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PM2.5 Air Quality Monitoring during COVID-19
Restrictions in Portugal: Key Findings

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Background:

Particulate matter with or less 2.5 diameters (PM2.5) has deleterious health effects on humans. In 2020, exposure to levels of PM2.5 above World Health Organization Air Quality Guidelines (WHO AQG) caused 238,000 and 2,600 premature deaths in the European Union and Portugal, respectively. During the lockdowns and restrictions periods due to the COVID-19 pandemic, air quality was improved. The aim of this study was to assess the variation of PM2.5 concentrations in Portugal during the years 2020 and 2021, considering COVID-19 restrictions.

Methods:

The daily average (24-hour) concentrations of PM2.5 were calculated based on the hourly values registered at the monitoring stations (Online Database on Air Quality of the Portuguese Environment Agency). Friedman tests were used for paired samples to assess differences between levels of PM2.5 in the months of total lockdown, partial restriction due to the COVID-19 pandemic and months without restrictions, considering a level of significance of 5%.

Results:

The levels of PM2.5 had heterogeneous variation over the months of the two years. The higher levels of PM2.5 in 2020 and 2021 were 21 and 34 $\mu\text{g}/\text{m}^3$ in March and February, respectively. Although 2020 did not exceed the EU Air Quality Directive 2008/50 (25 $\mu\text{g}/\text{m}^3$), the levels of PM2.5 exceeded the current WHO Guideline (5 $\mu\text{g}/\text{m}^3$) during the whole year. Levels of PM2.5 were statistically significant different between the months of lockdown, partial restrictions and without restrictions in the both years ($p < 0,001$).

Conclusions:

Despite the evidence showing that the lockdown and restrictions due to COVID-19 minimized emissions from anthropogenic activities mainly related with mobility, Portugal still exceeded the WHO AQG highlighting the need for further measures to improve air quality accordingly with the international standards.

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Key messages:

- Additional environmental policies are required to improve air quality in Portugal.
- Air monitoring is the first step to estimate the health impact of air pollution.