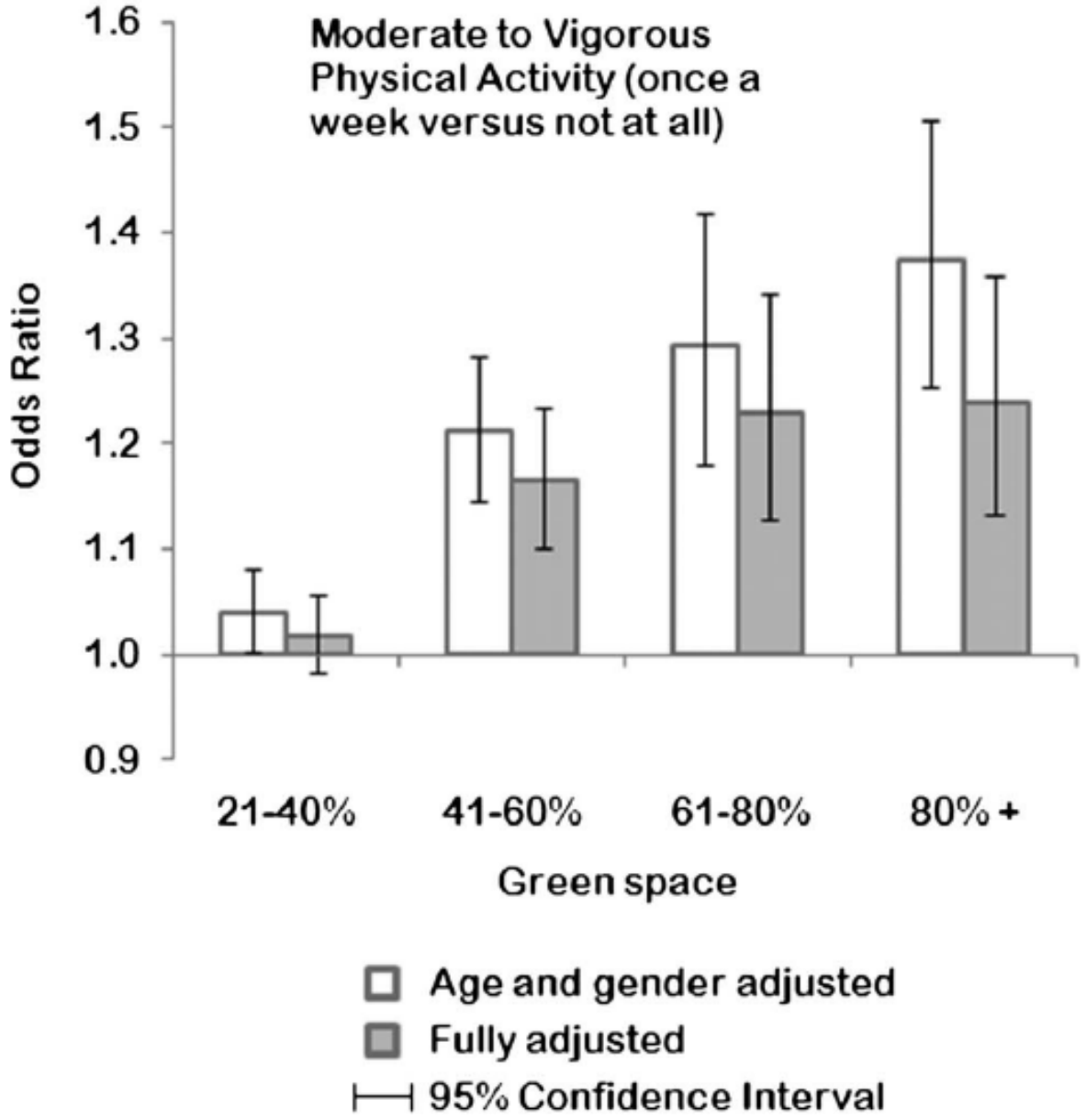
COLORADO STATE UNIVERSITY

Espacios Verdes y Salud

Dr. David Rojas-Rueda
Profesor
Universidad Estatal de Colorado

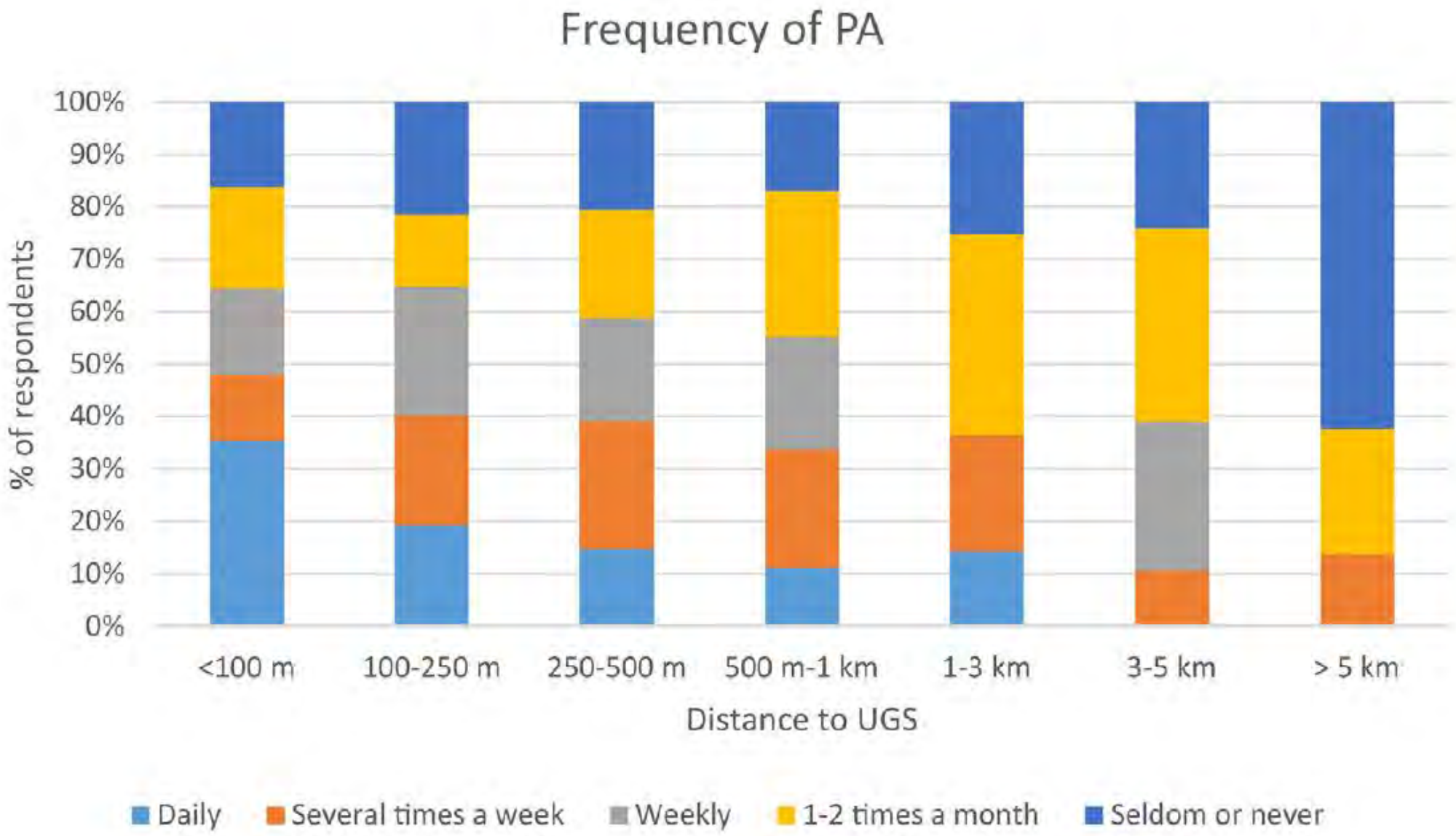

BUENOS AIRES, ARGENTINA

ESPACIO VERDE Y ACTIVIDAD FÍSICA



