft palate 65(9.3%), facial and neck structures 36(5.2%), urinary 24(3.4%) and respiratory 5(0.7%). The commonest single anomalies were hydrocephalus 40(5.7%) and hirschsprung's disease 38(5.4%). Sixty (8.6%) multiple anomalies while 149(21%) had complications. Furthermore, 66 (9.4%) died within the period of study. Children admitted for more than 24 hours ($p<0.001$) and those with congenital anomalies affecting the structures in the head and genital region were more likely to die ($p<0.001$). These remained predictors of mortality after logistic regression. A dose response relationship was noticed with duration of admission: >1-7 days/24 hours 2.4(1.2-5.0), >1-4 weeks/24 hours 2.9(1.4-5.9) and >1 month/24 hours 3.2(1.1-10.2).

Conclusion: Anomalies of the nervous system were the most common birth defects. Prenatal diagnosis should be emphasized, so that care can be instituted soon after birth to reduce mortality.
Keywords: congenital anomalies, Nigeria, children, mortality

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Title: Prevalence and factors associated with tobacco use among adolescents in Abuja, Nigeria, 2015

Background: More than one third of the world's deaths can be attributed to 5 risk factors and tobacco use is second leading risk for mortality. It causes the death of 6 million people annually, resulting in the deaths of 250 million children and young people. Nearly 80% of smokers worldwide live in low and middle income countries. 50% of all long-term smokers, particularly those who began smoking in adolescence, will die prematurely. We conducted a survey to determine the prevalence and factors associated with tobacco use among adolescents in Abuja, FCT.

Methods: Four hundred and sixty two adolescents aged 10 to 19 years residing in Abuja were interviewed, using a cross-sectional study design. Information on socio-demographic characteristics, knowledge and perceptions on tobacco use, self-esteem and social influences were obtained. Interviewer-administered questionnaires (modified from the Global Youth Tobacco survey questionnaire) on ODK collect, were used to elicit information. Correctly stating at least 2 ill-effects of tobacco was deemed good knowledge while had the right perception with a score of >50%. Frequency, means, odds ratio and binary logistic regression were performed to determine associated factors.

Results: The mean age of respondents was 14years±2 SD. Males were 250(54%). Students receiving formal education were 420(90%). For 340 (73%), the family setting was monogamous. The mean family income was 27000±55000 naira. Ninety-five (21.0%) had good knowledge and 419(91.0%) correct perception. None had ever used smokeless tobacco while 9(1.9%) also use alcohol. Two hundred and thirty-six (51.1%) had seen or listened to a cigarette advert in the last 3 weeks while 11(2.4) had ever smoked. The prevalence of current tobacco use was 6(1.3%). Three hundred and sixty 360(78%) had good self-esteem and 40(9%) had been in close contact with at least one family member that used tobacco. Twenty eight 28(6%) and 6(1%) stated that their friends and parents respectively, approved of smoking. Having formal education (OR=17.3, 95%CI= 1.7-179), alcohol use (OR= 32.1, 95%CI=5.0-204.8), having relatives (OR=14.3, 95%CI=2.8-74.2) or friends (O.R.=44.8, 95%CI=7.7-260.2) that use tobacco, believing that tobacco attracts friends (OR=12.7, 95%CI=2.3-70.9) or makes one smart (OR=8.5, 95%CI=1.7-43.3) and having one parent approve of tobacco (OR=18.0, 95%CI=1.8-183.7) were risk factors for tobacco use. Adolescents that felt close to their family (OR=0.06, 95%CI=0.01-0.29) and believed that cigarette pack warning was a good deterrent to tobacco use (OR=0.06; 95%CI=0.01-0.36) were less likely to use tobacco. Following modelling; alcohol use, belief that tobacco makes one smart, having friends and relatives that use tobacco remained significant.

Conclusion: The prevalence of tobacco use was low. However, knowledge on the ill-effects of tobacco use was poor while majority had the right perception. Social influence was an important predisposing factor to using tobacco. Messaging for tobacco control campaigns should focus on informing adolescents of the health detriments of smoking and impacts of alcohol use. Health education programmes in schools should focus on enhancing self-esteem and building skills needed to recognise and resist negative social influences.

Keywords: tobacco, smoking, Abuja, adolescent

CONSUMER KNOWLEDGE AND ATTITUDE REGARDING USE OF PESTICIDES AS FOOD PRESERVATIVE IN OGBOMOSO, SOUTH WESTERN, NIGERIA.

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Background information

Pesticides application in common food stuffs for preservation constitute a serious health problem in Nigeria. The effect of pesticides residues may result to loss of nutritive value as well as contamination of foodstuffs.

Objective

The study objective is to determine consumer knowledge and attitude regarding the use of pesticides as food preservative in Ogbomoso, South Western, Nigeria

Methodology

Respondents were selected from 3 major markets using multistage sampling technique. Pretested questionnaires were administered, collected and analyzed by using Statistical Package for Social Sciences version 19.

