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**HEALTH EFFECTS INSTITUTE**  
**AIR QUALITY WEBINAR SERIES**  
**SEPT-DEC 2023**

# Webinar 1:

**Building momentum for health studies  
using locally available air quality and  
health data**

**Date & Time**

Sep 19, 2023 08:00 AM  
Eastern Time (US and  
Canada)

**Webinar ID**

814 8043 9343



**Talk 2: 4.15-4.30pm**

**Showcase of ongoing or completed AQ  
and health research, opportunities &  
challenges**

**Augustine Afullo, Eastern Africa GEOHealth  
Hub (Kenya)**

# BAM and E-sampler, Quar



# The GEOHealth Cycle 1 2016-2021



**AIR POLLUTION  
& HEALTH**

**OCCUPATIONAL  
SAFETY  
& HEALTH**

**CLIMATE CHANGE  
& HEALTH**

**Policy  
Considerations  
&  
Regulatory  
Frameworks**

# Health and exposure assessment

Capital city population

- **Exposure Assessment:** BAM-1022 central site monitor (GOLD STANDARD MONITOR)
- **Health Effects Assessment:** Morbidity and mortality data from 10 hospitals
- **Time:** Continuous
- Poisson time-series modeling

1000 children from  
10 schools

- **Exposure Assessment:** School site e-samplers
- **Health Effects Assessment:** Health questionnaire, lung function tests (spirometry)
- **Time:** 1 year

30% of children's homes

- **Exposure Assessment:** PATS+ co-located with UPAS in homes with MA2000 for black carbon monitoring and home characteristic survey
- **Health Effects Assessment:** Health questionnaire, lung function tests (spirometry)
- **Time:** 3 days

## GEOHealth-UoN- Data collection duration

- a. The monitors include BAM 1022 that **ran for 3 years** then RECENTLY stopped due to PUMP failure (In process of being procured)
  - b. The E-Samplers are (Low cost sensors) **currently five** and have been running for the **last four years**.
  - c. They are at Moi Avenue, Riruta satellite, St Bakhita, Heshima road and James Gichuru pri schools
- ▶ 3 year uninterrupted data from BAM 1022
  - ▶ The annual mean PM<sub>2.5</sub> levels over 3 years (2019-2022) were higher (**18.9 ±0.6 µg/m<sup>3</sup>**)
  - ▶ **Dry and wet** season PM<sub>2.5</sub> levels vary btn **14 and 19 µg/m<sup>3</sup>**
  - ▶ E-Sampler reading varied from **10- 35 µg/m<sup>3</sup>**; **Karen C -James Gichuru**

# Spirometry- Lung Function Test and Hospitalisation / mortality/ Morbidity

- ▶ Spirometry done in 10 schools;
- ▶ A total of 1080 children grade 5-6 aged 12-13 years done lung function test;
- ▶ 10% of the children had 75% impaired lung function with half having acutely impaired lung function;
- ▶ Lung / heart related hospitalization highest among <15 yr-olds and those aged 45-54;
- ▶ Mortality is highest among those aged 85+ years at 3-7.4% (heart) and 2.5-3.03% (pulmonary) mortality.



## CYCLE II- 2022-2027: AT SETUP PHASE

- ▶ Environmental health studies:
  - ▶ Lung function **[ALL]**
  - ▶ Blood pressure **[Uganda]**
  - ▶ Cognitive development **[Kenya]**
- ▶ Occupational heat stress **[Ethiopia]**
- ▶ Time series-Hospital-based morbidity and mortality **[ALL]**

Research training program domains and competencies

**Addis Ababa University**  
ETHIOPIA

**University of Nairobi**  
KENYA

**Makerere University**  
UGANDA

Time series study

Outdoor air pollution monitoring

Children's and women's health study and personal exposure assessment

Traffic-related exposure assessment

Climate and worker health

Cognitive outcomes

Ambulatory blood pressure



Investigators/  
Research Team

2 Hub  
Scholars



2 PhD



4 MS/MPH



Investigators/  
Research Team

2 Hub  
Scholars



1 PhD



4 MS/MPH



Investigators/  
Research Team

2 Hub  
Scholars



2 PhD



4 MS/MPH

## AirQo Co-location / partnership and Quantaq

- ▶ The AirQo sensors have 21 weeks data.
- ▶ They are located in Nairobi Pri., Karen C, Embakasi, Baba Dogo and at UoN Parklands.
- ▶ The AirQo sensors were taken to the schools that initially had E-Samplers but broke down.
- ▶ 11 QuantAq sensors are currently collocated at UoN Parklands campus.
- ▶ They have been running for 10 weeks.

# HEALTH FACILITIES DATA-CAUSE RELATED MORTALITY AND MORBIDITY

- ▶ The health facilities include: Mbagathi, Aga Khan, Nairobi hospital, Mama Lucy, Marder hospitals.
- ▶ We have 46 months of data from these facilities.
- ▶ We had some challenges with Nairobi hospital but it's now picking up.
- ▶ Has been a cycle 1 activity; Continues in Cycle 2

## MoU on data sharing Protocols

- ▶ Partnership opportunities exist
- ▶ We have signed MoU with various partners and shared data with them.
- ▶ Some of them include; NEMA, SEI, a PhD student from UoN
- ▶ Team got an opportunity to showcase their work during the upcoming agricultural show
- ▶ It's possible to get real time data from the Airqo and Quantaq sensors.
- ▶ One just requires an internet.
- ▶ However, BAM data requires manual download.

# GAPS / AREAS FOR FURTHER PARTNERSHIP?

- ▶ Getting spare parts for the sensors is a challenge.
- ▶ We have to ship them from US
- ▶ Hence losing a lot of data in the process.

**A local manufacturer To consider venturing into this?**

## **Co-location Partnership**

- ▶ We are making all attempts to bring the BAM back to life;
- ▶ We are open for colocation with BAM, being a gold standard sensor

# Societal Benefits from GEOHealth Data so far

▶ Stakeholder workshop @UoN: 24<sup>th</sup> Jan, 2022: Awareness about risky parts of the city- schools, hospitals, NEMA, NBI county dept health; etc----- Link: [\(910\) GEOHEALTH STAKEHOLDER ENGAGEMENT: Air Pollution in the City of Nairobi-Bridging Evidence with Policy - YouTube](#)

▶ Policy brief 1 of 2022:



DOC-20230915-WA0007.pdf

▶ Policy Brief 2 of 2023:

## ▶ ACKNOWLEDGEMENT

▶ Prof Nicholas Oguge, GEOHealth PI, Kenya

▶ Prof S A Obiero- CO-I (Kenya)

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▶ Prof Abera Kumie-Reginal Geohealth PI (Addis Ababa Univ)