N=203,883 adults

Astell-Burt et al 2014



A. Akpinar , et al. 2016


YOU ARE NOW ENTERING
A STRESS FREE ZONE

Estrés y naturaleza

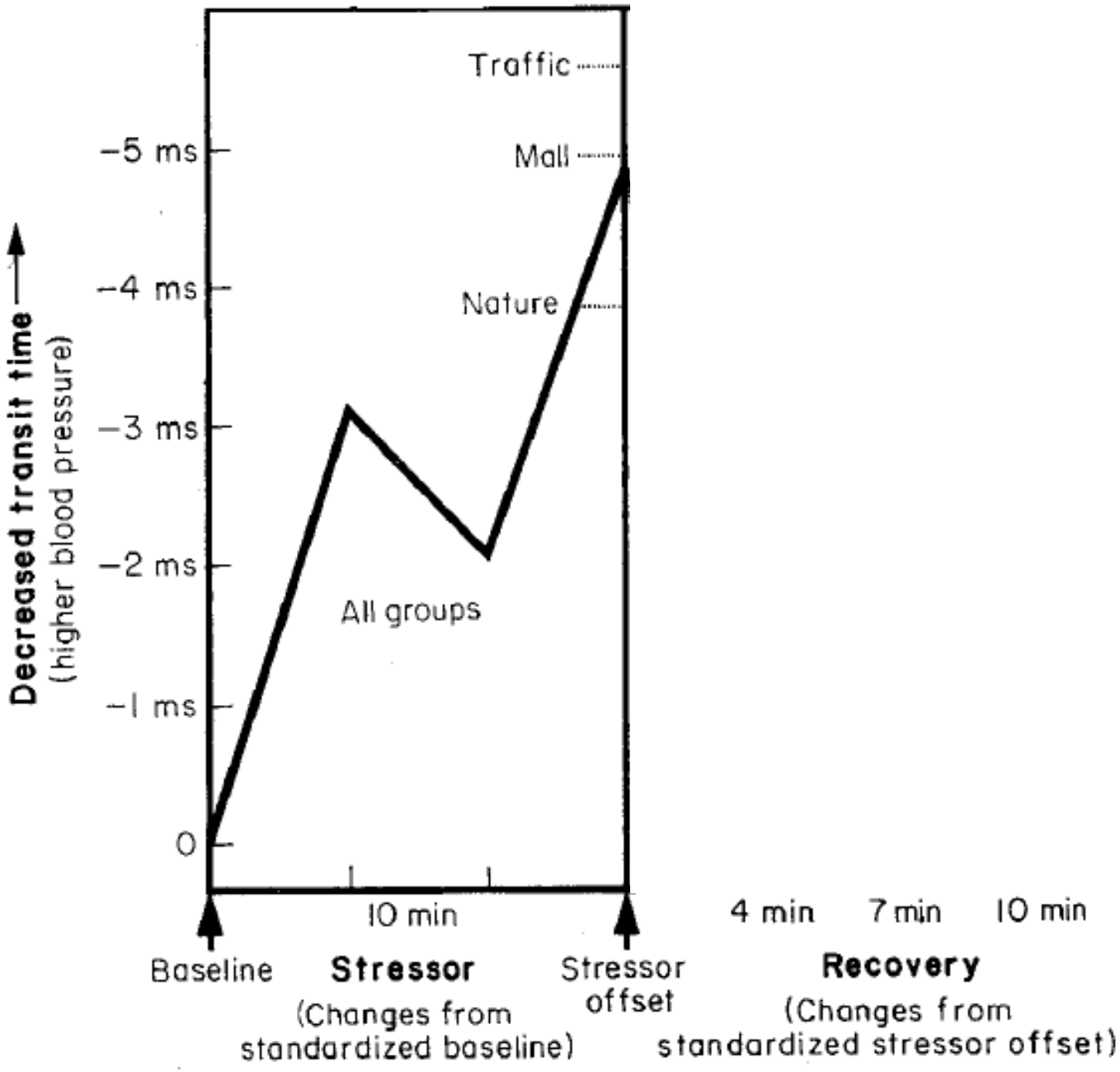


FIGURE 2. Changes in pulse transit time (PTT) during stress and recovery.

