



Ghana Training in Household Air Pollution and Monitoring

Accra, Ghana, July 17-20 2017

Introduction & Background

Approximately 50% of the global population and 90% of households in developing countries rely on solid fuels – including wood, dung, grass, and coal – for cooking and heating. Household air pollution arising from the use of these fuels is associated with acute lower respiratory infection, a leading cause of child morbidity and mortality, and a number of chronic health outcomes in adults. This workshop will enhance the capacity of researchers and practitioners throughout Ghana to measure exposure to household air pollution in their communities' homes.

Reducing exposure to HAP directly relates to specific Sustainable Development Guidelines (SDG) and Sustainable Energy For All (SE4ALL) goals and targets, including SDG 3.9, which calls for reduction in deaths and illnesses attributable to hazardous chemicals and air, water, and soil pollution; SDG 7, which calls for access to affordable, reliable, sustainable, and modern energy for all; and SDG 17, which aims to revitalize global partnerships.

The July 2017 Ghana Training in Household Air Pollution is a four-day training workshop on household air pollution (HAP) and exposure monitoring targeting 1) members of the Ghana Environmental Protection Agency, and 2) investigators currently engaged or interested in household air pollution research and exposure monitoring. The workshop will be run by a team of international experts from the University of California, Berkeley, Berkeley Air Monitoring Group, and the Global Alliance for Clean Cookstoves, in coordination with the Ghana Environmental Protection Agency and Accra Air Quality Monitoring Platform.

The training will include a combination theoretical and practical training on various aspects of household air pollution and related health exposures. It will provide participants with hands-on experience using HAP and exposure monitoring equipment and stove usage monitors, with a focus on the use of validated equipment and standardized, internationally-accepted protocols. Participants will be asked to form small groups during the first day of the workshop. These groups will work together on hands-on activities and create a short proposal for a household air pollution monitoring study which they will present to all participants.

This training is an extension of an ongoing series of trainings run by Kirk R. Smith's research group at UC Berkeley. Previous trainings were held in Antigua, Guatemala in 2011 (SCRIG, the Summer Cookstove Research Institute, Guatemala); in Palwal, India, in the fall of 2015 ([THAM, Training in Household Air Monitoring](#)); in Paro, Bhutan in the spring of 2016 ([THAP, Training in Household Air Pollution](#)); and in Addis Ababa, Ethiopia in the summer of 2016 ([ETHAP, Ethiopia Training in Household Air Pollution](#)).

Workshop Objectives

- 1) Provide attendees with background information on household air pollution and its associated burden of disease, with a focus on Accra, Ghana.
- 2) Provide attendees with training on basic skills on study design around household air pollution assessment in relation to its associated burden of disease, with a focus on Accra, Ghana.
- 3) Demonstrate the proper use and deployment of various HAP-related monitoring technologies, including personal and area PM_{2.5} and iButton-based stove use monitors
- 4) Hands-on experience with HAP measurement and personal exposure monitoring
- 5) Facilitate peer-to-peer exchange for ongoing air pollution related activities, including those planned as part of the broader Ghana Air Quality Monitoring (AQM) and Pollution Management and Environmental Health (PMEH) platforms.

Expected Outcomes

The overall goal of the workshop is to enable researchers to perform assessments of exposure to household air pollution using monitoring devices and samplers, with a particular focus on:

- 1) Increased familiarity with available online data sources related to HAP's burden of disease (primarily those provided by the Institute for Health Metrics and Evaluation and World Health Organization)
- 2) Understanding of sample protocols and operating procedures that can be adapted to meet specific study aims
- 3) Hands-on experience with various monitoring devices, including calibration, launching, placement, download, and data management.
- 4) Exposure to issues around study design as well as online tools and software to visualize data and to perform simple data analyses

Workshop Methods

The workshop will combine classroom based, interactive lectures with hands-on experience using monitors. Participants will (optionally) be able to attend a visit to households using biomass fuels for cooking, where they will practice placing equipment in a real-world setting. Trainees will be divided into groups of 3-5 people and rotate through hands-on activities. Instructors will



additionally place monitors in households prior to the start of the workshop and collect data for one or two 24 hour periods, enabling participants to see data from real homes.

Workshop Organizers

The Ghana Environmental Protection Agency (EPA) is involved in the arrangement of local provisions such as accommodation, venue, etc.

The Global Alliance for Clean Cookstoves (GACC), Berkeley Air Monitoring Group, and University of California, Berkeley (UC Berkeley), USA are involved in the identification of trainers, trainees, and budget resources and developing all curriculum materials.

Email communication and tele-conference using Skype are the means of communication to settle and elaborate workshop agenda items.

