

Presenter



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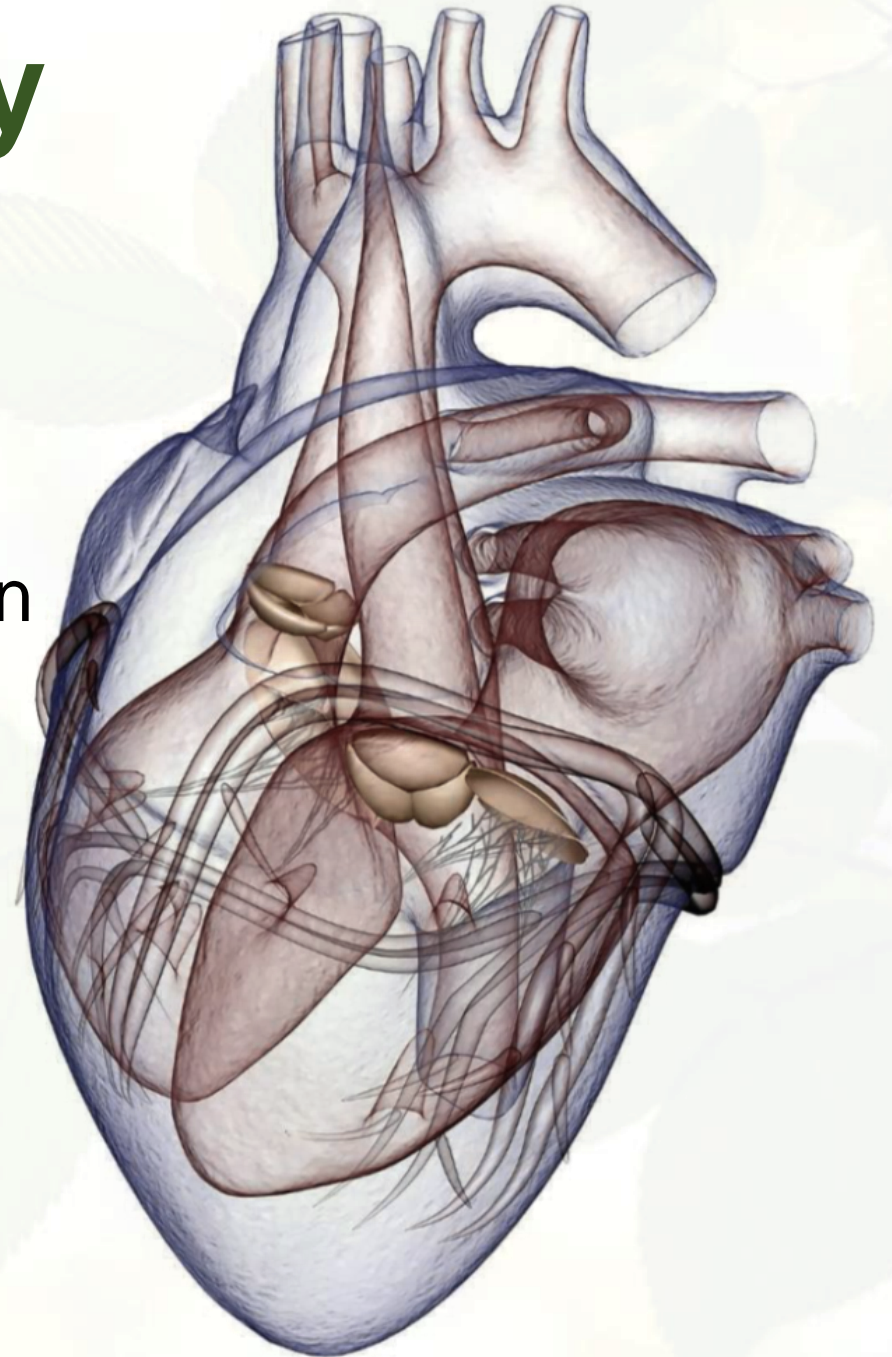
A close-up photograph of several green, lanceolate leaves on a thin branch, set against a blurred background of more green foliage. The leaves are vibrant green and have a clear vein structure.