Result

The mean age of the respondents in the study group was 32.7 $\pm$ 1.02 years with a range of 15 – 80 years. Majority are within the age group of 15-29 years, male 175 (50.1%), 141 (40.4%) had secondary education, Muslims 193 (55.3%) and married 200 (57.3%). Considerable proportion i.e 211 (60.5%) were aware of use of pesticides as food preservative but comprehensive knowledge on type of pesticides, hazards of its use as well as preventive measures is low. In addition, more than a quarter of respondents i.e 82 (23%) had unfavourable attitude. There is a significant difference between education of respondents on knowledge of using pesticides as preservative ($P< 0.05$)

Conclusion

There was insufficient knowledge coupled with un-favorable attitude on the use of pesticides as food preservative. In other to adopt good hygiene practices, consumers particular the uneducated ones need continuous health education on food safety procedures.

Key words: Food safety. Knowledge, Consumers.

A comparative analysis of Animal Blood lead levels in two exposed communities in Rafi LGA, Niger State, Nigeria, 2015

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Introduction: Lead poisoning usually occurs due to occupational exposure. Recently, illegal mining and processing of gold deposits in Northern Nigeria has resulted in large scale community level exposure to lead. In May 2015, a lead poisoning outbreak was reported from Unguwar Kawo (UK), Unguwar Magiro (UM) in Madaka Ward, Rafi LGA, Niger state. Twenty eight children were reported to have died in both villages. Preliminary investigation confirmed lead poisoning, with elevated blood lead levels ranging 171.5 – 224 µg/dL, against the WHO limit of ≥10 µg/dL in animals. This study determined the magnitude of the outbreak and lead concentration in environmental samples.

Methods: We collected data using an interviewer administered structured questionnaire. The respondents were heads of households. We captured the gold-ore processing activities of the household members and blood lead level of domestic animals. Soil and animal blood samples were also collected for detection of lead levels. Animal blood lead levels were analyzed from 82 (Unguwar Kawo) and 58 (Unguwar Magiro) samples of cattle, sheep, goat, dogs, chickens, ducks, guinea fowl, and pigeons. Elevated blood lead levels ≥10 µg/dL in animals confirms lead poisoning, while elevated soil lead level >400 ppm confirms soil contamination. Open Epi 2.3 and Epi-Info 7 were used for descriptive analysis.

Results: Lead poisoning was detected in 55(67 %) of animals in UK, while 38(66%) of animals in UM had elevated values. In both villages, the highest blood lead level was found in chicken. In Unguwar Kawo, 61(94 %) respondents participated in gold-ore processing compared to 73(78 %) in Unguwar Magiro. Unguwar Kawo had 12(57%) compounds with elevated lead soil levels while Unguwar Magiro had 29(71%). Soil samples from Unguwar Kawo showed mean lead level of 47,397±21,757 and 2,017±1,192 for outside and inside compounds respectively. Mean lead level (21,450±6,912 and 1,921±1,366 ppm) was seen outside and inside Unguwar Magiro compounds. Highest soil lead contamination occurred in

residential processing areas of Unguwar Kawo (557,700 ppm) and Unguwar Magiro (461,300 ppm).

Conclusions: Wide spread soil contamination and domestic animal poisoning was seen in the village where gold –ore mining was prevalent. We recommended soil remediation and safer mining practices.

Keywords*:* Lead poisoning, gold-ore, chelation therapy, soil remediation, safer mining.
Word count: 349

Title:
Prevalence of and risk factors associated with childhood lead poisoning in Zamfara State, northern Nigeria, 2012

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Abstract:

Introduction: Lead poisoning (LP) was first reported in Zamfara state in 2010 among few villages engaged in artisanal small-scale gold mining activities. Thereafter, it became widespread and hundreds of children died as a result LP complications.

Objectives: To assess the prevalence of gold mining, childhood LP and it's associated factors.

Methods: We conducted a cross sectional cluster study, surveyed 56 villages and administered questionnaires to 392 heads of compounds. We obtained data on participation of any family member in gold mining activities, and selected one child per compound for socio-demographics. We collected venous blood sample from selected children and tested for blood lead level (BLL) using inductively coupled plasma mass spectroscopy. WHO reference value for LP of ≥10 µg/dL and ≥45 µg/dL for chelation therapy were adopted. We analyzed data using Epi-info version 7 software (CDC Atlanta, USA), for descriptive statistics and level of significance. Significance level set at $p<0.05$.

Results: The median age of the children was 36 months (inter quartile range: 23-48 months) and males were the majority (51.8%). Median BLL was 6.5 µg/dL (range: 1.6-61.3). The prevalence of gold mining activities in the state was 17.6% (95% CI: 14.0-21.8) and 23.0% (95% CI: 18.9-27.6) of children have LP of which about1.0% required chelation. LP was significantly associated with age and participation of family member in gold mining activities ($p<0.05$).

Conclusion: The magnitude of LP is high and this underscores public health action by enforcing safer mining practices so as to protect children from the dangers of lead toxicity.

