Clean Air Institute

SUMMARY

2012 Edition

Air Quality in Latin America: An Overview

Produced by the Clean Air Institute

1. INTRODUCTION

Poor air quality is having serious impacts on health, social welfare and economic development worldwide and in the Latin American and Caribbean (LAC) region. These high concentrations of air pollutants are impacting citizens by reducing quality of life and causing premature death and illness, as well as harming ecosystems, whilst in turn directly impacting the national economies of the LAC countries and their economic and social development. In addition to their health effects, urban pollutants such as black carbon and tropospheric ozone also contribute to climate change.

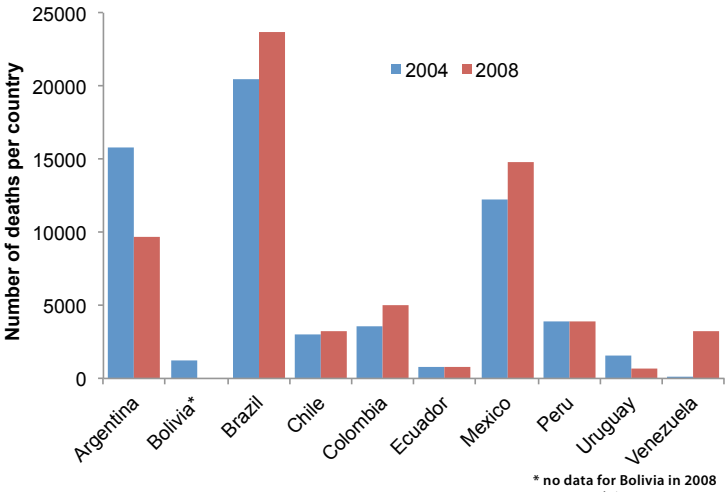
The Clean Air Institute (CAI) recognizes the important efforts that some Latin American Cities are making to measure and report urban air quality. However, throughout this analysis, CAI has confirmed that there is still a deficiency of consistent, available data on current air quality concentrations in some cities and countries in the LAC region, as well as widely differing Air Quality Standards. Some cities do not yet measure air quality. Furthermore, air pollution data is still not widely and adequately communicated to the public. Absent or substandard air quality information negatively affects citizens' awareness of the risks posed by air pollution leading to an ineffective or nonexistent decision making processes in this matter.

"Air pollution is set to become the world's top environmental cause of premature mortality, overtaking dirty water and lack of sanitation" with "the number of premature deaths from exposure to particulate matter… projected to more than double worldwide, from just over 1 million today to nearly 3.6 million per year in 2050". (OECD, 2012)

The CAI report represents the first attempt to collect, analyze and present data from air quality monitoring being undertaken in the LAC region as well as bringing together and comparing the latest information on Air Quality Standards. It also provides key recommendations to enhance air quality monitoring and related health protection standards, as fundamental elements of an overall air quality management system. The importance of technical assistance, capacity development, harmonization of standards and procedures, policy dialogue and other collaborative efforts at a Latin American scale are also highlighted.

Globally, poor air quality has a serious effect on the health of a population through impacts on the respiratory and cardiovascular systems as well as some pollutants having carcinogenic properties. The World Health Organisation (WHO) estimates that globally 1.34 million people died prematurely due to poor air quality in 2008. In Latin America, over 100 million people are exposed to polluted air.

A lack of action to improve air quality inhibits progress towards the UN Millennium Development Goals, in particular Goal 7 that includes commitments to promote sustainable development policies that support "a safe and healthy living environment for all" which includes "healthy air quality" amongst other actions.



The number of premature deaths lost per country in largest countries in the region (Global Health Observatory (WHO))

Poor air quality and its effects on health and environment in turn negatively impact on social and economic development, affecting a country's economic competitiveness and development. Among other negative implications, poor health resulting from air pollution costs billions of dollars annually in medical costs and lost productivity. In assessing air pollution impacts in LAC countries, the World Bank estimated, in 2005, that the implementation of pollution control scenarios might save between $2.2 billion or $6.2 billion per annum in "social cost of illness" costs.

Some cities in the region such as Mexico City, Bogotá, Sao Paulo, and Santiago have made significant improvements, but urban populations are still suffering from degraded air quality from polluting activities such as urban transportation, electricity generation, industry and manufacturing. This situation is preventable and reversible. Air Quality Management planning is essential for governments to build successful strategies for reducing emissions and improving air quality. As part of this wider planning process, setting air quality standards as explicit public policy goals and implementing effective air quality monitoring are necessities.