Ulrich et al 1991

Estrés y naturaleza

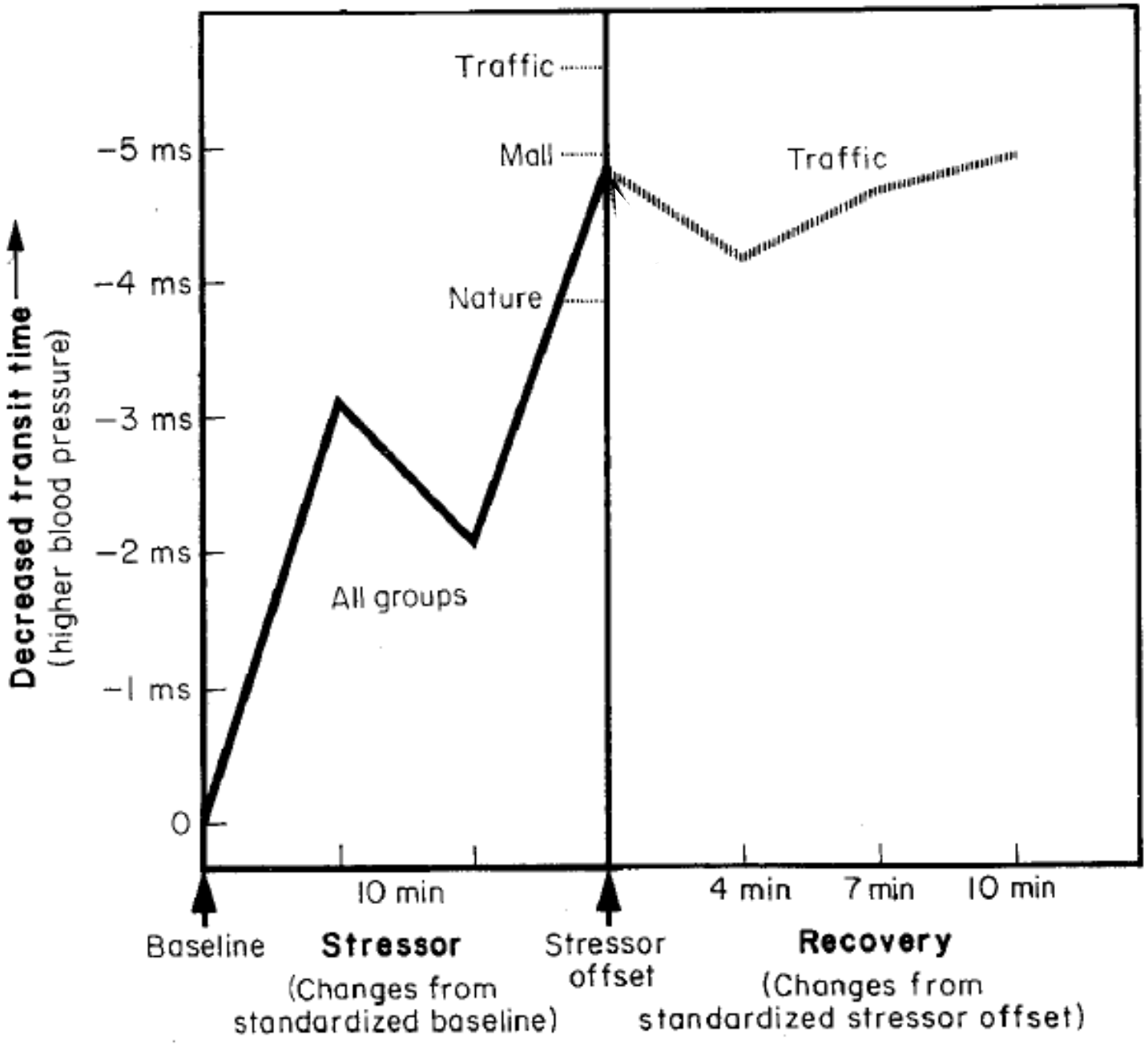


FIGURE 2. Changes in pulse transit time (PTT) during stress and recovery.

Ulrich et al 1991

Estrés y naturaleza

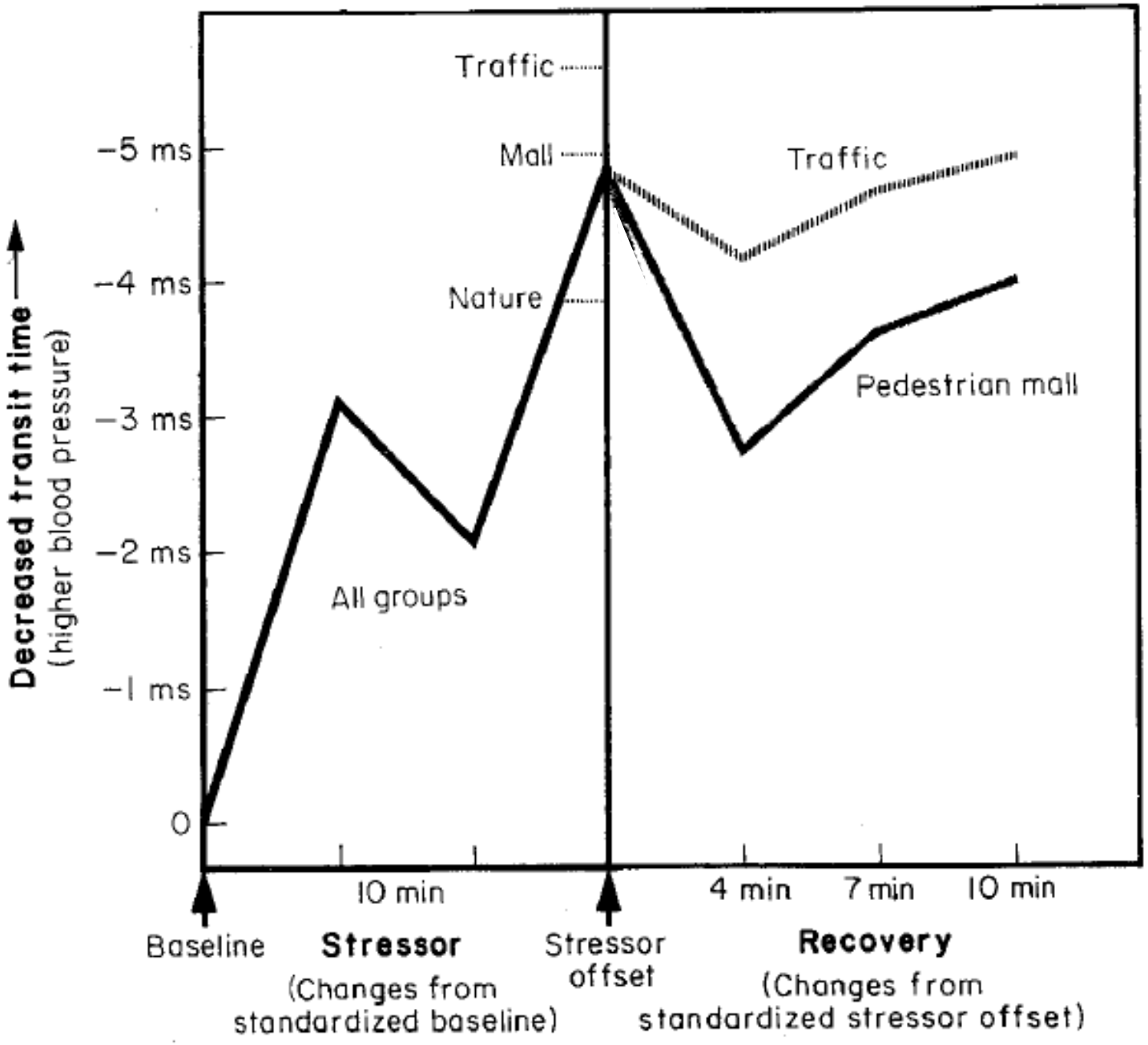


FIGURE 2. Changes in pulse transit time (PTT) during stress and recovery.