CARDIOVASCULAR DISEASE,
THE ENVIRONMENT, AND
CLIMATE CHANGE



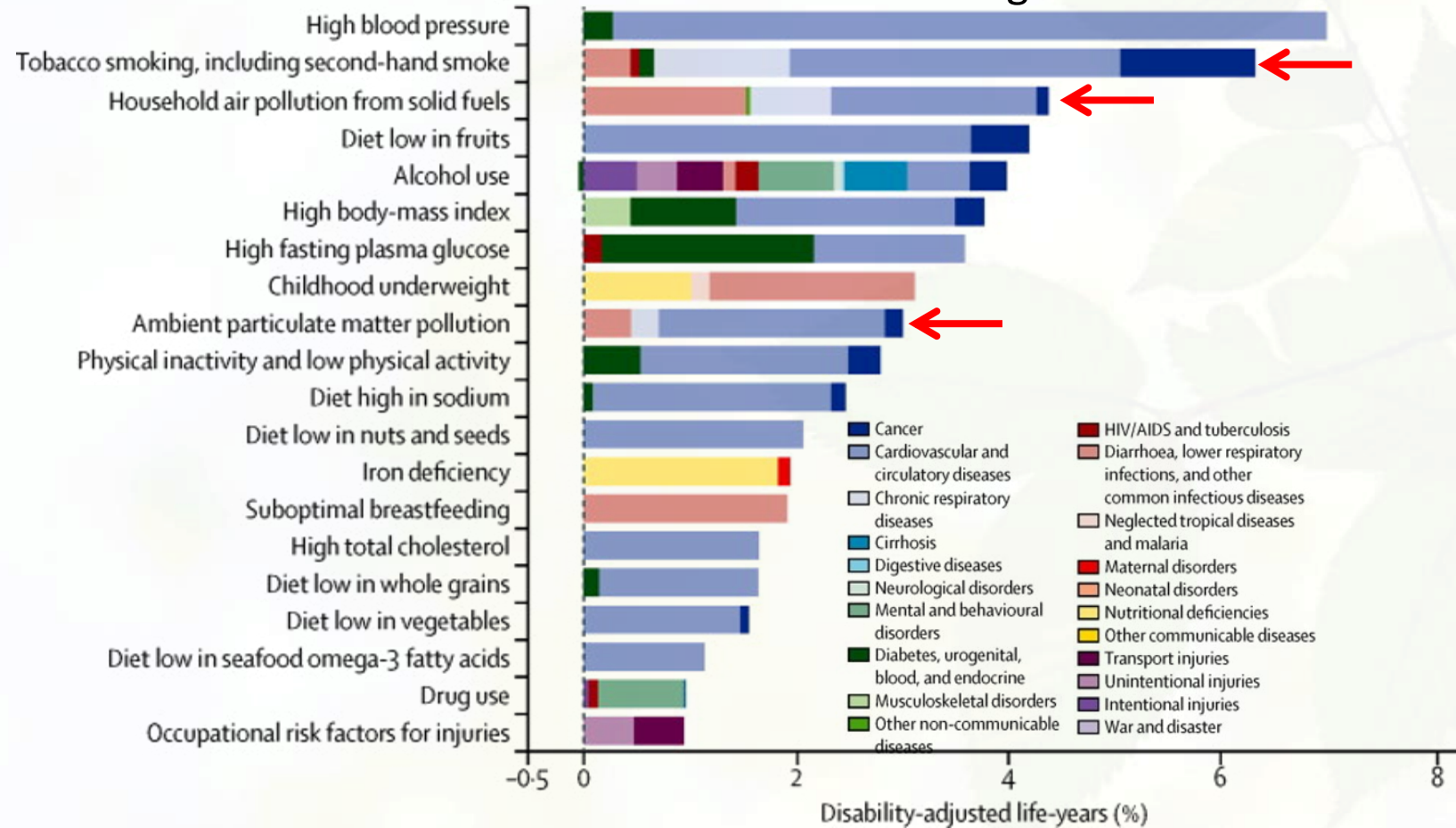
Environmental Cardiology

- Cardiovascular disease is an inherently environmental disease
- Environmental influences play major roles in CVD
- Risk is imparted from the natural, built, personal, and community environments
- The cardiovascular system is particularly vulnerable to environmental air pollutants