2. AIR QUALITY STANDARDS

In order to make use of monitoring data the setting of national air quality standards, which are nationally legislated limits on pollutant concentration to protect public health, is imperative. The World Health Organization produces air quality guidelines (AQGs) which, based on expert evaluation of current scientific evidence, are designed to offer guidance to nations seeking to reduce concentrations of air pollutants to a level less harmful to health. It is important that national standards are legally mandatory and not simply guidelines. If the standards are not legally enforceable there is no incentive for compliance. In this context, legally enforceable means that air pollution monitoring and reporting against the standards should be mandatory, and that the development of plans and actions to gradually meet the standards should be a requirement. The most prominent and cited example of standards internationally are set by the US Environmental Protection Agency (USEPA) and the European Union (EU) which consider the WHO AQGs as well as local issues and circumstances. In addition to the WHO guideline values, interim targets are given for some pollutants. These are proposed as incremental steps in a progressive reduction of air pollution and are intended for use in areas where pollution is high.

It is a positive finding that many countries and cities in the region have set official air quality standards to protect health although there are currently no identified legislated standards in three countries and a number of smaller island nations (although Uruguay has submitted a proposal for approval). However, many of these standards exceed the WHO guidelines. With scientific evidence suggesting that there is no safe ambient particulate matter threshold level below which health damage does not occur, the standards for both PM_{10} and $PM_{2.5}$ are of utmost importance. However, many Latin American countries do not have national $PM_{2.5}$ standards and both the annual and 24-hour PM_{10} standards for all countries are higher than the WHO Air Quality Guidelines. The health effects of NO_2 are most significant with short term exposure but most countries have standards set significantly higher than the WHO 1-hour AQG or have no short term standard at all.

Pollutant	$PM_{2.5}$ (µg/m³)		PM_{10} (µg/m³)		Ozone[2] (µg/m³)			SO_2 (µg/m³)				NO_2 (µg/m³)			CO (µg/m³)	
Averaging Time	24-hr	Annual	24-hr	Annual	1-hr	8-hr	Annual	1-hr	8-hr	24-hr	Annual	1-hr	24-hr	Annual	1-hr	8-hr
World Health Organization (WHO) AQG	25	10	50	20	-	120	-	500	-	20	-	200	-	40	-	-
Interim target 1	75	35	150	70	-	160	-	-	-	125	-	-	-	-	-	-
Interim target 2	50	25	100	50	-	-	-	-	-	50	-	-	-	-	-	-
Interim target 3	38	15	75	30	-	-	-	-	-	-	-	-	-	-	-	-
Argentina[1]	-	-	-	-	196	-	-	-	-	-	-	-	-	-	58	12
Buenos Aires[2]	65	15	150	50	235	157	-	-	1300	365	80	-	-	100	40	10
Bolivia	-	-	150	50	236	-	-	-	-	365	80	400	150	-	40	10
La Paz[3]	25	10	100	20	-	100	60	-	-	20	-	200	-	100	0.03	0.01
Brazil	-	-	150	50	160	-	-	-	-	365	80	320	-	100	40	10
Colombia	50	25	100	50	120	80	-	-	750	250	80	200	150	100	40	10
Chile[4]	50	20	150	50	-	120	-	-	-	250	80	400	-	100	30	10
Costa Rica	-	-	150	50	160	-	-	-	1500	365	80	400	-	100	40	10
Ecuador	65	15	150	50	160	120	-	-	-	350	80	-	150	100	40	10
El Salvador	65	15	150	50	235	120	60	-	-	365	80	-	150	100	40	10
Jamaica	-	-	150	50	235	-	-	700	-	365	80	100	-	-	40	10
Mexico	65	15	120	50	216	157	-	524	-	288	66	395	-	100	-	13
Nicaragua	-	-	150	50	235	160	-	-	-	365	80	400	-	100	40	10
Panama[5]	-	-	150	50	235	157	-	-	-	365	80	-	150	100	30	10
Peru	50[5]	-	150	50	-	120	-	-	-	80[6]	-	200	-	100	30	10
Puerto Rico	35	15	150	-	235	147	-	-	-	367	79	188	-	100	40	10
Dominican R.	65	15	150	50	250	160	-	450	-	150	100	400	300	100	40	10
Venezuela	-	-	150	50	200	160	-	-	1300	365	80	367	300	100	35	10
Honduras	-															
Belize	-															
Haiti	-															
Cuba	-															
Paraguay	-															
Guatemala	-															
Uruguay	-															

