Samachar: Print News Media on Air Pollution in India

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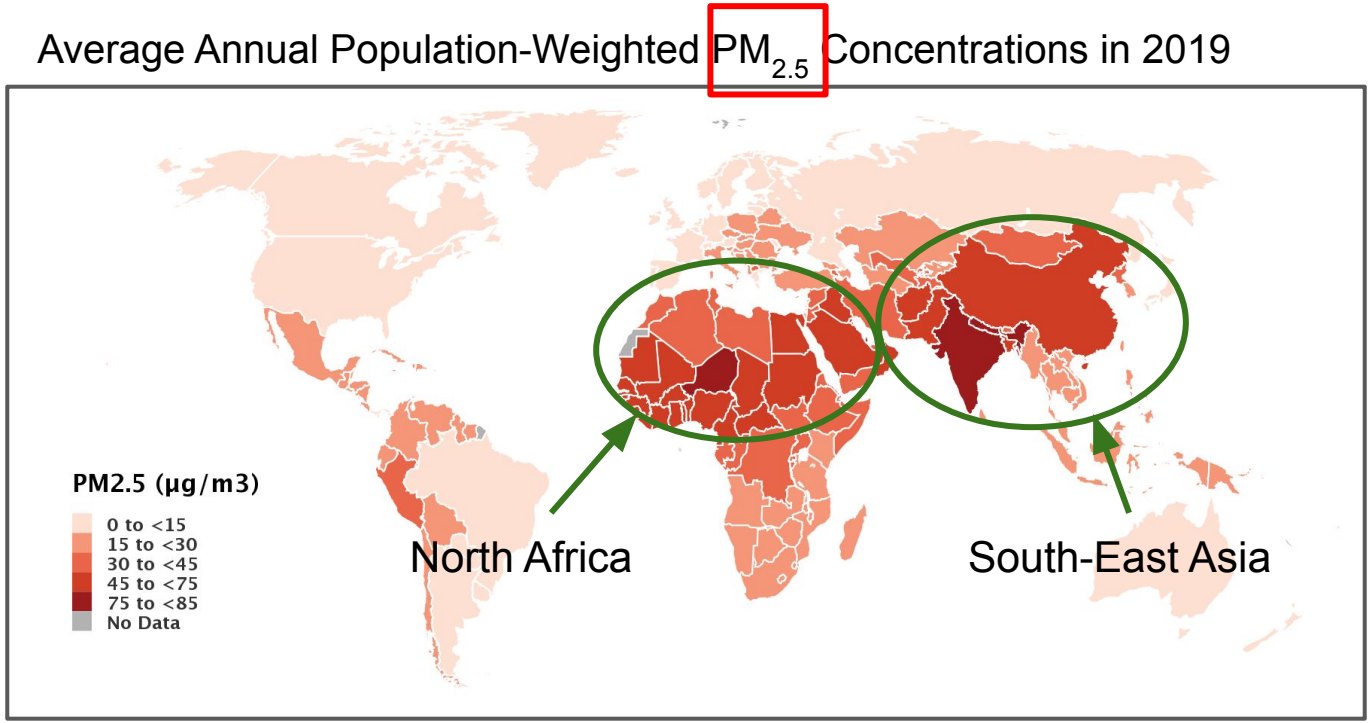
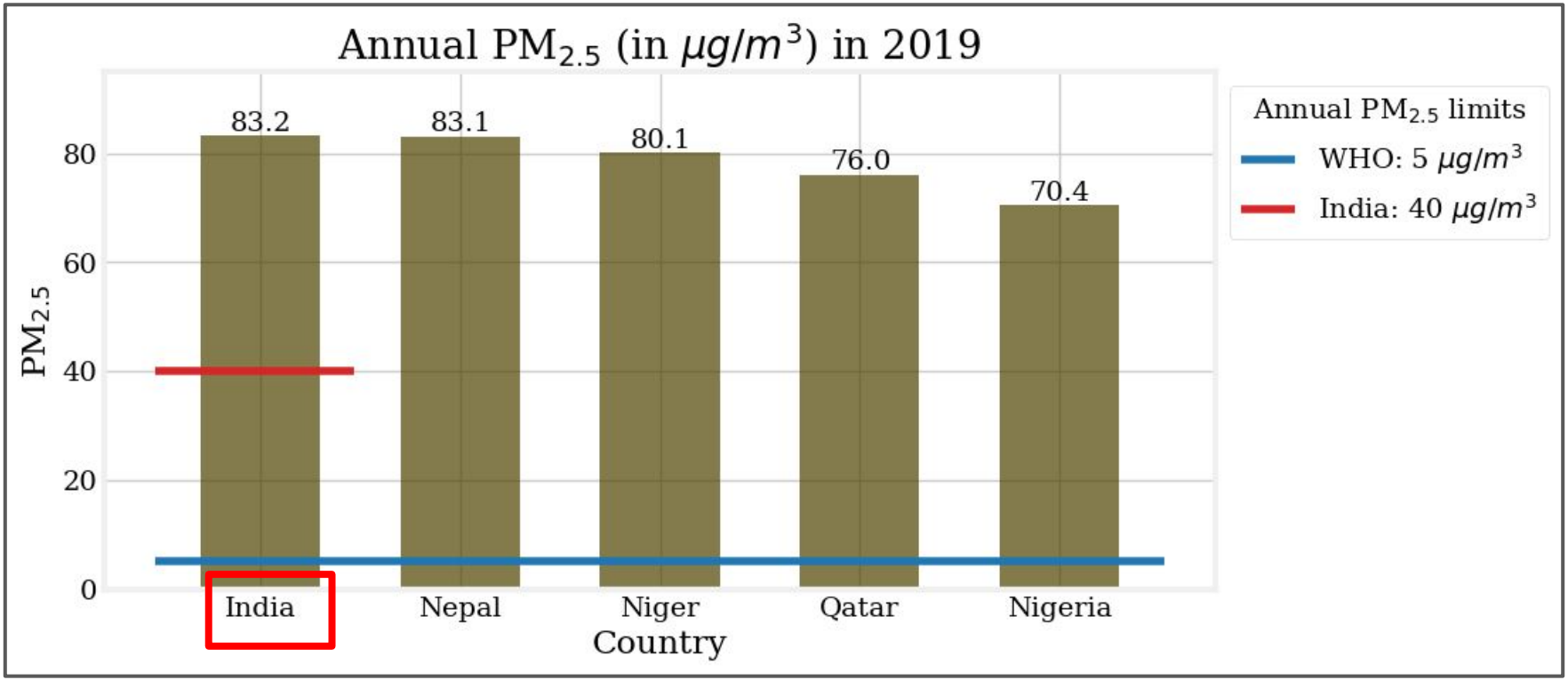
Air pollution in world



Source: Health Effects Institute. 2020. State of Global Air 2020. Data source: Global Burden of Disease Study 2019. IHME, 2020

Most 5 polluted countries (Ambient $PM_{2.5}$ pollution)



