COMPLEX RELATIONSHIPS BETWEEN GREENNESS, AIR POLLUTION, AND MORTALITY IN A POPULATION-BASED CANADIAN COHORT

ADELE LUNDY AND DAN L CROUSE

MY BACKGROUND

Education:

- BSc. Biology, University of New Brunswick
- Master of Public Health, Memorial University
  - Focus on Epidemiology and Population Health
- Population Health and Data Analysis program, University of Victoria
- Future plan to complete a doctorate in Epidemiology

Work Experience:

- Environmental Epidemiologist
- Database Analyst
- Senior Scientific Advisor

STUDY OBJECTIVE

Photo: Quinn Dombrowski

Investigate the role of residential greenness in modifying associations between long-term exposures to $PM_{2.5}$ and mortality

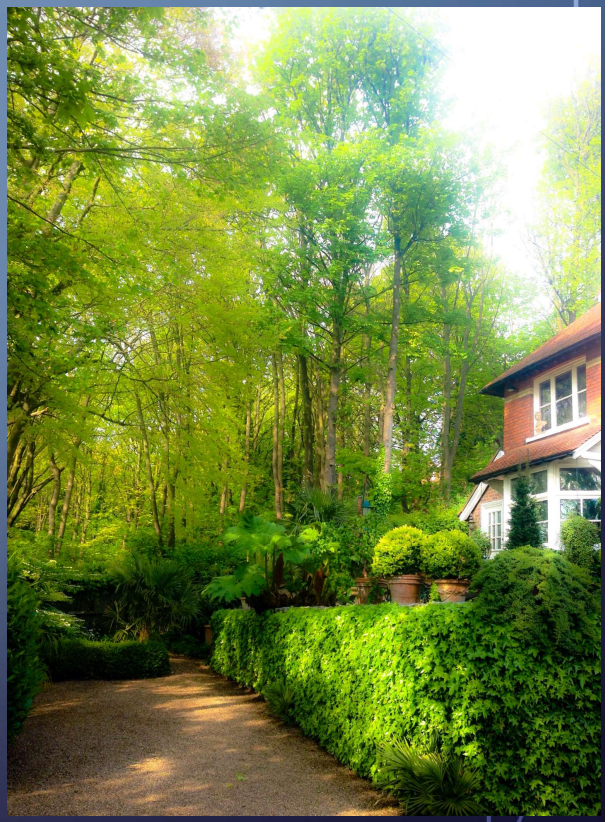


Photo: Gary Churchman

WORKFLOW

- Submitted a Research Data Center (RDC) application to Statistics Canada to access the study data
- Security clearance and privacy training was completed then access was granted to complete data analysis in the RDC center
- Results from the data analysis were vetted and released to the study team
- Research article was drafted and submitted for Publication

STUDY DATASETS

Statistics Canada:

