

Establishing a Nationwide Ambient Air Quality Monitoring Network: The Clean Air Initiative and PM2.5 Monitoring in The Gambia

Julius David^{1,4}, Dawda Badgies, Mariatou Dumbuyas, Awa Sabally Touray¹, Isatou Touray⁴, Saikou Camara³, Buba Manjang³, and Sunkaru Touray¹

¹Permian Health Lung Institute, Brusubi, The Gambia; ³Directorate of Public Health Services Ministry of Health, Banjul, The Gambia; ⁴Gambia Committee on Traditional Practices Affecting the Health of Women and Children (GAMCOTRAP), Kanifing, The Gambia; ⁵Ministry of Environment, Climate Change, and Natural Resources (MECCNA), The Gambia

BACKGROUND

- Air pollution causes ~7 million deaths globally per year.
- In The Gambia, major sources include firewood/charcoal use and harmattan dust.
- Women and children experience the highest health risks.
- Lack of air quality data limits effective policy and action.

OBJECTIVE

Launch the Clean Air Initiative (2023) to establish a nationwide, low-cost ambient air quality monitoring network.

METHODOLOGY

- Conducted stakeholder mapping to identify and engage key partners:
 - Government ministries (health, environment)
 - Private sector (construction companies)
 - Academic institutions
- Installed low-cost PM2.5 sensors (IQAir AVO) across all seven regions in The Gambia.
- Held educational workshops to support community awareness and capacity building.
- Integrated sensor data into actionable air quality management plans.

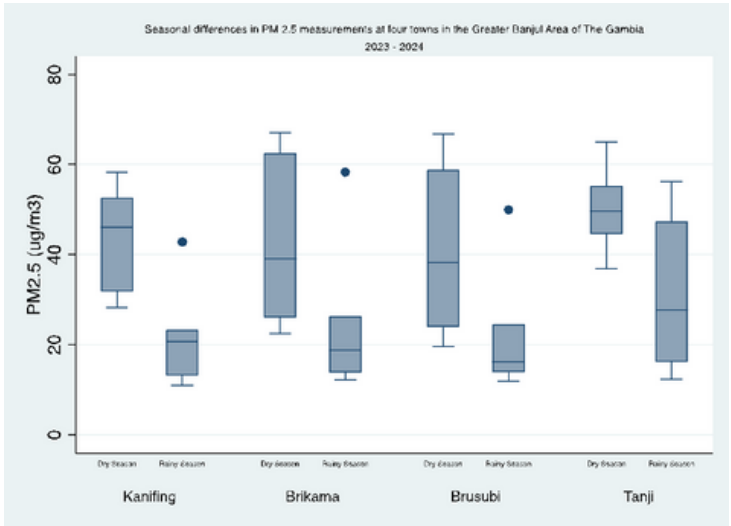


Figure 1

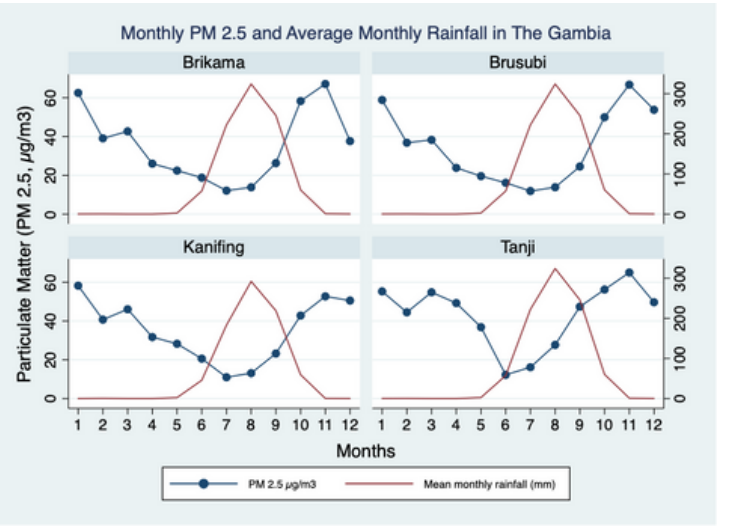


Figure 2

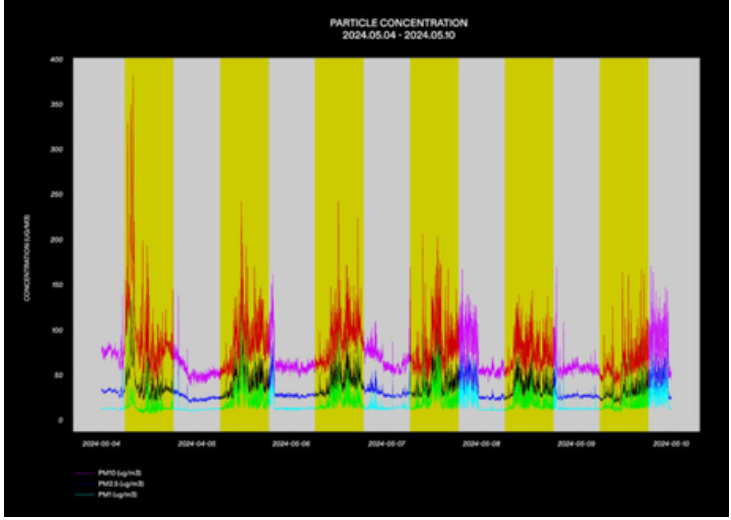


Figure 3



RESULTS & DISCUSSION

- Deployed 17 PM2.5 sensors across The Gambia within 12 months.
- Installed first Beta Attenuation Monitor
- Key operational challenges (sensor security, network reliability) addressed through:
 - Community engagement
 - Solar-powered installations
- Focused observations in Greater Banjul Area provided valuable urban data.
- Preliminary findings (first 4 sensors):
 - 12-month average PM2.5: **36.9 µg/m³** (95% CI: 31.9–42.0)
 - Over 7x the WHO guideline of 5 µg/m³
 - **Seasonal variation:**
 - Dry season: 44.9 µg/m³ (95% CI: 39.7–50.2)
 - Rainy season: 25.8 µg/m³ (95% CI: 18.6–32.9)

CONCLUSION

- The Clean Air Initiative has fundamentally advanced air quality management in The Gambia.
- Established first nationwide monitoring network, serving as platform for evidence-based policy and public health improvements.
- Ongoing collaboration and resolution of operational barriers are critical for long-term success.

