

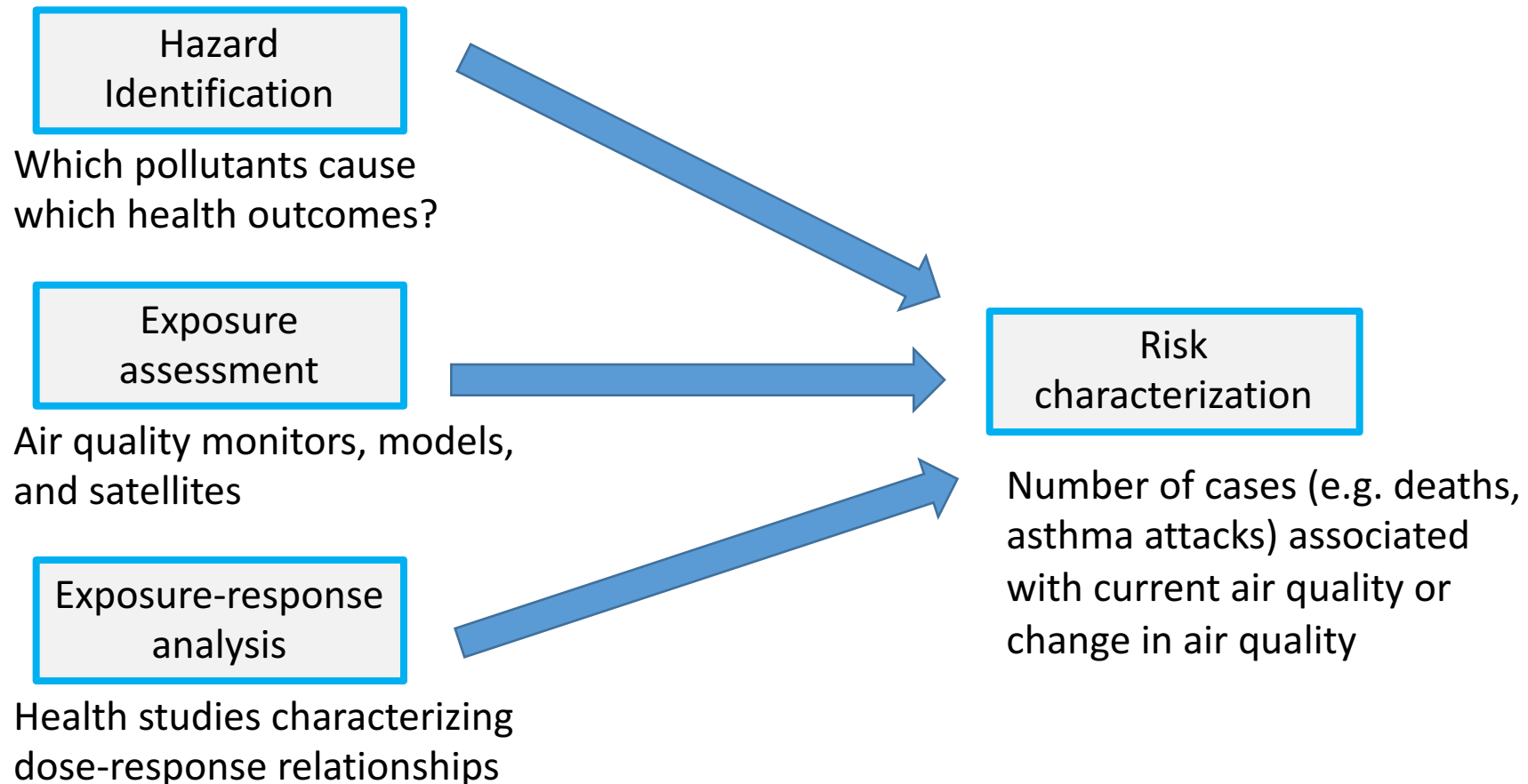
Air pollution health impact assessment

Susan Anenberg

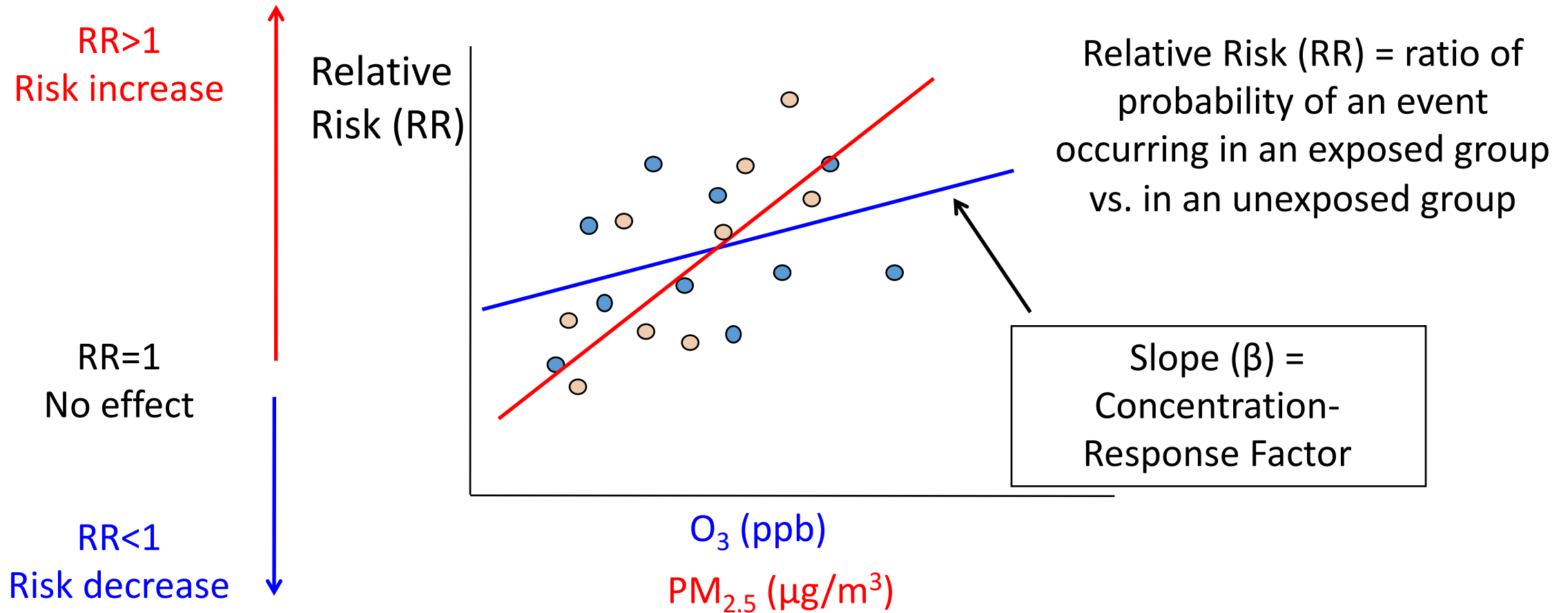
April 11, 2018

NASA HAQAST Tiger Team call

Risk assessment framework



Air pollution epidemiology



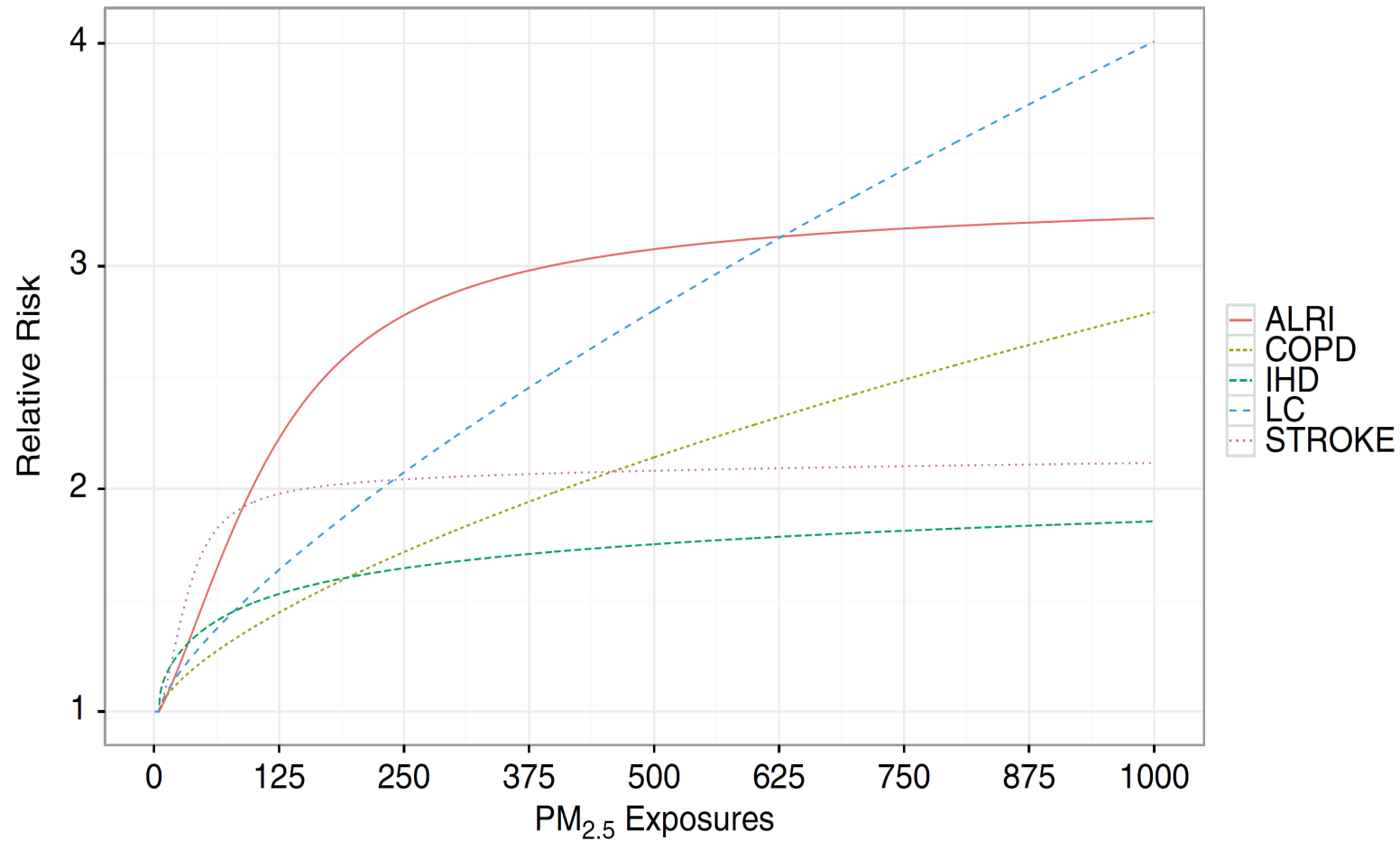
Health impact function

$$\Delta Mort = (1 - e^{-\beta \Delta X}) \times Pop \times y_0$$

Diagram illustrating the components of the Health Impact Function:

- Attributable fraction** (indicated by a red bracket over the term $(1 - e^{-\beta \Delta X})$)
- Baseline mortality** (indicated by a red bracket over the term y_0)
- Annual avoided deaths** (indicated by a blue arrow pointing to $\Delta Mort$)
- Concentration-response factor** (indicated by a blue arrow pointing to β)
- Change in concentration** (indicated by a blue arrow pointing to ΔX)
- Population exposed** (indicated by a blue arrow pointing to Pop)
- Baseline mortality rate** (indicated by a blue arrow pointing to y_0)

PM_{2.5} concentration-response relationships



Estimated impacts of PM_{2.5} in the U.S.