Ulrich et al 1991

Estrés y naturaleza

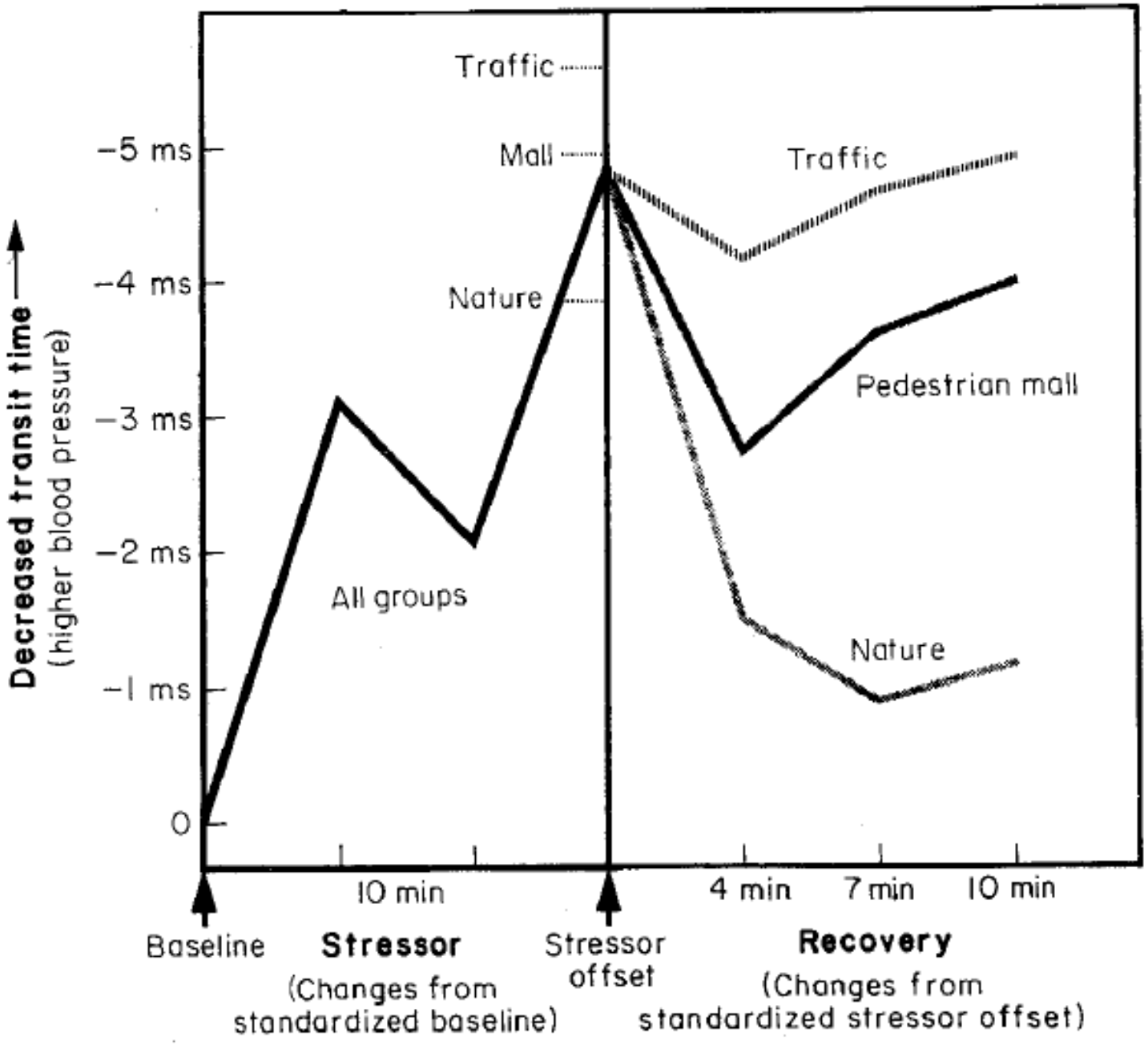


FIGURE 2. Changes in pulse transit time (PTT) during stress and recovery.

Ulrich et al 1991

CUBIERTA ARBOREA Y RECUPERACIÓN DE ESTRÉS

Figure 1. Panoramic photographs of two 3-D videos with a low (top, 2%) and a high (bottom, 61%) eye-level tree cover density.

Jiang et al 2014

CUBIERTA ARBOREA Y RECUPERACIÓN DE ESTRÉS

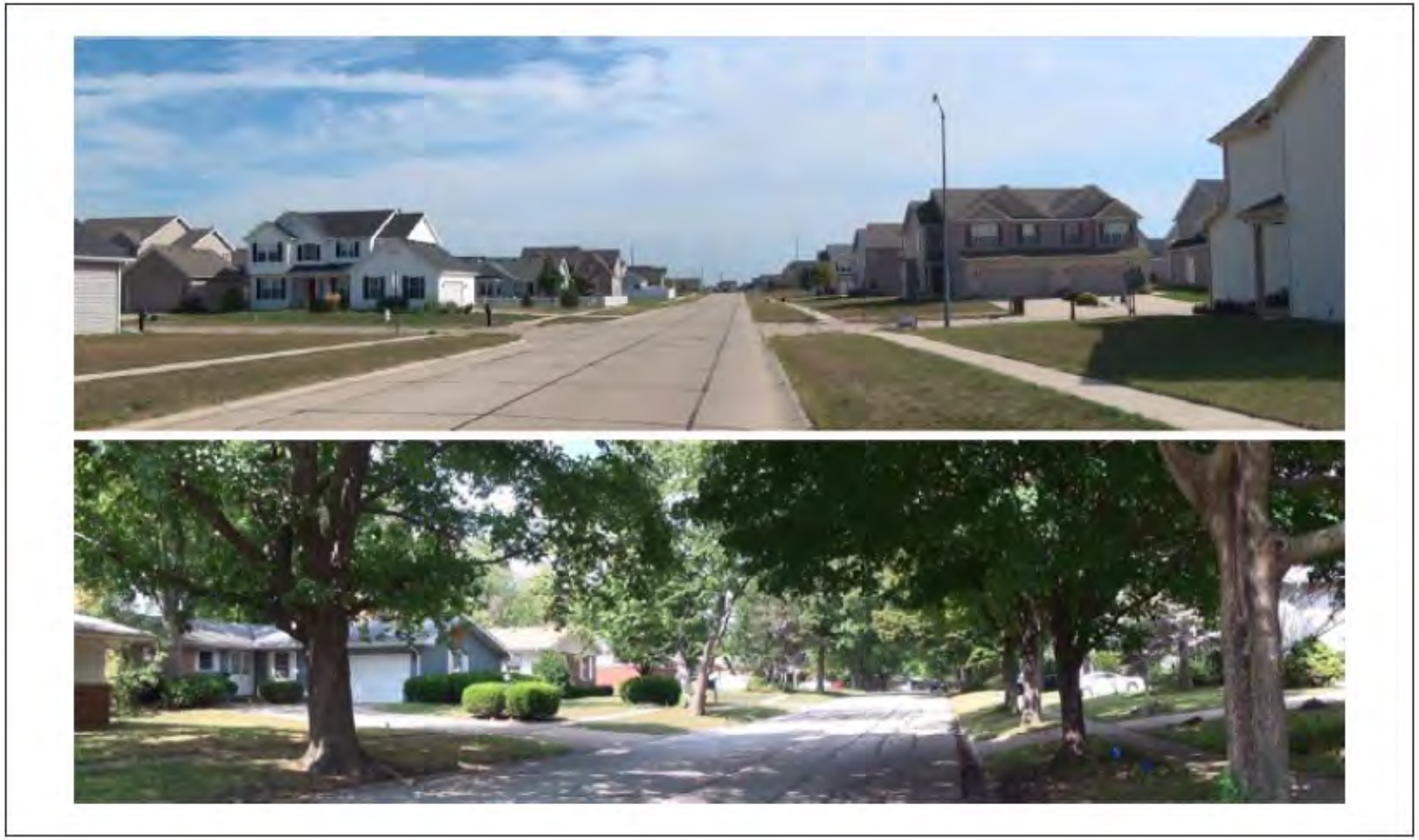


Figure 1. Panoramic photographs of two 3-D videos with a low (top, 2%) and a high (bottom, 61%) eye-level tree cover density.