CVD and Air Pollution

Global Burden of Disease Attributable to Leading Risk Factors



Particulate Air Pollution



Wood-Burning Stoves



Forest Fires



Heavy Duty Diesel Engines



Natural Sources

PM is derived from many different sources



Cars and Trucks



Non-Road Vehicles

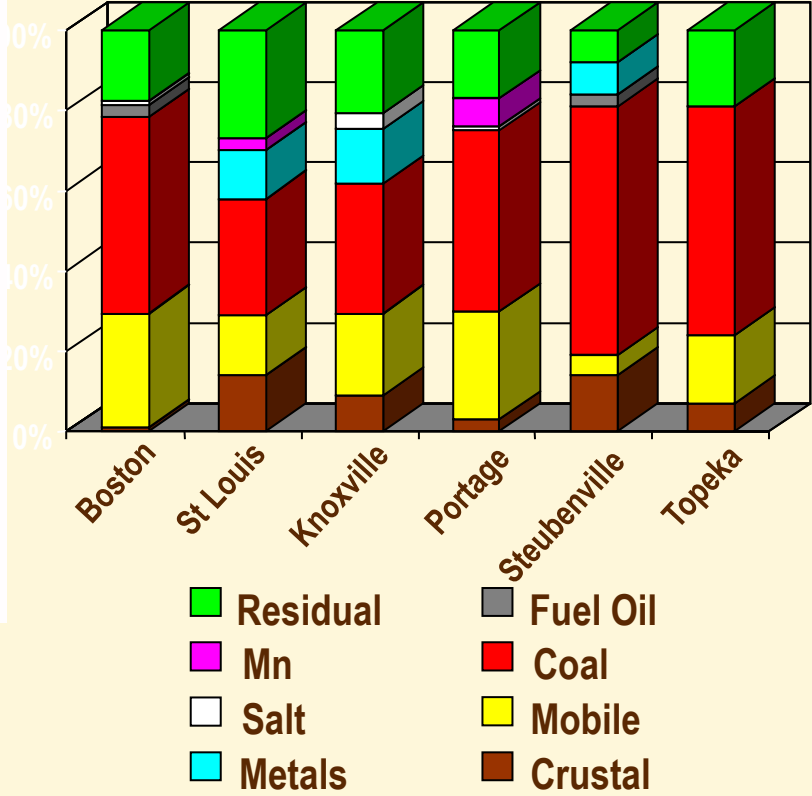
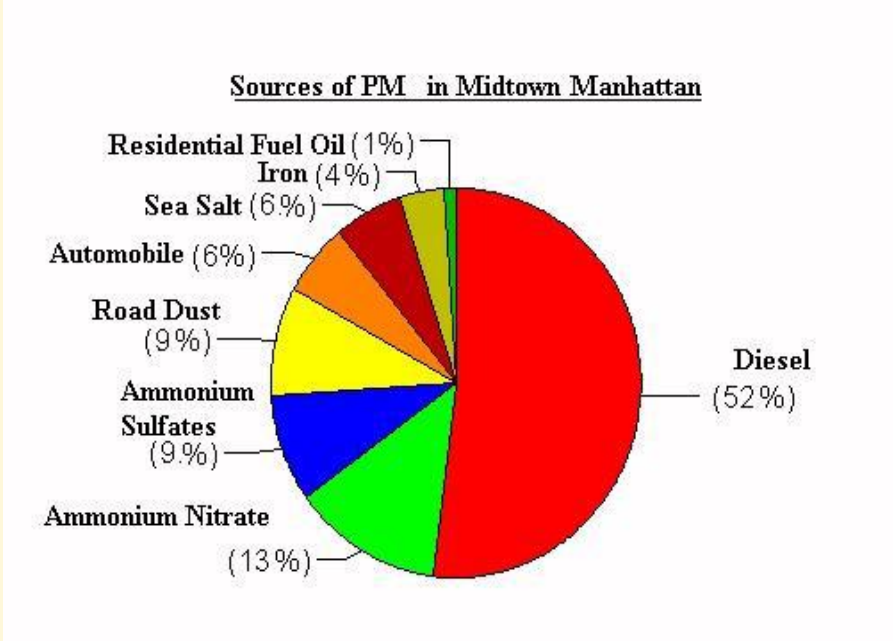


