NCD SYMPOSIUM

Particulate Air Pollution and Primary Care Visits in Kosovo: A Time-Series Approach

A study by: Zana Shabani Isenaj[12], Merita Berisha [12], Antigona Ukëhaxhaj[23] and Hanns Moshammer [4]

Presented by: **Zana Shabani Isenaj**

2023

Air pollution in Kosovo

A significant proportion of urban areas in Kosovo suffer from poor air quality

Ambient concentrations of PM2.5 or less significantly exceed the national and European Union (EU) standards (20 g/m3 annual mean) and global air quality guidelines for PM2.5 (5 g/m3 annual mean established by the WHO

Mainly associated with burning solid fuels in homes, obsolete large thermal power plants, industry and exhaust gas from vehicles.

A serious environmental problem and its effect on human health

Air pollution in Kosovo

Adverse effects of air pollution on both premature mortality and morbidity from respiratory and cardiovascular disease, following both short-term and chronic exposure.

Air pollution burden in Kosovo is not well documented, in part due to the not fully functional health information system

Short-term effects of air pollution, thus contributing to local data-based evidence of the environmental burden of disease in Kosovo.

Study Background

We performed times-series analysis, an elegant way of demonstrating health effects of air pollution.

Originally, with our previous paper we examined hospital admissions and its association with air pollution.

This study we used primary care visits (daily count data for several diagnostic groups)

NCD SYMPOSIUM

Objective

Examined the effects of daily variation in particulate matter (PM2.5) concentration on the number of primary care visits in the municipality of Pristina through times-series approach

Materials and Methodology

PM2.5 Data: Collected from the central monitoring station in Pristina. This data was used as a proxy for air quality in the region.

Health data: Available from the electronic system from primary care institutions in Prishtina (2019-2022)

Meteorological data: Provided by Hydro-Meteorological Institute (KHMI)

NCD SYMPOSIUM

Materials and Methodology

➢ **Health diagnoses:**

- **Cardiovascular Diagnoses:** All diagnoses with International Classification of Diseases, 10th Edition (ICD-10) codes starting with “I” were included in the analysis.

- **Respiratory Diagnoses:** All diagnoses with ICD-10 codes starting with “J” were included in the analysis.

- Additionally, a specific code, U.07, for COVID-19 was included among the respiratory diagnoses. This inclusion acknowledges the potential for COVID-19 to present as a respiratory disease and considers changes in diagnostic coding due to testing capacity and evolving guidelines over time.

Data Analysis

General Additive Models (GAM):

- Used for analysis.
- Family: Poisson distribution.

Temporal Variation:

- Modeled using splines.
- Knots selection based on minimal residual autocorrelation.

Temperature and Lag Selection:

- Lag selection for temperature and consecutive days.
- Based on Akaike Information Criterion (AIC).

Day of the Week:

- Included as a factor variable in the analysis.

Data Analysis

In the observation period, 6440 cardiovascular **(Table 1)** and

15,141 respiratory visits (11,344 with a "J") and 3797 with a "U07" diagnosis, **(Table 2)** were reported.

Table 1. Description of cardiovascular cases.

Gender	Number
Females	3539
Males	2901
Specialty	
Family medicine	3949
Internal medicine	2252
Others [1]	239
Total	6440
Age (mean +/− std. dev.)	61.9 +/− 13.6

[1] Including rheumatology (113), gynecology (38) and occupational medicine (61).

Table 2. Description of respiratory cases.

Gender	ICD10 = "J"	ICD10 = "U07"
Females	5910	3539
Males	5434	2901
Specialty		
Family medicine	8052	3741
Pediatric	1700	3
Occupational medicine	250	14
Internal medicine	197	34
Others	145	5
Total	11,344	3797
Age (mean +/− std. dev.)	29.6 +/− 23.8	41.5 +/− 16.9

