SPACE Meeting
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The Environmental Exposome's Impacts on Healthy Ageing

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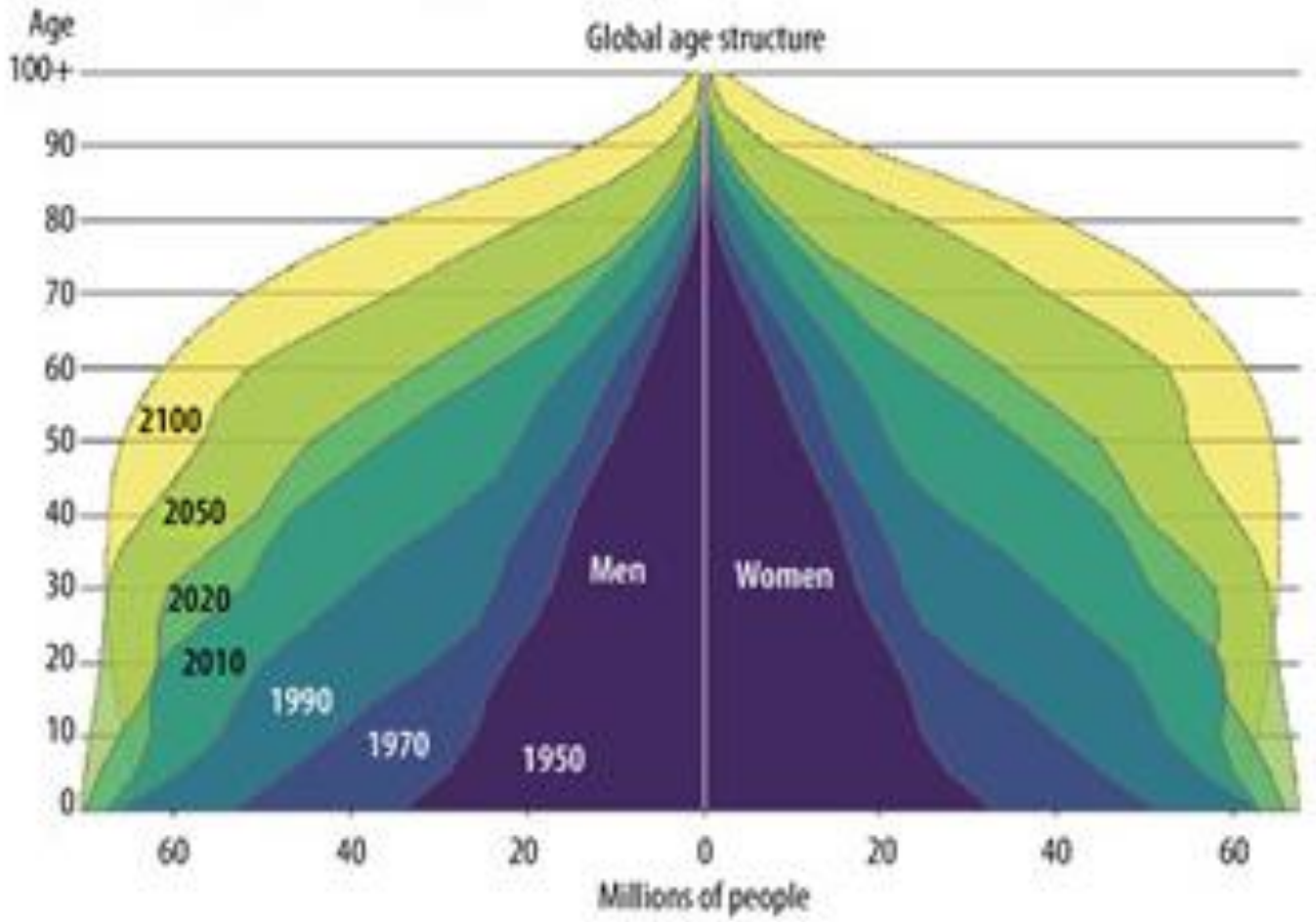
PUBLIC HEALTH

Talk Overview

- Environmental exposures impact health and well-being at older ages
- Environmental exposures can be modified to improve health
- Research to inform health promotion strategies