Key words: lead poisoning, gold mining, chelation therapy, Zamfara state, Nigeria

Trace elements in particulate matter of ambient air at Nigerian megacities

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Abstract

Elemental characterizations of suspended particulate matter ($PM_{2.5-10}$ and $PM_{2.5}$) in airs at six Nigerian megacities (Aba, Abuja, Lagos, Kano, Maiduguri and Port-Harcourt), were monitored using "Gent" stacked filter unit sampler (M250, Schlumberger, Houston, United States of America) capable of sampling $PM_{2.5-10}$ and $PM_{2.5}$ fractions simultaneously. Ion beam analysis (IBA) based proton induced x-ray emission (PIXE) technique was used to assess elemental concentrations of twenty-three elements; (Na, Mg, Al, Si, P, S, Cl, K, Ca, Ti, V, Cr, Mn, Fe, Ni, Cu, Zn, Se, Br, Rb, Sr, Zr and Pb) in both fractions. Enrichment factors and pollution indices were calculated and results revealed that some elements were anthropogenic with comparable inter-elemental ratios in both fraction. Application of principal component analysis (PCA) to elemental data matrix in both fraction implicated biomass burning, petroleum product combustions and industrial emissions as the major anthropogenic sources of suspended particulate matter in the cities.

Keywords: elements; emissions; particulate; mega cities; pollution; ion beam.

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Characteristics of Size Segregated Aerosols of Lagos Nigeria

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Abstract.
This study was conducted to provide an understanding of the chemical compositions and source identifications of $PM_{2.5}$ (aerodynamic diameter, $d_{ae} \leq 2.5$ µm) and $PM_{2.5-10}$ (2.5 µm $< d_{ae} < 10$ µm) particulate matter over Lagos, Nigeria. Samples of $PM_{2.5}$ (fine) and $PM_{2.5-10}$ (coarse) were collected on nuclepore polycarbonate filters using a low volume GENT sampler (Schlumberger Model: M250) equipped with double staged stacked filter units. A total of 192 samples were collected (96 of each fraction). Elemental analyses were carried out using Particle Induced X-ray Emission (PIXE) techniques. Data obtained from the elemental analysis of both fractions were further subjected to Pearson correlation and Positive Matrix Factorization (PMF) receptor model for source apportionment and identification. Pearson inter-elemental correlations indicated that some elements could have common source origins or similar chemical properties. Five source categories with stable profiles were identified in both fractions. The study concluded that anthropogenic (gasoline oil combustions, industrial, and biomass burning) emission sources could pose great hazard to Lagos receptors.
Keywords: source apportionment, PIXE, positive matrix factorization, emissions
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Distribution and Dosimetery of Radionuclides in Airborne Dust of Two Communities around Stone quarrying sites in Southwestern Nigeria

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Abstract

This study was undertaken to determine the natural radionuclides activities of ^{238}U, ^{232} Th, and ^{40}K as contaminants and their distribution from dust particles obtained from selected quarries in Ekiti and Ondo States. Airborne dust samples were collected using active sampling method. The filter holder was placed in a static position at approximately 1.6m high and the radioactivity concentrations of the natural radionuclides in dust samples were determined by gamma ray spectroscopy. The results revealed that activity concentration values in the investigated samples ranged from 8.02±2.0 to 25.00 ± 4.00 $Bqkg^{-1}$ for ^{238}U, 10.02±1.0 to 32.06 ± 2.00 $Bqkg^{-1}$ for ^{232}Th, and 600.06±2.0 to 1014.06 ± 1.00 $Bqkg^{-1}$ for ^{40}K. The total absorbed dose rate ranged from 34.944$nGyh^{-1}$ to 73.051$nGyh^{-1}$. The total absorbed dose rate values increase with activity concentration, and consequently enhances the radiological impact on the communities living in the surrounding of these quarry sites.

ABSTRACT

Title:

Preliminary investigation of suspected lead poisoning outbreak in Rafi Local Government Area, Niger State, North central, Nigeria, April–May 2015

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Background: In May 2015, Niger State Ministry of Health was notified of unusual childhood sicknesses and deaths among communities involved in artisanal gold processing activities (GPA) in Rafi Local Government Area (LGA). This was a suspected exposure to lead poisoning (LP) case. We investigated to confirm the diagnosis and recommend for control measures.

Methods: We defined suspected case of LP as any person living in communities involved in GPA who presented with or died of any three of the following: fever, headache, abdominal cramps, loss of appetite, body weakness, convulsion or unconsciousness. We reviewed hospital records between April and May 2015, obtained socio-demographic data of the suspects using line-listing form. We collected blood samples from four suspects and tested for blood lead level (BLL) using Lead Care ll analyzer. According to WHO criteria, LP is BLL ≥10µg/dL while BLL ≥45µg/dL required chelation therapy (CT). We conducted visual environmental assessment in the communities. Data were analysed using Epi-info 3.5.3 software.

Results: A total of 52 children we recorded of which 15 died (case fatality rate [CFR]: 29%). Males were 52% and constituted 46.7% of CFR. The median age was 29.5 months (range: 2-120 months), and CFR was highest among 0-59 months (86.7%). The communities affected were Unguwar-Kawo, Unguwar-Magiro and Sabon-Gida. All four children had BLL requiring CT with mean BLL of 193.4±23.4µg/dL. There was presence of gold processing sites within the communities.

Conclusion: The outbreak was caused by LP due to probably soil contamination from GPA within the communities. We referred the affected children for CT and recommended for house-to-house survey to identify LP children for CT and environmental assessment to identify possible lead contaminated areas for decontamination.