Leaf Burning



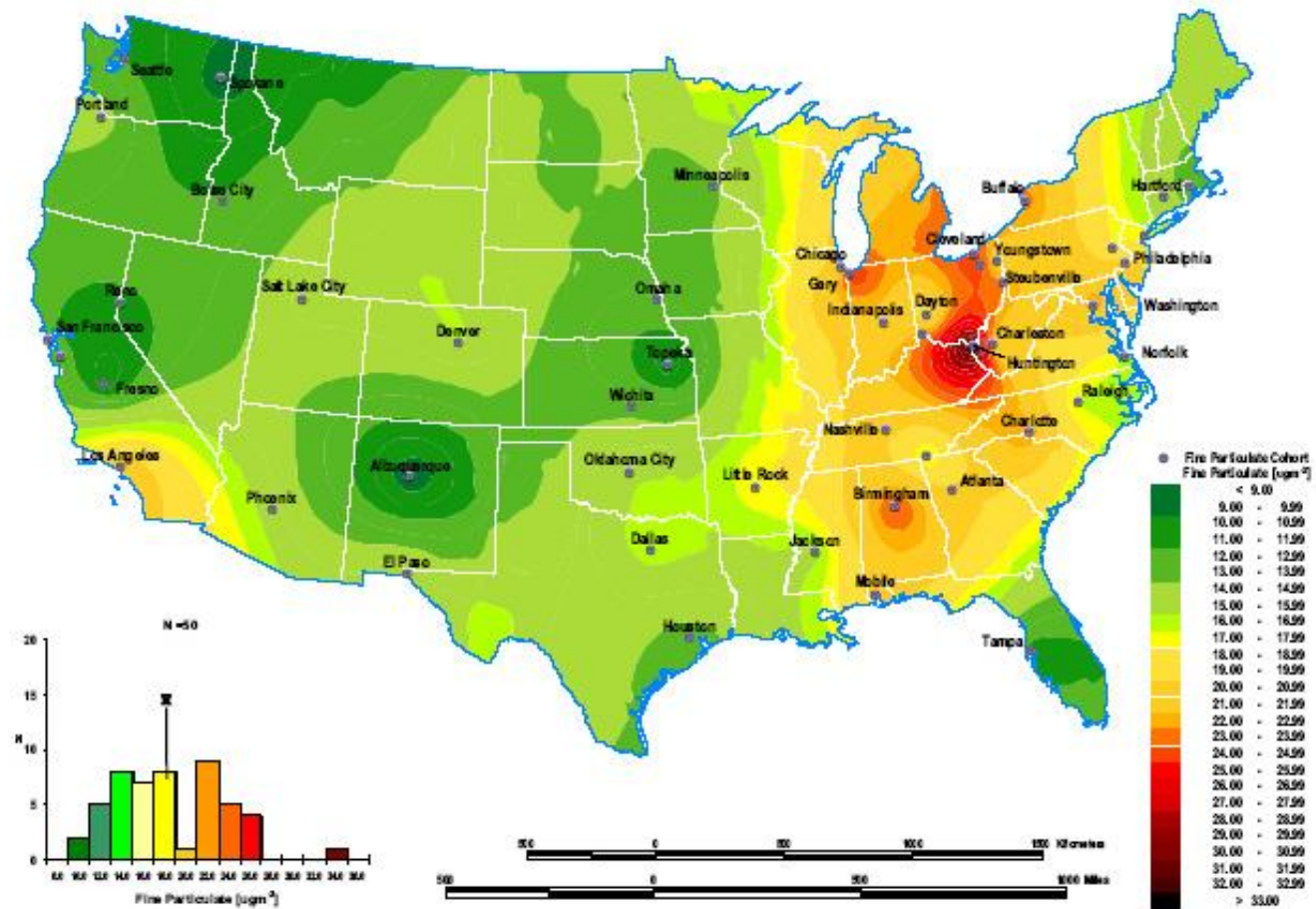
Industrial Sources

PM sources vary by geographic location



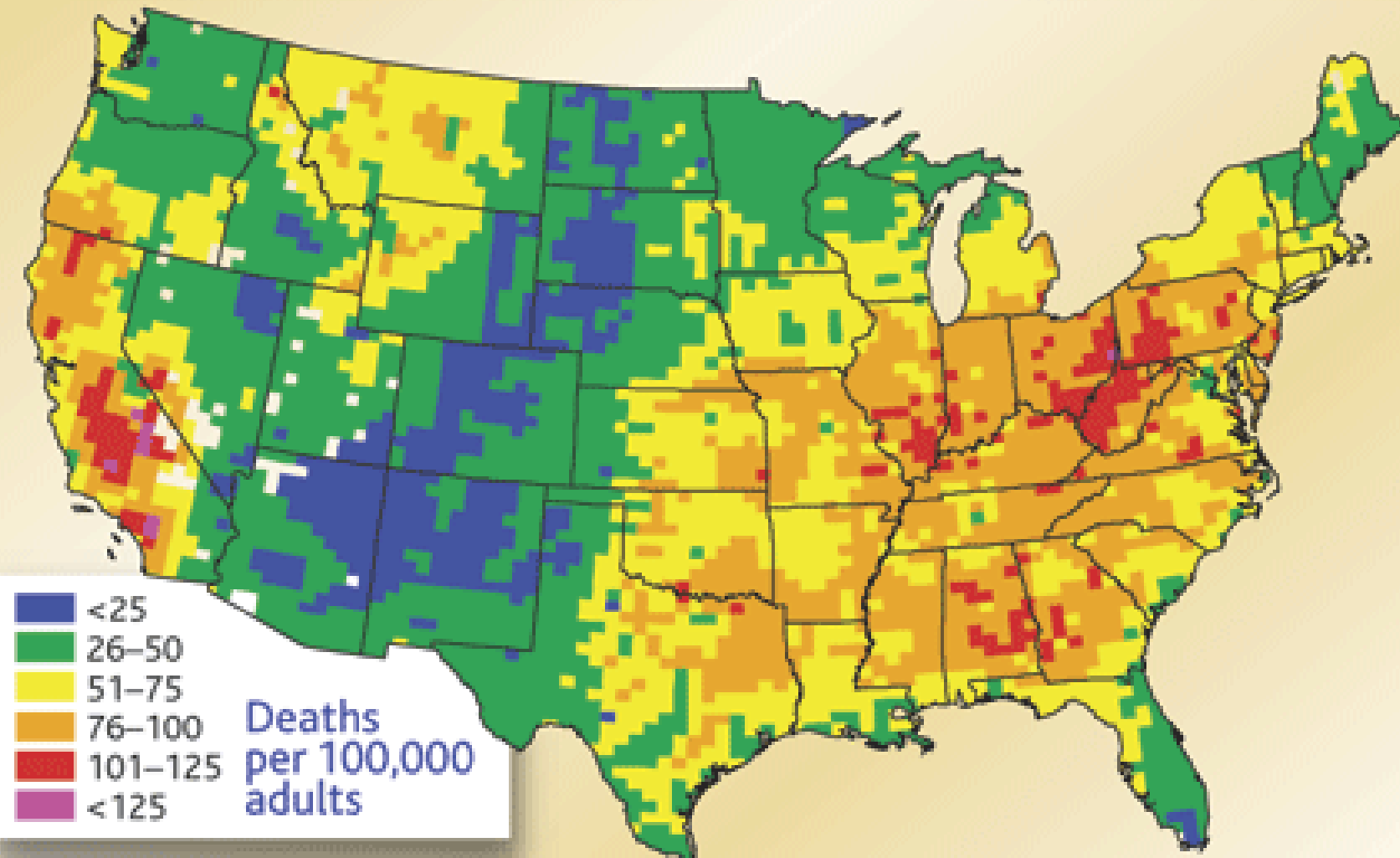