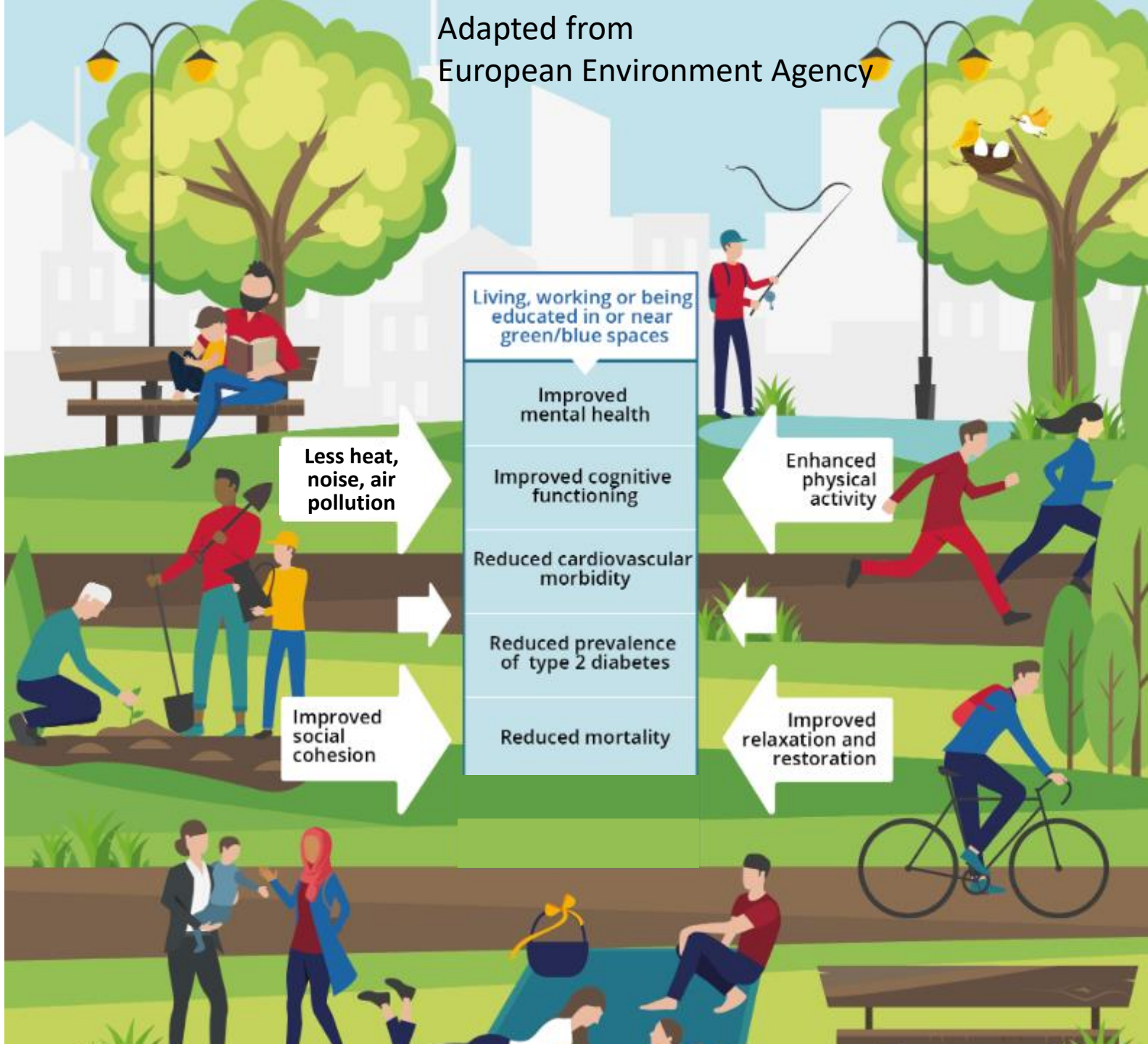
The World is Ageing



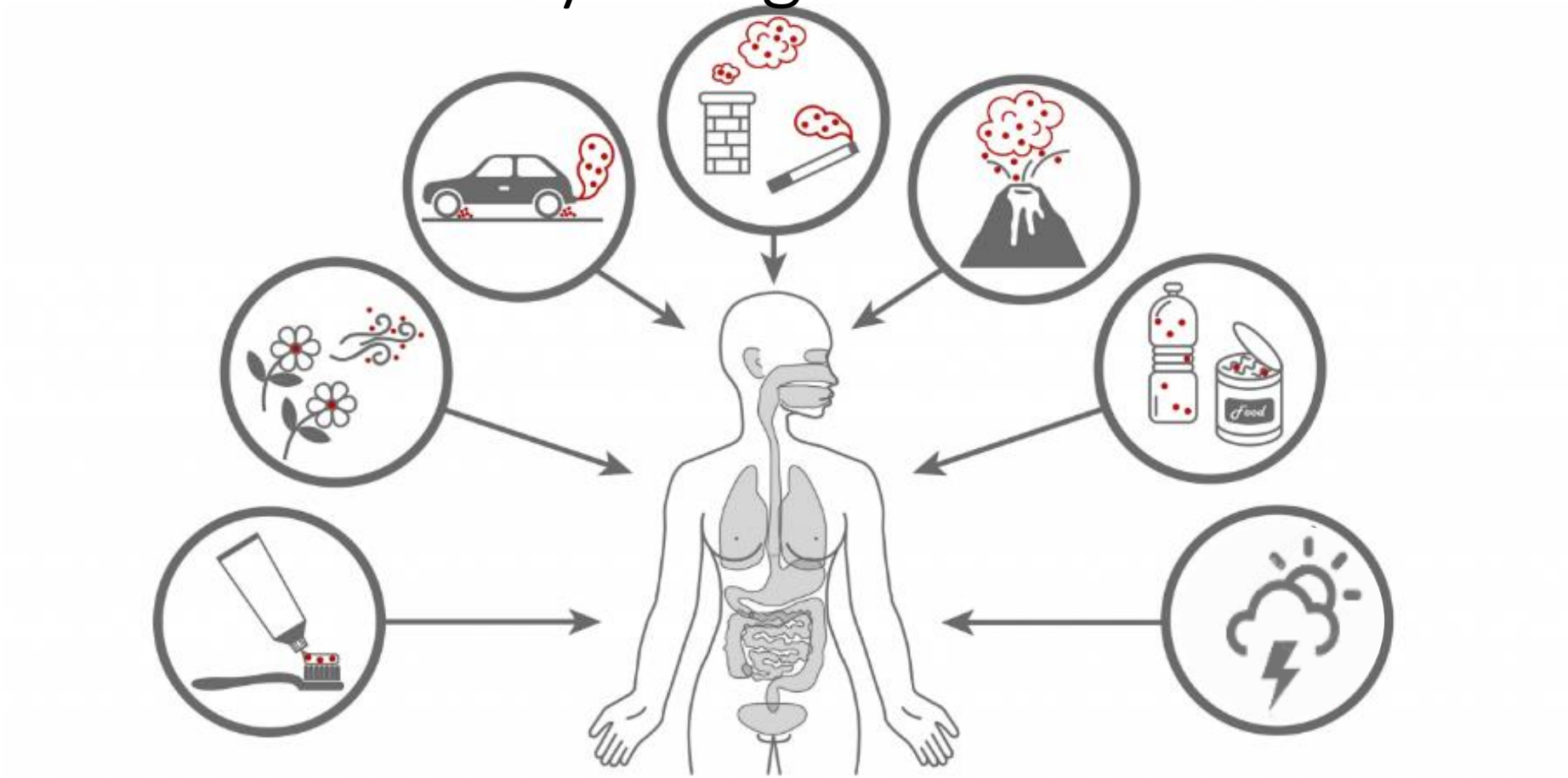
Source: United Nations Department of Economic and Social Affairs, World Population Division.