Key words: lead poisoning, outbreak, chelation therapy, Rafi LGA, Niger State

Word count: 287

PHYSIOLOGICALLY-BASED KINETIC MODEL FOR THE TRANSFER OF LEAD IN LACTATING NIGERIAN WOMEN WITH HIGH AND LOW EXPOSURE TO LEAD

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ABSTRACT

There are several physiologically-based kinetic models for lead, but none gave attention to infant lead exposure through breastmilk. This study aims to develop a physiologically-based kinetic model for lead and to predict the kinetic behavior of lead in lactating mothers with the model under different scenarios. The model consists of the following compartments: the lungs and the digestive tract through which lead enters the systemic circulation, the blood, the cortical bone, the trabecular bone, the soft tissues, the breastmilk and urine. Maple 13 was used to solve the generated model equations numerically (taking into account the mass balance principle). The model was used to simulate tissue lead concentrations in lactating mothers. Evaluation of the predicted concentrations was carried out using experimental data of 27 lactating mothers from Zamfara gold mines (high exposure) and 50 mothers from Ile-Ife (low exposure). The model was further used to study how various exposure scenarios such as intermittent exposure, massive medication, low medication, physiological changes (such as pregnancy) influence the levels of lead in key body compartments of female subjects. With appropriate values for individual body height and body weight, the results of the simulation were in agreement with the blood experimental data in both Zamfara (χ^2=0.0056, r=0.557 at 0.01 significance level) and Ile-Ife (χ^2= 0.0086, r=0.7851 at 0.01 significance level). The physiologically based kinetic model developed is an attractive and effective approach in predicting tissue lead levels in adult female subjects and also intakes in their breastfed infants based on exposure lead data from mothers.

ASSESSMENT OF THE LEVELS HEAVY METALS IN VEGETABLES FROM METAL RECYCLING COMPANIES IN OSUN STATE, NIGERIA.

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Abstract
Heavy metal pollution of the environment is an increasingly significant problem. This study was designed to investigate the potential health risks posed by the two metal recycling companies on vegetable crops. Using Flame Atomic Absorption Spectrometer (FAAS) (200A MODEL) the concentrations of eight metals (Ca, Cd, Cr, Cu, Fe, Mg, Mn, Zn) in vegetables (*Talinum triangulae, Amaranthus hybridus, and Solanecio biafrae)* were in the range (100.5-490.5) mg/kg, (0-2.8) mg/kg, (0-15.5) mg/kg, (5.3-135.5) mg/kg, (138.6-1081.2) mg/kg, (35.5-545.4) mg/kg, (5.3-545.2) mg/kg, (39.5-1380.0) respectively. The mean concentrations were in the order of Fe > Zn > Ca > Mn > Mg > Cu > Cr > Cd. Generally and relative to the control, vegetables from the sites were slightly enriched in Cu, Mn and Zn (EF = 1.61-8.02) while *Talinum triangulae* were highly enriched in Mn (EF=28.21-28.81). Using SPSS 17, the result indicated that significant difference ($p < 0.05$) exists between the levels of these metals and control. The levels of Cd, Cr, Cu, Fe, Mn and Zn from sites were also found greater than FAO/WHO (2011) safe limits but within for samples from control. The Health Risk Indices (HRI) were >1 for the vegetables from sites, indicating that vegetables from these areas are not good for consumption.

Keywords: Field accumulation risk, trace and heavy metals, vegetables, metal recycling companies
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AN EVALUATION OF THE PHYTOREMEDIATION POTENTIAL OF AQUEOUS EXTRACT OF SOME PLANTS ON HEAVY METALS IN CONTAMINATED WATER (Cd, Cu and Pb)

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ABSTRACT

It has been reported that apart from the phytoremediation activities of live plants on heavy metals, non – living plant parts have the potential of remediating water bodies contaminated by heavy metals as well. Several researches have been carried out using plant waste materials in solid phase but the use of plants in aqueous phase is novel (Agwarangbo, 2011). No previous publication on phytoremediation had reported the loading capacities of the metals in plants. This work was therefore set up to improve on the existing literatures on phytoremediation and to establish the maximum loading capacity of each metal on each of the plants under investigation. In this study, aqueous extracts of six different plants; *Vernonia amygdalina* (Bitter leaf), *Amaranthus hybridus* (Amaranthus), *Spinacea oliceria* (Spinach), *Capsicum annuum* (Green bell pepper), *Daucus carota* (Carrot) and *Solanum lycopersicum* (Tomato), bought from a local market in Abeokuta, Ogun State, Nigeria, were investigated on their potentials and capacities to remove Cadmium, Copper and Lead ions (Cd^{2+}, Cu^{2+}, and Pb^{2+}) from contaminated water samples at 28°C. The maximum loading capacity of each metal ion per gram of each plant was also evaluated. The results indicated that, extracts from all the plants investigated have positive remediation potential for Cd^{2+}, Cu^{2+}, and Pb^{2+} in contaminated water. The order of the capacities of the plants to remove Cd^{2+} from contaminated water was found to be; Bitter leaf > Amaranthus > Spinach > Carrot > Green bell pepper > Tomato with maximum loading capacities of 0.749, 0.608, 0.605, 0.592, 0.586 and 0.560 mg Cd^{2+}/g respectively. The order of the capacities of the plants to remove Cu^{2+} from contaminated water was also found to be; Amaranthus > Bitter leaf > Green bell pepper > Tomato > Spinach > Carrot with maximum loading capacities of 0.763, 0.742, 0.613, 0.588, 0.564 and 0.551 mg Cu^{2+}/g respectively. For remediation of Pb^{2+}, the capacities of the plants were found to be; Bitter leaf > Green bell pepper > Spinach > Amaranthus > Carrot > Tomato with maximum loading capacities of 0.967, 0.956, 0.922, 0.916, 0.911 and 0.803 mg Pb^{2+}/g respectively. This research has been able to show the efficacy of aqueous plant extracts in remediation of heavy metals (Cd^{2+}, Cu^{2+} and Pb^{2+}) in water samples and also establish the maximum loading capacities of each plant on each of the metals studied. The research findings indicated that extracts from Amaranthus is best suited for remediation of Copper while Bitter leaf extracts is best suited for remediation of both Cadmium and Lead in water samples.

