

Multiple Myeloma Incidence and PM 2.5 Pollution levels (2003–2011) in New England region compared to the rest of the United States

S. Sidhu¹, A. Sharma ², Y. Hamadah¹, K. Meleveedu³, S. Kumar³

1. University of Connecticut, Department of Internal Medicine, Farmington, CT, USA

2.Yale New Haven Hospital, Department of Internal Medicine, New Haven, CT, USA, 06150

3. Neag Comprehensive Cancer Center, University of Connecticut Health, Farmington, CT, USA



INTRODUCTION

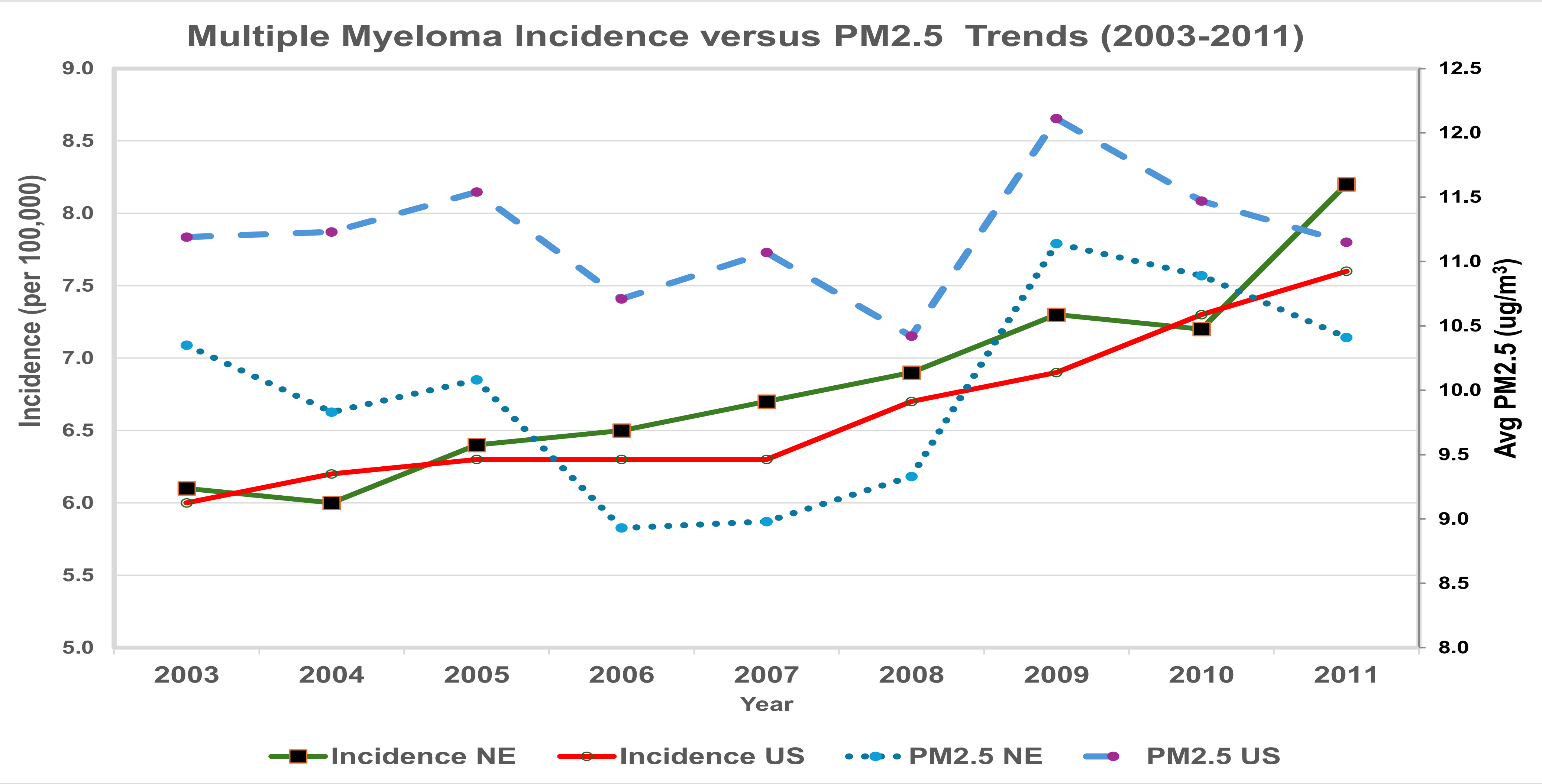
- Multiple myeloma (MM) incidence varies regionally within the United States.
- There are multiple environmental exposures that could be associated with the incidence of MM.
- Pollutants such as fine particulate matter (PM 2.5) have been suggested as potential risk factors.