Where we live, work, socialize impacts our health

Some places promote physical activity, social cohesion, and mental health



Pollution in the Environment Has Direct Physiological Effects

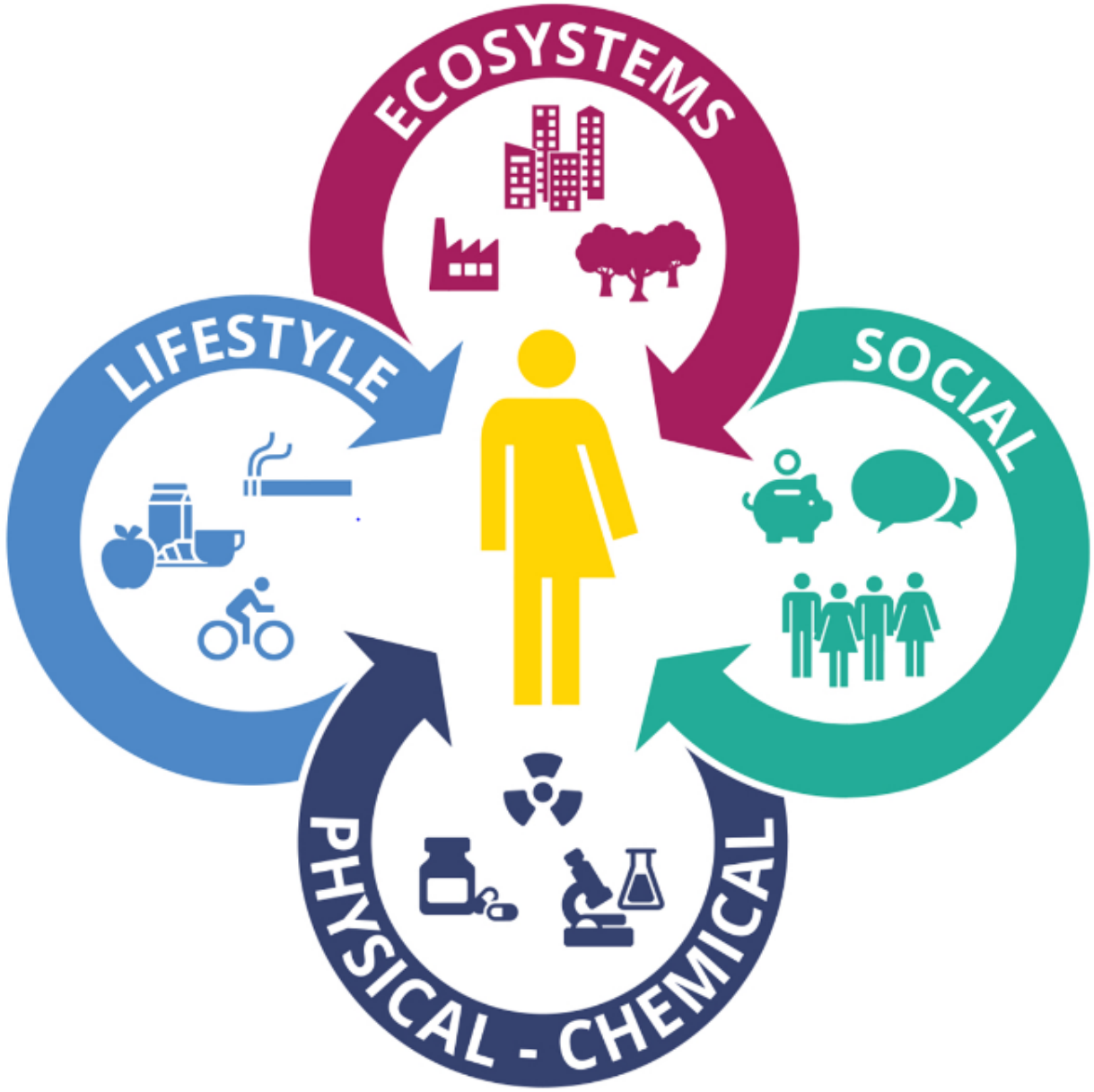


Oxidative Stress, Inflammation, Autonomic Activation, Vascular Changes, DNA Damage, Disruption of Homeostasis, Infections, Injuries

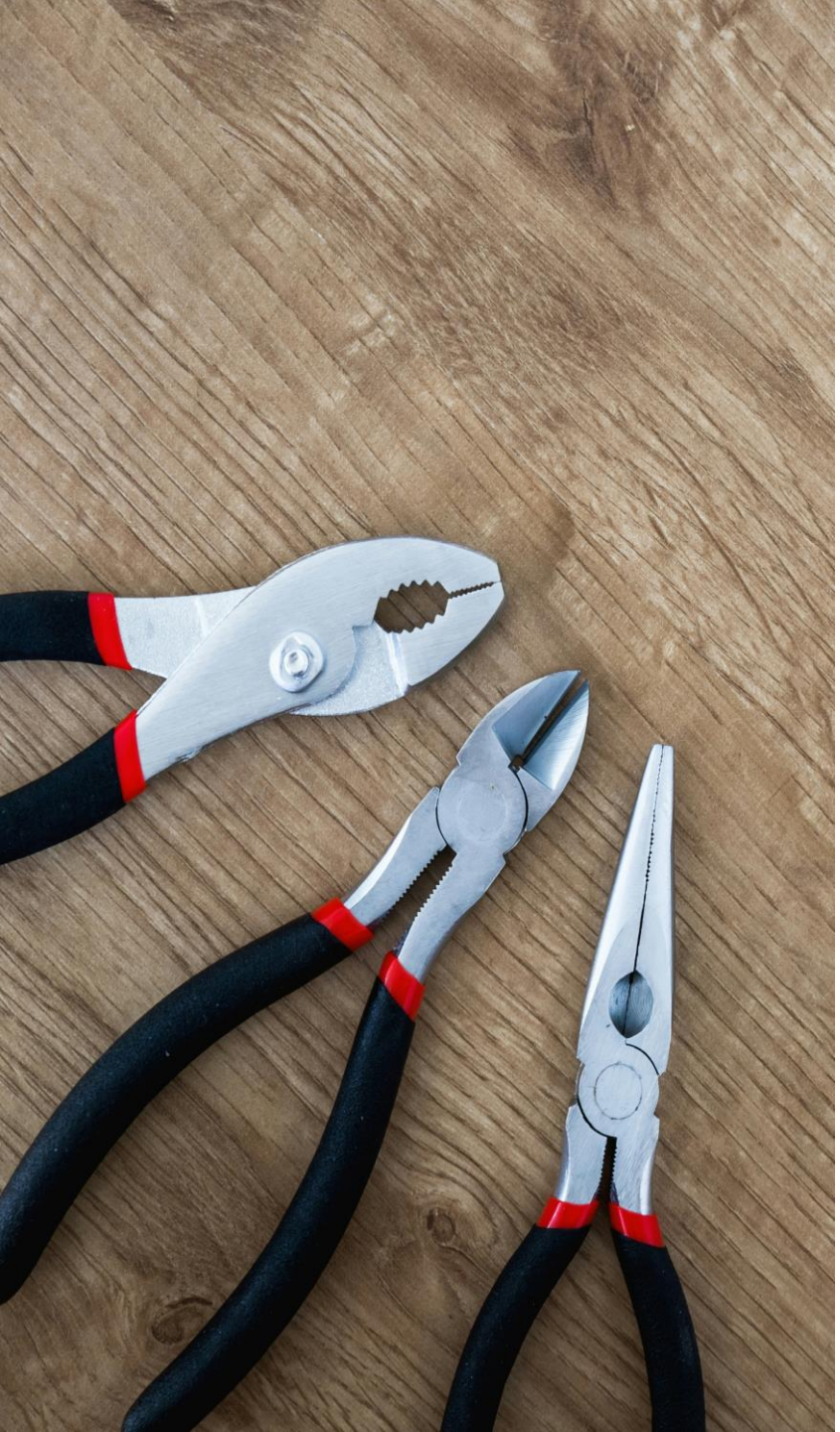
Adapted from figure by Matthias Marczynski 2021