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Abstract title: Risk Factors Associated with Outbreak of Methanol Poisoning in Southern Districts of Ondo State Nigeria – May 2015

Introduction: Methanol is a widely available chemical which has many industrial applications and is also found in a number of household products including varnishes, anti-freeze, windscreen wash. Methanol poisoning whether sporadic or mass poisoning is an acute medical emergency which can lead to considerable morbidity as well as mortality. Outbreaks of methanol poisoning arise from the consumption of adulterated counterfeit or informally-produced spirit drink. There have been numerous outbreaks in recent years affecting about 20 to over 800 victims and a case fatality rate of over 30% in some instances. Outbreak of methanol poisoning is rare in Nigeria compared to outbreaks associated infectious diseases. Methanol poisonings occur as isolated episodes caused by accidental or intentional ingestion, or epidemics. In the latter situation a large number of victims are often reported. On the 13th of April three people from Irele LGA, Ondo State Nigeria were reported having symptoms of headache, blurred vision, respiratory difficulty and loss of consciousness. All died within 24-72 hours of onset of symptoms. The State Ministry of Health was alerted and we investigated to characterize the outbreak in terms of time place and person. We also sort to identify the causative agent, its source and mode of transmission and associated risk factors.

Methods: Ondo State is situated in the southwestern part of Nigeria with a projected population of 3,440,000 based on the 2006 population census. We conducted a community-based case control study. A suspected case was defined as any person with headache, blurred vision and/or blindness, and/or respiratory distress with or without loss of consciousness within 24-48 hours of onset of symptoms beginning from 12th April 2015 in Ode-Irele LGA; and a control as any person without the above symptoms residing in Irele LGA of Ondo State. Nineteen cases and 57 controls were interviewed using a semi-structured interviewer administered questionnaire to obtain information on socio-demographic information, history of exposure to possible risk factors, history of symptoms, travel history and dietary history. The questionnaires were manually sorted out to check for errors and omissions at the end of collection. The obtained data was thereafter entered into a computer and analyzed using Epi-info software. Descriptive statistics and Odds ratio were done. We also collected blood and urine samples from 3 cases as well as remnants of consumed gin for toxicology analysis.

Results: There were 39 suspected cases, 29 deaths and a case fatality rate of 74.4%. Mean age of cases and controls was 40.4±12.5 years and 31.9±11.3 years. Majority of cases were males 38 (97.4%) and mostly farmers 16 (57.1%). Thirty-two (94.1%) reported local gin consumption prior to development of symptoms. Among risk factors studied, consumption of local gin [OR=17.2 (95% CI: 4.6-84.0)], other alcohol consumption [OR=24.2 (95% CI: 4.0-555.6)], recent travel history [OR=0.7 (95% CI: 0.1-3.5), being a farmer [OR=2.4 (95% CI: 0.8-2.5)] and low (at least primary) educational status [OR=2.5 (95% CI: 0.9-7.7). Laboratory findings revealed a significant inhibition of the acetyl-cholinesterase in the three blood

samples at 31.82%, 32.5% and 96.21%. Also the level of Zn was strikingly reduced in all samples. Levels of methanol toxicity in the three blood samples were 0.28g/l, 0.21g/l and 0.15g/l. Methanol was detected in the urine samples at a level of 0.018g/L. Methanol samples in the three samples of local gin were 125g/l, 65g/l and 9.6g/l.

Conclusion: Local gin contaminated with methanol was the major risk factor for the occurrence of the outbreak. Investigation confirms previous reports that methanol poisoning from the consumption of illicit alcoholic drinks results in very high mortality. Media campaign sessions were held in the communities, warning members of the hazards of local gin consumption. All affected persons were managed in nearby health facilities. It was recommended that enforcement of regulatory measures should be made to address the sale of illicitly produced alcoholic drinks to forestall future outbreaks. Sensitization of the public on reporting early to the facility if the signs and symptoms are noticed for prompt treatment to reduce complications. Training of the health personnel on the signs and symptoms of methanol poisoning and treatment modalities.
Keywords: Methanol, Alcohol, Headache and Toxicity

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Abstract title: Outbreak of methanol poisoning and its Environmental Determinants in Rivers State, Nigeria, May-June, 2015

Introduction: Local alcohol called ogogoro or Kaikai is distilled from palm wine, got from *Raphia farinifera* plant. Contamination with methanol may be deliberate or from poor control of the distillation process. Methanol is the simplest alcohol, with weak odour, clear, colourless and slightly sweeter than ethanol. Toxicity varies depending on the individual and treatment provision. In May 2015, the Disease Surveillance and Notification Officer (DSNO) reported cases of deaths in five Local Government Areas (LGAs) of Rivers State following ingestion of local alcohol. We investigated to characterize the outbreak, identify source, environmental determinants and implement control measures.

