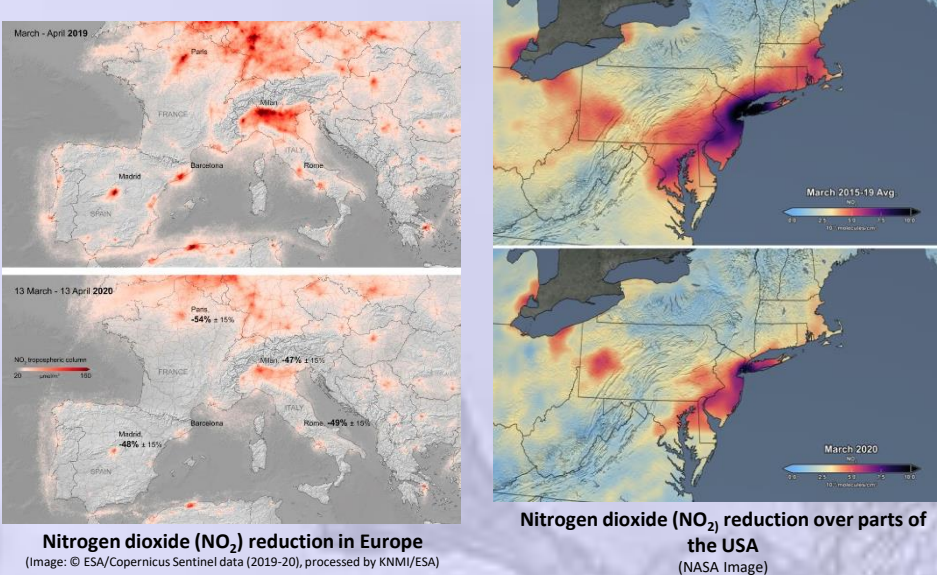


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## The Matter

Covid-19 lockdown has caused traffic and industrial activities to shut down and reduced air pollution in many regions around the world. This will benefit human health.



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## The Period

- Before quarantine : 16<sup>th</sup> February to 19<sup>th</sup> March 2020.
- During quarantine: 20<sup>th</sup> March to 20<sup>th</sup> April 2020.
- Period as during quarantine in 2016-2019.

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## The Results

- NO<sub>2</sub> dropped by -12 µg/m<sup>3</sup> in Casablanca and -7 µg/m<sup>3</sup> in Marrakech.
- PM<sub>2.5</sub> dropped by -18 µg/m<sup>3</sup> in Casablanca and -14 µg/m<sup>3</sup> in Marrakech.
- CO dropped by -0.04 mg/m<sup>3</sup> in Casablanca and -0.12 mg/m<sup>3</sup> in Marrakech.
- TS slopes for 2020 are statistically significant and confirm the trends of the DDE.

Air pollution changes due to the quarantine in Casablanca and Marrakech using DDE

	During vs before (2020)		During vs before (2016-2019)		Difference in difference	
	Casablanca	Marrakech	Casablanca	Marrakech	Casablanca	Marrakech
NO <sub>2</sub>	-12.5	-7.5	-0.28	-0.74	-12.21	-6.76
PM <sub>2.5</sub>	-11.63	-16.26	5.87	-2.48	-17.5	-13.78
CO	-0.06	-0.21	-0.02	-0.1	-0.04	-0.12

• More than 60% of the avoidable deaths were from cardiovascular diseases.

Avoided cause-specific deaths due to air pollution reduction

	Casablanca		Marrakech	
	NO2	PM2.5	NO2	PM2.5
Total	185(145,223)	48(70,89)	30(24,37)	15(10,19)
Cardiovascular Disease	96(76,126)	45(30,59)	16(12,21)	10(6,13)
Hypertensive heart disease	8(5,11)	4(1,6)	1(1,2)	1(0,1)
Chronic respiratory diseases	8(6,10)	3(2,5)	1(1,2)	1(0,1)
Stroke	23(13,30)	4(2,5)	9(5,13)	2(1,3)
COPD	5(7,9)	2(3,4)	1(1,1)	1(0,1)

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## The References

Khomsi, K., Najmi, H., Amghar, H., Chelhaoui, Y., & Souhaili, Z. (2020). **COVID-19 national lockdown in Morocco: impacts on air quality and public health** Submitted to: *OneHealth*

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What about North Africa?