Jiang et al 2014

CUBIERTA ARBOREA Y RECUPERACIÓN DE ESTRÉS

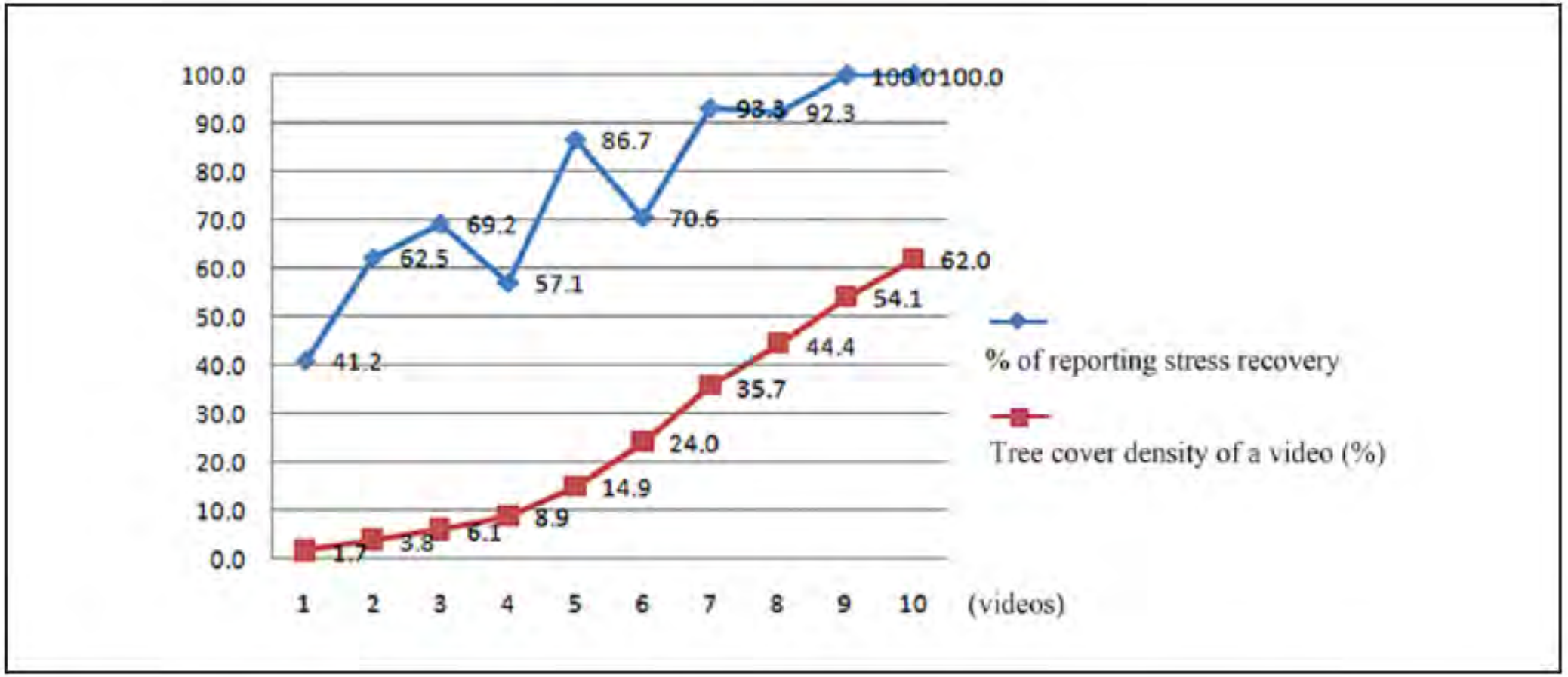


Figure 4. The relationship between tree cover density and percent of participants who reported the stress recovery effect for each of the 10 videos.

Jiang et al 2014

ESPACIO VERDE Y MEMORIA DE TRABAJO

N=2,593 children, 7-10 yrs

Dadvand, et al 2015. PNAS

ESPACIO VERDE Y MEMORIA DE TRABAJO

N=2,593 children, 7-10 yrs

Dadvand, et al 2015. PNAS

ESPACIO VERDE Y MEMORIA DE TRABAJO

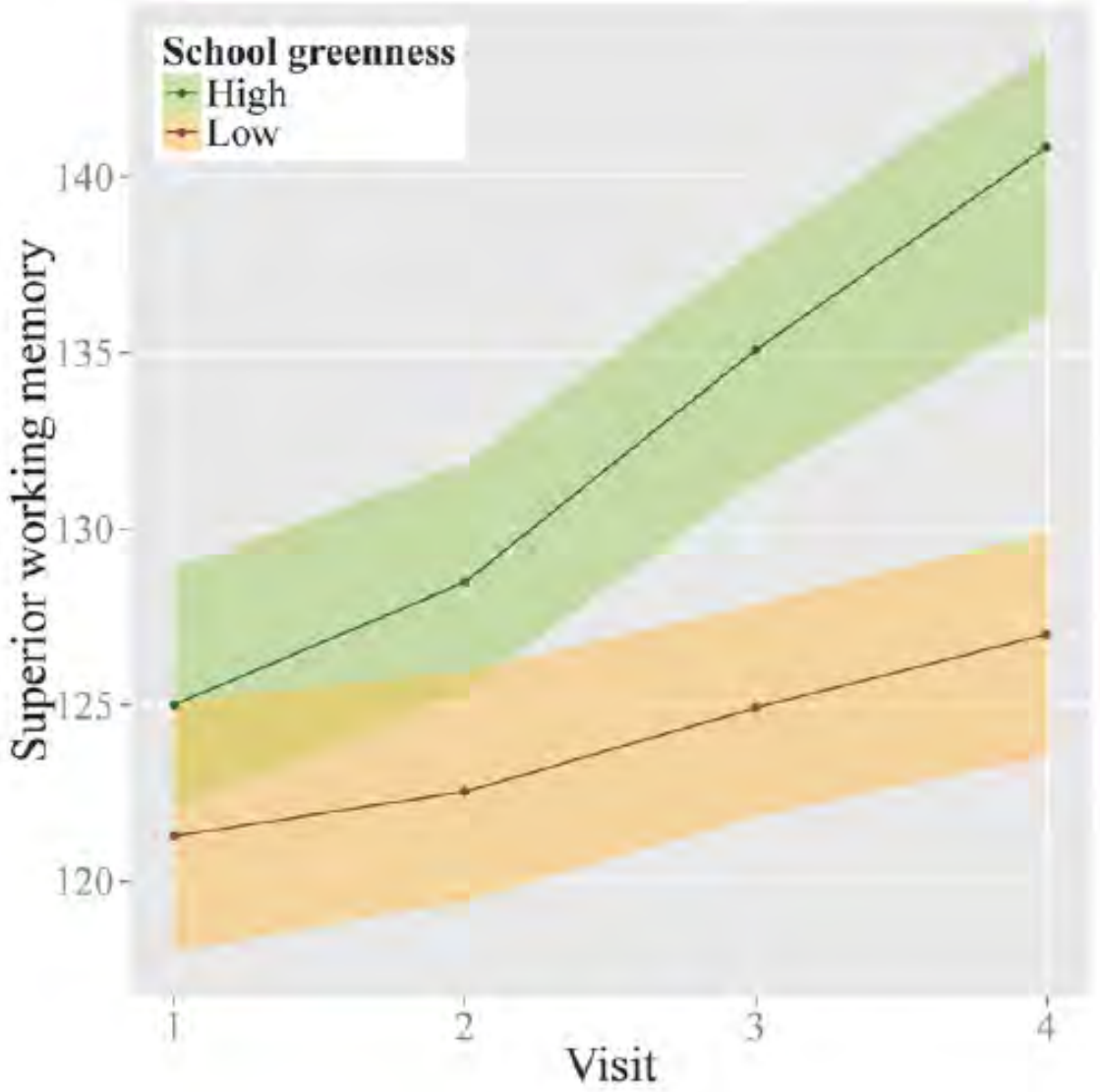
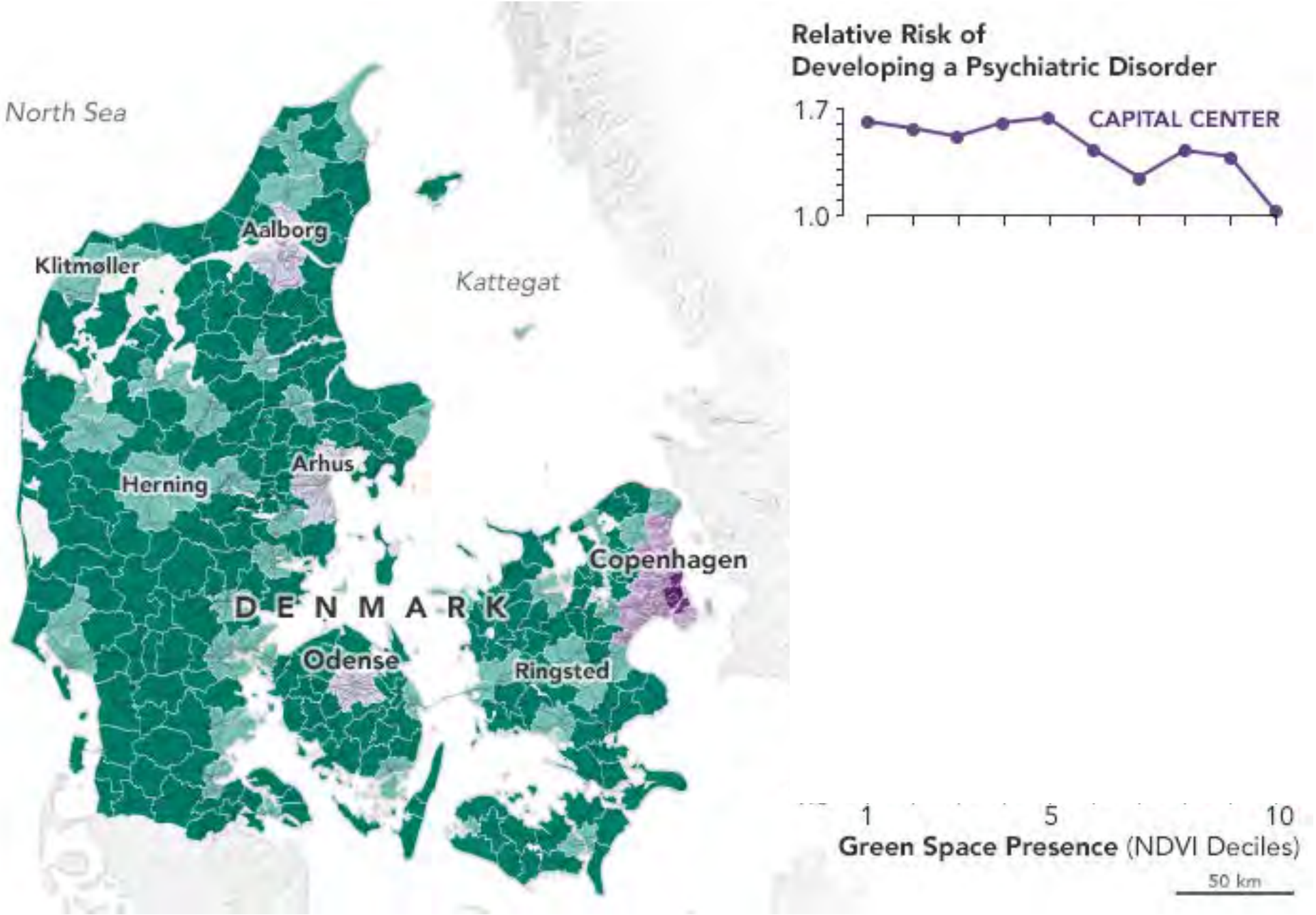