Climate Change Can Also Present Unique Challenges

- Infrastructure and supply chain disruptions
  - Utilities
  - Transportation
  - Essential supplies
  - Medical care
  - Communication systems



- GBD estimates that nearly 50% of global morbidity/ mortality attributable to environmental factors (Lim et al 2012)
- Genetics only explains <15% of chronic disease risk (Rappaport 2011, 2016)
- Environmental features are often modifiable!



Opportunities for Intervention

- National regulations
- Local ordinances
- Urban design
- Community supports

Soot pollution poses risks to millions of Americans

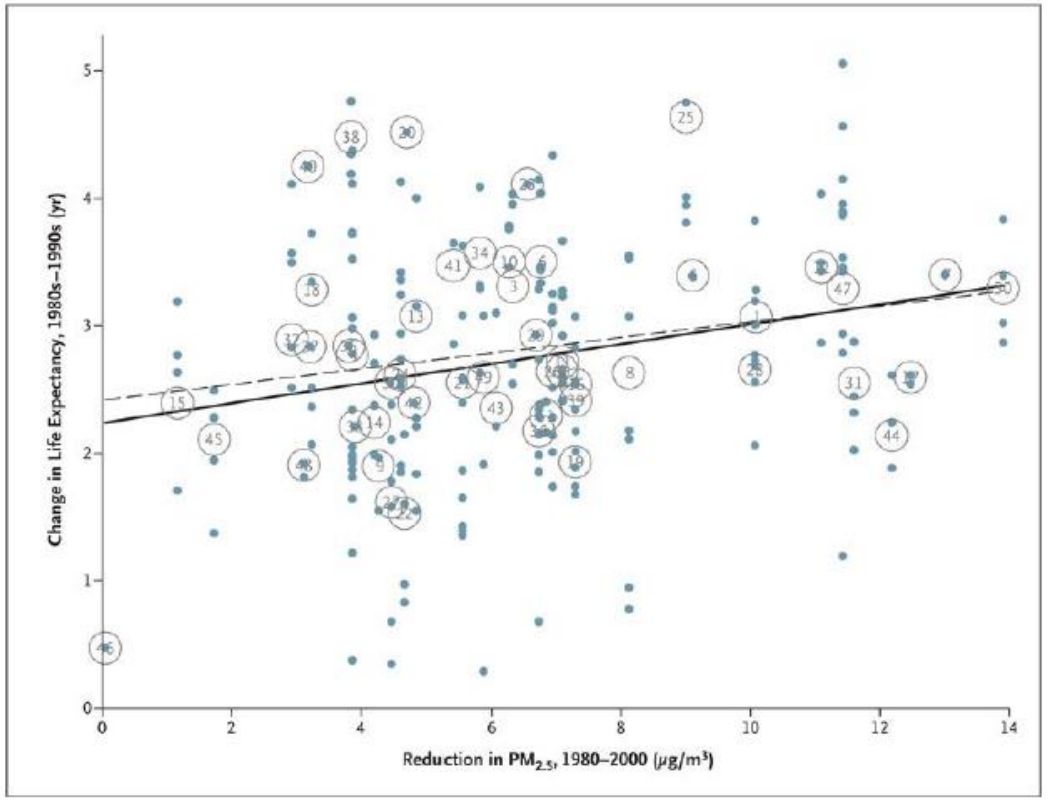
Stronger standards will better protect communities, resulting in cleaner air for everyone.

epa.gov/pm-pollution

EPA

National Regulations Effective

The NEW ENGLAND JOURNAL of MEDICINE



Fine-Particulate Air Pollution and Life Expectancy in the United States

C. Arden Pope, III, Ph.D., Majid Ezzati, Ph.D., and Douglas W. Dockery, Sc.D.

N Engl J Med 2009; 360:376-386 | January 22, 2009

- Reductions in PM associated with increases in life expectancy
- 10 μg/m^3 decrease in exposure associated with ~7 (+2) months longer life expectancy