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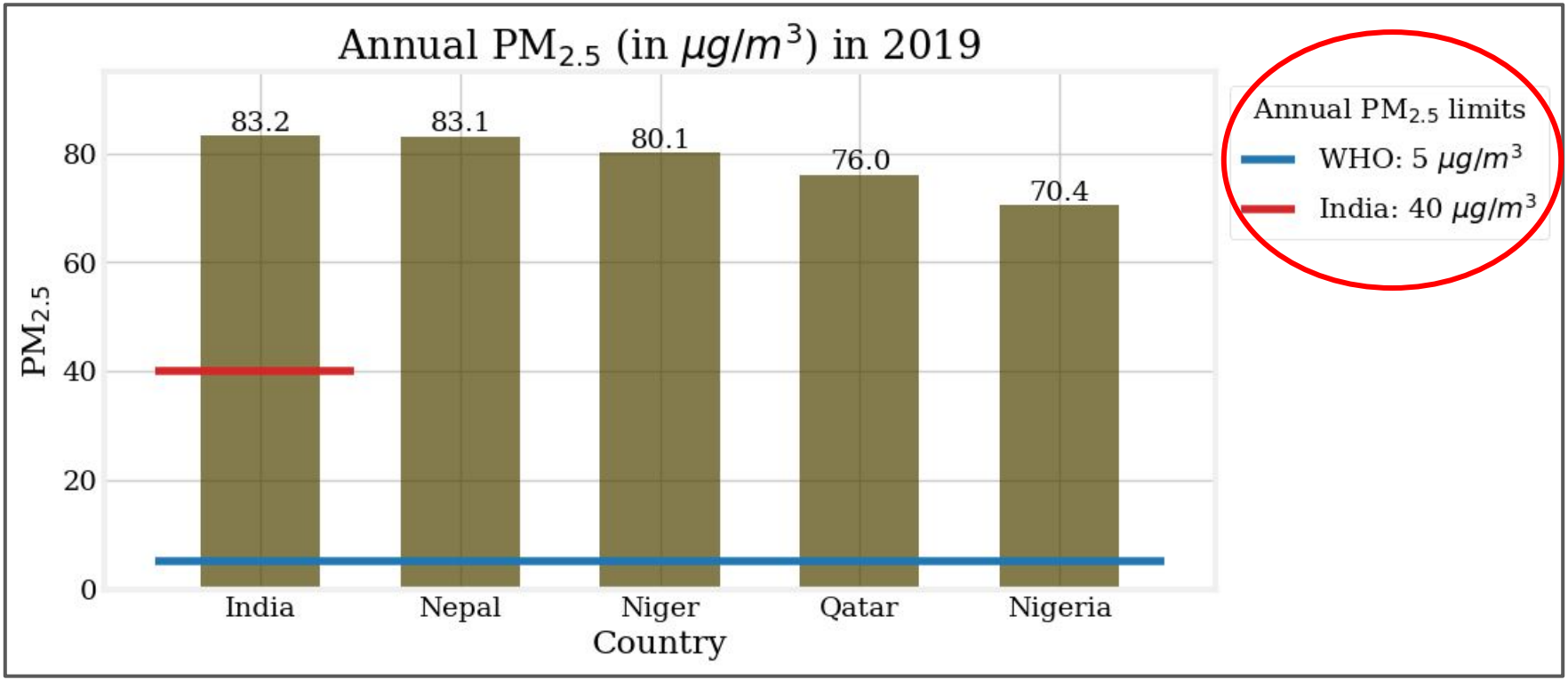

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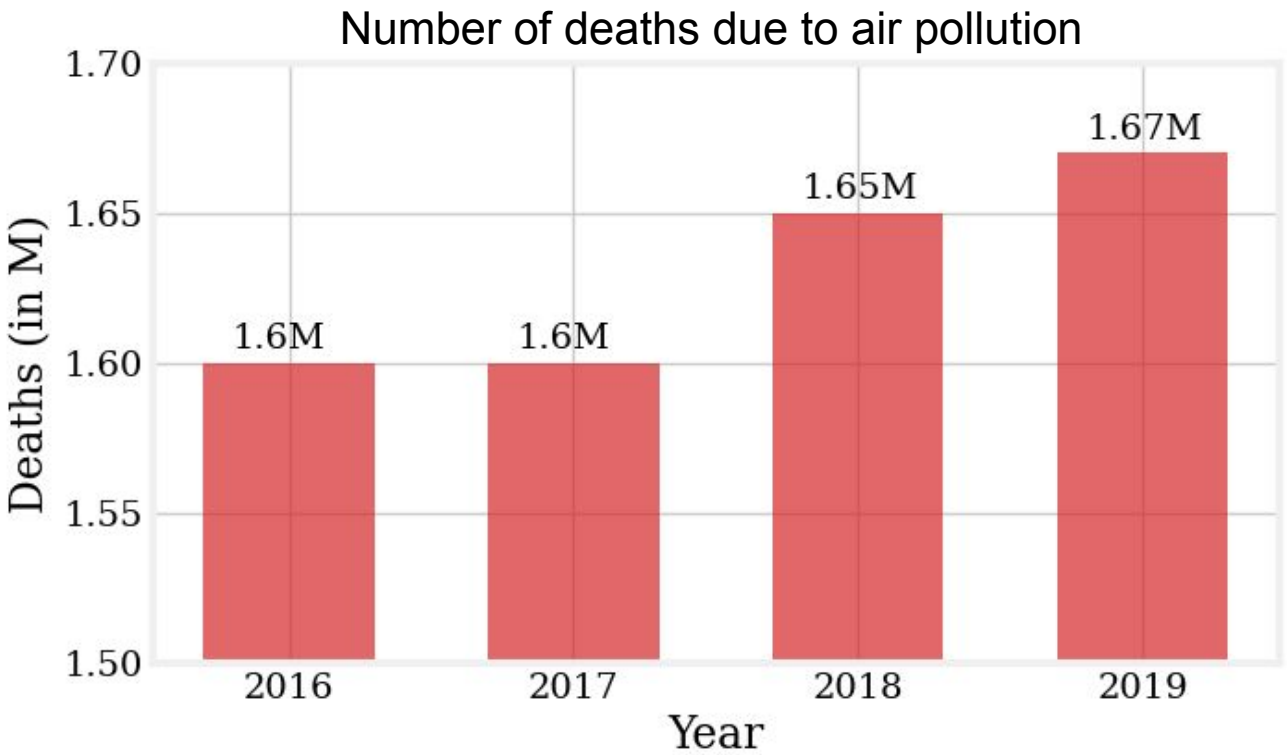
Air Pollution in India



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News media impact

#1: Delhi's Air Pollution (2015)

Death By Breath: A look at key studies on Delhi's pollution and how warnings were ignored

DEATH BY BREATH AN EXPRESS INVESTIGATION- PART ONE

Seven years ago, everyone saw Delhi's air take a deadly U-turn but no one did a thing

As many as 15 authoritative studies red-flagged how landmark gains from CNG were being frittered away

'HOW DID THIS HAPPEN?'

https://indianexpress.com/article/cities/delhi/death-by-breath-delhi-pollution/

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#2:Polluting Industry in Bengaluru (2018)

NDTV Impact: Top Court To Look At Air Pollution In Whitefield, Bengaluru

"We Breathe Black Soot": Bengaluru's War Against Graphite Plant

Graphite India unit in Bengaluru to shut down

https://www.ndtv.com/topic/graphite-plant

Research Questions

1. **Is the news media coverage around air pollution have a geographical and temporal bias?**

2. **Is the news media discussion is pertinent to scientific evidences?**

News articles dataset

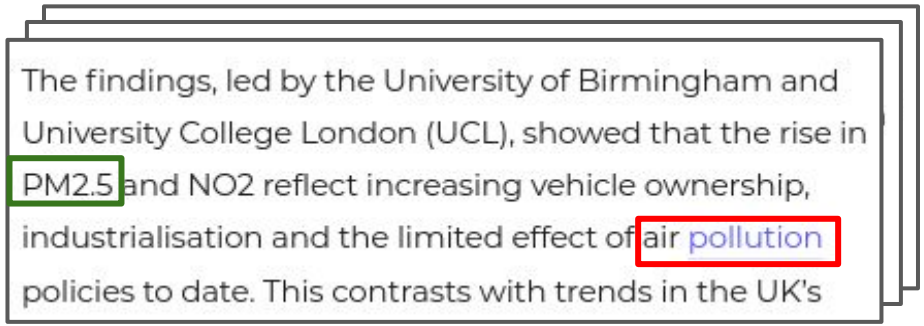
News media	Times of India	The Hindu
Total readers*	17.3M	8M
Time-period	Jan’10 to May’21	Jan’10 to May’21
Total articles	1.96M	1.21M
Air quality articles	11,746	5,628
Cities	67	148

* Total readers till end of 2020

Snowball sampling

air pollution, pm 2.5

Queries

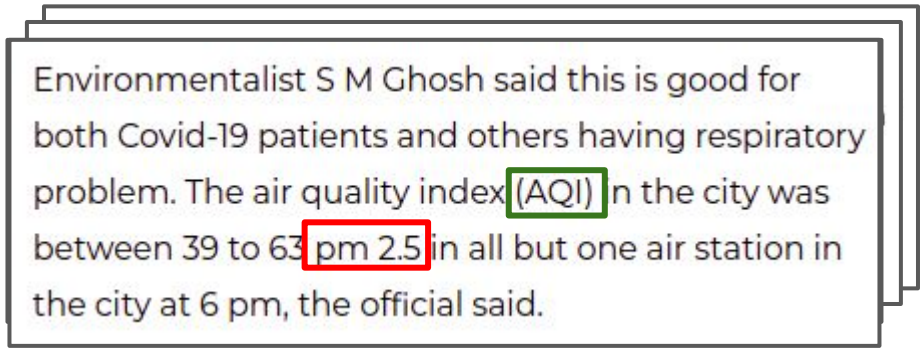


Articles

Snowball sampling

air pollution, pm 2.5, AQI

Queries



Articles

Snowball sampling

air pollution, pm 2.5, air quality, aqi, pm10, stubble burning, crop burning, ozone, air pollutants, sulphur dioxide, so2, carbon monoxide, smog, nitrogen dioxide, acid rain, odd even, car emissions

Queries

Articles

Air pollution ($PM_{2.5}$) Dataset

Number of cities	87
Maximum time-span	2010-2021*
Granularity level	15 minutes

* Time-span of each cities is varying depending of installation of air quality monitors.