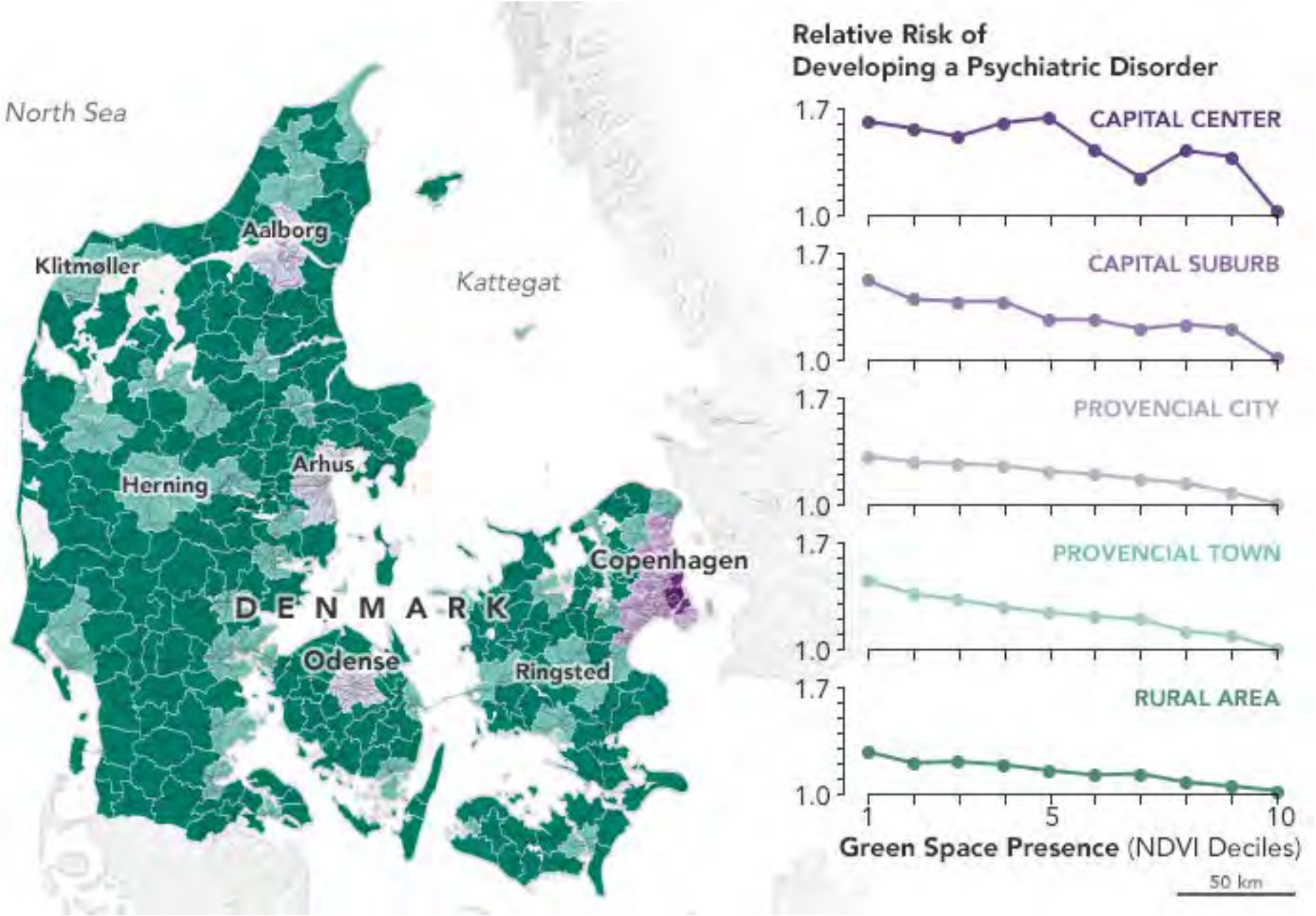
Fig. 1. Twelve-month progress (with 95% confidence bands) in superior working memory for participants with the first (low greenness) and third (high greenness) tertiles of greenness within the school boundaries.

