

**PROMOTING ENVIRONMENTAL HEALTH AND  
EXPOSURE CHARACTERIZATION IN  
RAPIDLY URBANIZING AREAS  
OF A LESS DEVELOPED COUNTRY IN AFRICA:  
COLLABORATIVE SHORT-COURSE TRAINING AND  
PILOT FIELD RESEARCH  
IN IBADAN, NIGERIA**

***Running header: Air Quality and  
Exposure Science in Africa: Ibadan, Nigeria***

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**American Public Health Association (session #3131.3),  
November 8, 2010, Denver, CO U.S.A.**

## Presenter Disclosures

**Derek G. Shendell, D.Env, MPH**

**No relationships to disclose.**

## **Learning Objectives**

At the end of this presentation, members of the audience will be able to:

1. Identify the components of an environmental health sciences training workshop conducted for medical residents and public health graduate students in an urban area of a less developed country in Africa.
2. List environmental exposure agents and issues of relatively more concern to health professionals in practice and training in Ibadan, Nigeria.
3. List environmental and socio-cultural attributes considered during conduct of pilot field research at community sites and local industries in urban areas of less developed countries, per example of Ibadan, Nigeria.

## **Outline of this Summary Talk / Discussion**

- Acknowledgements
- Brief Background
  - Air and environmental quality in poorer less developed countries (LDCs), community and occupational settings
- Geography: Africa, Nigeria, city of Ibadan
- Initial March 2007 trip
- May 2008 trip
  - Short-course training, new pilot field research, etc
- Post-May 2008 to present
  - Update on recently completed schools-based research

## Acknowledgements

These projects are international and interdisciplinary

2006-09:

- Heartley Egwuogu, RRT, MPH (now, Ph.D student, U.Pitt SPH)
- Justice Egwuogu (Heartley's brother, who lives in Lagos)
- Dr. Eme Owoaje, Chair, Department of Community Medicine
- Dr. Godson Ana, Lecturer & Graduate Program Coordinator
- Dr. Foloshade Omokhodion, occupational medicine
- Prof. (Dr.) Isaac Akinyele, Dean, College of Medicine and the Faculty of Public Health (*through 2008*)
- Several MBBS and MPH students, and current resident physicians, at College of Medicine, Univ. of Ibadan, Nigeria

## Acknowledgements

These projects are international and interdisciplinary

2006-07:

- Dr. Solomon **Ike** Okosun, chronic diseases epidemiology (GSU IPH)
- Dr. **Adebowale** Adeyemo, pediatrics and genetics (Howard University and University of Ibadan)
- Dr. Olayemi Omotade and staff, Institute of Child Health
- Dr. Aduragbenro Adedapo, occupational medicine and infectious disease epidemiology
- Dr. **Ikeoluwapo** Ajayi, occupational medicine and infectious disease epidemiology

## Acknowledgements

These projects are international and interdisciplinary

2007-08:

- Several MBBS and MPH students, College of Medicine, University of Ibadan, Nigeria
- Several senior and junior resident physicians working at College of Medicine, University of Ibadan, Nigeria
  - 2006-08: Dr. Obi Uchendu, the senior registrar (i.e., chief resident)
- Faculty in epidemiology theory, statistics, community health
  - Dr. Bo Adedokun, medical statistics/biostatistics
  - Dr. David Dairo, epidemiology
  - Dr. Elizabeth Oloruntoba, community health & drinking water quality

## Acknowledgements

### Funding Sources

#### I. Georgia State University (2006-07)

- Institute of Public Health, which houses the Partnership for Urban Health Research as well
- Office of International Affairs, International Strategic Initiatives program (FY 2006-07)

Also, external funding proposals attempted/peer-reviewed for some projects (NIH FIC; foundations, companies, banks-- n=5 in U.S.)

Each received full review or peer-review: one was successful....

#### II. The Atlantic Philanthropies, Bermuda office

11/2007- 5/2008: Funding was used for continuing education training and further pilot field research planning and initial equipment training

#### III. UMDNJ-SPH, via Foundation of UMDNJ (2008-)

*Proposals submitted to foundations 6-10/08—10 in U.S.—to further focus and build on work to 5/08; 11 no, two pending as of fall 2010*

## EPHS in LDCs

### Globalization

- The process of interconnected changes worldwide—economic, social, technological, political (including trade), and cultural—has increased the speed of communications and in-person meetings and helped start removing barriers (geographic, political, cultural).
- And, produced forces and factors that have changed or created new EPHS exposures (risks) and health and environment effects across geographic scales.