Local Ordinances Improve Health

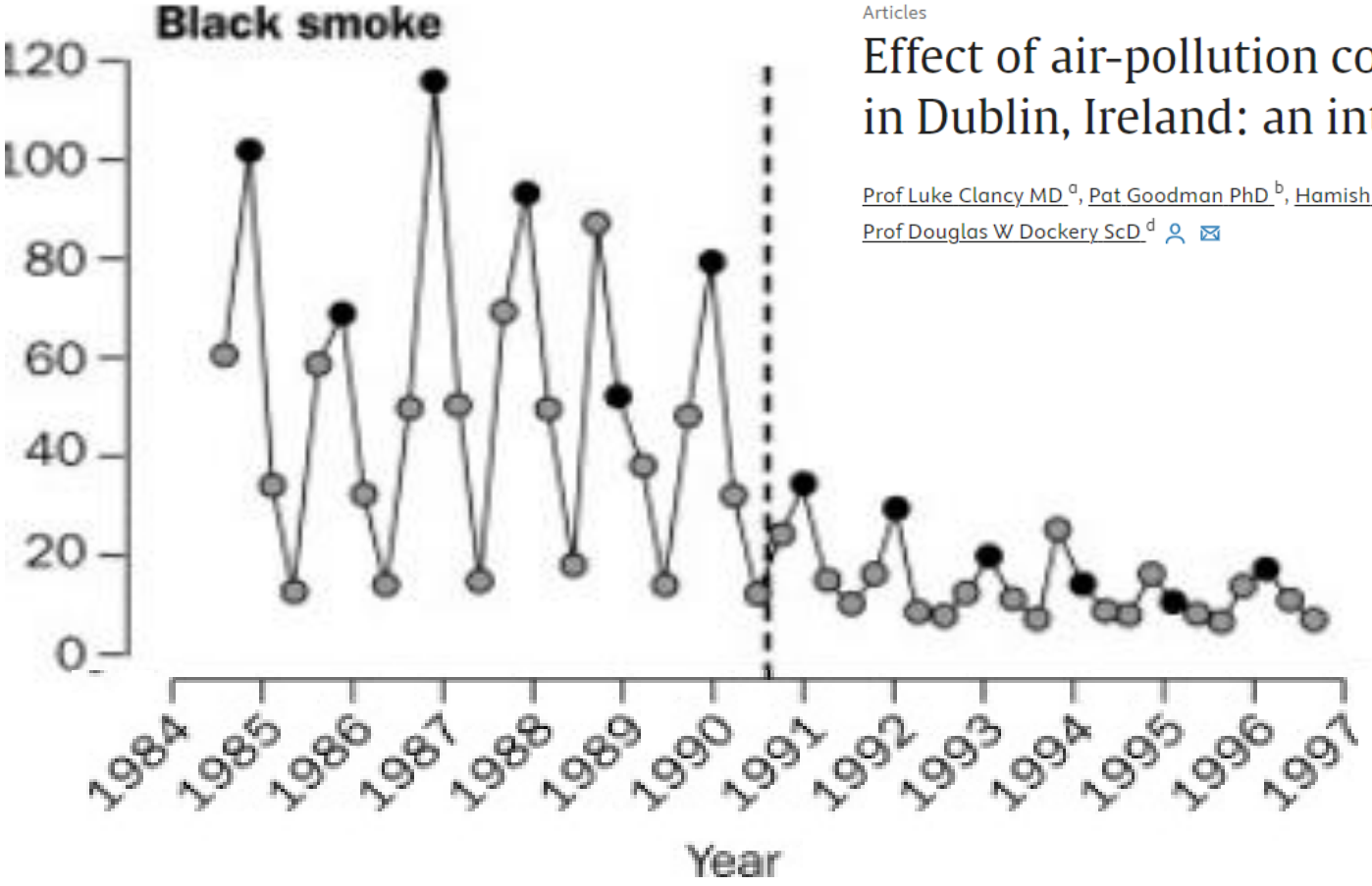
THE LANCET

Volume 360, Issue 9341, 19 October 2002, Pages 1210-1214

Articles

Effect of air-pollution control on death rates in Dublin, Ireland: an intervention study

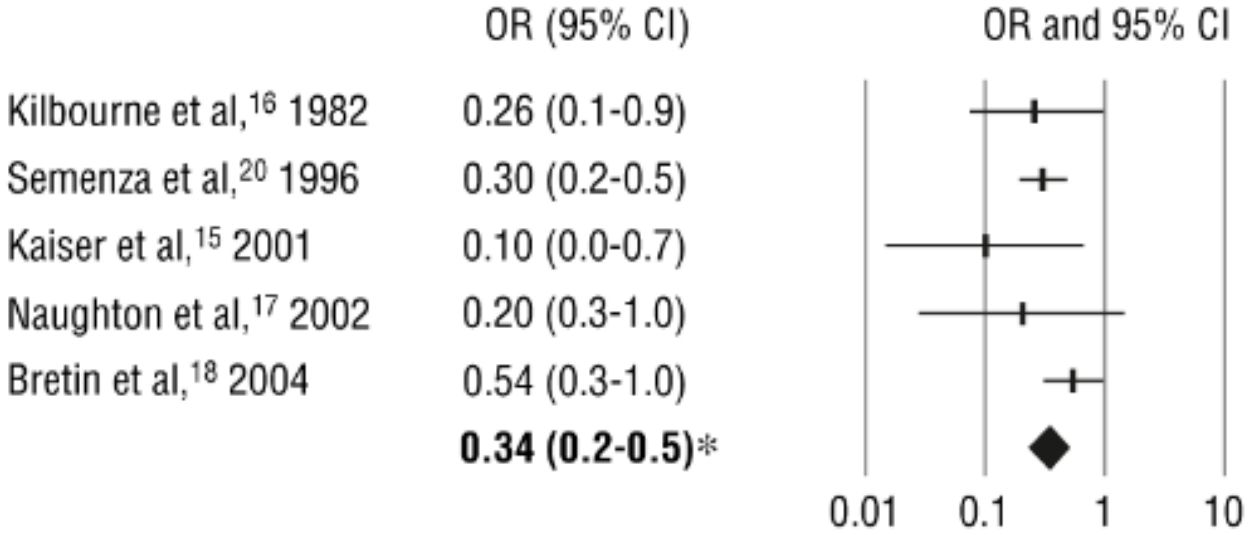
Prof Luke Clancy MD [a], Pat Goodman PhD [b], Hamish Sinclair PhD [c], Prof Douglas W Dockery ScD [d]



