**Title: Addressing Air Pollution Exposure in Nigerian Secondary Schools: A Case for Early Health Intervention through Data**

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**Field:** Chemical Engineering
**Project Year:** 2021

**Summary**
This policy brief is based on a field research project conducted in four secondary schools in Ogbomosho, Nigeria. It investigates levels of PM2.5 particulate matter to assess the health risks associated with air quality exposure among students. The findings underscore the urgent need for data-driven environmental health interventions in Nigerian schools.

**Background**
Air pollution, especially fine particulate matter (PM2.5), poses a significant threat to public health. These microscopic particles can penetrate deep into the lungs and bloodstream, causing respiratory illnesses, cardiovascular disease, and cancer. Children are especially vulnerable to long-term exposure. In Nigeria, air quality monitoring is not commonly conducted at the school level, creating a dangerous blind spot in the country's health and education systems.

**Methodology**
Using air quality monitors, I collected PM2.5 concentration data during class and outdoor activities across four secondary schools. The goal was to evaluate what students are exposed to throughout the day. The data was analyzed and benchmarked against the World Health Organization's air quality guidelines.

**Key Findings**

- Two schools recorded PM2.5 levels significantly exceeding WHO's 24-hour mean limit of 25 µg/m³.
- Indoor exposure was often higher than outdoor exposure, indicating poor classroom ventilation.
- Students exposed to these levels from a young age face elevated risks of disease in adulthood.

**Table: Average Maximum Ground Level PM2.5 Concentration (µg/m³)**

| School | Morning Indoor | Morning Outdoor | Afternoon Indoor | Afternoon Outdoor |
|---|---|---|---|---|
| Nurudeen Secondary | 19.0 | 21.0 | 16.5 | 19.8 |
| Anglican High | 27.9 | 30.5 | 23.6 | 24.0 |
| School of Science | 41.2 | 46.0 | 28.0 | 32.4 |
| TA-Taoheed Int'l | 23.2 | 24.8 | 18.6 | 18.4 |

This table highlights that schools like School of Science and Anglican High significantly exceed WHO thresholds, especially during morning hours. These data-driven insights reinforce the urgency of implementing environmental controls.

**Dashboard and Visualization Insight**

In addition, while I have not directly developed APIs, I understand the importance of interoperability in data systems. During my research, I applied standardized comparisons (e.g., WHO air quality limits) to ensure that field data was relevant and usable across different sectors. This approach aligns with the principle of interoperability — enabling data to be shared and reused effectively for decision-making across health, education, and environmental domains.

