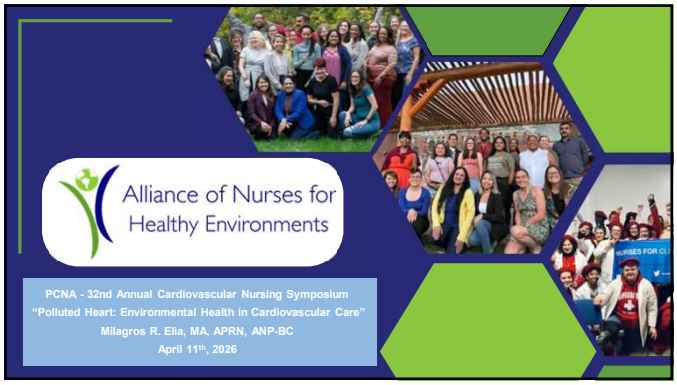
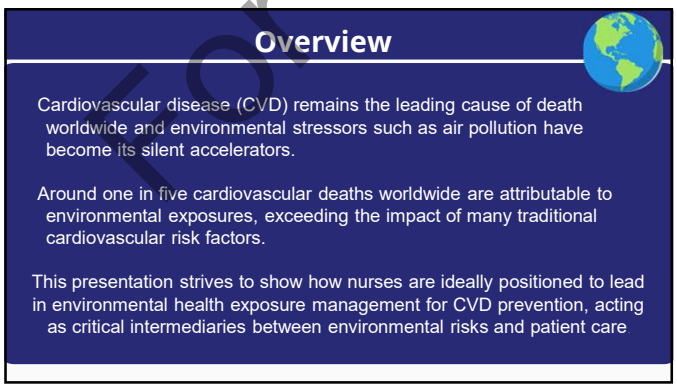


1

2



3

Learning Objectives

- Explain the biological mechanisms through which environmental exposures contribute to cardiovascular disease development and progression
- Examine the impact of environmental exposures on cardiovascular outcomes through a health equity lens
- Describe evidence-based strategies nurses can use to reduce cardiovascular risk associated with environmental exposures

4

Key Pollutants

Epidemiological Evidence

Key

- PM2.5/PM10: increased risk of morbidity & mortality
- NO2: traffic-related cardiovascular risk
- SO2: linked to hospitalizations
- O3 & CO: contribute to cardiopulmonary burden

5

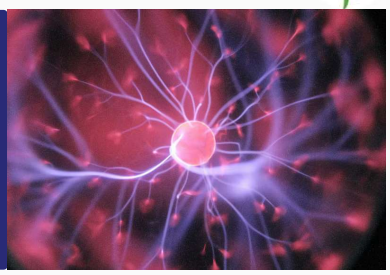
Sources of Pollution

- Traffic emissions
- Industrial processes
- Energy production
- Domestic heating

6

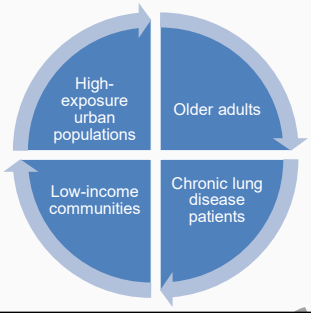
Mechanisms of Harm

- Systemic inflammation
- Oxidative stress
- Endothelial dysfunction
- Thrombosis risk



7

Vulnerable Populations



8

Disparities in Health Equity

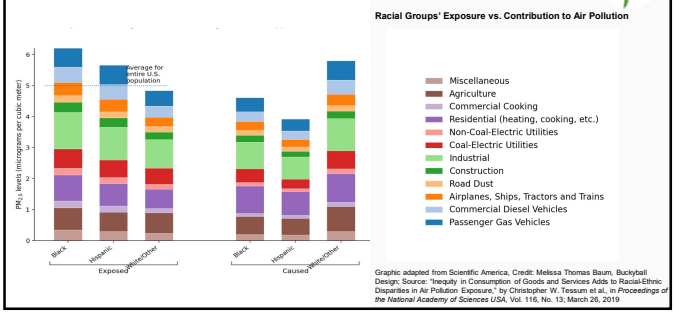
Nearly half of the U.S. population lives with unhealthy levels of air pollution