Geographic Distribution of PM

Modeled Fine Particle Surface

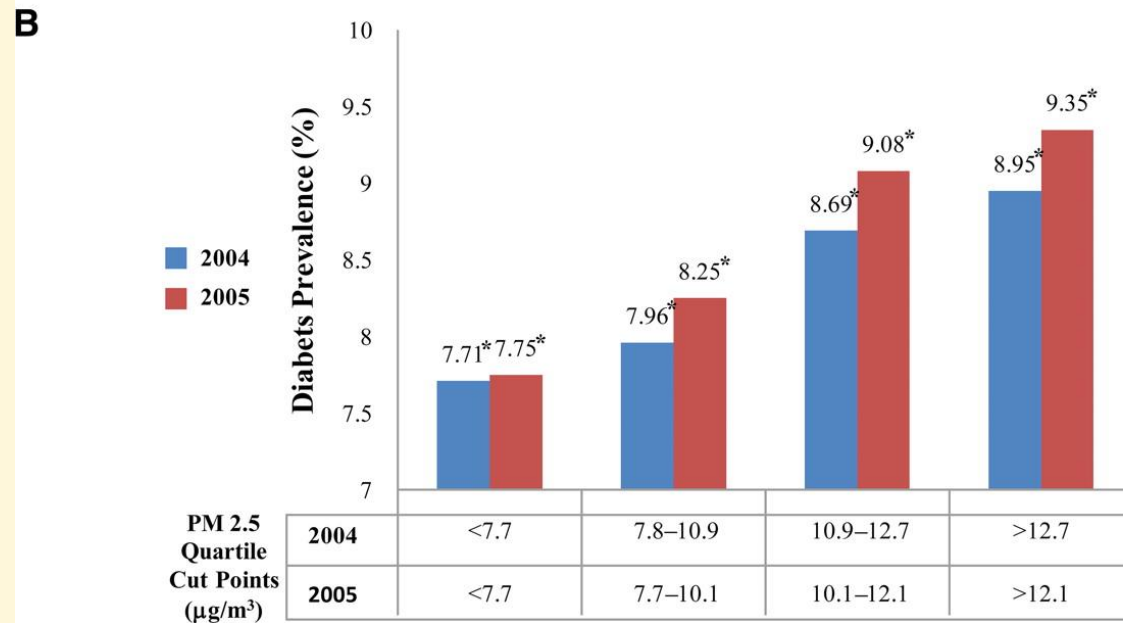
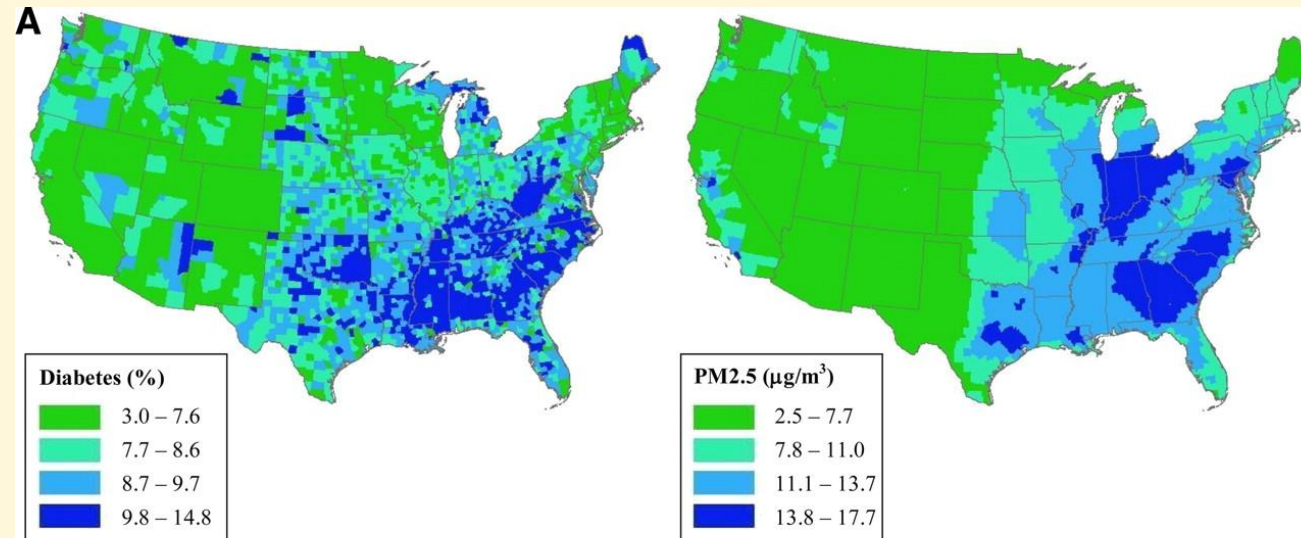