**Figure: PM2.5 Dashboard Visualization**

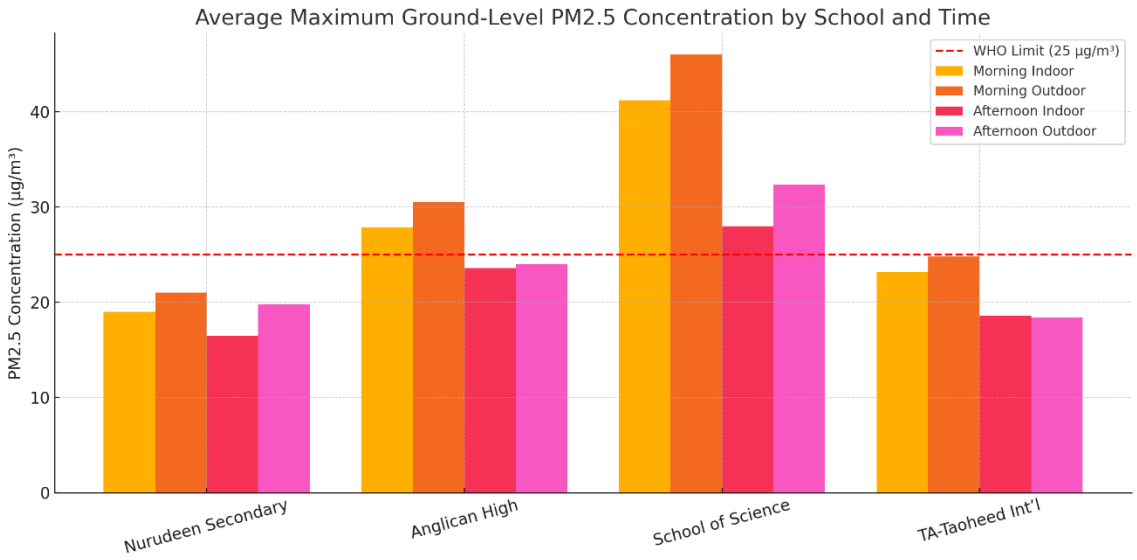


***Figure 1: Average PM2.5 Levels by Time and Location***

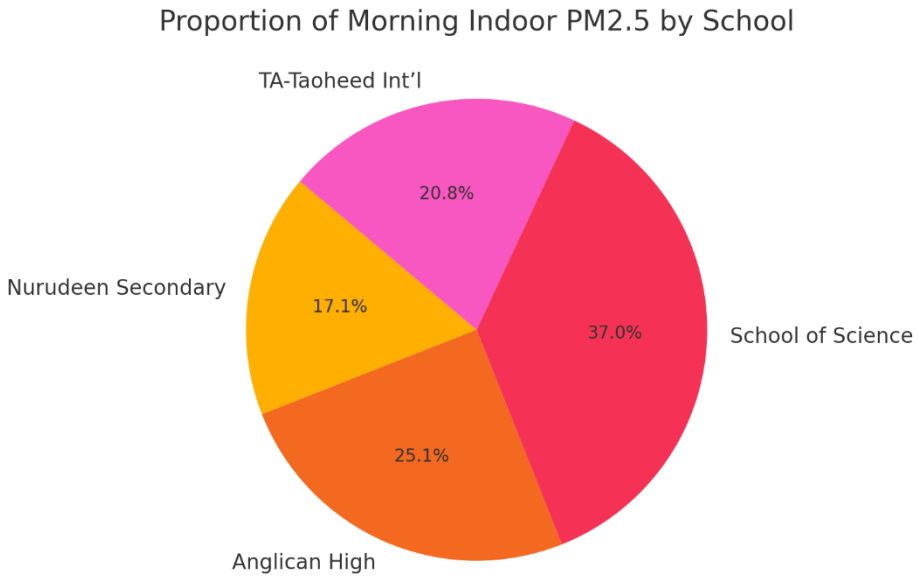


***Figure 2: Proportion of Morning Indoor PM2.5 by School***

**Recommendations**

1. Install better ventilation systems in schools and relocate classrooms away from high-traffic zones.
2. Introduce school-based air quality monitoring programs.
3. Develop localized environmental data dashboards for policymakers and educators.
4. Plant grass and trees around school premises to naturally filter air pollutants.
5. Tile classroom floors to reduce dust and particulate accumulation.
6. Integrate environmental health data into education and health policy planning.

**Conclusion**
This research demonstrates how localized environmental data collection can inform practical and evidence-based solutions in public health and education. By identifying real exposure levels within school environments, the study highlights the critical role of data in revealing hidden health risks and guiding targeted interventions.

With access to reliable air quality data, schools and government agencies can take proactive, informed steps to reduce children's exposure to PM2.5 and other harmful pollutants. Implementing data-driven policies and environmental improvements can significantly reduce preventable health risks and contribute to healthier learning environments.

Ultimately, empowering institutions with accurate, actionable data is essential for protecting vulnerable populations and improving quality of life for present and future generations.

## References


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- Pope, C. A., & Dockery, D. W. (2006). Health effects of fine particulate air pollution: lines that connect. *Journal of the Air & Waste Management Association*, 56(6), 709-742.


**About the Author  Oyeleye Shina Joseph:**

Oyeleye Shina Joseph is a **Chemical Engineering graduate** with experience in environmental health research and a growing specialization in **data analysis, business analytics, and financial analytics**. His work focuses on applying **data-driven methods to tackle real-world challenges** in public health, environmental monitoring, and decision-making.

Through his research on particulate matter exposure in Nigerian secondary schools, he has gained **practical experience in data collection, analysis, visualization, and evidence-based policy recommendations**. His analytical work aligns with global data standards and emphasizes **ethical data use, accessibility, and societal impact**.

Beyond environmental research, Shina has built **interactive data dashboards** and conducted projects such as:

- **Vehicle population analysis across regions**
- **Success experience service sales**
- **Customer behavior and market analysis**
- **Nigeria economic inflation monitoring through CSEA updates**

These experiences have strengthened his capabilities in **business intelligence, financial insight generation, and economic data analysis**.

He is particularly interested in **data governance, public health policy, and leveraging analytics** to support sustainable development and informed decision-making across sectors.

Through continued professional development and research engagement, he aims to advance the **integration of environmental, economic, and business data** to create meaningful societal impact.