What implications on Human Health?

3

## The Tools

- Daily Means of NO<sub>2</sub>, PM<sub>2.5</sub> and CO concentrations;
  - Difference-in-Difference (DDE), Theil and Sen approach (TS) & Mann-Kendall test;
  - Concentration-response functions (CRF) from previous studies;
  - The attributable fraction (AF) to estimate the daily avoided cause-specific mortality from air pollution reduction.
- $$AF = 1 - e^{-\beta \Delta c}$$
- $\beta$  : Cause-specific coefficient
- $\Delta c$  : Air quality changes.

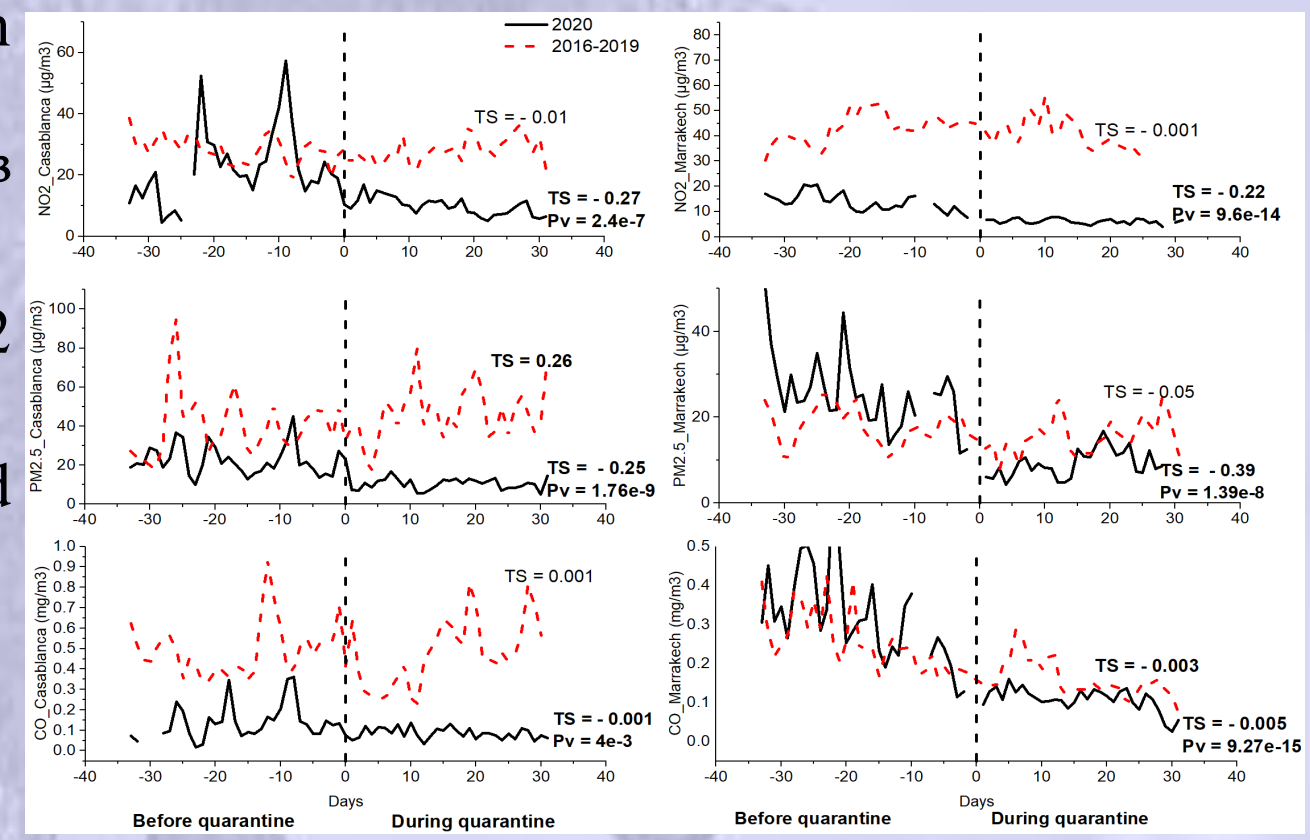
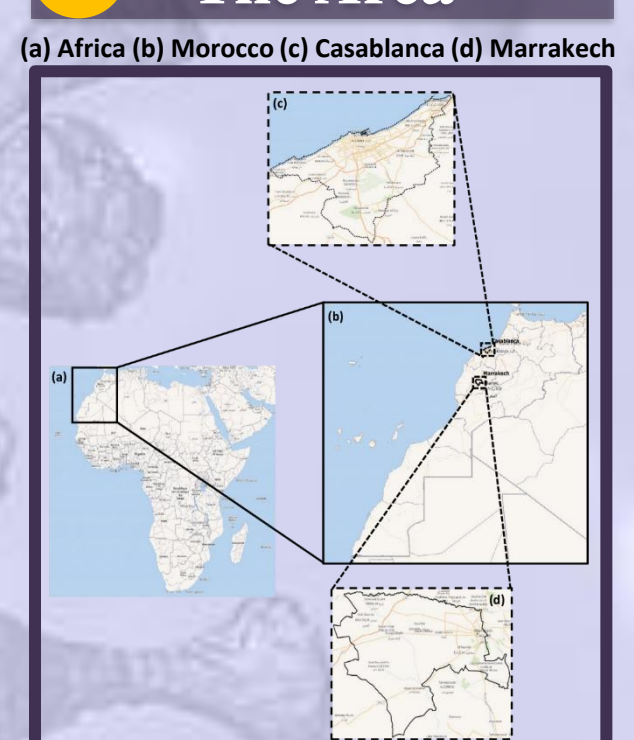
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## The Aim