Methods: We did descriptive study in four LGAs. Retrospective cohort study was employed in one LGA. Interviewer-administered questionnaires to drinkers and in-depth interviews to alcohol sellers and drinkers were used to elicit socio-demographic information, history of alcohol ingestion and lifestyle of cases. Cases records reviewed in four health facilities and data collected using line-listing forms. Active case search was employed to identify cases and exposed persons using case and exposure definition. Local alcohols from outbreak sites and blood samples from cases were collected for laboratory analysis. Data analyzed using Epi Info 7 and Microsoft excel. Descriptive analysis was done by time, place and person. Univariate analysis for frequencies and descriptive statistics. Bivariate analysis was done using Chi-square test at 95% confidence level.

Results: Identified total of 84 cases, mean age 45.6±11.1 years, 72(85.8%) males, and 29(34%) had visual impairment as the predominant symptom. Case fatality rate is 83.3 %(Range: 66.7-100.0). Among survivors, 4/14(28.6%) lost their sight. Alcohol addicts belonging to drinking clubs 67(80%), highest numbers of cases in Gokana 32(38%) but Bonny had highest deaths number 25(28%). Of 55/84 cases, 41(74.6%) were married while 34/55(61.8%) had ≤primary education. Exposure to local alcohol was associated with illness, RR=6.5(95%CI: 1.02-41.28) and ARP (84.6%). Laboratory results of collected alcohol samples were positive for methanol contamination. Analyzed blood samples of patients admitted showed electrolytes derangement and methanol concentration greater than 20mg/dl. Local alcohol supply source traced to Nembe Water-side open market in Port Harcourt from 5/6(83.3%) retailers. High number of cases and fatality rate linked to disbelief of the people that the local alcohol can lead to death.

Conclusion: ***Methanol is the local alcohol contaminant.*** Supply source is Nembe waterside. Alcohol addiction and socialization, low education level, disbelief among the people and unregulated local alcohol production and trade are environmental determinants to methanol poisoning in Rivers State. Prevention is by orientation of the public and adequate implementation and enforcement of laws regulating local alcohol production and trade.
Key words: Local alcohol, Methanol, poisoning, Rivers State

An Investigation of Ionospheric Conditions during the Main Phase of Geomagnetic Storm Events as measured from GPS Observations at Ile-Ife, Nigeria

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Abstract

Space weather events such as geomagnetic storms can have adverse effects on the reliability and performance space-borne and ground-based technological systems as well as endanger human health and life. The effect of the main phase of two intense geomagnetic storm events which occurred on August 5 – 6 and September 26 – 27, 2011 on the equatorial ionosphere have been investigated using Global Positioning System (GPS) data obtained from an Ile-Ife station (geomagnetic lat. 9:84_N, long. 77:25_E). Total Electron Content (TEC) profiles during the main phase of the two geomagnetically disturbed days were estimated and compared with quiet time average profiles to examine the response of the equatorial ionosphere. International Reference Ionosphere (IRI) 2012 TEC model was also obtained from Virtual Ionosphere, Thermosphere, Mesosphere Observatory (VITMO) and the extents of deviation from observed GPS-derived TEC were examined for the main phase of the storm events. The results showed that the intensity of both storm events during the main phase which occurred at night-time correlated well with a strong southward direction of the z-component of the Interplanetary Magnetic Field (IMF-Bz) and Solar Wind Speed (Vsw), with the Disturbance storm time (Dst) profile showing multiple step development. TEC depletion was observed during the main phase of the August 5 – 6, 2011 storm event with TEC recording a maximum value of 9.31 TECU. A maximum TEC value of 55.8 TECU was recorded during the main phase of the September 26 – 27, 2011 storm event. Significant scintillation index value of 0.57 was observed when the main phase started on August 5 – 6, 2011 followed by a prolonged suppression while there was less significant scintillation impact on September 26 – 27, 2011 with a maximum value of 0.33. The study concluded that the intensification of the ring current during the main phase of geomagnetic storm events was responsible for the intensity of the storm events causing large variations in TEC and significant scintillation phenomenon.

Keywords: Equatorial Ionosphere, Main Phase, Intense Geomagnetic Storm Events, GPS

Diurnal and Daily Characteristics of Ionospheric Total Electron Content Signatures at an Equatorial Station of Ile-Ife using Geodetic GNSS Measurements

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Abstract

The effects and significance of Total Electron Content (TEC) in maritime, aviation and land transportation has made the study unique and relevant. The high magnitudes of TEC observed in literatures at equatorial or low-latitude stations has further resulted into continuous and extensive research in the region. The AFREF GNSS Station located at Ile Ife (Geographic lat. 7:51_N, long. 4:52_E; Geomagnetic lat. 9:53_N, long. 78:49_E) was used to investigate the diurnal and daily characteristics of the signatures of TEC at Ile-Ife during different geomagnetic
activities. A month data between 1st and 31st January in 2011 was used for the analysis of TEC in this paper. The data was analyzed using the GPS-TEC analysis application and a custom MATLAB program. The results show that the diurnal characteristics are symmetrical depicting a rise in the magnitude of TEC during sunrise and having peak value (_ 34 TECU) between the 12th and 16th hour and a corresponding decrease in its magnitude at sunset. The characteristics of the signature shows irregular variation during the disturbed days while the quiet days characteristics depict a regular variation.