PM_{2.5} associated with 130,000 - 320,000 premature deaths in the U.S. in 2005 (5.4% of all deaths nationwide)

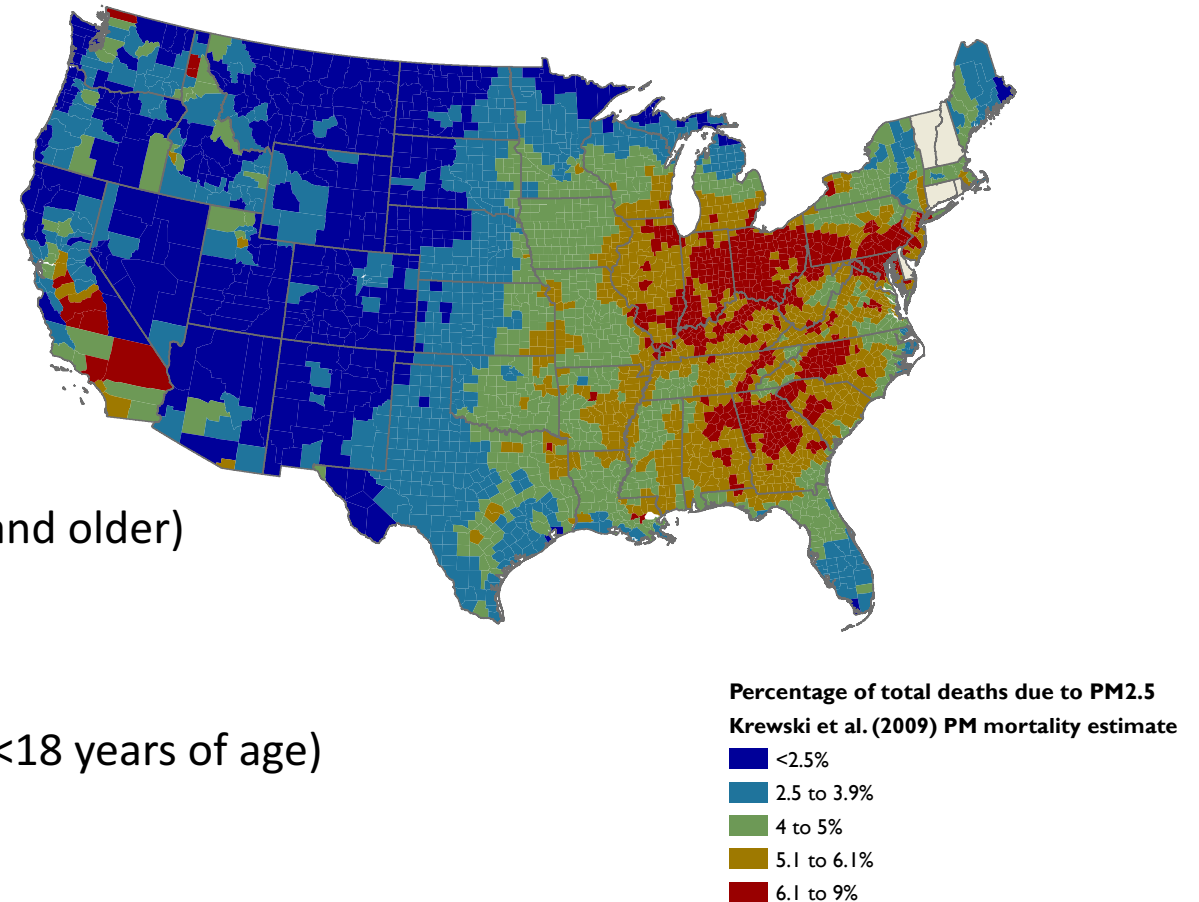
Other Effects:

Adults:

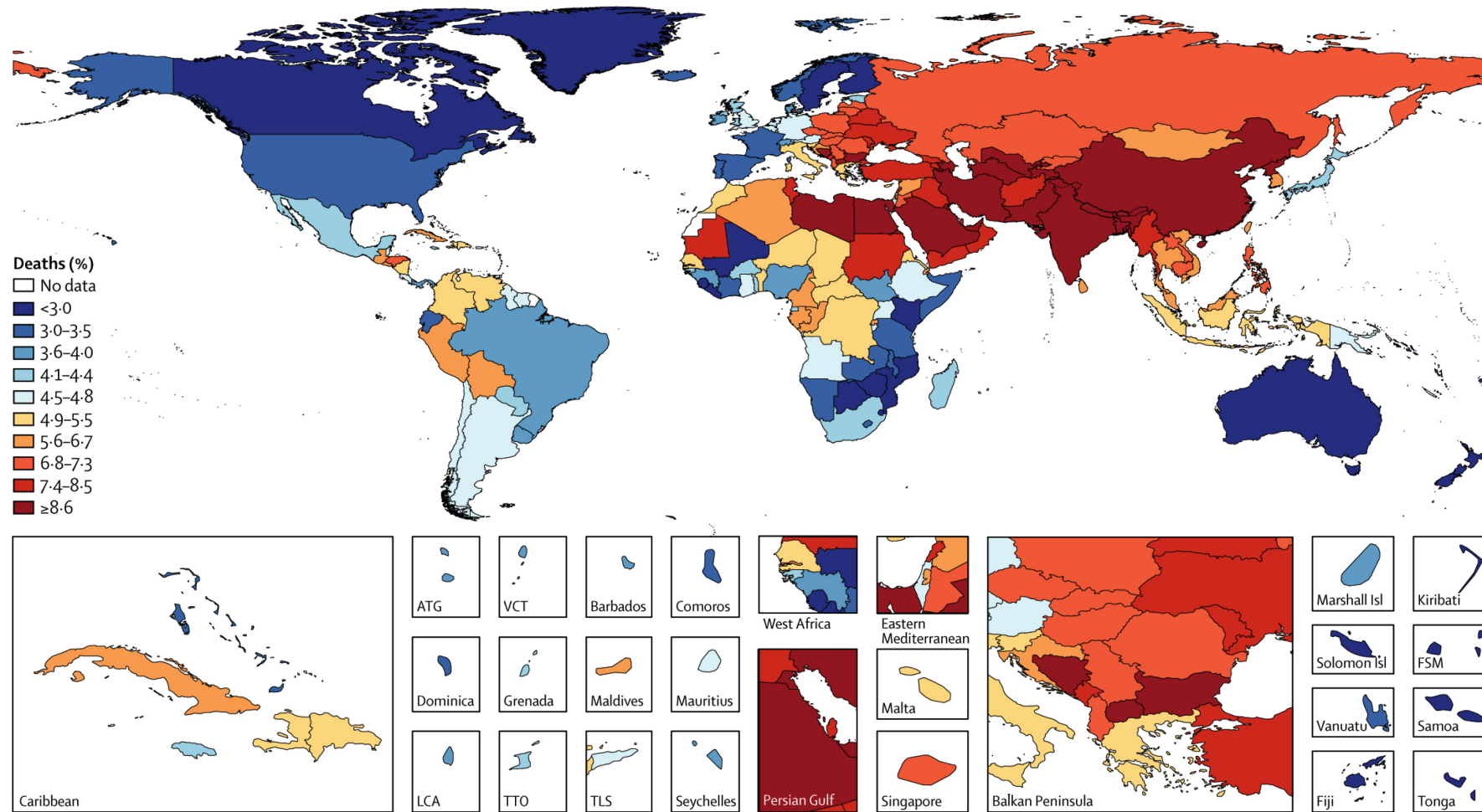
- 18,000,000 lost work days (age 18-65)
- 180,000 heart attacks (age 17 and older)
- 83,000 cases of chronic bronchitis (age 26 and older)
- 62,000 hospitalizations for cardiovascular effects (age 17 and older)
- 30,000 hospitalizations for respiratory effects (all ages)

Children:

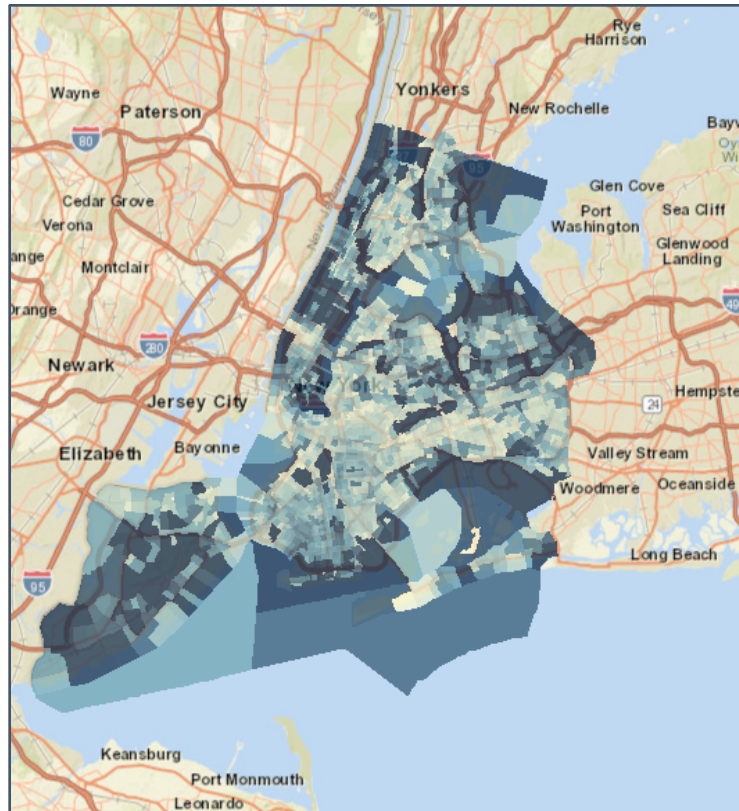
- 110,000 emergency department visits related to asthma (<18 years of age)
- 200,000 cases of acute bronchitis (age 8-12)
- 2,500,000 cases of exacerbation of asthma (age 6-18)



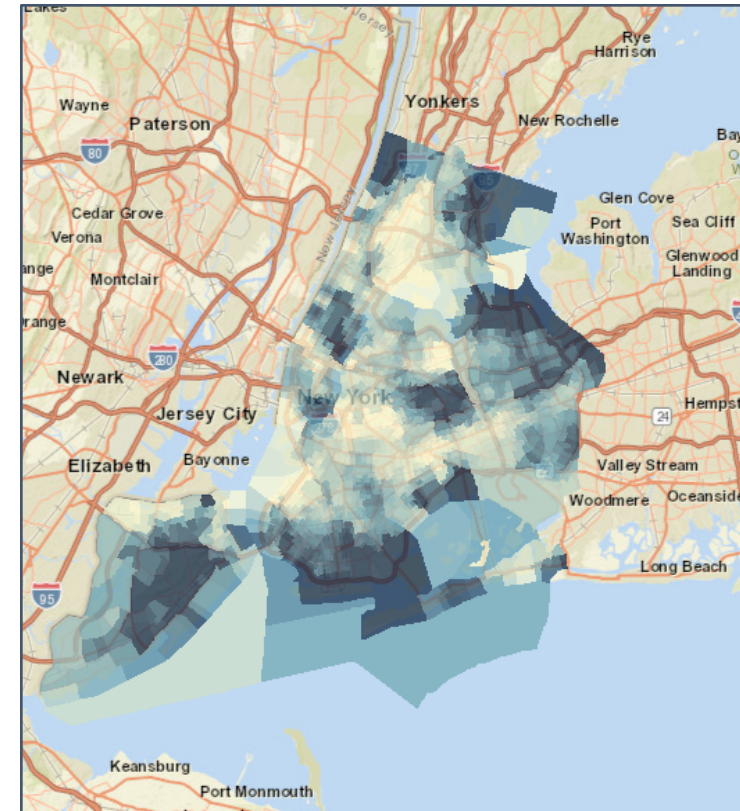
PM2.5 global burden of disease



Tiger team project preliminary results: Tract-level health impacts of PM2.5 in NYC



No. of
Persons



Rate per
100,000