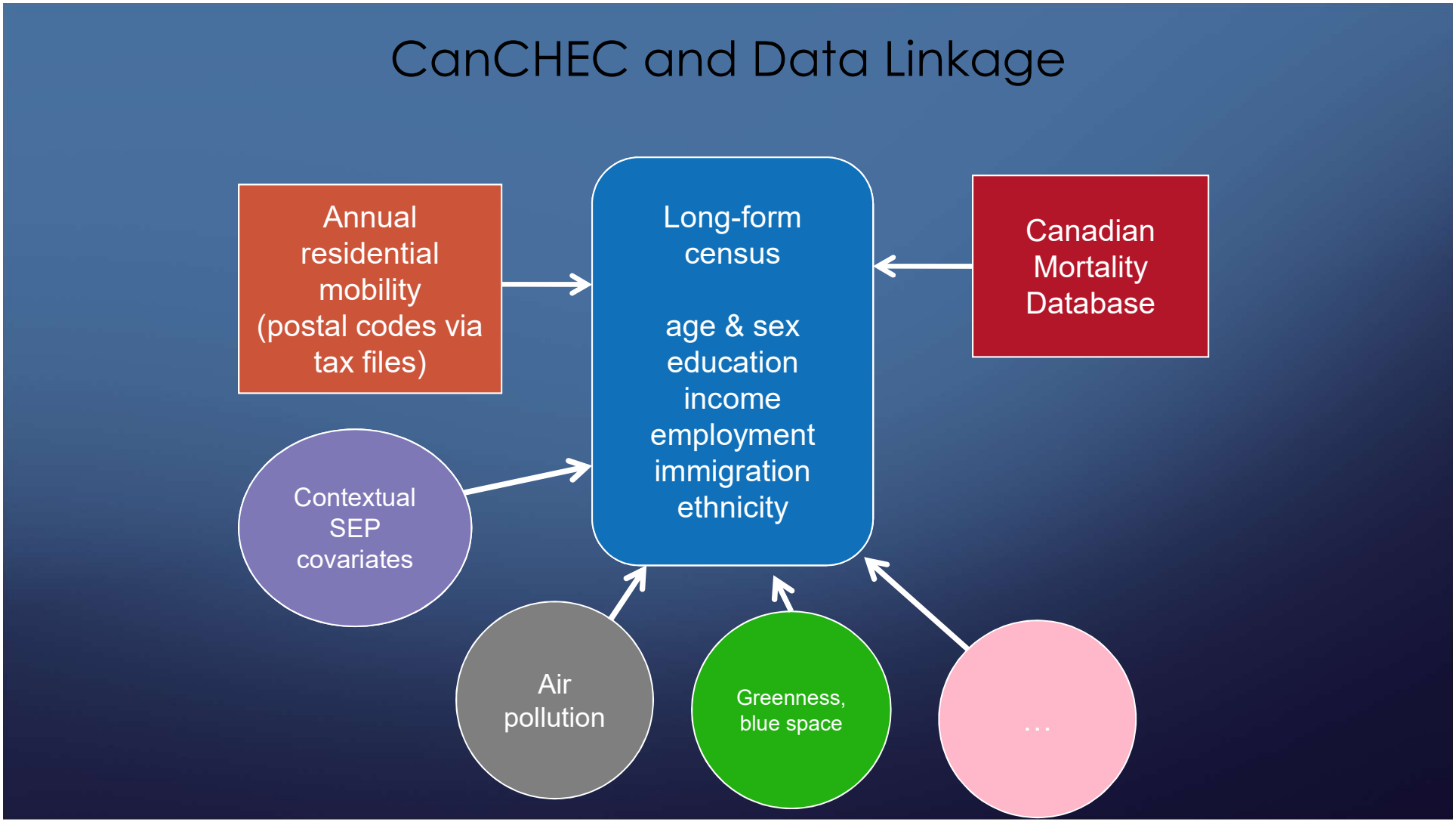
Statistics Canada Statistique Canada

- Canadian Census Health and Environment Cohort (CanCHEC)

CANUE:

- Greenspace
- Air Pollution
- Can Marg

CanCHEC and Data Linkage

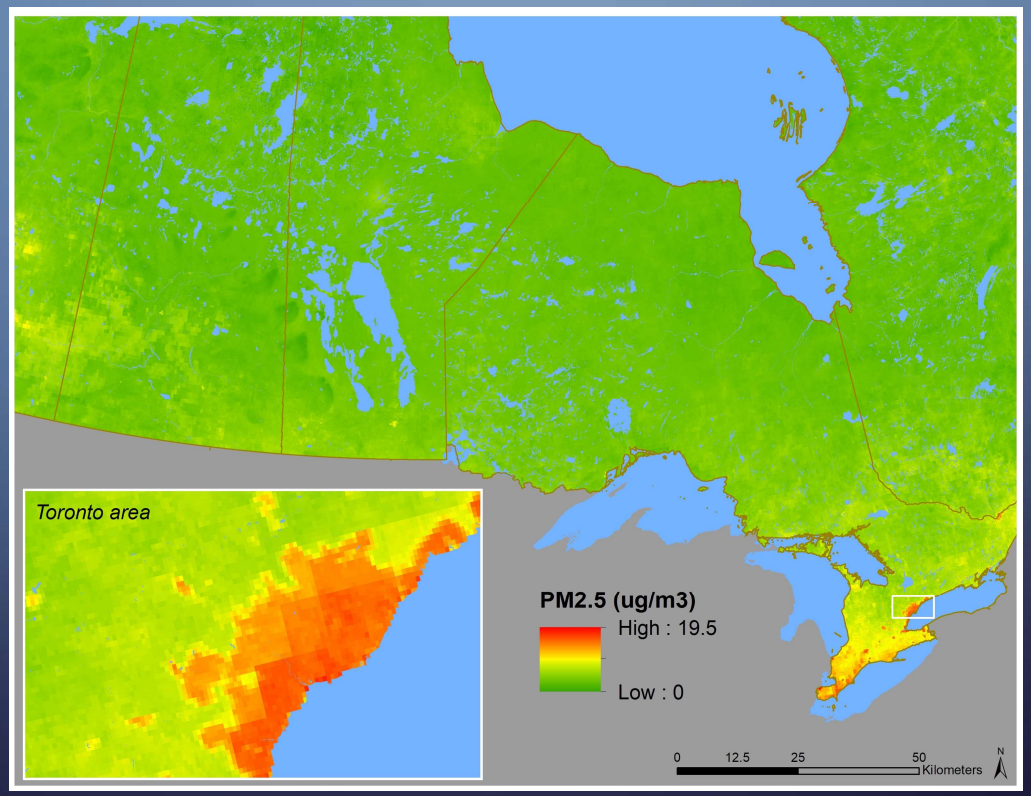


COHORT DETAILS

- Follow-up 2001 through 2011
- Restricted to:
  - non-immigrants
  - aged 25 to 89
  - n ~ 2.4 million individuals

EXPOSURE ASSIGNMENT

$PM_{2.5}$ = 3-year moving average of annual satellite-derived estimates; 1-km resolution



EXPOSURE ASSIGNMENT

Greenness = 3-year moving average of annual growing season Landsat NDVI; 500m resolution

satellite-derived indicator of green vegetation on the ground

green vegetation absorbs most of the visible, and reflects most of the near-infrared light

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COMMUNITY LEVEL MARGINALIZATION (CAN-MARG)

- Describes:
  - community-level material deprivation
  - Residential instability
  - Dependency
  - Ethnic concentration