[1]Provinces in Argentina set their regulations, including own standards. Therefore Buenos Aires is included in the table to demonstrate the more advanced status of standards at the province level. [2]Various averaging periods and/or allowable exceedences are adopted. [3] La Paz also has a 10 minute limit for SO_2 of 500 µg/m³. [4] For Chile all pollutant annual averages are the average of 3 consecutive previous years, 24-h standard for particles is the annual 98th percentile and 1-hr standard for gases is annual 99th percentile. [5]Draft laws only - available via website. [6] The current 24-hour standards for $PM_{2.5}$ and SO_2 in Peru will drop to 25 µg/m³ and 20 µg/m³ respectively in 2014.

3. AIR POLLUTANT DATA AND CONCENTRATIONS

The CAI report presents annual average concentration data for particulate matter, or particles, (both PM_{10} and the smaller sized particles termed $PM_{2.5}$), ozone (O_3), nitrogen dioxide (NO_2) and sulfur dioxide (SO_2). These data are compared to the WHO AQGs and the USEPA and EU standards. The largest cities were targeted for data collection and data was successfully obtained from 20 of these cities and two further cities.

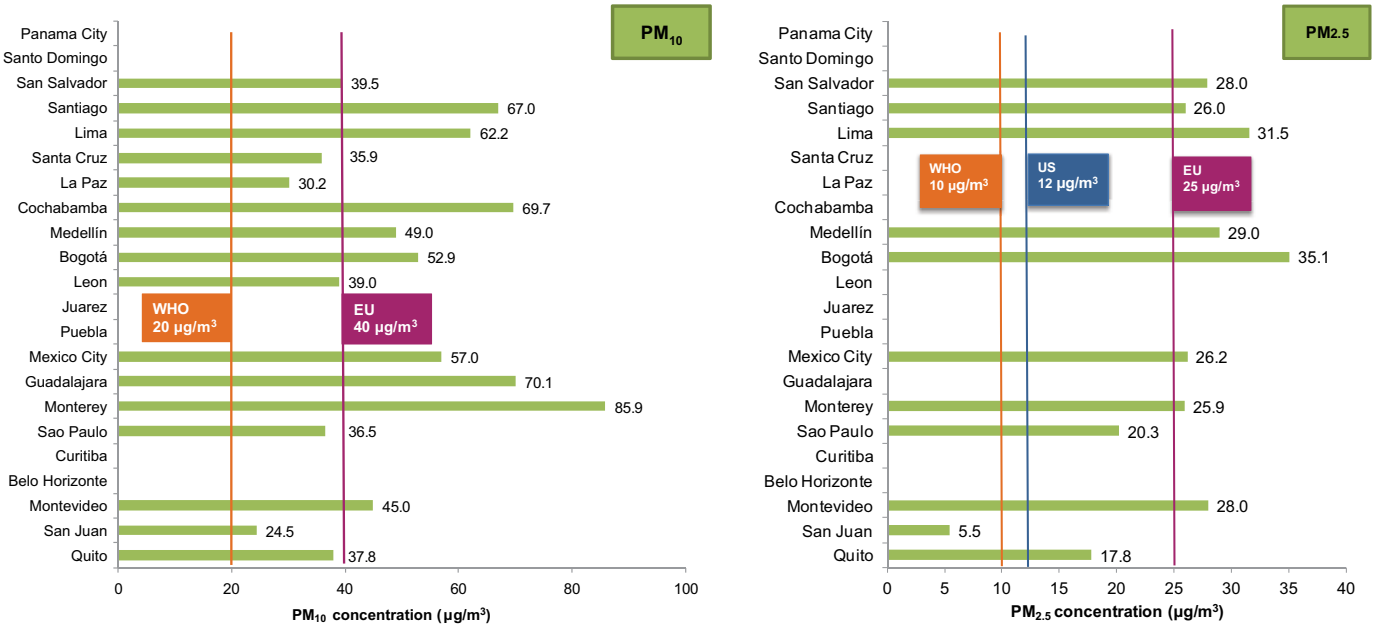
The presence and availability of data in the region was found to be a key issue. Although there were some excellent examples of monitoring, data availability and regular reporting, such as Mexico and Mexico City in particular, this was not common across the region. Data were, in most cases, difficult to locate and to acquire, particularly the most recent information. In a number of cities, there is no evidence of systematic air quality monitoring at all. This lack of transparency raises issues such as public accessibility to important information and appropriate consideration of air pollution as a public health and development issue.

