

# The Impact of Covid-19 lockdowns on the Particulate Matter (PM<sub>2.5</sub>) Pollution in Addis Ababa

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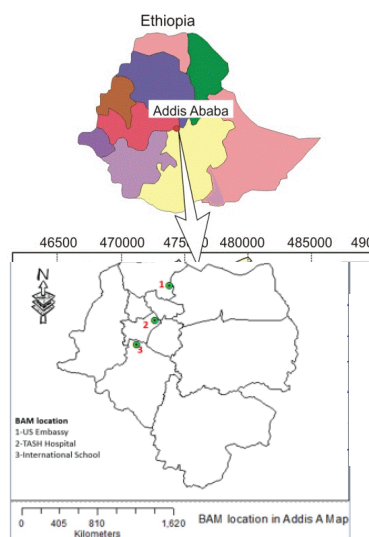
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## Introduction:

In response to the epidemic of COVID-19, countries have implemented a lockdown strategy to slow down the spread of the disease. Ethiopia confirmed the first COVID-19 case on March 13, 2020, and since then to control the rapid dispersion of the virus, the country imposed a partial lockdown policy from March to May 2020 by allowing vehicles to move on alternate even and odd plate numbers. This has led to reduced human activities and the movement of vehicles in the city. We investigated the air quality changes during the COVID-19 lockdowns using a real-time PM<sub>2.5</sub> concentration, in Addis Ababa, Ethiopia.

## Material and Methods:

a reference grade monitor known as Beta Attenuator Monitor (BAM-1022) has been used to measure hourly real-time PM<sub>2.5</sub> concentration. We calculated the daily concentration to compare data. Three data sets were used for analysis; before COVID lockdown (Jan 1 to March 16, 2020), during lockdown (March 17-May 26, 2020), and after lockdown (May 27 to June 30, 2020).



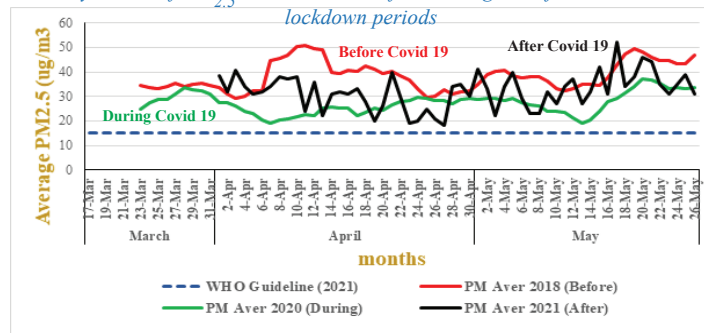
## Results:

PM<sub>2.5</sub> emissions have been reduced significantly by 11% in March, 28% in April 2020, by 22% in May 2020 when compared with the same months of 2018. There was a 23% reduction in June when compared with the same months of the year 2017–2019. The independent sample t-test comparing the lockdown months (March to May, 2020) with the previous years of the same months showed a significant reduction ( $p < 0.05$ ). There was also a 41% reduction compared with the month after the lockdown period.

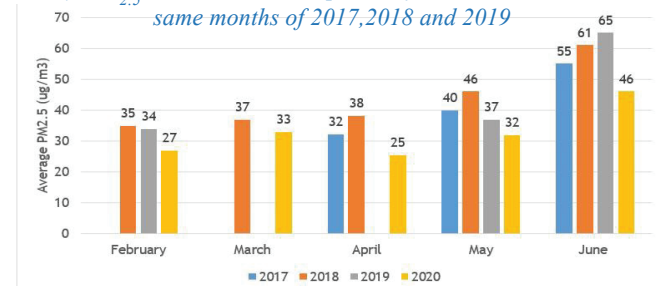
Descriptive of PM<sub>2.5</sub> Concentration by COVID-19 lockdown periods, Addis Ababa,

Year	Status of lockdown	Mean	SD	Min	Max	Deviation from Covid time (%)
2021	After	32.4	7.1	18.3	51.9	15%
2020	During	27.4	7.6	10	48	0%
2019	Before	35.3	11.2	14	58.8	22%
2018	Before	39.2	15.5	17.4	118.1	30%
2017	Before	34.3	9.8	19.8	65.5	20%

Daily Trends of PM<sub>2.5</sub> Concentration before, during and after COVID-19 lockdown periods



Monthly PM<sub>2.5</sub> concentration comparison from Feb -June, 2020 with same months of 2017, 2018 and 2019



## Keywords:

air pollution, COVID-19, Lockdown, PM<sub>2.5</sub> concentration

## Conclusion:

A brief restriction of vehicles because of the lockdown during the COVID-19 epidemic had an impact on air pollution. The finding has a policy implication to consider vehicles are the main sources of air pollution in Addis Ababa.

## Disclaimer:

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