Keywords: Ionospheric Total Electron Content, Geodetic GNSS Measurements, Ile-Ife

Environmental Health Officers and Urban Environmental Protection in Selected LGAs in Osun State: Issues and Perspectives

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Abstract

The enforcement of public health standards is a key responsibility of any government. In Nigeria, this responsibility is shared among the three tiers of government. At the federal and state levels, the Ministry of Environment is saddled with this task while at the local government levels; the task of environmental protection is usually carried out by Environmental Health Officers (EHOs). In the southwest, the EHOs, who were once referred to as *wole-wole* were a force to be reckoned with during the colonial and post colonial era. Then, the fear of *wole-wole* was the beginning of urban cleanliness. This article traces the history of EHOs in Nigeria, particularly in the southwest Nigeria, noting the metamorphosis which has taken place in the body as well as challenges facing them in the discharge of their duties. Using both primary and secondary data which include historical documents, and key informant interviews, the study examined the challenges facing the EHOs in three urbanized Local Government Areas in Osun State, Nigeria (Osogbo, Ilesa and Ife Central). The study revealed *inter alia* that; there was no appreciable synergy between the State Ministries of Health and Environment and the EHOs as they were left to be solely financed by the LGAs. Also, there were no coordinated efforts between the EHOs and organized private operators in the management of solid waste in the state. Other challenges facing the EHOs include; inadequate and obsolete equipments; inadequate funding; inadequate capacity development for staff; operational and institutional instability among others. The study concludes that promotion of urban public health management and alleviation of municipal solid wastes and city pollution can be achieved with more organized and better motivated EHOs in the LGAs since they are the closest to the people. Some programmatic implications were suggested at the end of the study.

Keywords: Environmental Health Officers; Public health; environmental protection; solid waste management; local government.

Meteorological Parameters in Regulatory Air Pollution Dispersion Models: An Overview of Near Surface Measurement in a Dense Plume Environment

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Abstract

Unregulated release of gaseous effluents into the atmosphere emanating from operations within the industrial sectors (e.g., recycling of scrap-iron), which is widespread in Nigeria, constitutes serious human health and environmental issues. This problem is exacerbated by lack of in-situ measurements of air quality and enforcement of guidelines that regulate short- and long-term impacts. The consequences are therefore far reaching because of inadequate and improper control strategies caused by prohibitive costs of equipment and inadequate skilled manpower to monitor criteria pollutants' concentration at all locations of interest. An approach which has proven to be efficient and cost saving to obtain estimates of the concentrations for these pollutants is by use of advanced regulatory (Gaussian-based) air pollution dispersion models.

Regulatory air pollution dispersion models, the most widely used AERMOD model for example, however require as input basic meteorological variables to characterize the surface layer dynamical parameters that are needed in estimation of lateral and vertical dispersion coefficients (σ_y and σ_z respectively) as well as pollutants' concentration at downwind locations from a known source of atmospheric pollution. The meteorological inputs required by the dispersion models are often compromised in the sense that location-specific measurements are not always available. As a consequence of this limitation, most atmospheric dispersion estimates of pollutants concentration are made from meteorological data obtained from sources different from the location of application thereby failing to fully represent the prevailing surface layer conditions at the required location. As such, the reliability of dispersion models' concentration estimates is strongly dependent on the representativeness of the input meteorological parameters to fully describe the atmospheric dynamics and surface layer characteristics at the source location.

In a bid to demonstrate the appropriate use of meteorological data as input in advanced regulatory air pollution dispersion models particularly in West African sub-region where measurement are scarce and site-specific studies are not available, we present as a case study, an overview of a near surface meteorological measurement carried out in a dense plume environment of a scrap-iron recycling factory (7^o 29' N, 4^o 28' E, 262 m a.s.l) located at Ile-Ife, southwest Nigeria. Gradient and single level measurement of near surface atmospheric parameters comprising air temperature, relative humidity, radiation fluxes (global ad net), soil heat flux, wind speed and wind direction were made from August 2012 – June 2014. At the study site, a 6-m meteorological mast was instrumented with two (2) pulse

type cup anemometers (model A100ML), two (2) air temperature and relative humidity sensors (model HMP45), a potentiometer type wind vane (model W200P), a net radiometer (model NR-LITE), a pyranometer (model CS300), a soil heat flux plate (model HFP01) and a soil temperature probe (model T108). The measurement levels for wind (1.5 m and 5.5 m), temperature and relative humidity (both at 1 m and 5 m) were so chosen such that the ratio z_2/z_1 falls within ~ 4 – 8 (Arya, 2001) to ensure that the gradients of wind, temperature and relative humidity are sufficient for obtaining appreciable flux values to resolve the surface layer parameters.