Summary Figure 3. Spatial distribution of fine particles.

Premature Mortality Risk Attributable to PM_{2.5}



Diabetes Prevalence and PM_{2.5} for US Counties



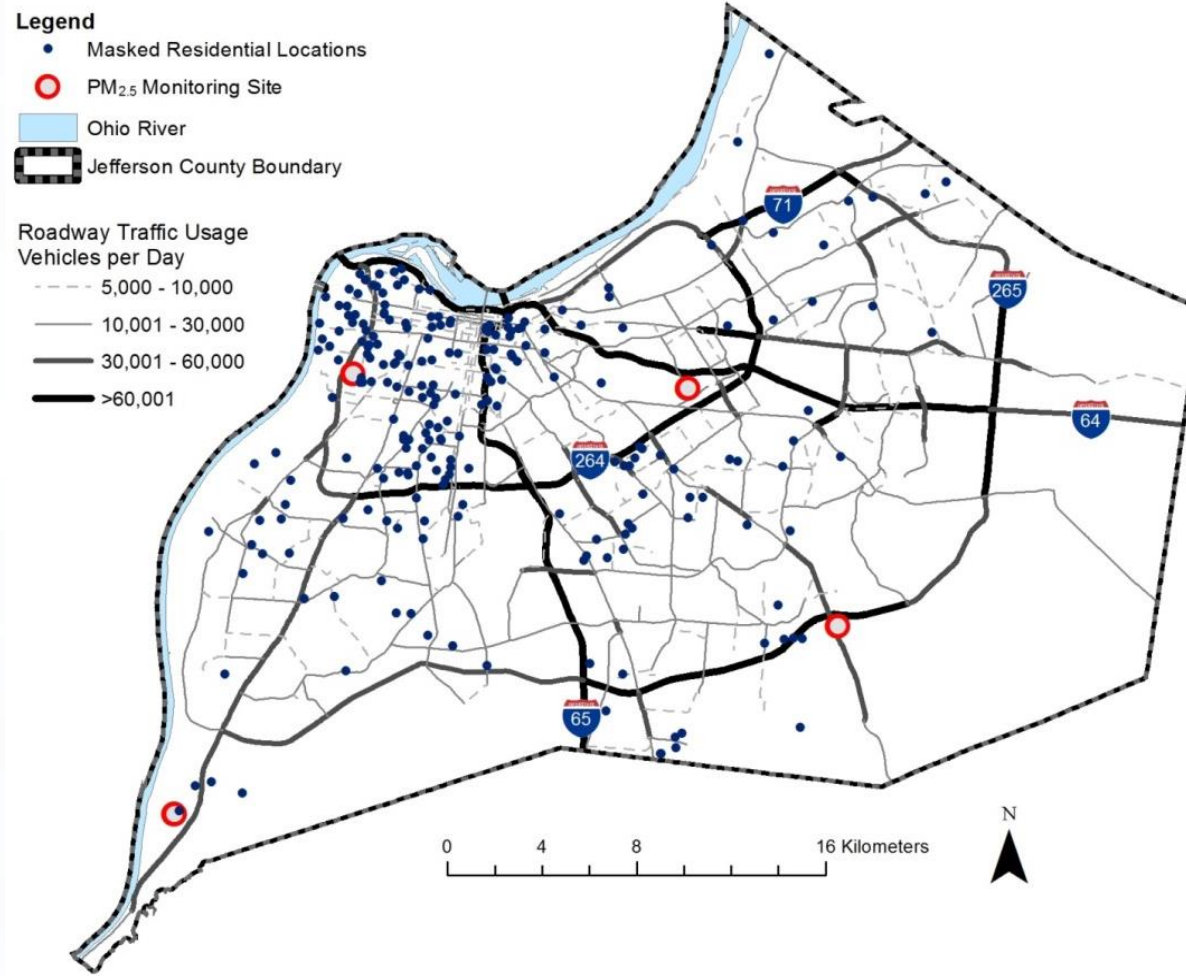
Do Environmental Exposures Affect CAC Levels?



