Impact of COVID-19 on Air Quality in Spain

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The new Coronavirus is responsible of the disease COVID 19, which spread around the world any time between October and December 2019. The rapid spreading and the high mortality rate forced different nations to declare a State of Alarm. The Spanish government was one of the first to declare a lockdown on March 14th, 2020. From that moment, and in order to cope with the health emergency situation, a series of mitigation and containment policies were established. They included confinement and quarantine, working from home when possible, online education (at schools and universities), cancelation of mass events, closure of restaurants, gyms, etc. (Briz-Redón *et al,* 2021). The suspended human activities together with the absence of motor vehicle traffic during the COVID-19 lockdown period and the different de-escalation phases, produced a unique experiment to assess the important impact of anthropogenic activities on air quality (Zhihua *et al,* 2021).

This study assesses the impact of the lockdown and the COVID-19 de-escalation on air quality in Spain. In order to evaluate the consequences all over the country, at least one urban air quality station in each provincial capital was selected, with a total of 54 stations. Data were obtained from the air quality monitoring network website of each Autonomous Community (compiled in https://www.miteco.gob.es). The evolution of the concentration of different atmospheric pollutants has been evaluated: PM_{10}, $PM_{2.5}$, NO_2, NO, SO_2, O_3 and CO. The results obtained during 2020 have been compared with the pre-lockdown concentrations and with the identical period during the previous two years. The Kruskal-Wallis non-parametric test followed by Dunn test has been applied in order to determine the eventual statistically significant differences.

Preliminary results show, in general, a decrease in the pollutant concentration, except for O_3. This pollutant registered an increase in several cities, probably due to the important role of organic volatile compounds on O_3 production (Grange et al., 2021).

Figure 1 shows the evolution of the monthly PM_{10} concentration at Barcelona for 2018, 2019 and 2020. The impact of the lockdown on the PM_{10} concentration is noted from April.

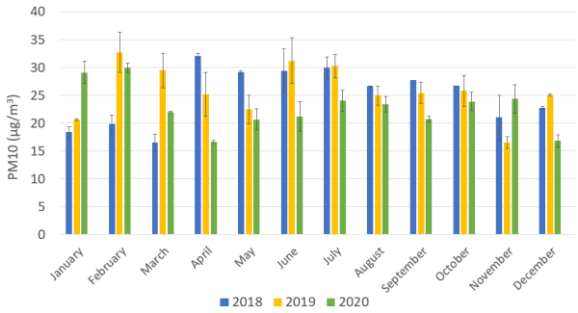

Figure 1. Monthly PM_{10} concentration at Barcelona (mean values of two urban stations: Eixample and Gràcia-Sant Gervasi) for 2018, 2019 and 2020.

The deviation of COVID 19-related pollution levels from the pandemic-free periods has enable us to assess the important role of anthropogenic activities on the environment and, therefore, on human health. This fact should be enough to motivate the tightening of the current air quality policies.

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