LOCAL ← → GLOBAL

## EPHS in LDCs like Nigeria

### Selected Critical Issues

- Rapid development coupled with population growth, urbanization and/or sprawl, strains on basic services, and limited resources due to inequities in distribution, access, availability and/or use.
- Natural and human – or built, physical - environments are increasingly burdened by pollution of water and air as well as noise, heat stress, and garbage (solid & hazardous waste).
- In many regions, “Millennium Development Goals” of 1990 for 2015, and goal to decrease poverty 50%, may not be met.

Priorities include:

- Clean household **water** for consumption and hygiene, and sanitation (refuse, etc) at home and community levels;
- Cleaner indoor (**homes, schools, etc**) and outdoor **air**;
- Chemical hazards (**community and occupational microenvironments**);
- Unintentional injuries (**pedestrian accidents**).

## **EPHS in LDCs**

### **Environmental Health in 21<sup>st</sup> Century Africa**

- Modern environmental health hazards result from rapid development (economic, industrial, urbanization) in the absence of health and environmental safeguards, and unsustainable consumption of natural resources (lack of conservation and efficiency).
- Environmental health education/training and practice initiatives could expand to African & Caribbean LDCs.

#### **SOURCES:**

Berg R. 2008. An interview with John Steward, Region 10 VP. *J Environ Health*, 70 (9): 71.  
Nweke OC and Sanders III WH. 2009. Modern Environmental Health Hazards: A Public Health Issue of Increasing Significance in Africa. *Environ Health Perspect*, 117 (6): 863-70.

## **EPHS in LDCs**

### **Quotes on Professional Education**

**“There is a real need to further educate health practitioners and the public [in LDCs] about environmental health.”**

**“A medical approach alone is not sufficient for a holistic understanding of the factors affecting human health: economic, social and environmental components [are equally important].”**

#### **SOURCES:**

Gopalan HNB. 2003. Environmental Health in Developing Countries: An Overview of the Problems and Capacities. *EHP*, 111 (9): A446-47. *The Nation's Health*, 9/2005, p.10.

**“The U.S.-Nigeria Partnership  
for  
Prevention Sciences Training,  
Urban Environmental Quality  
and Community Health”**  
originated in 2006 and led by  
GSU IPH (P.I.: Shendell) and the  
College of Medicine, University of Ibadan

[http://sphweb02.umdj.edu/sphweb/sphc/content\\_files/global\\_projects/nigeria/pdf/Nigeria%20Global%20PH%20Info.pdf](http://sphweb02.umdj.edu/sphweb/sphc/content_files/global_projects/nigeria/pdf/Nigeria%20Global%20PH%20Info.pdf)

**Maps of Africa, Nigeria and Ibadan**

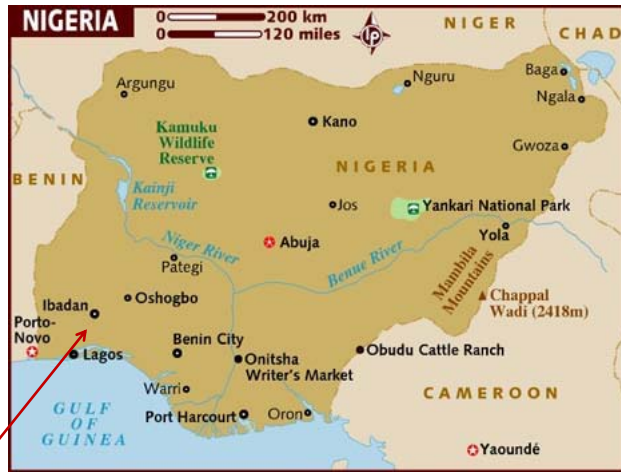


Nigeria is in  
west Africa,  
south of the  
equator, in  
the same  
time zone as  
the U.K.

Internet, [http://www.afri-sa.org/africa\\_map.gif](http://www.afri-sa.org/africa_map.gif), last accessed May 5, 2008

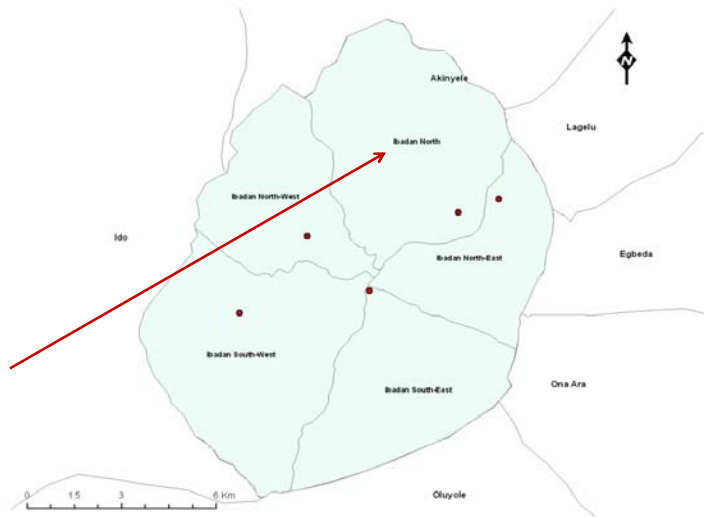
## Maps of Africa, Nigeria and Ibadan

NOTE:  
Estimated  
population  
reported to  
be 140-150  
million in  
Nigeria,  
depending  
on source