Primary End Points: Circulating CACs and urinary acrolein metabolite HPMA

| Categorical Variable | Total | Low | Medium | High | P |
|-----------------------------------------|----------|---------|---------|-----------|--------|
| Gender | | | | | 0.863 |
| Female | 100 (47) | 32 (46) | 33 (47) | 35 (50) | |
| Male | 111 (53) | 38 (54) | 38 (54) | 35 (50) | |
| Ethnicity | | | | | 0.005 |
| Caucasian | 120 (57) | 35 (50) | 34 (48) | 51 (73) | 0.004 |
| African American | 87 (41) | 32 (46) | 37 (52) | 18 (26) | 0.004 |
| Hispanic | 4 (1.9) | 3 (4.3) | 0 (0.0) | 1 (1.4) | 0.165 |
| CVD Risk Factors | | | | | |
| Hypertension | 168 (81) | 61 (88) | 55 (80) | 52 (75) | 0.137 |
| Hyperlipidemia | 131 (64) | 40 (58) | 46 (67) | 45 (66) | 0.492 |
| Diabetes | 55 (26) | 18 (26) | 23 (33) | 14 (20) | 0.243 |
| Obese | 118 (58) | 45 (66) | 44 (63) | 29 (43) | 0.015 |
| Current smoker | 82 (39) | 8 (12) | 22 (31) | 52 (74) | <0.001 |
| Never smoked | 56 (27) | 19 (28) | 28 (40) | 9 (13) | 0.001 |
| Former smoker | 71 (34) | 42 (61) | 20 (28) | 9 (13) | <0.001 |
| Environmental Smoke* | 41 (53) | 19 (31) | 13 (28) | 8 (44) | 0.425 |
| High FRS Category† | 168 (80) | 49 (70) | 55 (78) | 64 (91) | 0.006 |
| Medical History | | | | | |
| Myocardial Infarction | 73 (35) | 19 (28) | 25 (36) | 29 (41) | 0.225 |
| Stroke | 22 (11) | 7 (10) | 9 (13) | 6 (9) | 0.705 |
| CABG/ PCI/ Stents‡ | 58 (28) | 14 (20) | 17 (24) | 27 (39) | 0.040 |
| Heart Failure | 36 (17) | 11 (16) | 17 (25) | 8 (12) | 0.120 |
| Medication | | | | | |
| Angiotensin-converting-enzyme inhibitor | 112 (54) | 35 (52) | 42 (59) | 35 (52) | 0.604 |
| Angiotensin-receptor blockers | 12 (6) | 6 (9) | 4 (6) | 2 (3) | 0.328 |
| Beta-blocker | 129 (63) | 40 (60) | 42 (59) | 47 (69) | 0.400 |
| Calcium-channel blockers | 45 (23) | 17 (25) | 15 (21) | 13 (19.1) | 0.668 |
| Diuretics | 81 (39) | 32 (48) | 33 (47) | 16 (24) | 0.005 |