Source:

1. Central Pollution Control Board (CPCB)
2. OpenAQ

Research Questions

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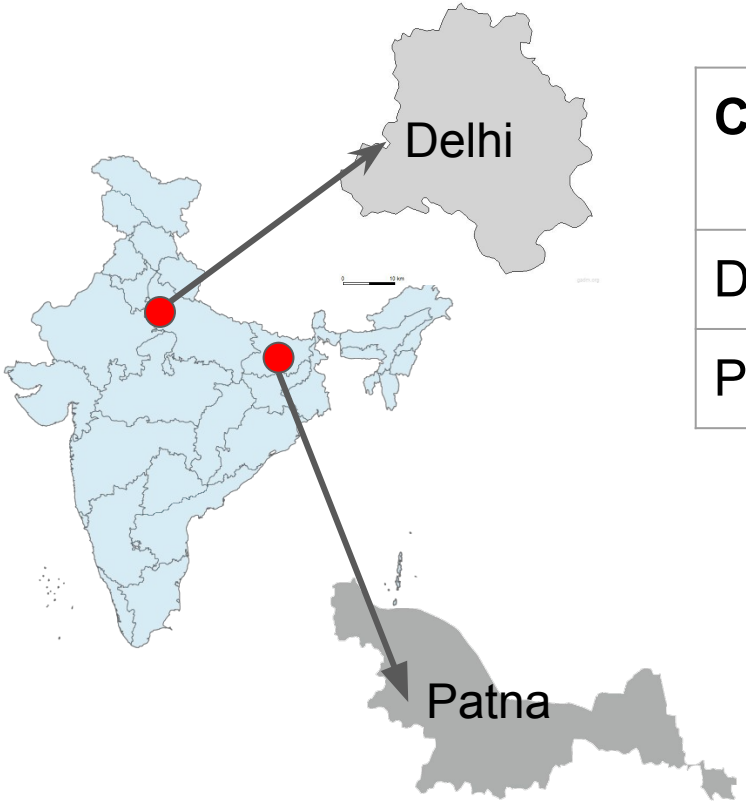
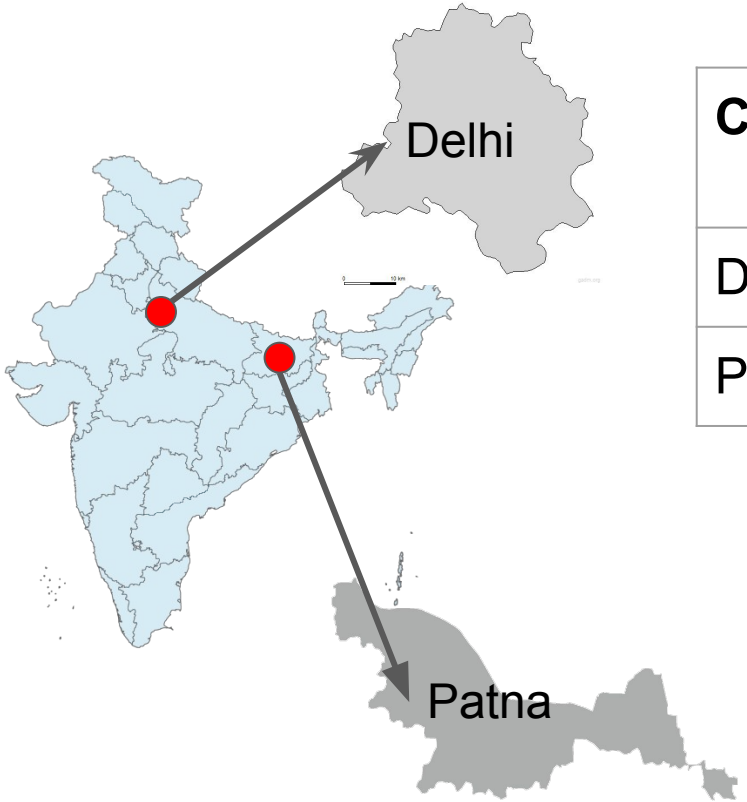
Why geographical bias matters?



City	$PM_{2.5}(\mu g/m^3)$
Delhi	142
Patna	119

- India Annual $PM_{2.5}$ limit: 40 $\mu g/m^3$

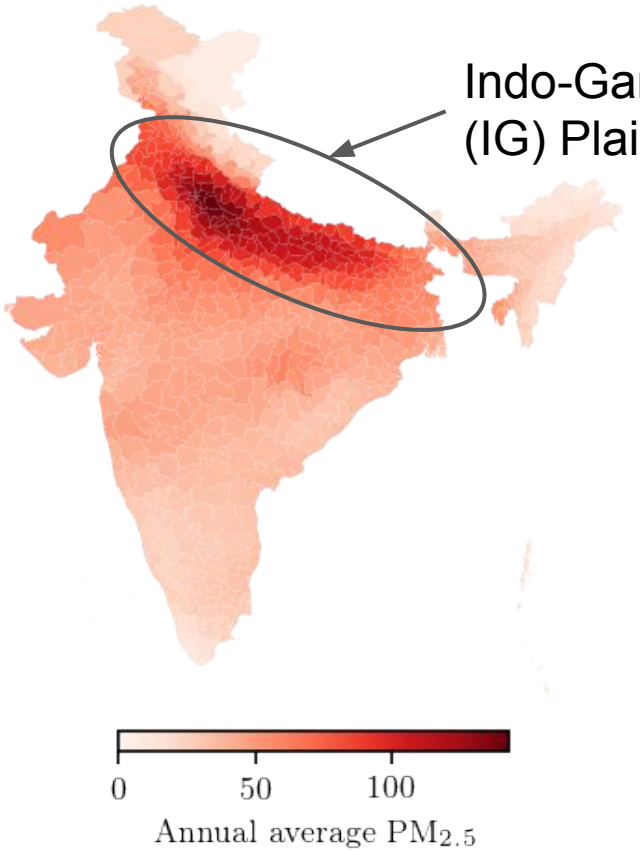
Why geographical bias matters?



City	$PM_{2.5}(\mu g/m^3)$	Articles (2010-2021)
Delhi	142	5300
Patna	119	317

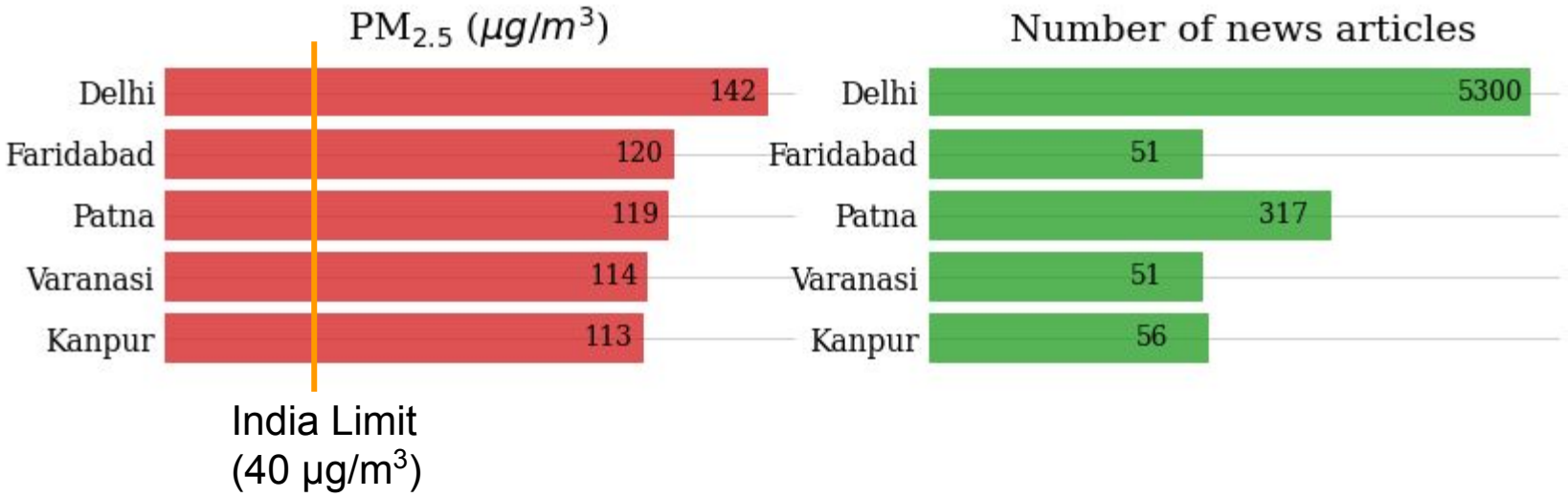
- India Annual $PM_{2.5}$ limit: 40 $\mu g/m^3$