The data itself was also of variable quality. There are no standardized monitoring techniques, or data collection, or averaging protocols across the region. There is also limited evidence of quality control or quality assurance activities which should be in place to ensure optimum monitoring practices and data quality.

"Ozone and particle pollution are the most widespread air pollutants—and among the most dangerous" (American Lung Association)

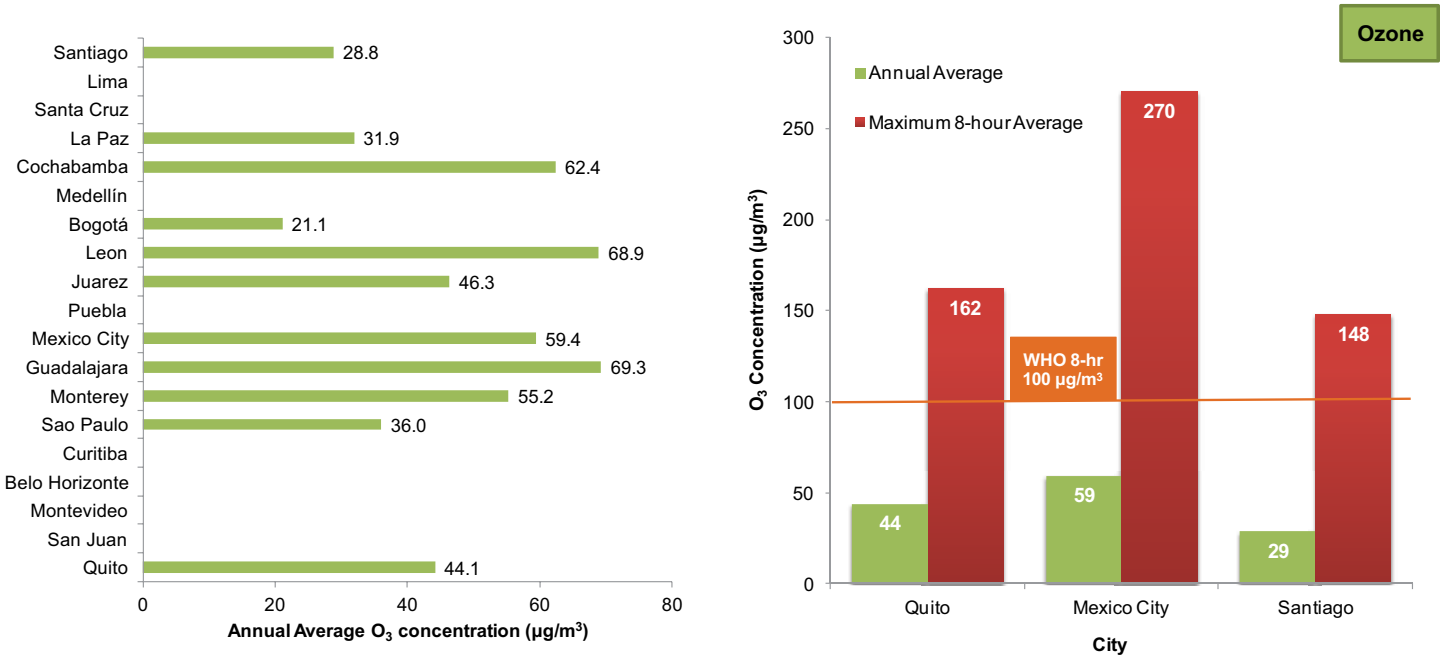
"Elevated levels of fine particulates in ambient air – typically emitted by vehicles, industry and energy generation – are associated with increases in daily and long-term premature mortality…." (WHO, 2008)

The data analyzed in this report strongly supports the concern over particulate matter and ozone. Of the 16 cities that measured concentrations of PM_{10} in 2011, all exceeded the WHO annual AQG of 20 µg/m³ and 9 of them exceeded the EU annual standard of 40 µg/m³. From the 11 cities that recorded concentrations of $PM_{2.5}$ in 2011, 10 exceeded the annual WHO AQG (10 µg/m³) and the USEPA standard (15 µg/m³) and eight of them exceeded the EU annual standard (25 µg/m³). All of the exceedences were also over the WHO Interim Target 3 (15 µg/m³).