EPIDEMIOLOGICAL APPROACH

Cox models adjusted for personal & contextual covariates

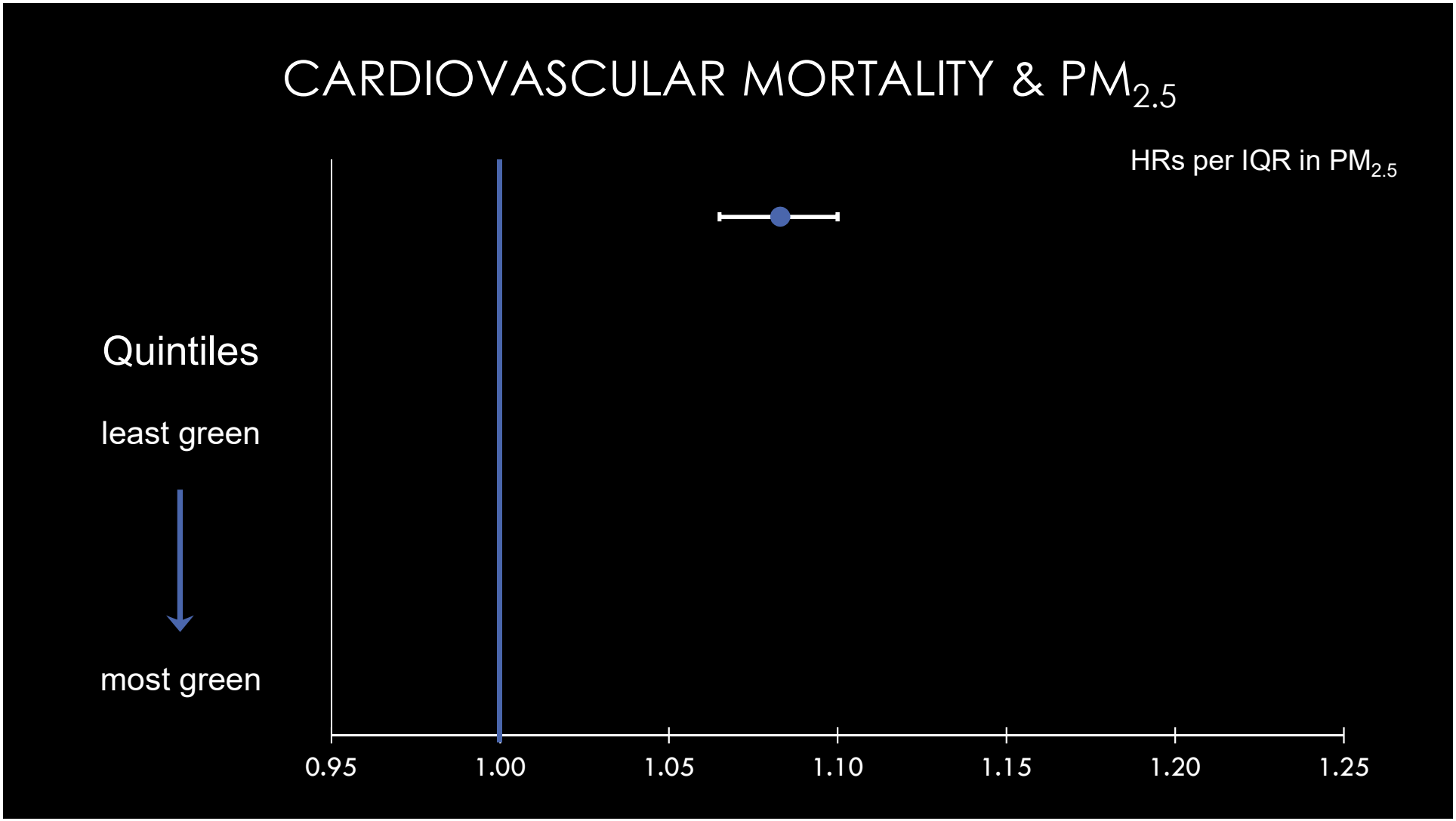
Deaths from non-accidental, cardiovascular, cardiometabolic causes