Air Pollution level in India



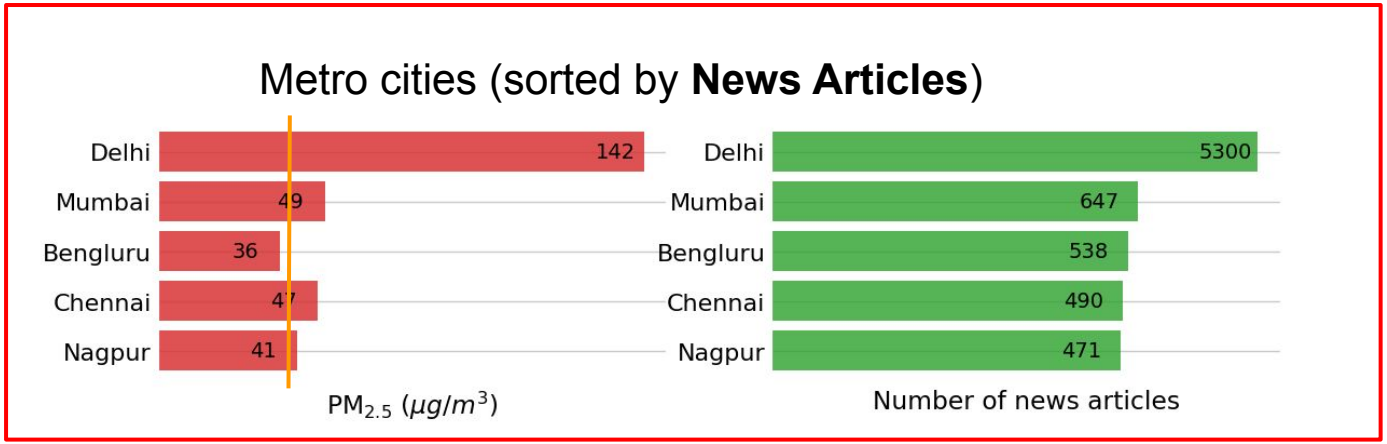
- IG Plain is extremely polluted
- Do news media focus on cities in IG plain?

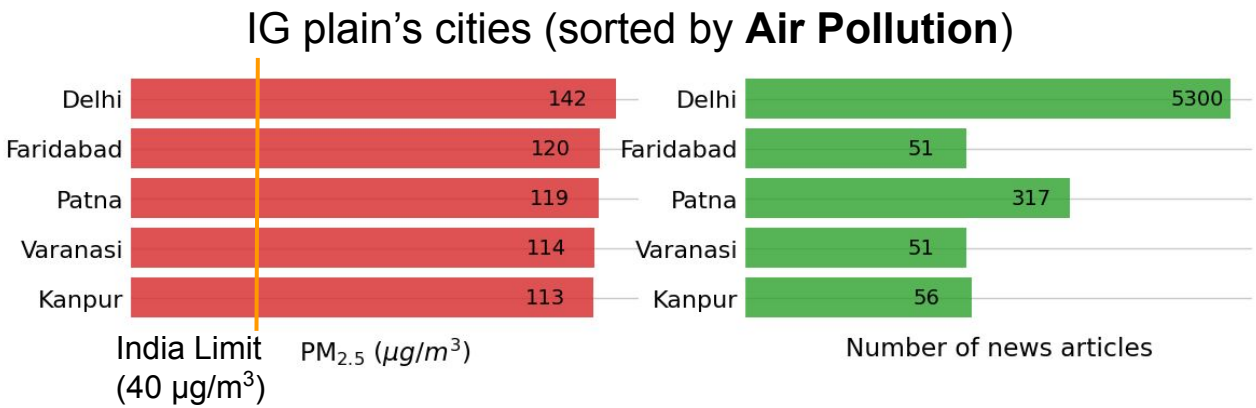
Cities in IG plain



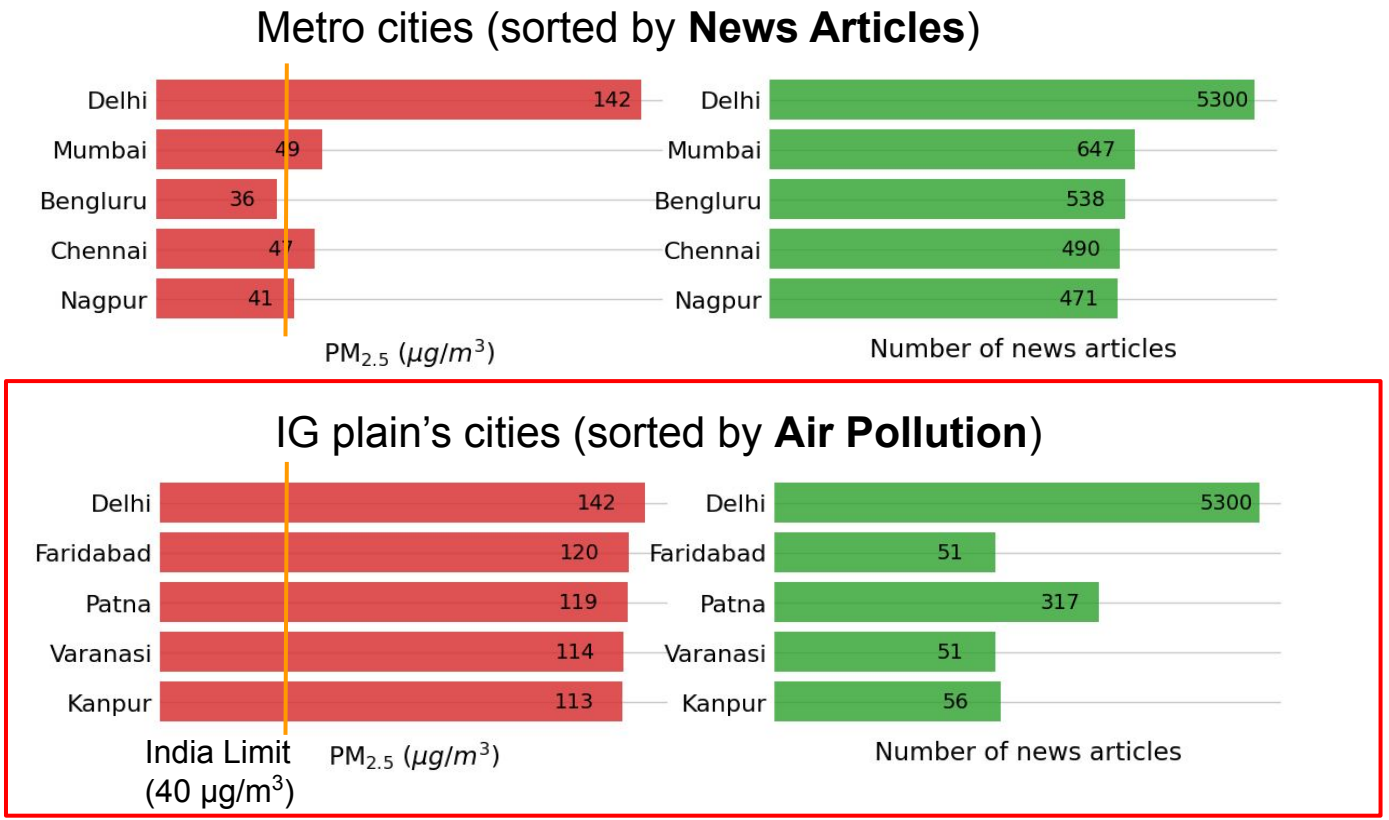
- News media do not focus on most of the polluted cities in IG plain
- Then, what are the cities get news media attention?