- Local ban lowered exposures and reduced mortality rates by 6% overall and 10-15% for cardiovascular and respiratory deaths

Community Services Can Provide Resilience

Visited other air-conditioned places



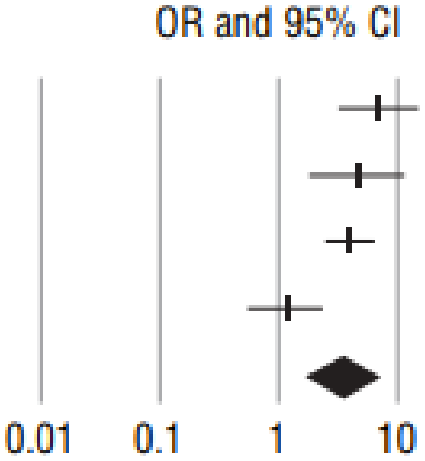
Bouchama et al Arch Int Med. 2007

- Ability to visit air-conditioned locations was associated with lower mortality

Not all People Can Benefit from Resources

Does not leave home

	OR (95% CI)
Semenza et al,[20] 1996	6.69 (3.0-14.7)
Naughton et al,[17] 2002	4.48 (1.7-11.5)
Bretin et al,[18] 2004	3.90 (2.5-6.2)
Lorente et al,[19] 2005‡	1.12 (0.5-2.3)
	3.35 (1.6-6.9)*



Bouchama et al Arch Int Med. 2007

Environmental Injustices Also Exist in Exposures

Socioeconomic Status	Below poverty Education Income Unemployed
Minoritized Population	Race/Ethnicity Immigrants Disabled
Locations	Urbanicity Rurality Coast/mountains/desert
Health	Age Chronic disease

Importantly, sources of environmental injustice vary by place!!!

How Do We Prioritize Environmental Exposome Research for Healthy Aging?

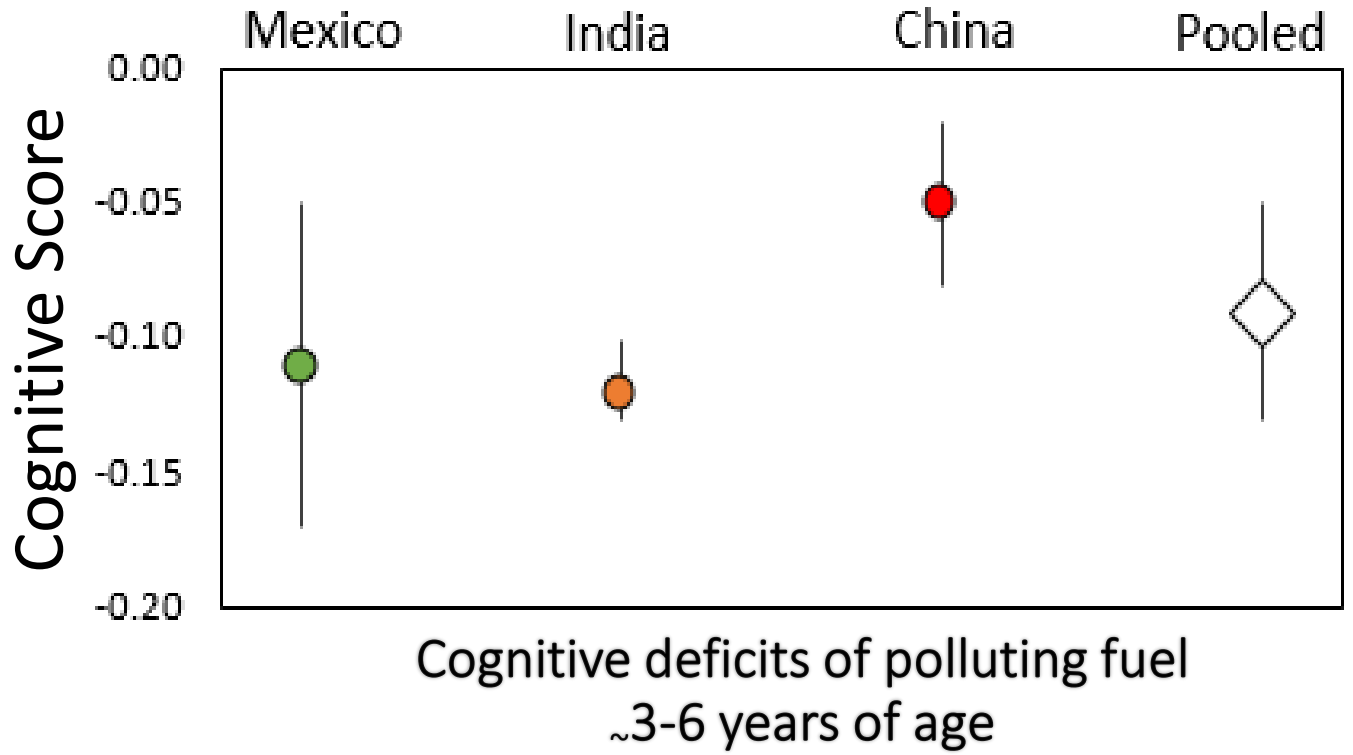
Does that Result Apply Here?