N=2,593 children, 7-10 yrs

Dadvand, et al 2015. PNAS



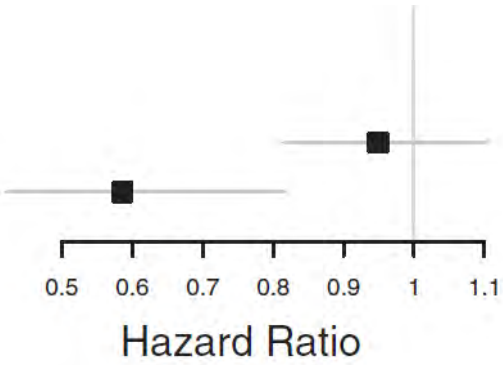
Engemann, et al 2019



Engemann, et al 2019

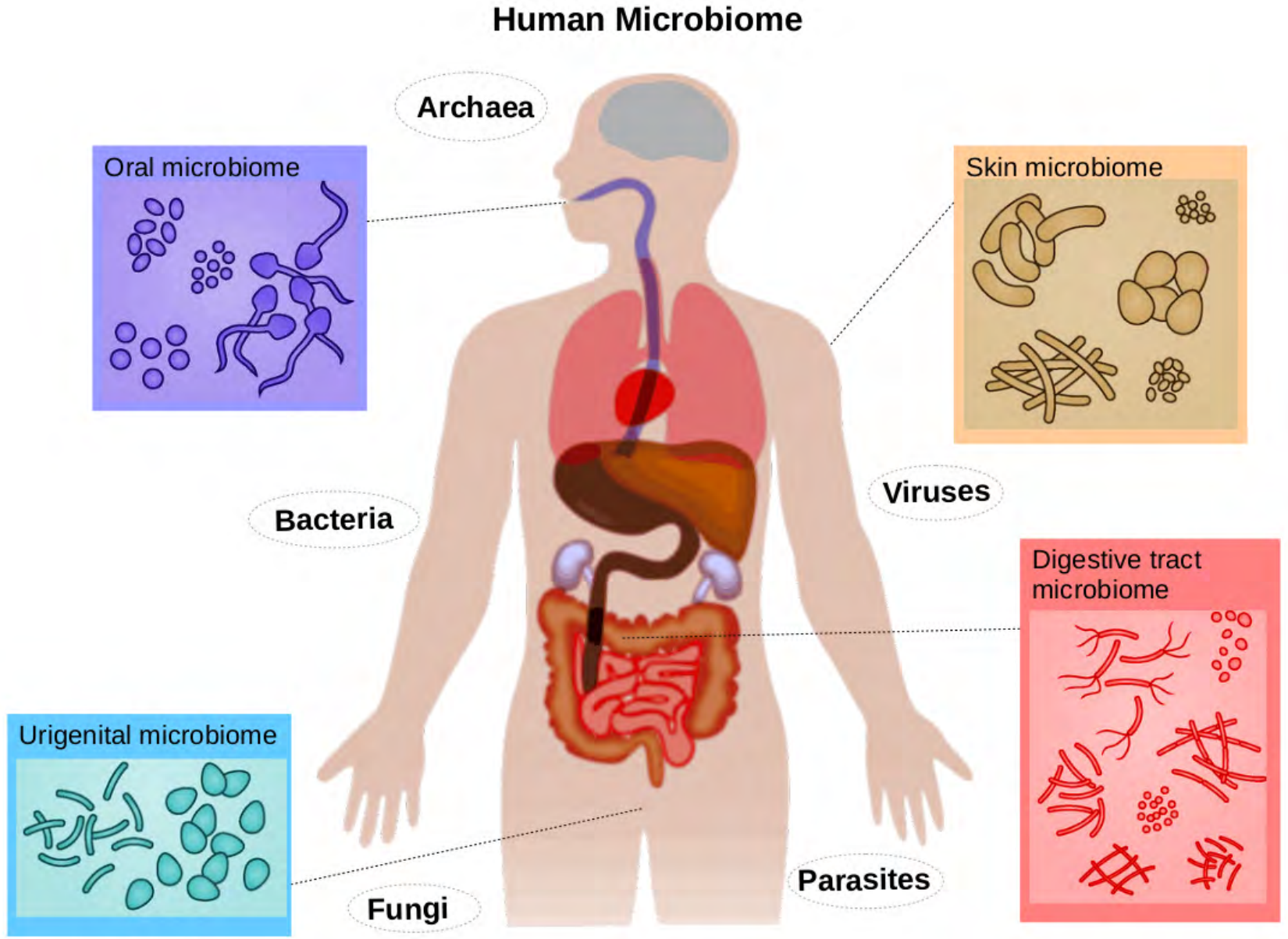
Capital social y mortalidad

Variable	HR (95%CI)
Model B²	
Male	0.949 (0.816–1.104)
Female	0.586 (0.421–0.816)

