

# The Effects of Photochemical Air Pollution on Respiratory Health in Abuja Nigeria

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## Summary

This study aims to critically evaluate the effect of photochemical smog on COPD patients in Nigeria. A cohort of COPD patients was recruited from two large hospitals in Abuja Nigeria. Symptom questionnaires, daily diaries, dyspnoea scale and measurement of lung function were used to obtain health data. Real-time air pollution data was obtained from a monitoring site at Abuja airport. Measured air pollution concentrations, for the precursors of photochemical smog, are far higher than those recorded in the developed world where a link between air pollution and respiratory health has been observed. The lung function values recorded for the cohort would indicate that respiratory health in the cohort is poor with a mean age suggesting that COPD is developing at a far earlier age in Nigeria. The correlation between measured air pollution and an exacerbation of symptoms will be investigated as part of this project.

## Introduction

Many studies have investigated the effects of air pollution on health in the developed world however information from the developing world, including Africa is sparse (Mustapha et al., 2011). However, research has shown that the concentrations of air pollution in Nigeria are considerably higher than those reported in the developed world (Olajire, Azeez & Oluyemi, 2011).

## Method and Result

A cohort of patients was recruited from 45 University of Abuja Teaching hospital, and 28 from the National Hospital both in Abuja, Nigeria. All members of the cohort were attending respiratory clinics at the hospitals and had been diagnosed with COPD. Lung function was determined using spirometers supplied from the UK, at each clinic attendance. Information on symptoms was obtained using a modified version of the St Georges respiratory questionnaire with 30% of the cohort reporting worse wheeze in the morning, 10% cannot go shopping, 15% take long time to get washed, 25% walk slower, 15% if they hurry have to stop and 5% cannot take bath.

Mean +/-SD Age	Mean +/- SD FEV <sub>1</sub>	Mean +/- SD % predicted FEV <sub>1</sub>
57.89 +/- 11.76	2.66	34.0

Table 1 Mean +/- SD, Age, FEV<sub>1</sub> and % predicted FEV<sub>1</sub> for the cohort n= 73

The results show that the mean FEV<sub>1</sub> for the cohort was 2.66 with the mean predicted % being 34.0 indicating that the patients in the cohort have impaired lung function.

Patients were asked to keep daily diaries of their symptoms and this information will be correlated with air quality data. An ozone monitor has been supplied from the UK and has been sited at the Nigerian Meteorological agency (NIMET) monitoring site at Abuja airport. Other pollutants monitored at the site are NO<sub>x</sub> and PM<sub>10</sub>.

Concentrations of NO<sub>x</sub> and PM<sub>10</sub> are far in excess of those measured in the developed world and would indicate that there is the potential for air pollution to impact on respiratory health notably in the winter. The high temperatures found in Abuja are also likely to lead to the formation of a range of secondary air pollutants including ozone and secondary particles.

## Conclusion

It is likely that the concentrations of air pollutants monitored in Abuja will lead to an exacerbation of the symptoms reported by the cohort of COPD patients. The study will investigate this using patient diaries and real-time air pollution measurements.

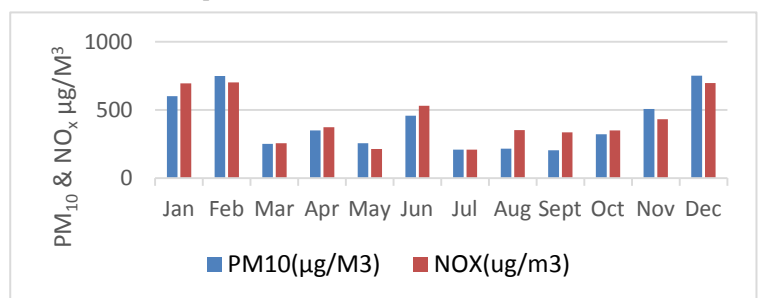


Figure 1: Concentrations of NO<sub>x</sub> and PM<sub>10</sub> in Abuja Nigeria 2016

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References: Mustapha, B.,Blangiardo, M., Briggs, D., & Hansell, A.L. (2011) Traffic air pollution and other risk factors for respiratory illness in schoolchildren in the Niger-Delta region of Nigeria. *Environmental Health Perspectives*, 119(10) 1478-1483.

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