- Must think about local issues and context when conducting studies

Environment International
Volume 156, November 2021, 106722

Household use of polluting cooking fuels and late-life cognitive function: A harmonized analysis of India, Mexico, and China

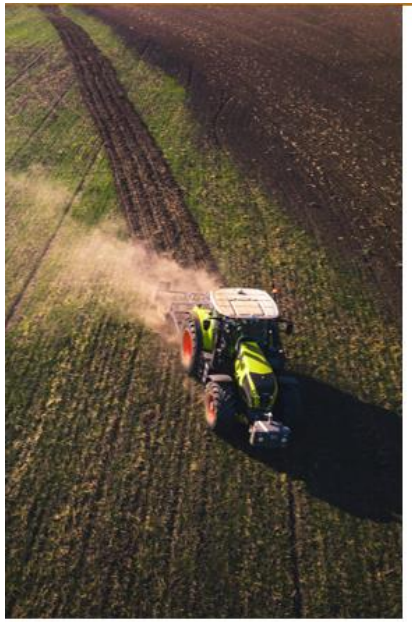
Joseph L. Saenz [a], Sara D. Adar [b], Yuan S. Zhang [c], Jenny Wilkens [d], Aparajita Chattopadhyay [e], Jinkook Lee [d, f], Rebeca Wong [g]