Internet, <http://www.lonelyplanet.com/maps/africa/nigeria/>, last accessed May 5, 2008

## Maps of Africa, Nigeria and Ibadan



International Institute for Tropical Agriculture and University of Ibadan Library, received April 2008



The revised/focused *specific aims* of our collaboration were:

1. Providing graduate students and medical/health professionals an intensive multi-part, short-course training workshop in 1-2 weeks in Nigeria at Ibadan led by U.S. and Nigerian faculty.
  - Enhanced awareness, knowledge and skills in environmental and occupational science, exposure assessment, and epidemiology → build capacity, reduce adverse health effects
2. Research pilot projects/studies in Nigeria, involving qualitative and/or quantitative data collection, conducted by MPH students in collaboration with U.S. and Nigerian faculty.
  - Determine a few specific, concreted research topics for pilot studies in one defined topic area, from the original list of four areas based on our comprehensive literature review on past Nigeria research as well as our team's skills and interests.

## Preliminary Results—Air Quality Research and Practice Priorities

Selected Photographs, March 2007 trip to Lagos-Ibadan, Nigeria

Books about Nigeria describe urban sprawl and traffic rivaling L.A., CA and Atlanta during rush hours. Nigeria has no emissions controls on cars, minivans (their local transport vehicles VS buses), trucks etc. Levels of numerous "criteria" and toxic outdoor air pollutants are high, but no outdoor monitoring system (only World Bank project, Lagos, 2006-).



This is heading north on a main road in Ibadan.

## Preliminary Results—Environmental Research and Practice Priorities

Selected Photographs, March 2007 trip to Lagos-Ibadan, Nigeria



We observed several health and safety issues for pedestrians and motorcycle riders in urban Nigeria; actions possible at personal, community, state and federal levels.

## Preliminary Results—Environmental Research and Practice Priorities

Selected Photographs, March 2007 trip to Lagos-Ibadan, Nigeria



There appeared to be several health and safety issues for pedestrians and motorcycle riders in urban Nigeria. These people, and other people spending time near roadways, are some of the susceptible subpopulations, with some vulnerability factors.

## **Preliminary Results— Research and Practice Priorities Related to Various Personal Exposures**

Selected Photographs, March 2007 trip to Lagos-Ibadan, Nigeria



Poor community sanitation leads to human and ecological health risks due to exposure to physical, chemical and biological agents in urban Nigeria. This is on Lagos-Ibadan freeway. Near roadway exposures and associated cardiovascular and respiratory health risks are topics of emerging importance to research and policy in industrialized nations.

## **Preliminary Results— Priorities Related to Waste Management**

Selected Photographs, March 2007 trip to Lagos-Ibadan, Nigeria



Poor community sanitation and dilapidated housing due to sprawl are major built environment issues in urban Nigeria.

**THE FACULTY OF PUBLIC HEALTH,  
UNIVERSITY OF IBADAN, IBADAN,  
NIGERIA AND THE SCHOOL OF PUBLIC HEALTH  
UNIVERSITY OF MEDICINE AND DENTISTRY  
(UMDNJ-SPH), NEW JERSEY, USA**

Announces A  
**ONE WEEK JOINT TRAINING  
WORKSHOP/PILOT RESEARCH**

**THEME**  
*Advances in Community Outdoor and Indoor  
Air and Environmental Quality  
Monitoring and Exposure Assessment*

**Date: May 19-23, 2008**

**VENUE:** Mac Arthur Foundation Building, Adjacent Faculty of Education,  
Olona, Benue Road, University of Ibadan, Ibadan, Nigeria

Featuring:  
Course modules on: Principles of outdoor and indoor community air pollution sources,  
exposure (hazard) agents and sampling, exposure assessment,  
susceptibility and vulnerability, study design, field measurements,  
data collection / management procedures, computer applications, etc

Plus:  
Practical demonstrations, examples of field data collection and group discussions

Resource Persons:  
Dr Derek Shendell and Others from UMDNJ-SPH New Jersey, USA  
Prof M.K.C.Sridhar and Others from University of Ibadan, Nigeria