Annual average concentrations for PM_{10} and $PM_{2.5}$ – 2011.

Ozone has no annual standard or guideline due to the impacts on health seen at shorter exposure times but the annual average data was the most accessible metric to obtain from across the region. Despite the difficulty in obtaining the correct data it was deemed important by CAI to undertake an analysis against the WHO 8-hour AQG. The analysis was undertaken on three cities where suitable data were obtained for 2011.



Annual average concentrations for Ozone (all cities) and a comparison with the maximum 8-hour average (2011)

The wide variety of annual average ozone concentrations across the region, suggests that this is an issue in some cities and maybe not others due to differences in the key drivers of ozone formation: the emissions of ozone precursor pollutants in the locality and the prevalence of solar radiation that is required for the photochemical transformation processes that lead to ozone formation to. The exceedences of the 8-hour WHO AQG in all three cities suggests that even those cities with a low annual average concentration are likely to have short-term concentrations of ozone above concentrations deemed unsafe for public health by WHO.

The annual mean concentrations of NO_2 presented in the report show that there were exceedences of the WHO annual AQG in 7 out of 13 cities. This is less of a widespread issue than particulates but NO_2 is still a problem in some cities. The report also recommends a more in-depth investigation into the shorter term exposure to NO_2 with an analysis of the 1-hour concentrations which would allow a fuller picture of the impacts of this pollutant on health in each city.

4. SUMMARY OF RECOMMENDATIONS

Based on the observations and findings of the report the **Clean Air Institute** puts forward the following recommendations:

1. Countries in the region should adopt a harmonized set of air quality standards to protect public health, with interim goals depending on particular national and/or local circumstances (as suggested by the current WHO Air Quality Guidelines).
2. All countries should adopt a $PM_{2.5}$ standard for both health and climate change assessments. Funding should be made available to expand monitoring of this pollutant.
3. It is essential that countries and/or cities initiate monitoring or, where it exists but it is not optimal, improve their monitoring practices. Activities to strengthen capacities in this area include:
   - **a.** Training and technical assistance.
   - **b.** Regional "Communities of Practice" on air quality standards, monitoring and air quality management good practices.
   - **c.** Further in-depth review of existing monitoring practices and recommendations.
   - **d.** Utilizing existing international knowledge to establish region-wide guidance and best practice as to how to under take effective monitoring, quality control and assurance, and the collection, processing and analysis of data would be invaluable to improving the quality of data from the region.
   - **e.** Harmonization in measurement to ensure consistency in sampling periods, calculation methods and comparable sampling techniques.
   - **f.** Identification of alternative funding mechanisms to support air quality monitoring network implementation and operation, including analysis of good practices and successful cases.
4. Improved accessibility to the data, as well as enhanced air quality reporting for both scientific and public information purposes.
5. Dissemination of good practice and capacity building in activities associated with good air quality monitoring and effective data dissemination.

Improved monitoring and adoption of air quality standards are crucial to addressing these issues. In addition, there is a broader suite of activities and actions required to move towards improved air quality. This can be encompassed in an over all Air Quality Management planning process. Air Quality Management planning is essential for governments to build successful strategies for reducing emissions and improving air quality. Governments must be encouraged and supported to take on this responsibility and must understand the importance of this issue. This planning process should also be considered a major mechanism and opportunity to fulfill national commitments to the UN Millennium Development Goals; protect public health; advance social and economic development for all; increase competitiveness; mitigate climate change; and open up investment opportunities.

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Produce by The Clean Air Institute
1100 H Street NW, Suite 800, Washington D.C., 20005 USA.
Phone: +1 (202) 464 5450, Fax: +1 (202) 785 4313
http://www.cleanairinstitute.org | info@cleanairinstitute.org

Full report and Summary available at:
http://www.cleanairinstitute.org/calidaddelaireamericalatina/

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