OBJECTIVES

Assess the association of pollution levels with Multiple Myeloma incidence

METHODOLOGY

- A retrospective analysis was conducted to evaluate the age-adjusted MM incidence in the New England region (NE) versus other parts of U.S. from 1999–2022 based on the data available at CDC WONDER, alongside annual average PM_{2.5} concentrations from 2003-2011.
- Findings were contextualized against two recent studies: (1) a pooled European cohort (n ≈ 234,800) assessing PM_{2.5} and MM incidence, and (2) a Bronx-based U.S. cohort of MM patients (n ≈ 1,600) evaluating PM_{2.5} exposure and survival outcomes.



RESULTS

- Crude rates of incidence of MM averaged at 8.57 for males in the NE region and 6.60 for females. This is in comparison to 8.21 for Males and 6.54 for females in the rest of the US.
- Average PM_{2.5} levels from the years 2003 to 2011 were 9.99 in the NE region compared to 11.21 in rest of the US.
- In our analysis, the pollution trends showed that though the PM_{2.5} levels fluctuated, but they remained higher nationally (10.4–12.1 µg/m³) than in the NE (8.9–11.1 µg/m³).
- The NE incidence rates of MM were consistently higher than U.S. averages.
- A moderate positive correlation was observed between NE PM_{2.5} and incidence (in case of men NE r ≈ 0.48; slope ~0.487 cases per 100,000 per µg/m³), although associations were not statistically significant and limited by only eleven years of overlapping data. (Fig.1)
- In contrast, the European pooled analysis reported no significant association between PM_{2.5} and MM incidence (HR 1.04 per 5 µg/m³).
- The Bronx cohort identified a modest association between prolonged exposure to PM_{2.5} levels >12 µg/m³ and poorer overall survival in MM patients (HR ~1.12), suggesting pollution may influence outcomes rather than incidence.

CONCLUSION

- While our ecological analysis suggested a possible positive relationship between PM_{2.5} exposure and MM incidence in the NE, but this finding is not supported by larger, well-powered European incidence data.
- Emerging U.S. clinical evidence points towards PM_{2.5} as a factor in MM prognosis rather than etiology.

CONTACT INFORMATION

Sukhmani Sidhu, MBBS

PGY3 Internal Medicine, University of Connecticut

Email ID- ssidhu@uchc.edu

REFERENCES

1. Centers for Disease Control and Prevention, National Center for Health Statistics. (n.d.). *United States Cancer Statistics: Data Visualizations, 1999–2022* [Data set]. CDC WONDER Online Database. U.S. Department of Health and Human Services. <https://wonder.cdc.gov/>

2. Wysota, M., Pradhan, K., Jacobs, S. *et al.* Fine particulate matter exposure is linked to worse myeloma outcomes in a diverse urban cohort. *Blood Cancer J.* **15**, 115 (2025). <https://doi.org/10.1038/s41408-025-01301-0>

3. Hvidtfeldt UA, Chen J, Rodopoulou S, Strak M, de Hoogh K, Andersen ZJ, Bellander T, Brandt J, Forastiere F, Brynedal B, Hertel O, Hoffmann B, Katsouyanni K, Ketzel M, Leander K, Magnusson PKE, Nagel G, Pershagen G, Rizzuto D, Samoli E, So R, Stafoggia M, Tjønneland A, Weinmayr G, Wolf K, Zitt E, Brunekreef B, Hoek G, Raaschou-Nielsen O. Multiple myeloma risk in relation to long-term air pollution exposure - A pooled analysis of four European cohorts. *Environ Res.* 2023 Dec 15;239(Pt 1):117230. doi: 10.1016/j.envres.2023.117230. Epub 2023 Oct 6. PMID: 37806476.

COL: SK: Advisor to J&J and Sanofi; research funding J&J, BMS. No other financial disclosures.