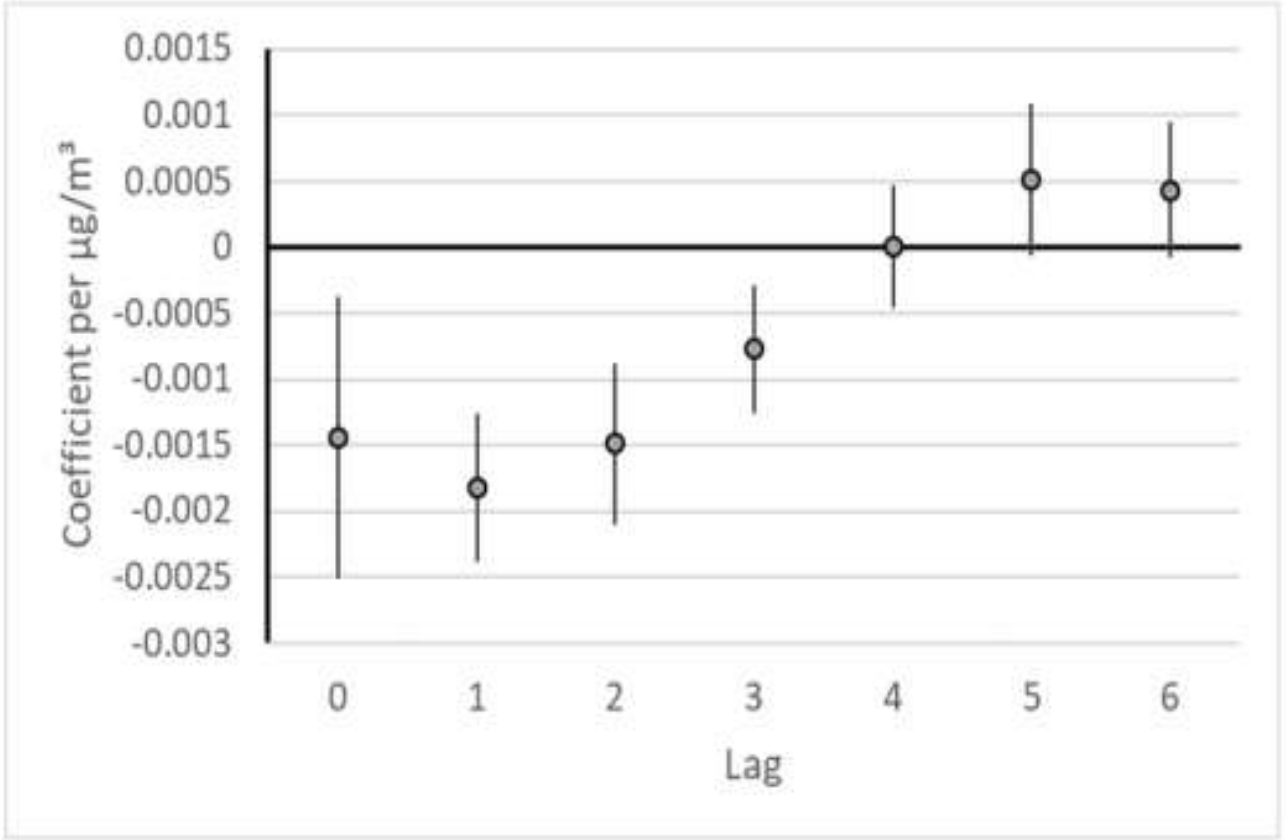
Data Analysis

Both outcomes show a bi-phasic lag structure.

Increasing effect estimates observed four or five days after the air pollution event.