Metro cities

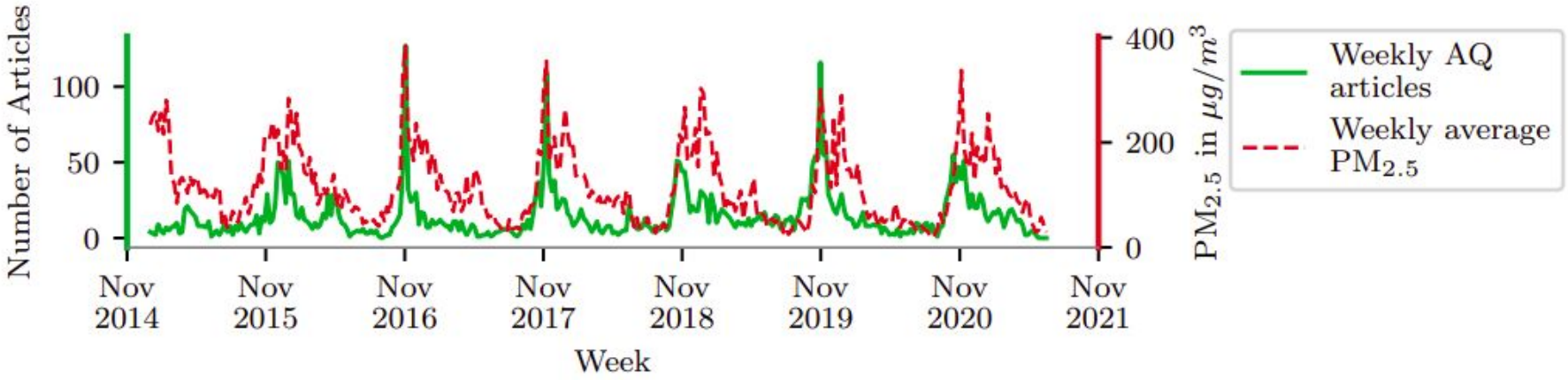




Metro cities



Temporal pattern: News media on Delhi



- Periodic reporting after 2015

Which place is more polluted ?

A

B

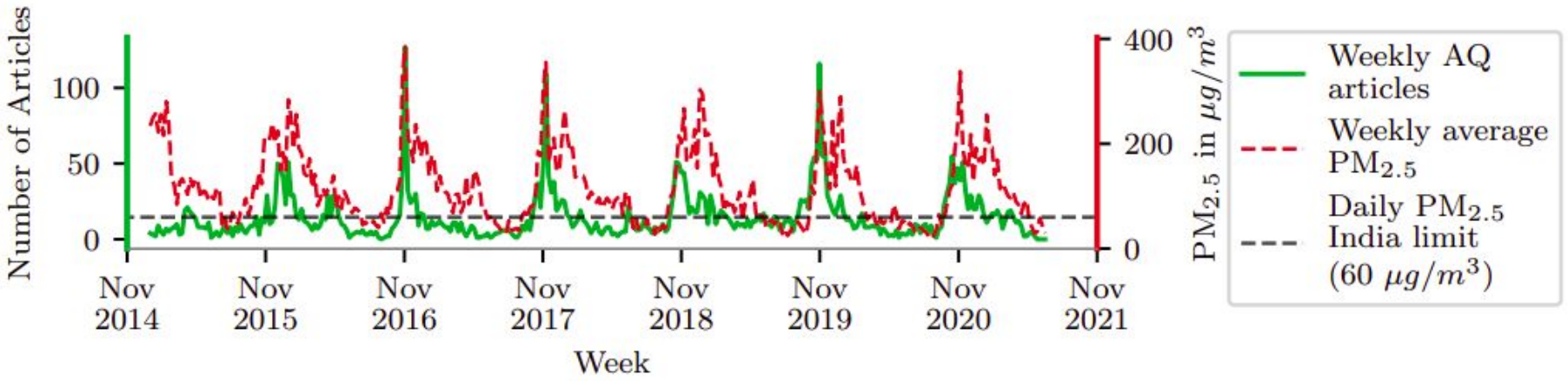
Which place is more polluted ?

A

B

- While **B** is more polluted. Pollution level in **A** is 6 times above the WHO limit!
- Air pollution is not always visible, leading to incorrect perception.

Temporal bias: News media on Delhi



- 82% of times above the India limit
- Temporal bias!

Research Questions

1. Is the news media coverage around air pollution have a geographical and temporal bias?

2. **Is the news media discussion is pertinent to scientific evidences?**

What are the topics discussed by news media?

- Topic modeling
- Unsupervised machine learning technique
- ‘latent Dirichlet allocation’ (LDA) algorithm.

How LDA works?

Article #1	Article #2	Article #3	Article #4
Air pollution is a serious concern	Sport is good for health	Government should take action against air pollution	Football match canceled due to poor air quality

Air Pollution
Sports
Government

How LDA works?

Article #1	Article #2	Article #3	Article #4
Air pollution is a serious concern	Sport is good for health	Government should take action against air pollution	Football match canceled due to poor air quality

Air Pollution	0.90	0.04	0.40	0.50
Sports	0.01	0.95	0.05	0.45
Government	0.09	0.01	0.55	0.05

How LDA works?

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Air Pollution	Sports	Government	Air Pollution

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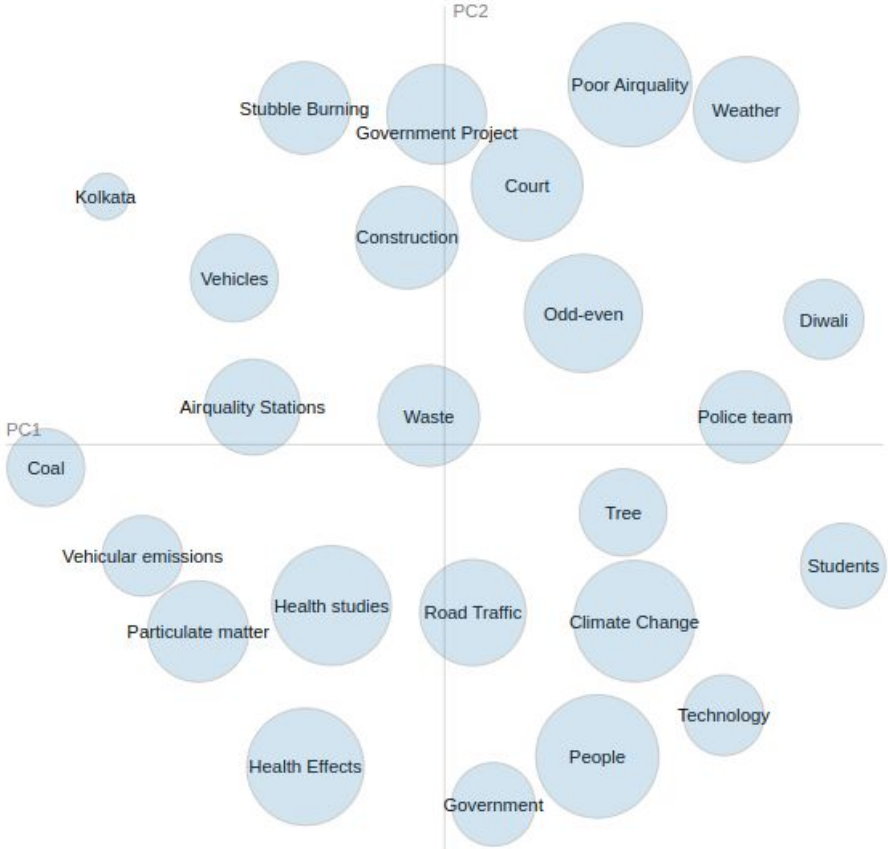
Topic modeling



