New WHO global air quality guidelines: more pressure on nations to reduce air pollution levels

After the accumulation of evidence over 16 years since the last global update in 2005, WHO has released updated global air quality guidelines.[1] The new reference values are considerably lower for most air pollutants than in the previous guidelines. For example, annual means were decreased from 10 to 5 μg/m³ for $PM_{2·5}$, 20 to 15 μg/m³ for PM_{10}, and 40 to 10 μg/m³ for nitrogen dioxide. 24-h limits were also lowered, although to a lesser degree. These new reference values reflect findings from studies which have shown that even lower levels of air pollution might be harmful to human health.[2–4] With an estimated global toll of 7 million deaths related to air pollution annually with the previous guidelines in place, it is expected that millions of lives will be saved if countries comply with these new guidelines. Although many countries have their own air quality standards, WHO air quality guidelines are generally stricter, especially if compared with those adopted by low-income and middle-income countries (LMICs). Air quality guidelines, associated with air quality monitoring, have managed to induce a decrease in air pollution levels in many cities and countries over the past two decades. Despite still having high air pollution levels, China, for example, has been managing to substantially reduce its air pollutant levels in the past decade, resulting in health benefits to its population.[5]

To evaluate the challenge imposed by the new WHO air quality guidelines, we used data from WHO air quality reports for $PM_{2·5}$ for 2014, 2016, and 2018,[6] the most recent report available, and compared the levels of this pollutant, and the percentage reduction from 2018 $PM_{2·5}$ levels that would be necessary to meet the new WHO guidelines in 47 selected cities with different levels of air pollution, distributed across six continents (appendix p 1). Cities were divided into lower and higher levels of air pollution (cutoff 35 μg/m³). Most of the cities in the lower air pollution group are in high-income countries, whereas most cities in the higher air pollution group are in LMICs. Although some cities showed decreases in $PM_{2·5}$ annual means from 2014 to 2018 according to WHO air quality data, and for some of the cities with lower levels of air pollution these values were enough for them to meet the previous WHO guidelines, the new guidelines will demand increased efforts to further reduce $PM_{2·5}$ levels. This scenario includes cities with already low $PM_{2·5}$ levels, of less than 10 μg/m³, such as Adelaide (Australia), Auckland (New Zealand), Helsinki (Finland), Stockholm (Sweden), and Vancouver (Canada), as well as cities that managed to decrease air pollution levels from 2014 to 2018, such as New York (USA) and Oslo (Norway). Cities such as Amsterdam (Netherlands), Barcelona (Spain), Lisbon (Portugal), London (UK), Los Angeles (USA), Moscow (Russia), Rio de Janeiro (Brazil), and Rome (Italy) had decreasing $PM_{2·5}$ levels between 2014 and 2018 and were close to meet previous WHO guidelines. However, other cities, such as Berlin (Germany), Frankfurt (Germany), São Paulo (Brazil), Tokyo (Japan), and in particular Mexico City (Mexico), Milan (Italy), and Seoul (South Korea), showed air pollution levels in 2018 that were well above the previous WHO guidelines. From the list of the 30 cities with lower $PM_{2·5}$ values, only Porto (Portugal) and Stockholm had concentrations in 2018 that would comply with the new WHO guidelines of 5 μg/m³. Cities such as Adelaide, Auckland, Helsinki, New York, and Vancouver will need a reduction in $PM_{2·5}$ concentrations of less than 30% and will probably be the cities to first meet these new guidelines. However, many of these cities with lower air pollution will still need a 50–77% reduction in $PM_{2·5}$ concentrations and will probably require a much greater effort to comply with the new WHO guidelines.

Most of the selected cities with higher air pollution levels are located in LMICs in Africa, south Asia, east Asia, and the Pacific, or in the Middle East, while some are in eastern Europe. Due to their higher air pollution levels, all of these cities will need at least an 80% reduction in 2018 $PM_{2·5}$ concentrations to meet the new guidelines. The situation is particularly concerning in Mumbai (India), which will need a 92% decrease, Beijing (China) and Riyadh (Saudi Arabia; 93%), Karachi (Pakistan; 94%), Ulaanbaatar (Mongolia; 95%), and New Delhi (India; 97%).

See Online for appendix

The new WHO global air quality guidelines set the target for air pollution even lower than in the previous guidelines, and are intended to further induce air

pollution decreases all over the world. It is a difficult task and most cities, especially those with higher air pollution levels in LMICs, will probably need many years to get closer to these new guidelines. However, with the simultaneous pressure to reduce the use of fossil fuels to mitigate climate change, many countries have been establishing goals for reduction of CO_2 emissions to comply with the Paris Agreement, which has been leading to an increase in clean energy generation[7] and, until 2030, will lead to large-scale electrification of vehicles[8] in high-income countries. The new WHO air quality guidelines will work as an additional driving force in the direction of a world where air pollution will be history. It will take time, but it is achievable. The sooner we get there, the more lives will be saved.

I declare no competing interests.

Helotonio Carvalho
helotonio.carvalho@ufpe.br

Department of Biophysics and Radiobiology, Biological Sciences Centre, Federal University of Pernambuco, Recife, Pernambuco 50670-901, Brazil; Department of Immunology, Aggeu Magalhães Institute (IAM), Oswaldo Cruz Foundation (FIOCRUZ), Recife, Pernambuco, Brazil

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