The study has made available to researchers in air pollution modeling community high quality and extensive site-specific meteorological dataset for testing and evaluating air pollution dispersion models and for use in other related applications.

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Distribution and Dosimetery of Radionuclides in Airborne Dust of Two Communities around Stone quarrying sites in Southwestern Nigeria

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Abstract

This study was undertaken to determine the natural radionuclides activities of ^{238}U, ^{232} Th, and ^{40}K as contaminants and their distribution from dust particles obtained from selected quarries in Ekiti and Ondo States. Airborne dust samples were collected using active sampling method. The filter holder was placed in a static position at approximately 1.6m high and the radioactivity concentrations of the natural radionuclides in dust samples were determined by gamma ray spectroscopy. The results revealed that activity concentration values in the investigated samples ranged from 8.02±2.0 to 25.00 ± 4.00 $Bqkg^{-1}$ for ^{238}U, 10.02±1.0 to 32.06 ± 2.00 $Bqkg^{-1}$ for ^{232}Th, and 600.06±2.0 to 1014.06 ± 1.00 $Bqkg^{-1}$ for ^{40}K. The total absorbed dose rate ranged from 34.944$nGyh^{-1}$ to 73.051$nGyh^{-1}$. The total absorbed dose rate values increase with activity concentration, and consequently enhances the radiological impact on the communities living in the surrounding of these quarry sites.

INDEX OF AUTHORS

Abdullahi, 74, 76
Abiodun, 3, 6, 8, 10, 71, 72
Abiye, 5, 77
Aboderin, 3, 5, 43
Aboyeji, 10, 53
Abubakar, 12, 74
Adebisi, 8, 68
Adedeji, 19
Adedire, 84
Adenuga, 10, 59
Adeola, 9, 51
Adewole, 8
Adewusi, 10, 43, 58
ADEWUYI, 10, 64
Adeyeye, 66
Afolabi, 10, 61
Ahmad, 7, 8, 37, 67, 74
Akeju, 53
Akinleye, 5, 73
Akinola, 90
Akintade, 78, 92
Akintunde, 1, 10, 61
Akinyemi, 3, 5, 6, 16, 21, 27, 51
Alaka, 74
Aliyu, 74
Anetor, 68
Anka, 21, 44, 74
Ariyibi, 87
Asubiojo, 6, 12, 17, 26, 77
AYODEJI, 83
Ayoola, 3, 5, 14
AYOOLA, 39
Badamasi, 69
Bansa, 43
Boakye, 10, 58
Dalhat, 67, 74
Davis, 74
Donald, 10, 52
Ebire, 40
Ebun, 52
Emma-Ukaegbu, 74
Eze, 72
Ezeh, 5, 8, 9, 52, 77
Fadahunsi, 84
Fadupin, 56, 57
Falade, 5, 9, 10, 58, 66
Getso, 74
Gidado, 72, 74
Giwa, 56
I. Muhammad, 74
Ibitoye, 40
Ibrahim, 8, 67, 69, 79
Idris, 72, 74
Ijaleye, 40
Ijeoma, 74
Ilesanmi, 68
Isa, 74
Jesuleye, 3, 5, 8, 70
Joseph, 3, 10, 16, 64, 74
Kanoma, 3, 5
Karokatose, 8
Kolo, 74
Kolos, 74
Komolafe[3], 40
Kusfa, 74
Lawal, 70
Liman, 67
Maike, 7, 8, 37
Maza, 9, 40, 49
Muhammad, 7, 8, 37, 74, 76, 79
Nasidi, 79
Nda, 74
Nguku, 67, 71, 72, 74
Nigeria Field Epidemiology and Laboratory Training Program, Abuja, 74
Obiajunwa, 40, 52
Obioh, 12, 77
Oddoh, 74
ODEKANYIN, 10, 64
Ogbonna, 5, 9, 57
Ogunba, 5
Ogunkoya, 6, 18
OGUNKOYA, 18, 32
Ojo, 1, 2, 3, 5, 7, 8, 9, 10, 30, 40, 43, 49, 51, 52, 53, 54, 56, 57, 58, 60, 61, 63
Oketayo, 5, 8, 9, 10, 43, 56, 57, 61
Okomah, 8, 74
Olabode, 8, 17, 87, 88
Oladejo, 8
Oladimeji, 3, 72
Olaniyi, 10, 44, 46, 61
Olarewaju, 8, 73
Olawale, 8, 9, 50, 51, 90
Olayinka, 6
OLODUDE, 10, 64
Olorunfemi, 10, 53
Oloruntoba, 68
Olubiyo, 74
Oludele, 10, 64
Olumayede, 9, 78, 92
Oluwasina, 50
Omolola, 10, 63, 66
Onayade, 19, 34
ONAYADE, 19
Osunko, 67
Osunkwo, 72, 74
Owolabi, 8, 88
Oyemakinde, 74
Parakoyi, 73
Salau, 53
Salawu, 43
Salewa, 10, 63
Sani-Gwarzo, 74
Shekwagu, 74
Shuaibu, 72
Siyanbola, 70
Sodeinde, 78, 92
Tajudeen, 10, 63
Tebeda, 9
Tirima, 74
Tsafe, 74
Umar, 74, 76
Waziri, 74