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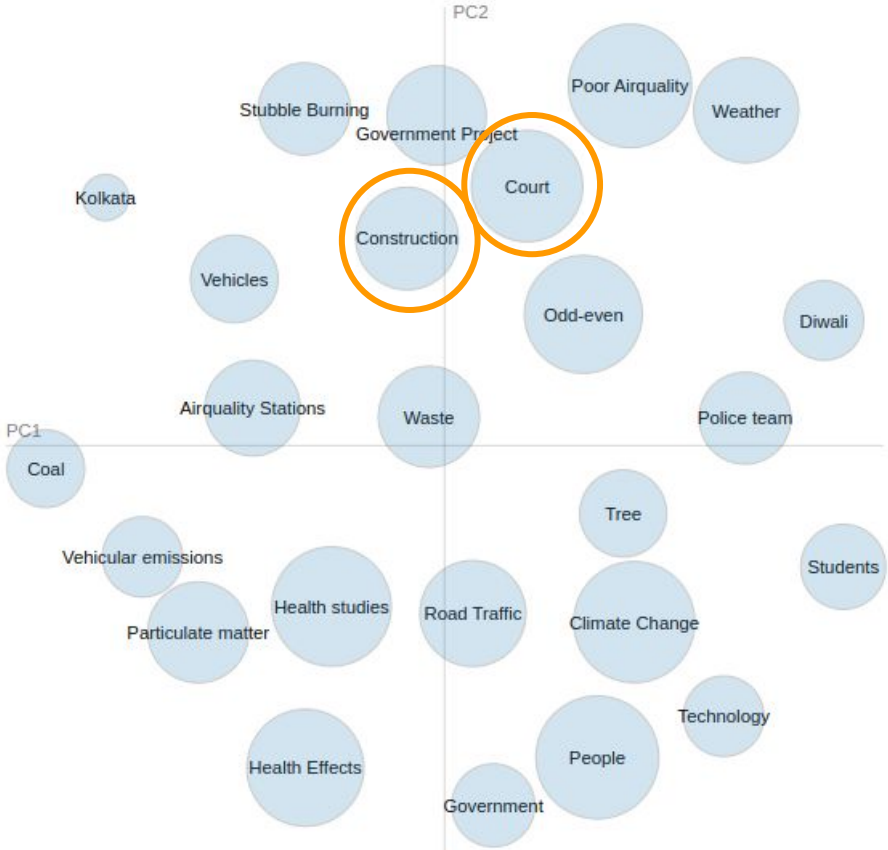
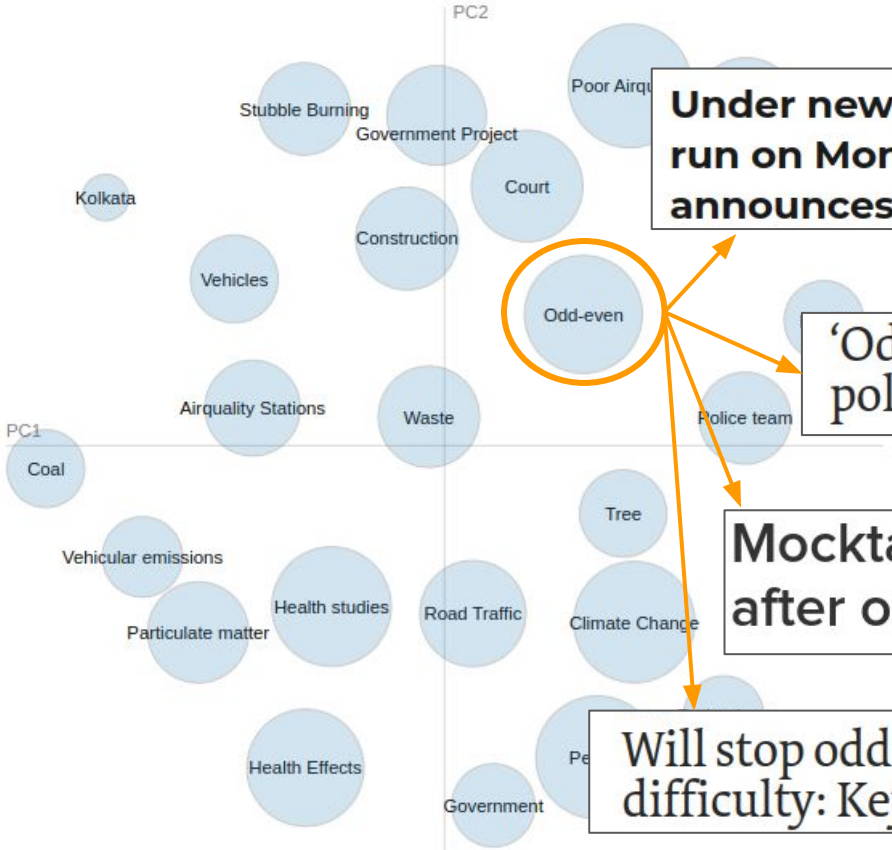


Odd-even vehicle rationing scheme in Delhi



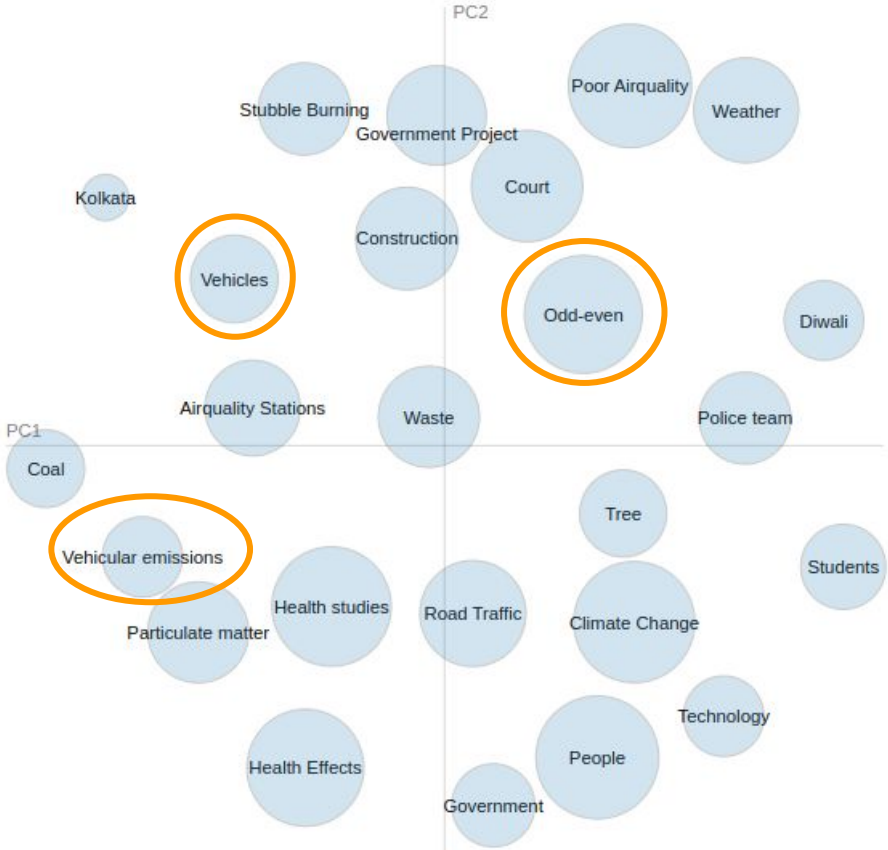
Under new plan, odd-numbered vehicles to run on Monday, Wednesday and Friday, announces Delhi government

'Odd-even to be last weapon against pollution'