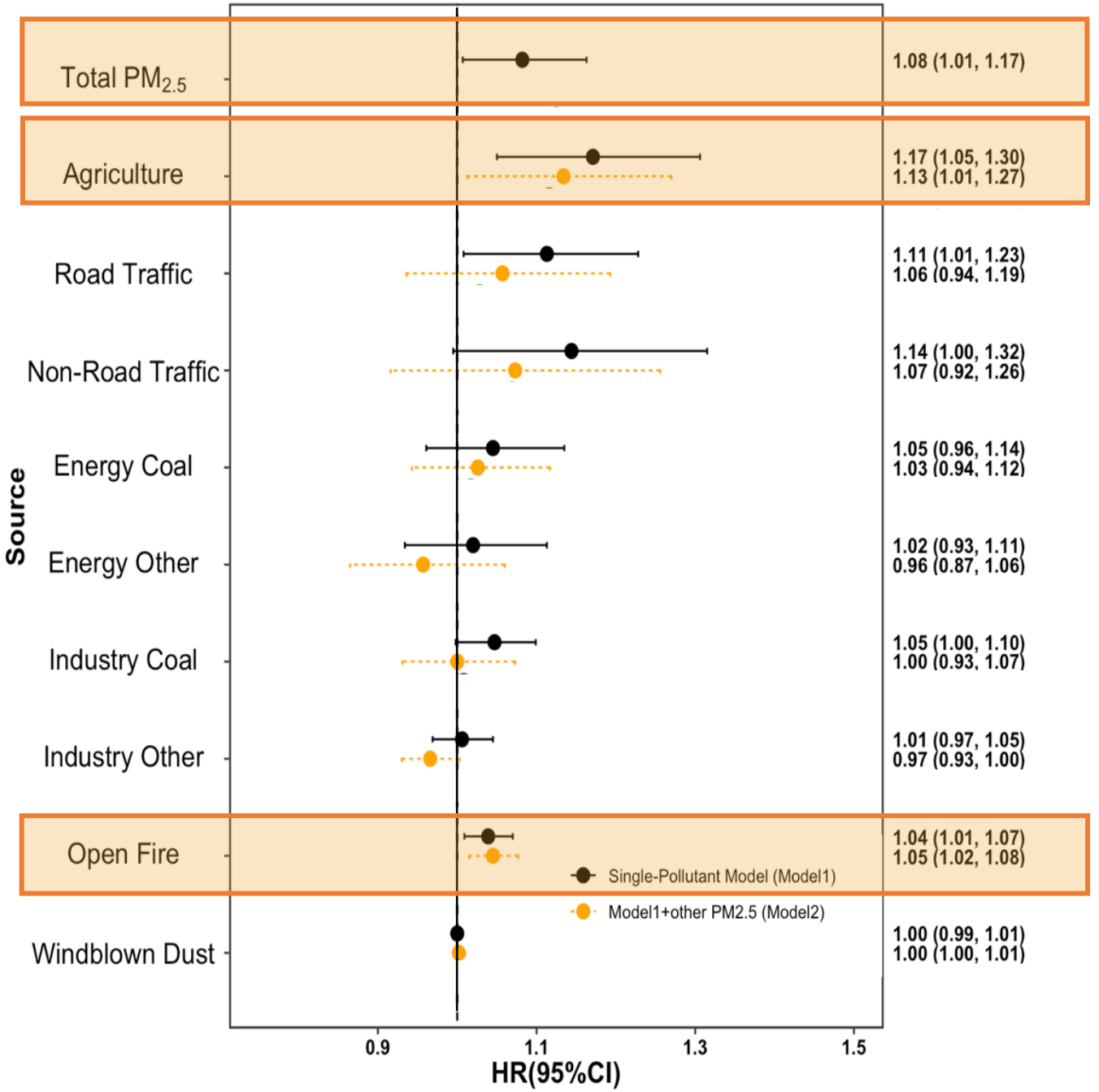


Gateway to Global Aging Data
Aims to Harmonize Data & Analyses

Look at Actionable Questions

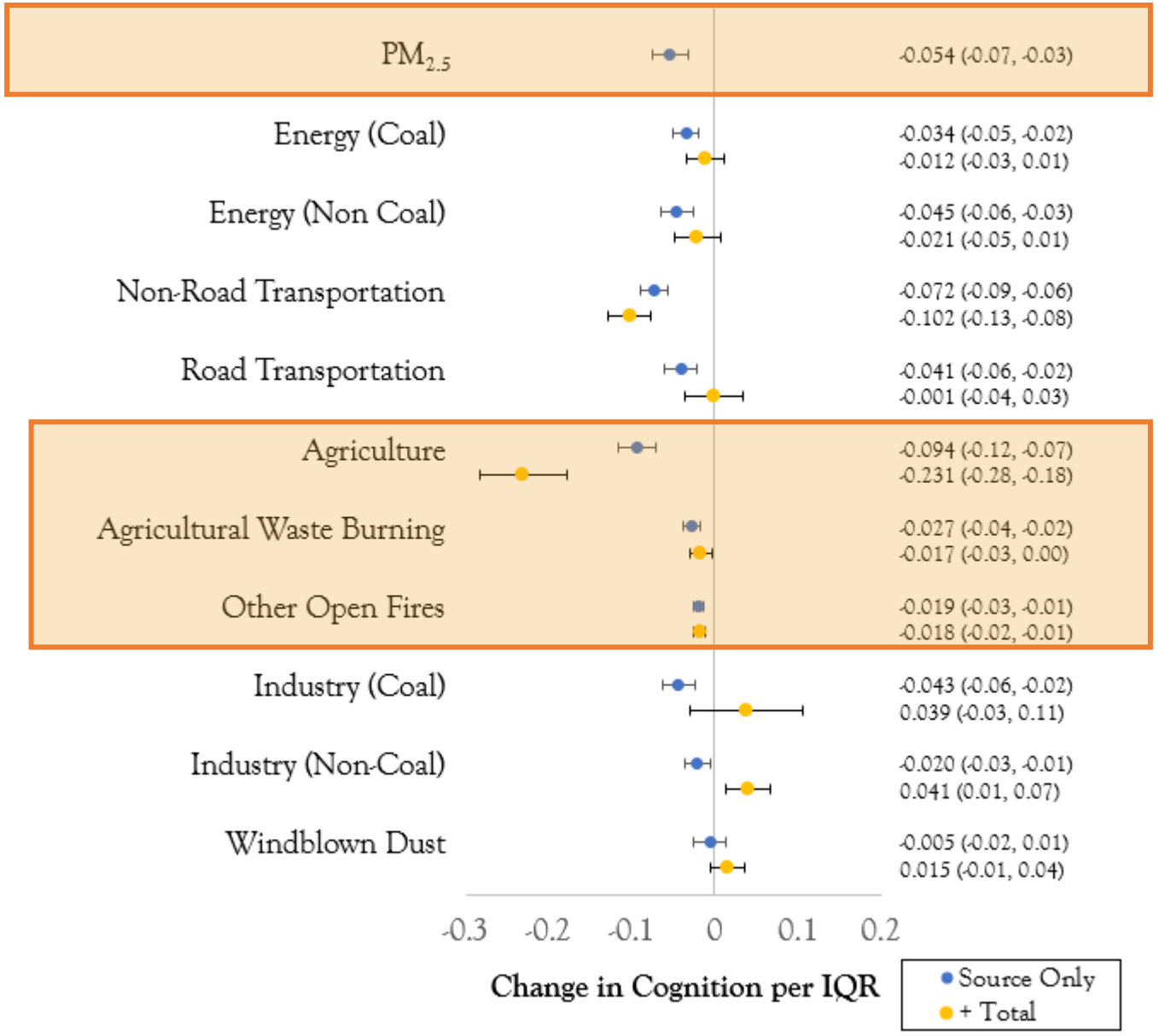
Evaluate interventions/ strategies that are possible or existing



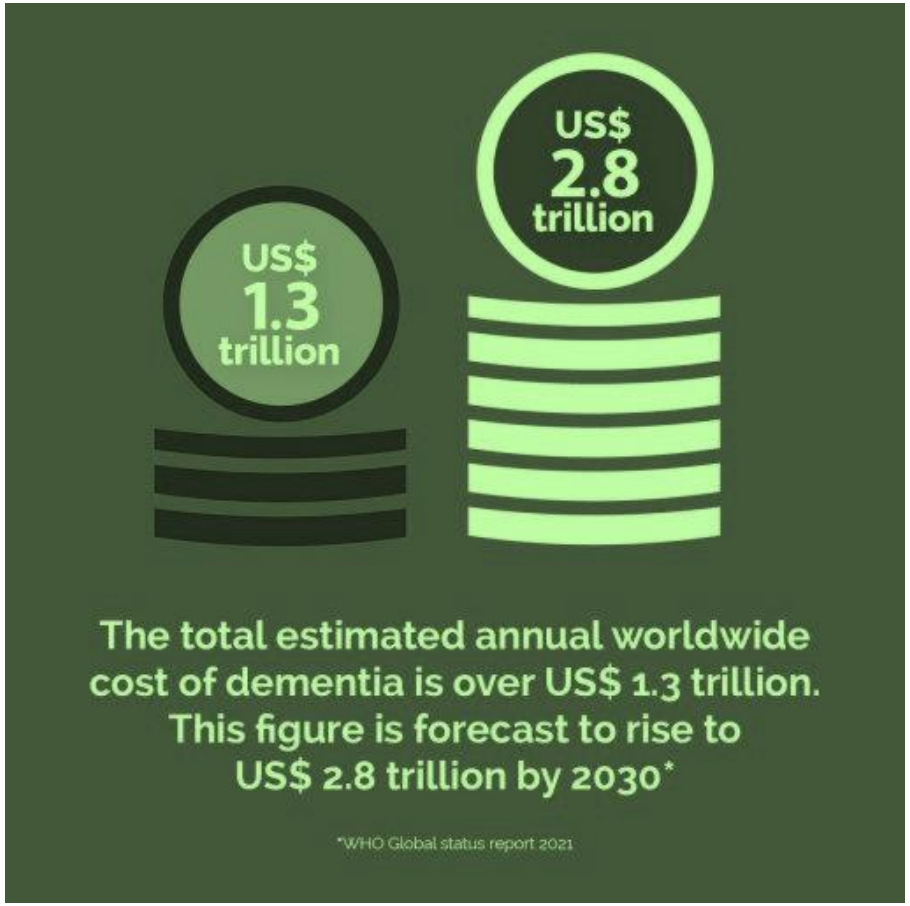


Time: Calendar time, age at recruitment, birth cohort
Demographics: Sex, race/ethnicity
Socioeconomics: Education, primary homeownership, other wealth, neighborhood SES
Area: Urbanicity, smoothing spline for place (df=10)

Similar Findings in India



Translates to Large Public Health Burden



Alzheimers Disease International

- Almost 200,000 new cases of dementia/year attributable to $PM_{2.5}$ in the US
- >700,000 people newly lose independence/year due to $PM_{2.5}$ in the US, with a cost of $12B/year

Make Our Science Easier to Use to Promote Change

- Present information in compelling (attributable cases, saved money) manner to support our regulators
- Provide evidence on existing or possible policies
- “Make it hard to make the wrong choice”

Action without science may be a waste of time. Science without action is merely a way to pass the time. Science with action can change the world.

-Adapted from a quote by Joel A Baker

Gateway to Global Aging is generously supported by the NIH National Institute on Aging