Dr. Erne Dwojko Department of Community Medicine College of Medicine, University of Ibadan, Nigeria (Facilitator)	Dr Derek Shendell Department of Environmental and Occupational Health, EDHSI UMDNJ-SPH, New Jersey, USA (Principal Resource Person)
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01-2919000/01-2919000/01-2919000/01-2919000

# 1<sup>st</sup> Annual Short- Course Training

## May 19 to 23, 2008

# 1<sup>st</sup> Annual Short-Course Training University of Ibadan, Nigeria

**CLASS SIZE:** Original goal = 20 participants, and we decided to target:

- Academic staff (other lecturers): 4**
- Post-graduate students: 8 or more**
- Resident Doctors: 4 or more**
- Ministry/LGA officials: 3 or more**
- Industry workers: 4 or more**

We achieved an enrollment of 27 (some days ~10% missed a part per evaluation), and turned away eight from geology/natural resources.

**FIELD VISITS:**

**Community (n=3): market and residential areas near heavy traffic sites** (near main roads adjacent to hospital and campus of Univ. of Ibadan, traditional houses, schools and markets), waste disposal burnings sites; and, as time and resources would allow,

**Industrial: a drinking water bottling plant, Brit. Amer. Tobacco, P&G etc**



Selected Photographs,  
May 2008  
training/pilot research,  
Ibadan, Nigeria



Selected Photographs, May 2008  
training/pilot research, Ibadan, Nigeria



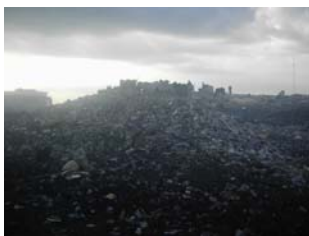
The visit to Bodija market at a major primary road intersection in Ibadan.

Selected Photographs, May 2008  
training/pilot research, Ibadan, Nigeria



These are from visit to staff (non-faculty) living area of UI campus.

Selected Photographs, May 2008  
training/pilot research, Ibadan, Nigeria



(L) Open refuse dumping and burning behind local abattoir (i.e., butcher or meat shop);  
(R) At start of tour of drinking water bottling industry plant; field trip debriefing session.

Selected Photographs, May 2008  
training/pilot research, Ibadan, Nigeria



Time to examine, demonstrate and practice with sampling equipment donated to University of Ibadan or on loan to Dr. Derek inside first....

Selected Photographs, May 2008  
training/pilot research, Ibadan, Nigeria



We went outside on University of Ibadan campus to take GPS coordinates, compare / validate distances measured given our interest in near roadway exposure assessment pilot projects at schools, and measure noise, CO<sub>2</sub>, T, RH and fine particles (PM<sub>2.5</sub>).

## May 2008 Faculty Pilot Field Research

- We had seven days (May 19-26) for various opportunities; weather prevented sampling only once.
- Assess Ibadan background, near-roadway and in-vehicle between IITA & UI daily + IITA & Lagos airport
- Try to assess weekdays and weekend, early morning & rush hour, and afternoon & evening (by sundown)
- Selected real-time measures, short-term samples:
  - Carbon dioxide, CO<sub>2</sub>,
  - Particle counts, PM<sub>x</sub>,
  - Noise, in terms of loudness (A-weighted decibels), outdoors
    - In-vehicle was not possible given sampler position and orientation requirements could not be met for 4-dr car or SUV or vans used.
  - Air temperature and relative humidity, indoors and outdoors

## School and Community-Based Research 2007-10 per Trips, etc

- Ana GREE, Shendell DG, Odeshi TA, Sridhar MKC. 2008. Identification and initial characterization of prominent air pollution sources and respiratory health at selected secondary schools in Ibadan Nigeria. *J Asthma*,46(7): 670-76.
- Ana GREE, Shendell, DG, Brown, GE, Sridhar MKC. 2009. Assessment of noise and associated health impacts at selected secondary schools in Ibadan, Nigeria. *J Environ Public Health*, doi:10.1155/2009/739502.
- Ana GREE, Shendell DG. 2010. School Environmental Health Programs and the Challenges of Achieving the Millennium Development Goals. *J School Health*, in press.
  - Please note we (Ana, Shendell et al) also have papers in review in *J Environ Health* on waste management practices, knowledge and awareness in Ibadan schools as well as on the training we conducted May 2008.



## Collaborations in Global Environmental Public Health: Improving Science + Sharing and Experiencing Cultures



Yes, nearly vegetarian can work in Nigeria. Meg Ana et al prepared workshop lunch daily.

**THANK  
YOU FOR  
YOUR  
INTEREST!**



The women, led by Dr. Eme Owoaje and her oldest daughter, were superior joke and story tellers...to help celebrate the end of a week of training and field work.