Mocktale: AAP MLAs to buy two cars after odd-even rule 😜

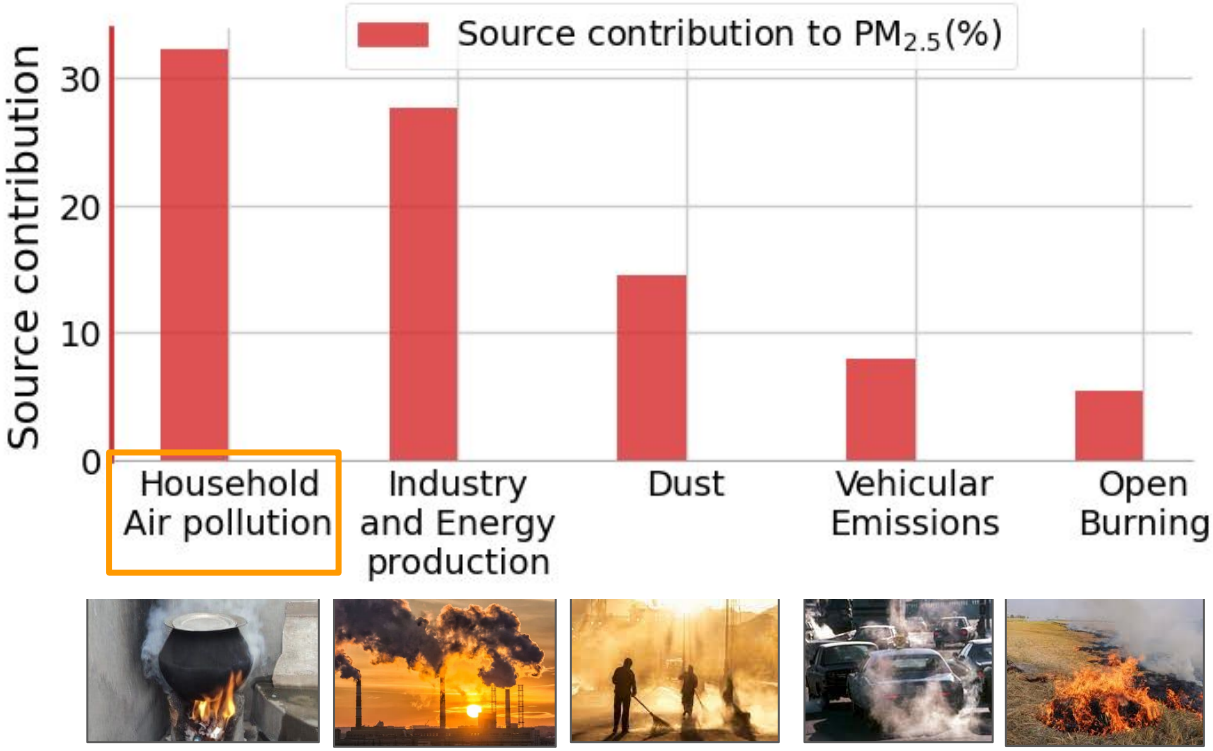
Will stop odd-even scheme if people face difficulty: Kejriwal

Topic modeling



- 3 Topics are related to vehicles
- But, How much vehicles contribute to air pollution?
- What are other Sources?
- Are these sources discussed by news media?

Source contribution in Delhi



https://doi.org/10.1038/s41467-021-23853-y

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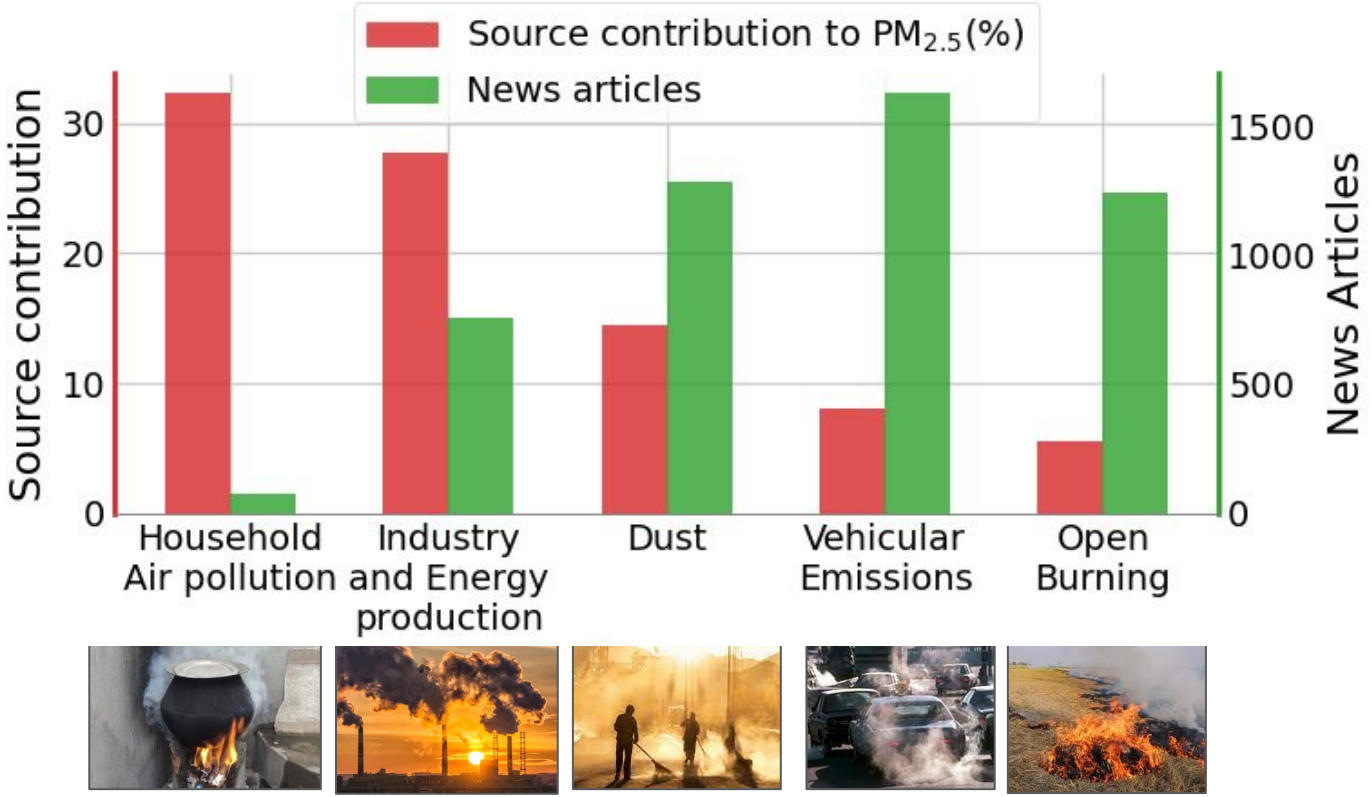

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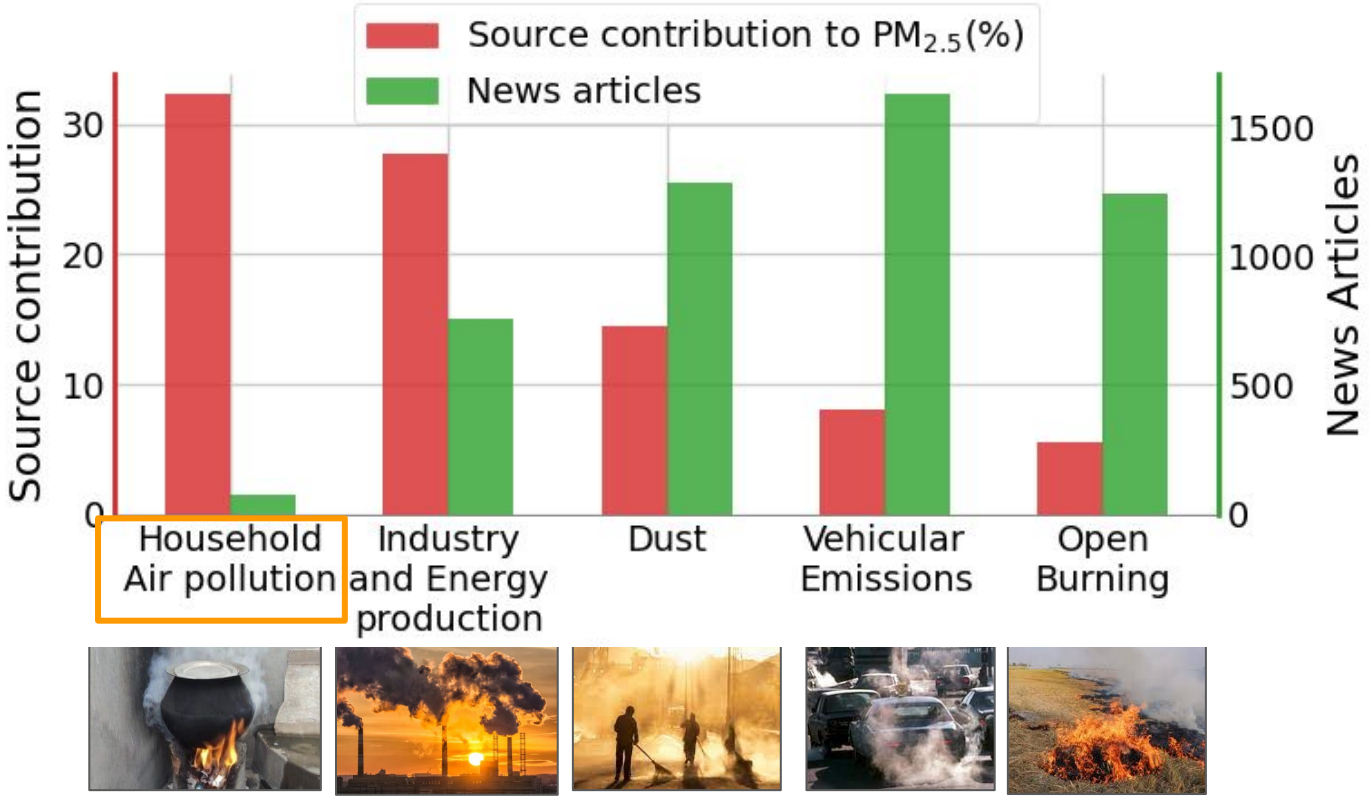

