

Changes in air quality during and after large-scale social restriction periods in Jakarta city, Indonesia

ABSTRACT

COVID-19 outbreak has constrained human activities in Jakarta, Indonesia during the large-scale social restriction (LSSR) period. The objective of this study was to evaluate the changes in the spatial variation of air pollutants over Jakarta during and after the LSSR periods. This study used satellite retrievals such as OMI, AIRS, and MERRA-2 satellite data to assess spatial variations of NO₂, CO, O₃, SO₂, and PM_{2.5} from May to June 2020 (during the LSSR period) and from July to August 2020 (after the LSSR period) over Jakarta. The satellite images were processed using GIS software to increase the clarity of the images. The relationship between air pollutants and meteorological data was analyzed using Pearson correlation. The results showed the levels of NO₂, PM_{2.5}, O₃, and CO increased by 59.4%, 21.2%, 16.2%, and 1.0%, respectively, while SO₂ decreased by 19.1% after the LSSR period. The temperature value was inversely correlated with PM_{2.5}, NO₂, and SO₂ concentrations. Furthermore, the backward trajectory analysis revealed that air pollutants from outland areas such as the east and southeast carried more particulate matter and gases pollutants, which contributed to the air pollution during and after the LSSR periods. As a whole, the COVID-19 outbreak had bad impacts on human health, but the increase in air pollutants levels after loosening the LSSR policy could also lead to a higher risk of severe respiratory diseases. This study provides new insight into air pollutant distribution during and after LSSR periods and recommends an effective method of mitigating the air pollution issues in Jakarta.