

Urban Air Quality: Case Study in the City of Brasília/DF, Capital of Brazil

Margarida Correia Marques¹, Marcia Silva de Oliveira¹, Fernando Glenadel Braga², and Margarida L. R. Liberato³

¹Universidade de Trás-os-Montes e Alto Douro (UTAD), Centro de Investigação e de Tecnologias Agroambientais e Biológicas (CITAB)

²Universidade de Trás-os-Montes e Alto Douro (UTAD), Centro de Química-Vila Real (CQVR)

³Universidade de Trás-os-Montes e Alto Douro (UTAD). Instituto Dom Luiz

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Abstract

Ambient air quality is an increasingly prominent environmental factor within the sustainable development of an urban territory, due to a growing awareness on the harmful and transboundary nature of its effects. The main objective of this work was to build knowledge on the quality of ambient air and climate, in the metropolitan area of Brasília/DF, the capital of Brazil. The experimental procedure was designed so as to allow the response to this objective: a) appealed to the temporal series of pollutants measured in the existing regulatory network in this urban area, in the last 10 years; and the data from the National Institute of Meteorology – NIMET; b) correlated statistically all data analyzed. We found a poor spatial coverage of the network for monitoring of ambient air quality in urban area. The only pollutants measured continuously in Brasília/DF are respirable particles (PM10), which is manifestly insufficient, taking into account the different types of sources found. In this way, it is crucial to raise the level of knowledge about the quality of the resource “air” in this city to become more effective and efficient management. The information now obtained constitutes the basis for developing an urban strategy to increase the resilience of populations potentially affected by this problem, i.e., aims to guide the process of ambient air quality management of this Brazilian city to enable you to hold (when good) or, in other cases are initiated investigations/actions that improve.

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Margarida Correia Marques; Marcia Silva de Oliveira; Fernando Glenadel Braga; Margarida L. R. Liberato

School of Life and Environmental Sciences, University of Trás-os-Montes and Alto Douro (UTAD)
Centre for the Research and Technology of Agro-Environmental and Biological Sciences (CITAB)

INTRODUCTION

Urban ambient air quality is an increasingly prominent environmental factor within the sustainable development of an urban territory, due to a growing awareness on the harmful and transboundary nature of its effects.

OBJECTIVES

The main objective of this work was to build knowledge on the quality of ambient air and climate, in the metropolitan area of Brasília/DF, the capital of Brazil: to evaluate the prevalence of hospitalizations for respiratory disorders in the public health network and correlate them with the ambient air quality; and to produce data and build information to support the design and implementation of public policies, strategies and management of ambient air quality at the municipal level.

METHODOLOGY

The experimental procedure was designed so as to allow the response to this objective: a) appealed to the temporal series of pollutants measured in the existing regulatory network in this urban area, in the last 10 years; and the data from the National Institute of Meteorology – NIMET; b) correlated statistically all data analyzed.

STUDY AREA

The area of the present study is the city of Brasília/DF, capital of Brazil (Figures 1 and 2). The climate in Brasilia is tropical with a dry season (the type Aw in the Köppen climate classification), with average monthly temperatures always above 18°C and average rainfall of 1,540 mm annually, concentrated between the months of October and April, occurring in the form of rain and, sometimes, of hail. During the dry season (May to September) (Figure 2), the levels of relative humidity of the air fall enough, getting many times below 30%.



Figure 1. The Federal District (arrow) is one of 27 federal units in Brazil, where is located the country's capital Brasília.



Figure 2. Spontaneous "Cerrado" forest fire. Brasília/DF, 2017.

RESULTS

We found a poor spatial coverage of the network for monitoring of ambient air quality in urban area. The only pollutants measured continuously in Brasília/DF are respirable particles (PM₁₀), which is manifestly insufficient, taking into account the different types of sources found (Figure 3). In this way, it is crucial to raise the level of knowledge about the quality of the resource "air" in this city to become more effective and efficient management.

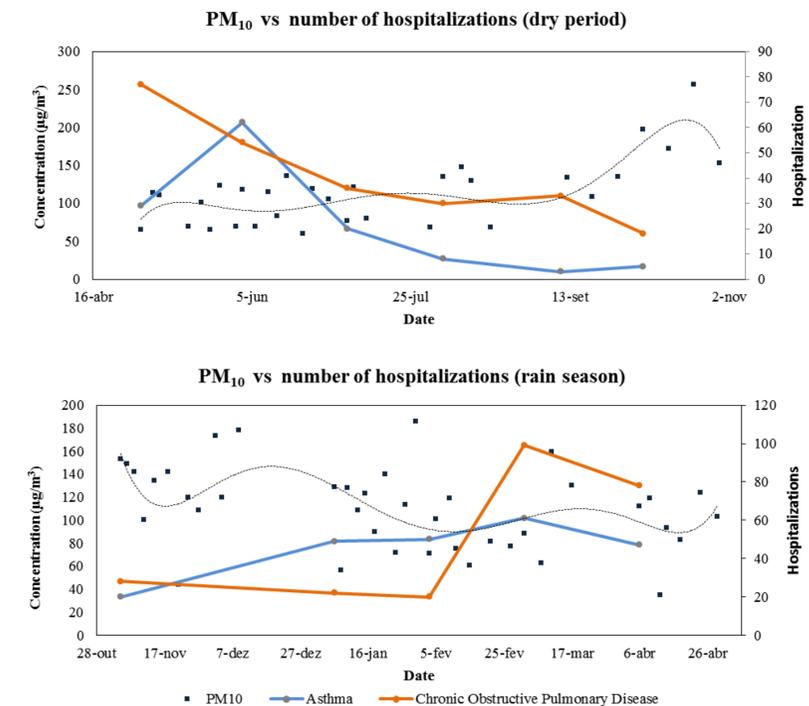


Figure 3. Concentration of pollutants in correlation with the hospitalizations

Graphical representation show, in the dry period of 2015, an increase in the number of hospitalizations in relation to other periods of the year, and high concentrations of PM₁₀ in the atmosphere, with the period between May and September, November and December, and May, July and August reflecting the deterioration of air quality due to the climate. In the period of rain, the concentration of particles has reached safe levels of exposure to health in the atmosphere of the DF.

CONCLUSIONS

The information now obtained shall constitute the basis for developing an urban strategy for the resilience of populations potentially affected by this problem, i.e., aims to guide the process of ambient air quality management of this Brazilian city to enable you to hold (when good) or, in other cases are initiated investigations/actions that improve.