Respiratory Cases: distributed lag model with 7 lags

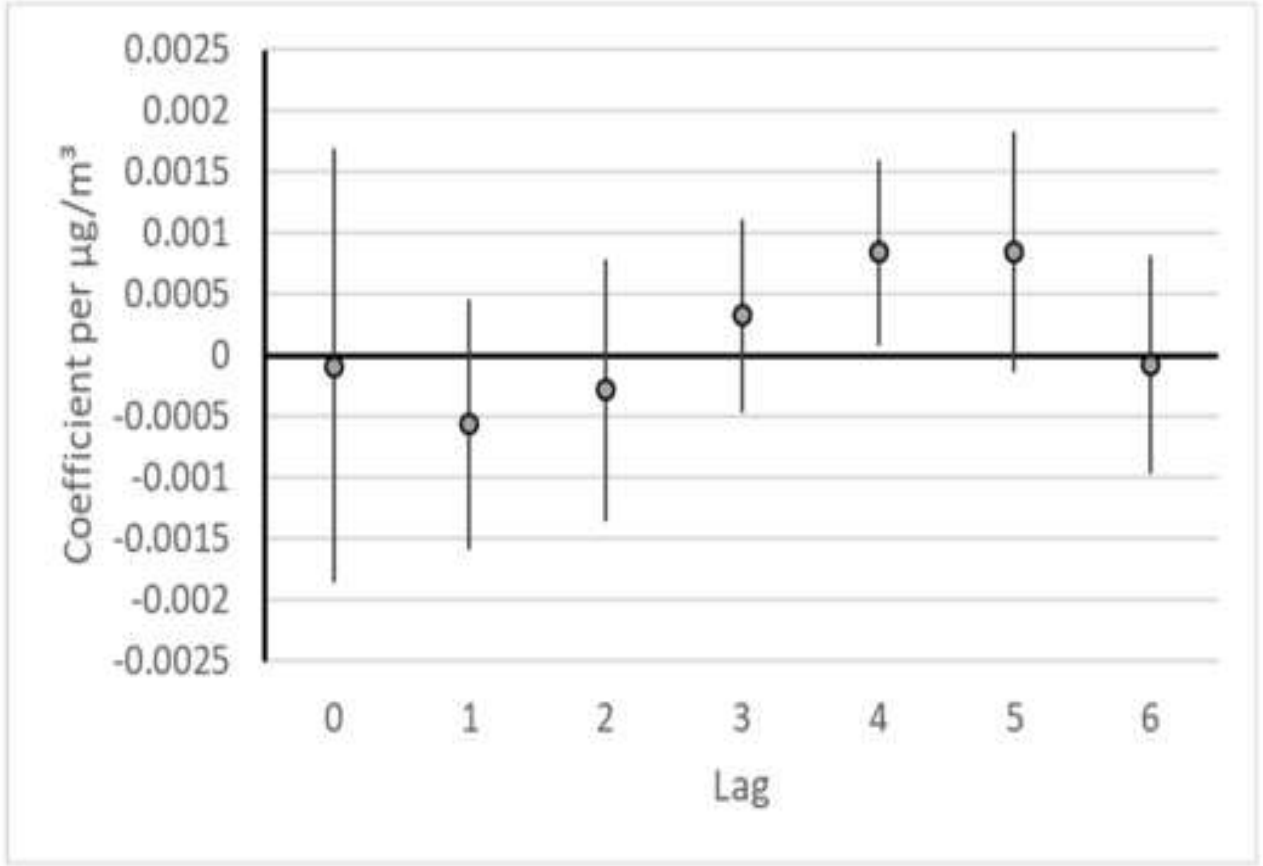
- Effect estimates for respiratory cases were clearly negative on days 0 to 3.
- Increase in visits only after a latency up to lag 9



Data Analysis

Cardiovascular Cases: distributed lag model with 7 lags

- Slightly negative effects in the first days (lag 1 and 2) were not significant.
- However, effect estimates were significantly positive in later days, indicating adverse effects of air pollution
- Cumulative effect: +1% (0.1-1.9%) per 10 µg/m³ PM2.5.



Limitations

2.5 years is relatively short for a time-series analysis.

The need for long-term studies to capture comprehensive trends.

Uncertainty regarding consistent reporting by practitioners

Key takeaways

- Cardiovascular visits and air pollution effects were within plausible magnitude
- Lag time between air pollution episodes and doctor visits was observed, especially for non-life-threatening conditions.
- Primary healthcare patients tend to wait a few days before consulting a doctor for less severe diseases.
- The immediate protective effect of air pollution on respiratory visits was unexpected.
- Adverse effects became significant after a latency of about five days

Future considerations

- Delve into the prospective utilization of electronic primary care data for forthcoming research endeavors and policymaking.
- Emphasize the significance of enhancing reporting adherence to attain more thorough and comprehensive data in the future.
- Address the necessity for forthcoming, extended-duration studies to meet evolving research needs.

REFERENCES

Air Pollution Management in Kosovo (English). Washington, D.C. : World Bank Group. http://documents.worldbank.org/curated/en/214511576520047805/Air-Pollution-Management-in-Kosovo

Shabani Isenaj, Z., Berisha, M., Gjorgjev, D., Dimovska, M., Moshammer, H., & Ukëhaxhaj, A. (2022). Air Pollution in Kosovo: Short Term Effects on Hospital Visits of Children Due to Respiratory Health Diagnoses. International Journal of Environmental Research and Public Health, 19(16). https://doi.org/10.3390/IJERPH191610141

Kim, K. H., Kabir, E., & Kabir, S. (2015). A review on the human health impact of airborne particulate matter. *Environment International*, *74*, 136–143. https://doi.org/10.1016/J.ENVINT.2014.10.005

Samoli, E., Peng, R., Ramsay, T., Pipikou, M., Touloumi, G., Dominici, F., Burnett, R., Cohen, A., Krewski, D., Samet, J., & Katsouyanni, K. (2008). Acute Effects of Ambient Particulate Matter on Mortality in Europe and North America: Results from the APHENA Study. *Environmental Health Perspectives*, *116*(11), 1480–1486. https://doi.org/10.1289/EHP.11345

Thank you