- To compare air quality status in Casablanca and Marrakech before the pandemic and during the confinement.
- To show whether COVID-19 lockdown may have saved lives by restraining air pollution than by preventing infection.

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## The Area

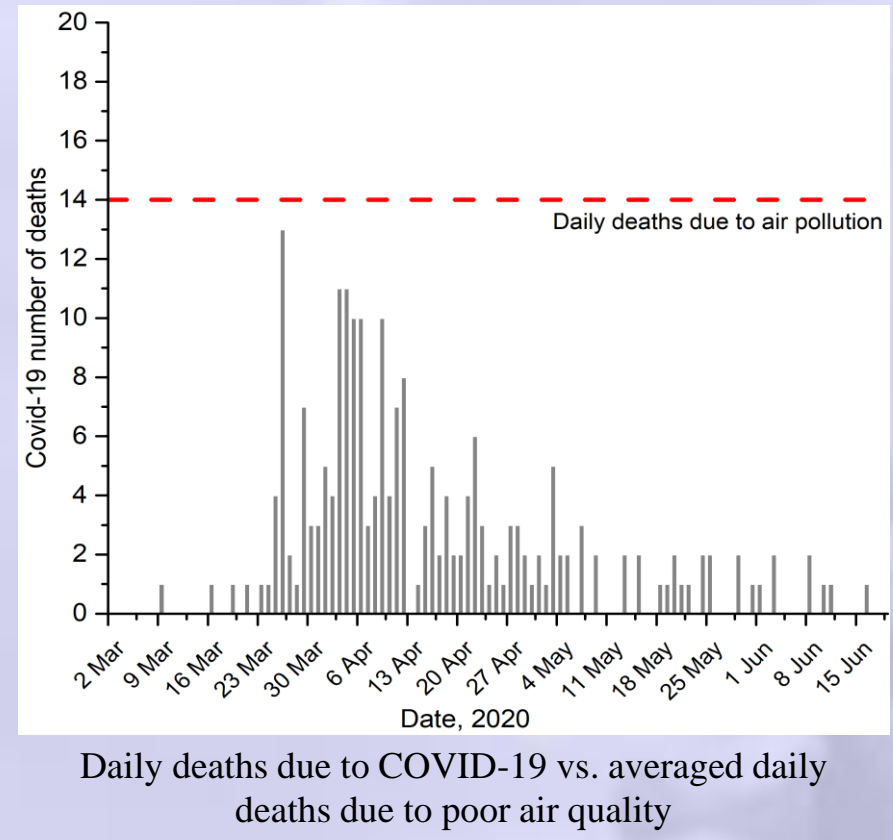


Air pollution changes due to the quarantine using Theil-Sen slope

**Bold character:** statistically significant

•The daily average deaths due to air pollution in Morocco is 14 deaths every day.

•This average exceeds the daily reported deaths due to COVID-19.



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