Fully adjusted Cox proportional hazards models

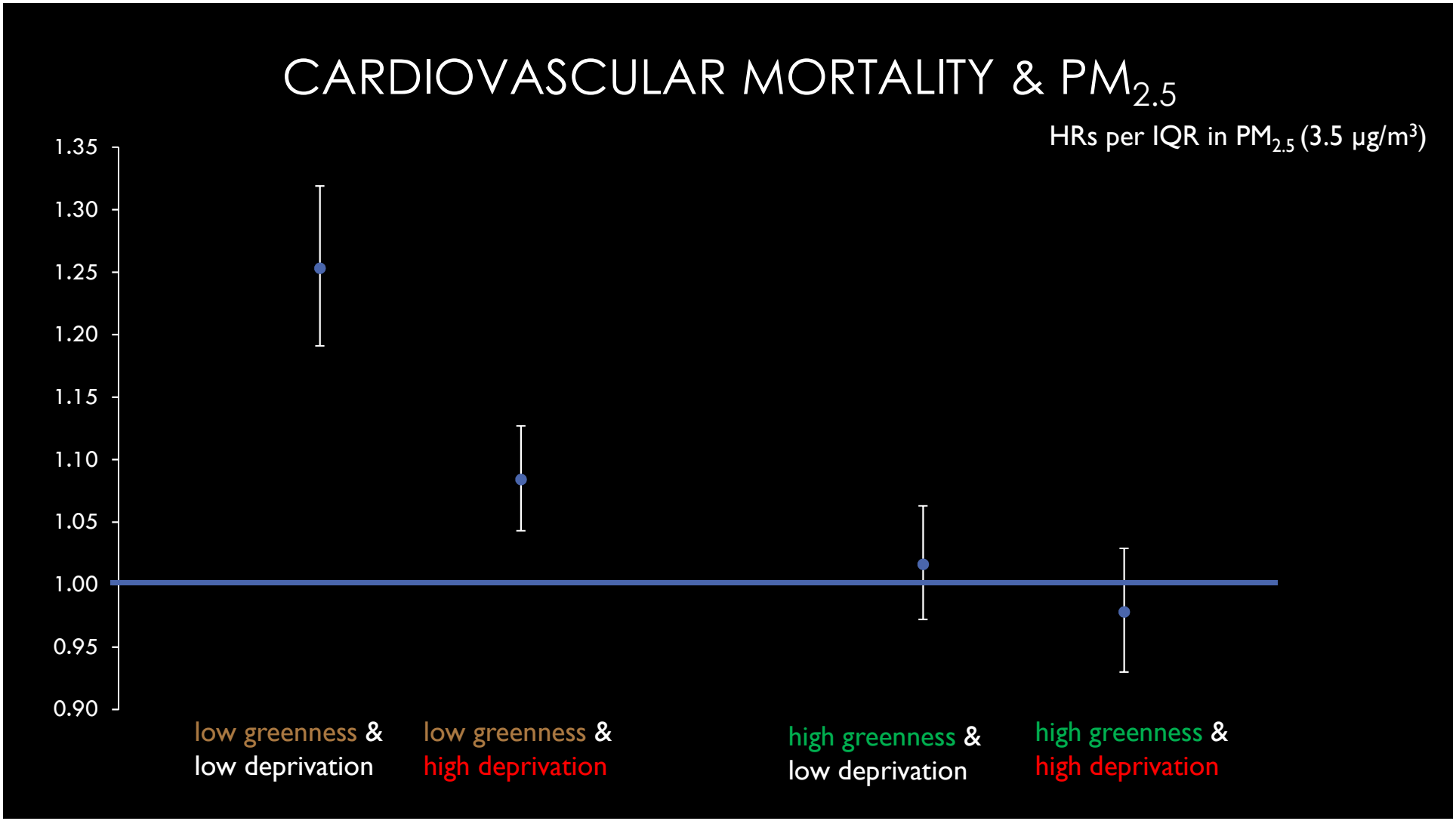
1. $PM_{2.5}$
2. $PM_{2.5}$, adjusted additionally for greenness
3. $PM_{2.5}$, across quintiles of greenness
4. $PM_{2.5}$, according to community-level deprivation

DISTRIBUTIONS OF GREENNESS AND $PM_{2.5}$ AT BASELINE

	Full cohort		Q1 (least green)		Q3		Q5 (most green)	
	Greenness	$PM_{2.5}$	Greenness	$PM_{2.5}$	Greenness	$PM_{2.5}$	Greenness	$PM_{2.5}$
Mean	0.48	8.4	0.35	9.1	0.48	8.8	0.64	6.6
Std. Dev.	0.10	2.7	0.05	2.9	0.02	2.1	0.04	2.4


CARDIOVASCULAR MORTALITY & PM2.5
HRs per IQR in PM2.5
Quintiles
least green
most green
0.95
1.00
1.05
1.10
1.15
1.20
1.25

CARDIOVASCULAR MORTALITY & $PM_{2.5}$



SUMMARY, KEY MESSAGES

- Pattern of decreasing risks of mortality associated with exposure to $PM_{2.5}$ among individuals in each successive quintile of increased greenness
- Living in greener areas may be protective against the effects of $PM_{2.5}$
- Studies that don't account for greenness may be overstating the air pollution effect
- People in deprived neighbourhoods with high amounts of trees and green spaces benefitted by having more attenuated associations between air pollution and mortality than those living in deprived areas with less greenness

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CANUE

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CRDCN Canadian Research Data Centre Network

MSSU - USSM
MARITIME SPOR SUPPORT UNIT
UNITÉ DE SOUTIEN SRAP DES MARITIMES

THANK YOU

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Complex relationships between greenness, air pollution, and mortality in a population-based Canadian cohort☆

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