85 million people live in counties with failing grades for year-round particle pollution

Graphics included in and used with permission by: American Lung Association. (2025). *State of the air 2025.* https://www.lung.org/research/sota

9

Disparities in Health Equity



Graphic adapted from Scientific America, Credit: Melissa Thomas Baum, Buckyball Design; Source: "Inequity in Consumption of Goods and Services Adds to Racial-Ethnic Disparities in Air Pollution Exposure," by Christopher W. Tessum et al., in *Proceedings of the National Academy of Sciences USA*, Vol. 116, No. 13; March 26, 2019

10

Special Considerations: AQI, Extreme Heat

- The US Air Quality Index (AQI) measures air pollution on a 0–500 scale based on EPA standards, with 0–50 being "Good" and over 300 "Hazardous." (AirNow, n.d.)
- AirNow.gov is the official source for real-time monitoring, which is critical during wildfire season. (AirNow, n.d.)
- High heat increases Air Quality Index (AQI) levels (University Corporation for Atmospheric Research, n.d.)

11

Clinical Implications for Nursing

Integrate	Recognize	Personalize
Integrate air quality into risk assessment	Recognize exposure windows (1–3 days)	Personalize care for high-risk patients

12

Case Study

Maria, a 68-year-old Hispanic female with a history of heart failure and hypertension presents to the emergency department with dyspnea and signs of fluid overload.

It is summer, and the Air Quality Index (AQI) in her urban community has reached 165.

13

Case Study Question

What environmental exposure question would be important for the clinician to include in the assessment to evaluate the potential impact of air pollution on her current presentation?

14

Strategies for Healthcare Systems

15

Legislative Policy & Advocacy

- Advocate for strong air quality standards
- Promote environmental justice
- Support nursing leadership in policy

16

Conclusion

17

Alliance of Nurses for Healthy Environments

THANK YOU!

www.envirn.org

18

References

[1] American Heart Association. (2026, January 20). *Global societies unite to address environmental threats to heart health*. https://newsroom.heart.org/news/global-societies-unite-to-address-environmental-threats-to-heart-health

[2] American Lung Association. (2025). *State of the air 2025*. https://www.lung.org/research/sota

[3] Thompson, A. (2019, June 1). *People of color breathe more than their share of polluted air*. Scientific American. https://www.scientificamerican.com/article/minorities-breathe-more-than-their-share-of-polluted-air/

[4] Spiller, E., Proville, J., Roy, A., & Muller, N. Z. (2021). Mortality Risk from PM2.5: A Comparison of Modeling Approaches to Identify Disparities across Racial/Ethnic Groups in Policy Outcomes. *Environmental health perspectives*, *129*(12), 127004. https://doi.org/10.1289/EHP9001

[5] Zhang, X., Han, L., White, S., Hassan, S., Kalra, P. A., Ritchie, J., ... & Shorley, J. (2025). Tabulatime: A novel multimodal deep learning framework for advancing acute coronary syndrome prediction through environmental and clinical data integration. *arXiv preprint arXiv:2502.17049*.

[6] An update on adverse health effects from exposure to PM2.5
Sangkham, S., Phairuang, W., Sherchan, S. P., Pansakun, N., Munkong, N., Sarndhong, K., Islam, M. A., & Sakunkoo, P. (2024). *An update on adverse health effects from exposure to PM2.5*. **Environmental Advances, 18**, 100603. https://doi.org/10.1016/j.envadv.2024.100603

19

References

University Corporation for Atmospheric Research. (n.d.). *How weather affects air quality*. Center for Science Education. https://scied.ucar.edu/learning-zone/air-quality/how-weather-affects-air-quality

AirNow. (n.d.). *Air quality index (AQI) basics*. U.S. Environmental Protection Agency. https://www.airnow.gov/aqi/aqi-basics/

20

Join our movement

SIGN UP FOR OUR NEWSLETTER

21