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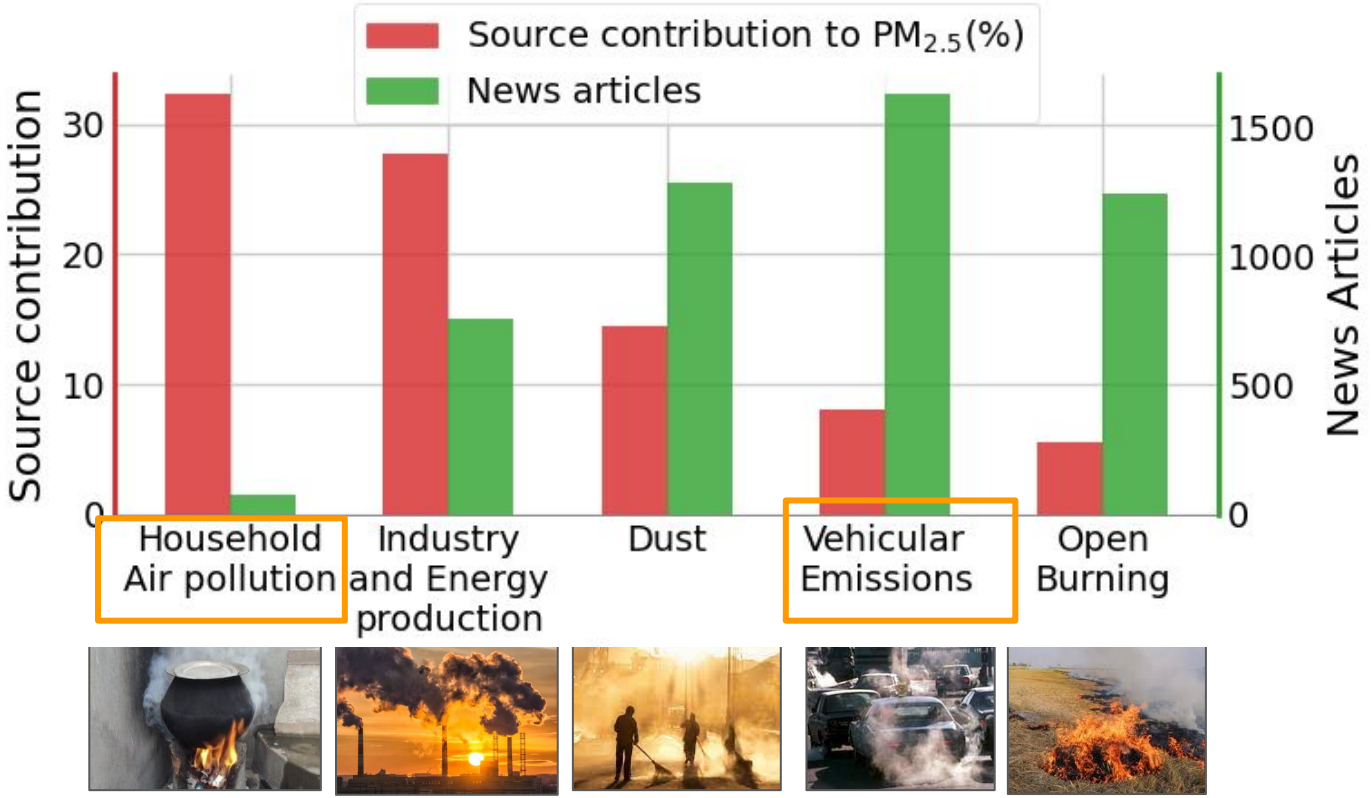

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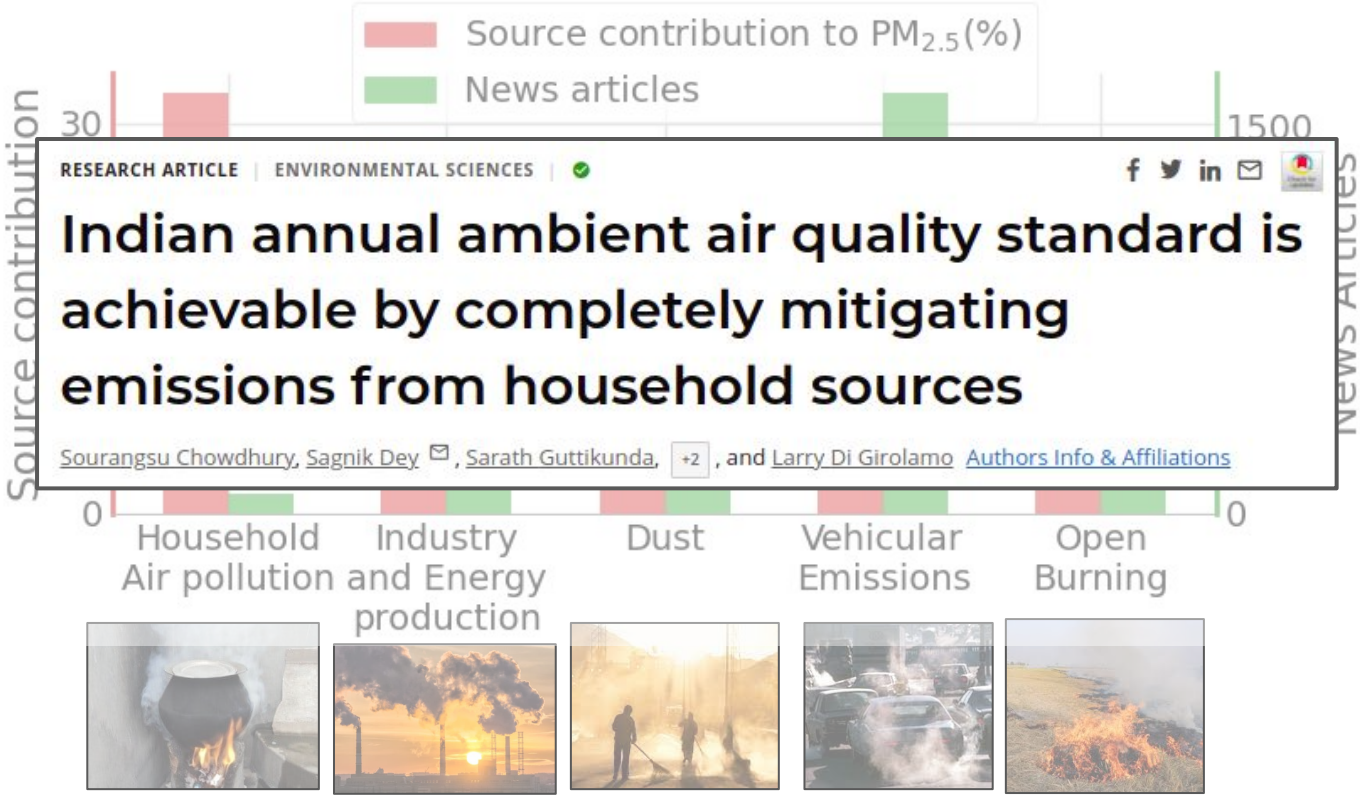

RESEARCH ARTICLE | ENVIRONMENTAL SCIENCES

Indian annual ambient air quality standard is achievable by completely mitigating emissions from household sources

Sourangsu Chowdhury, Sagnik Dey, Sarath Guttikunda, +2, and Larry Di Girolamo Authors Info & Affiliations

https://www.pnas.org/doi/full/10.1073/pnas.1900888116

Summary

- Geographical bias
  - No coverage in Polluted cities (IG plain)
  - More attention on metro cities (which are not polluted)
- Temporal bias
  - Air pollution is year long problem in India.
  - Periodic news media reporting.
- Reporting on source contributions deviate from the scientific studies.