Early Progenitor Cell levels are Increased With Road Way Proximity



Adjusted Association between roadway proximity and CAC levels

| | Total population, n=151 | | 6-month residential duration, n=73 | |
|----------------------------------------------------------------------------------|-------------------------|---------|------------------------------------|---------|
| CAC population | β | p-value | β | p-value |
| CAC-4 (CD31 ⁺ /34 ⁺ /45 ⁺ /AC133 ⁺) | -0.705 | 0.029* | -1.463 | 0.001* |
| CAC-5 (CD31 ⁺ /AC133 ⁺) | -0.736 | 0.001* | -0.822 | 0.024* |
| CAC-11 (AC133 ⁺) | -0.620 | 0.005* | -0.760 | 0.063 |
| CAC-14 (CD34 ⁺ /45 ⁺ /AC133 ⁺) | -1.260 | 0.007* | -1.011 | 0.014* |

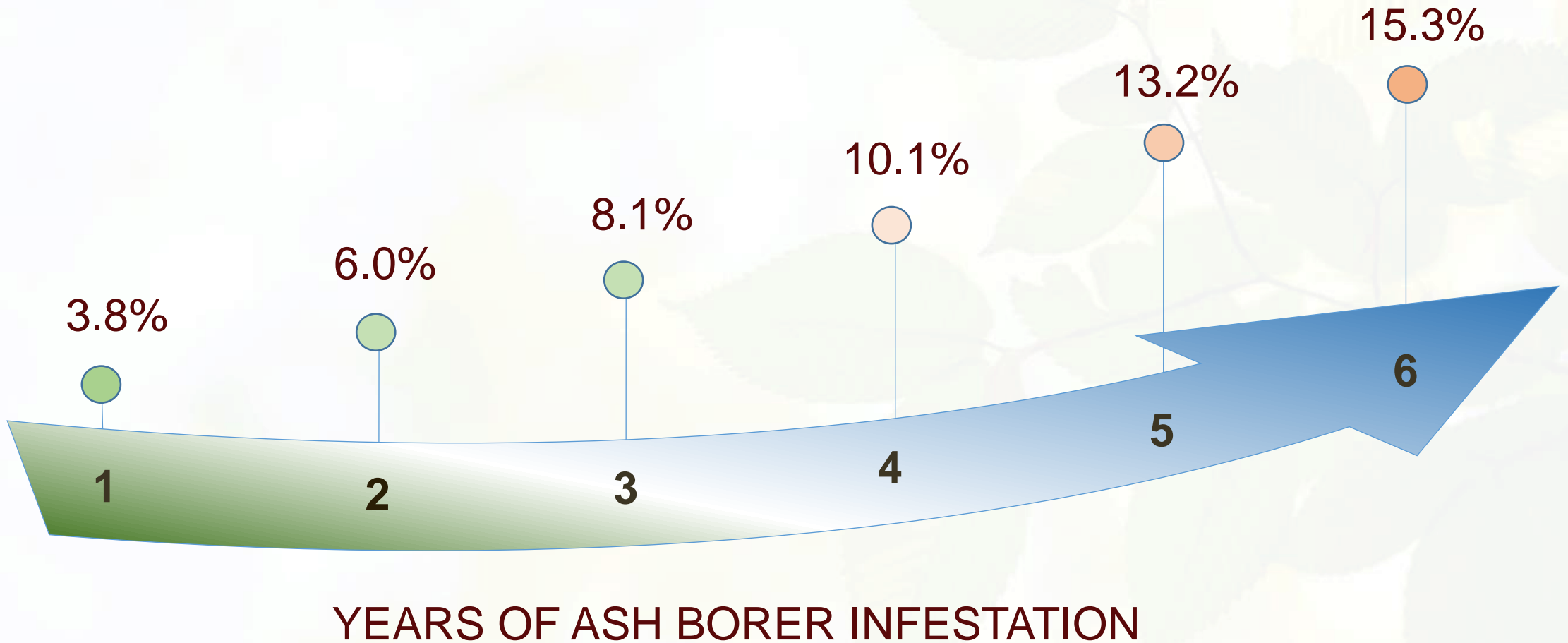


The Green Heart Project:

Assess the impact of urban vegetation on air pollution and cardiovascular health.



INCREASE IN CVD MORTALITY



Hypothesis

Exposure to neighborhood greenspace diminishes cardiovascular disease risk by decreasing levels of ambient air pollution

Study Aims

- Examine baseline cardiovascular health in two demographically-matched neighborhoods with low greenspace
- Determine how increasing greenspace affects neighborhood characteristics
- Assess the impact of increasing neighborhood greenspace on cardiovascular health



Green for Good Project



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ENVIRONMENTAL CARDIOLOGY