Local contact persons:

Dr. Emmanuel Appoh, Deputy Director, Ghana EPA

Kwesi Sarpong, Regional Market Manager, Global Alliance for Clean Cookstoves

Workshop participants will include representatives from:

Ghana Environmental Agency (EPA)

Ghana Atomic Energy Commission (GAEC)

Ghana Health Service (GHS) - invited

World Health Organization (WHO) - invited

World Bank - invited

Climate and Clean Air Coalition (CCAC) – invited

Kenya Ministry of Health – invited

Ghanaian HAP and Health Research Groups

Venue

The training will be held at the Ghana EPA's Institute for Environmental Studies (IES) located in Amasaman, Accra. It provides all provisions needed for the workshop, has two halls (with capacity of 25-30 and 100), Wi-Fi, and a pleasant setting. It has its own kitchen that serves the meals, tea, and coffee when needed as well as accommodations for participants traveling from elsewhere.

Workshop Resources/ Budget

The Global Alliance for Clean Cookstoves will fund the workshop, including all necessary equipment and supplies, as well as all expenses for lunch and tea/coffee/snack breaks and transportation from the training facility to the field visit sites. No travel, accommodations, or per diem will be offered to participants.

All equipment used during the workshop will become the property of the Ghana EPA. This will include Particle and Temperature Sensors + (PATS+), Ultrasonic Personal Air Samplers (UPAS), 5-7 iButton data-logging thermometers, among others, and corresponding data transfer and visualization software.

Sample Schedule (adapted from workshop held in Addis Ababa, Ethiopia in July 2016):

Day 1 – Monday, July 17th

08:30 – 09:00	Registration
09:00 – 09:10	Welcome address and expected workshop outcome
09:10 – 09:25	<i>Opening address: TBD</i>
09:25 – 10:00	Introductions
10:00 – 10:20	Tea, Coffee Break
10:20 – 11:10	HAP Research in Ghana and other African countries
11:10 – 11:40	Global Burden of Disease <i>An overview of findings from the Global Burden of Disease, Comparative Risk Assessment, and World Health Organization's solid fuel use to provide context for the entire workshop. A brief description of GBD techniques will be discussed.</i>
11:40 – 12:00	Study Design Issues on HAP assessment <i>A basic overview of HAP-related study designs will be presented with focus on health effect oriented studies.</i>
12:00 – 13:15	Lunch
13:15 – 15:15	EHS Pathway & Exposure Pyramid Fuels, Combustion, and Pollutants <i>This module utilizes the Environmental Health Sciences pathway to contextualize HAP. We will discuss the trade-offs in accuracy and precision with various exposure monitoring techniques and the large number of potential measurements that can be made in a home – and why we focus on certain commonly measured pollutants.</i>
15:15 – 15:30	Tea, Coffee Break
15:30 – 16:30	Split into teams, randomly distribute exposure monitors (temperature) <i>Participants will be put in groups of four or five; these groups will work together during the workshop to deploy equipment and move through various hands-on activities.</i>

Day 2 – Tuesday, July 18th

09:00 – 09:15	Daily Overview and Q&A
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09:15 – 11:15 10:30 – 10:40	HAP Monitoring <i>Tea / Coffee available</i> <i>Using the exposure pyramid, this module will focus on various approaches for estimating and measuring HAP. A portion of the module will focus on how to select appropriate equipment, how to deploy it, and how it works.</i>
11:15 – 12:00	Stove Usage I: Overview and Frameworks <i>Incomplete adoption of a clean cooking technology greatly limits its ability to reduce exposure to HAP in a meaningful way for health. This module focuses on various techniques for monitoring stove usage – mainly by measuring temperature – and analyzing usage data to better understand short and long-term adoption.</i>
12:00 – 13:15	Lunch
13:15 – 14:00	Stove Usage II: Field monitoring <i>This module focuses on various techniques for monitoring stove usage – mainly by measuring temperature – and analyzing usage data to better understand short and long-term adoption.</i>
14:00 – 14:15	Tea, Coffee Break
14:15 – 15:30	Personal Exposure Assessment <i>This module focuses on how, when, and why to monitor personal exposure. It includes an overview of monitoring techniques, issues with personal exposure assessment, and discussion of state of the art technologies enabling more precise and easier personal exposure assessment.</i>
Remainder	Group work: Personal Exposure Assessment practice, Devices, Data <i>Groups will rotate through a number of activities, including equipping each other with personal exposure monitors, launching and downloading devices, and managing data.</i>

Days 3&4 – Wednesday and Thursday, July 19th & 20th

Field Exercise Overview, Field Visit, and Data Review