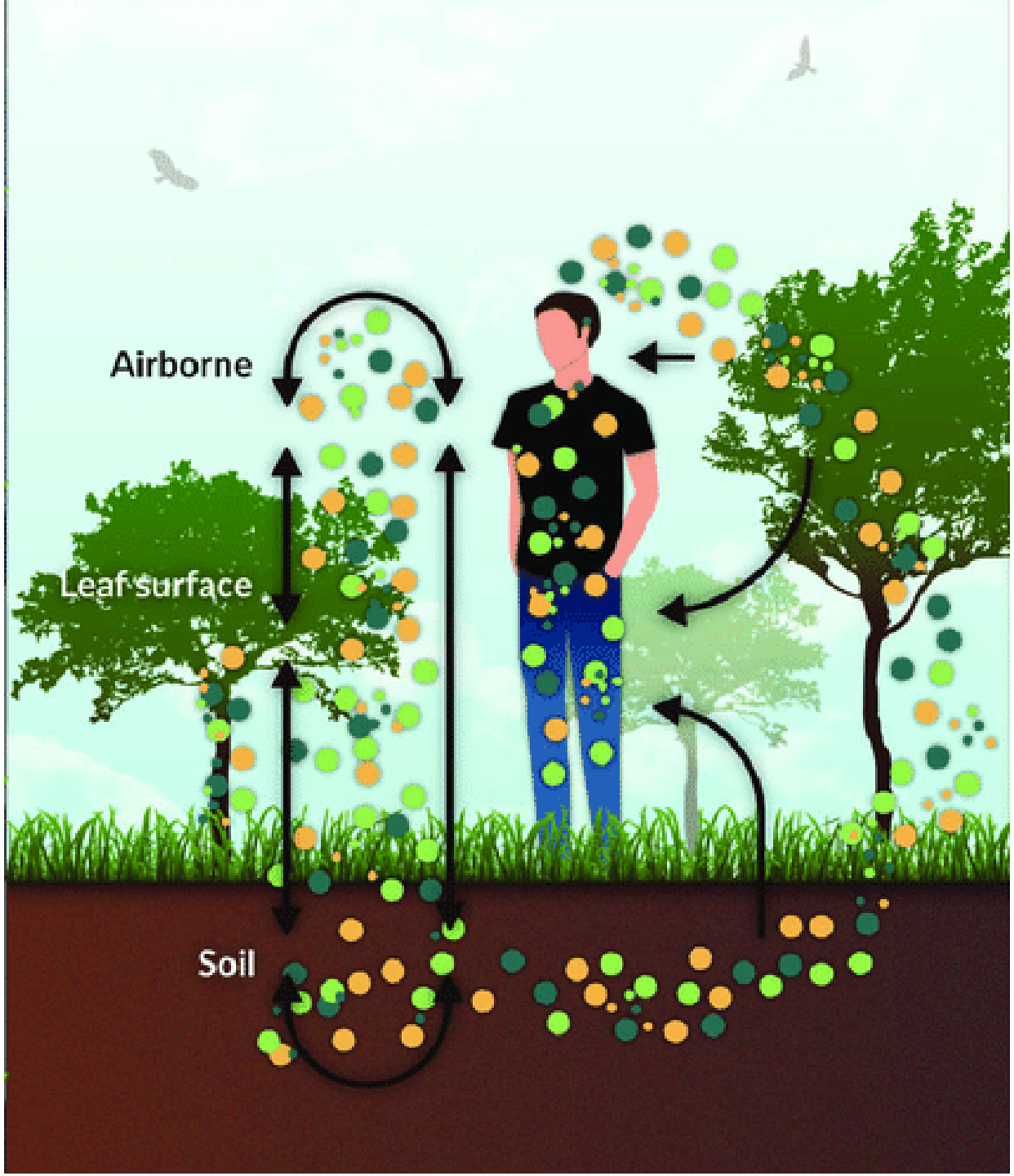


> Capital social = 40% menos riesgo de mortalidad

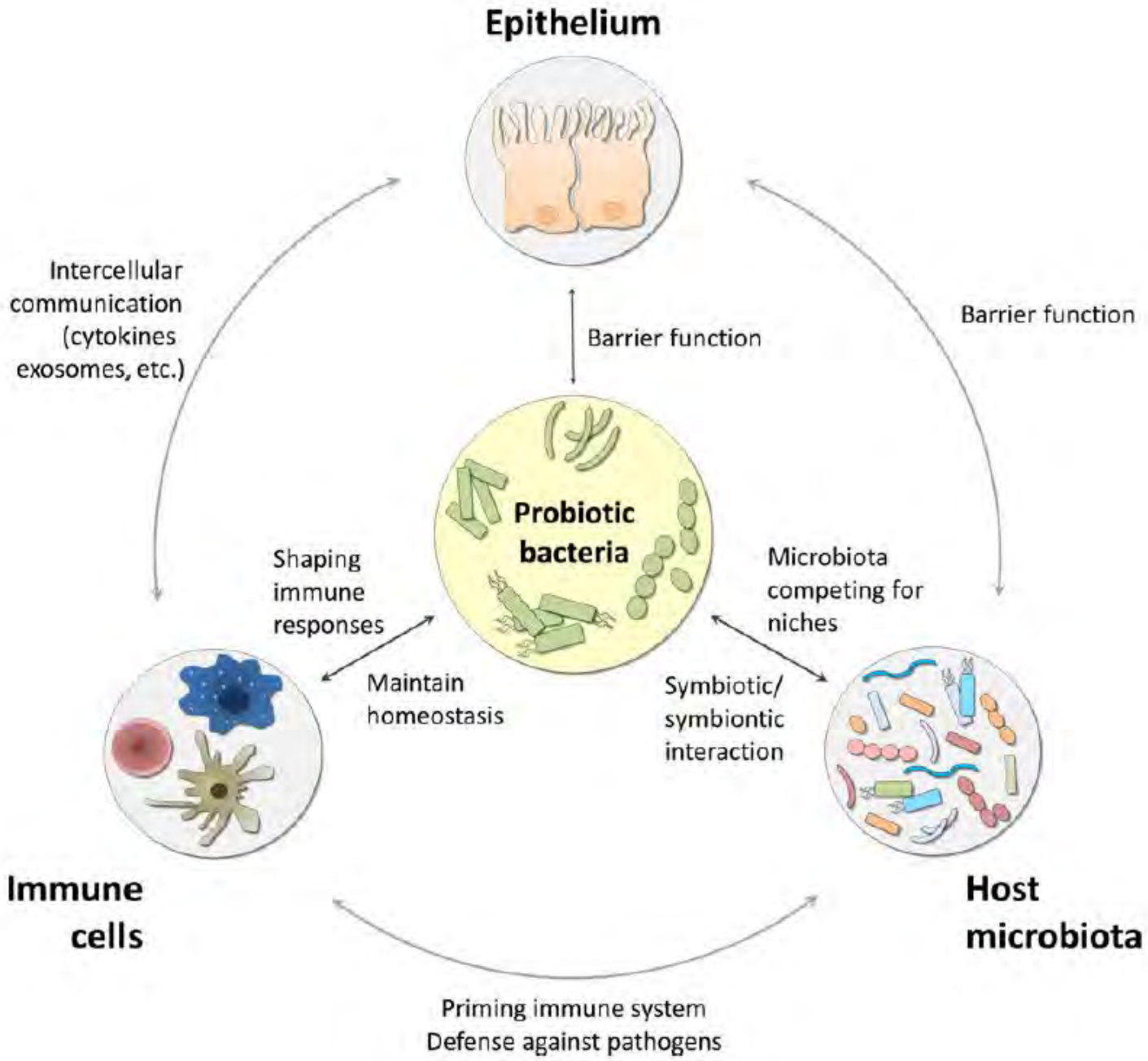
Ambiente Y Microbioma



Ambiente Y Microbioma

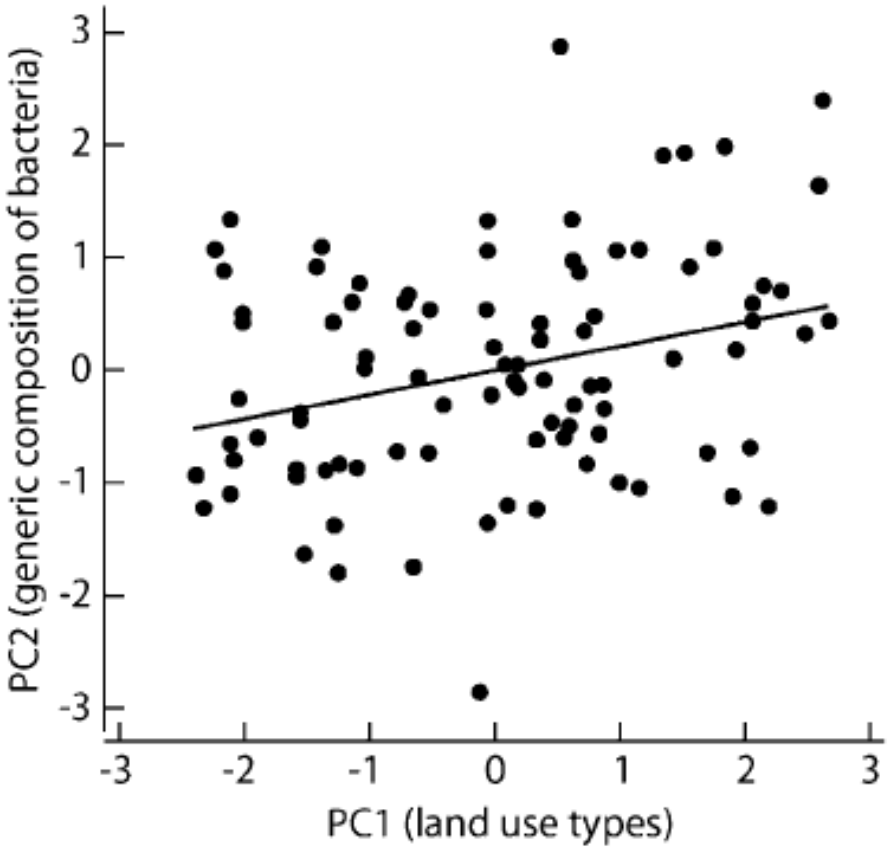


Bacterias y Huesped



G. Jatzlauk et al, 2017

Bacterias de la piel
Y
Tipo de uso del suelo



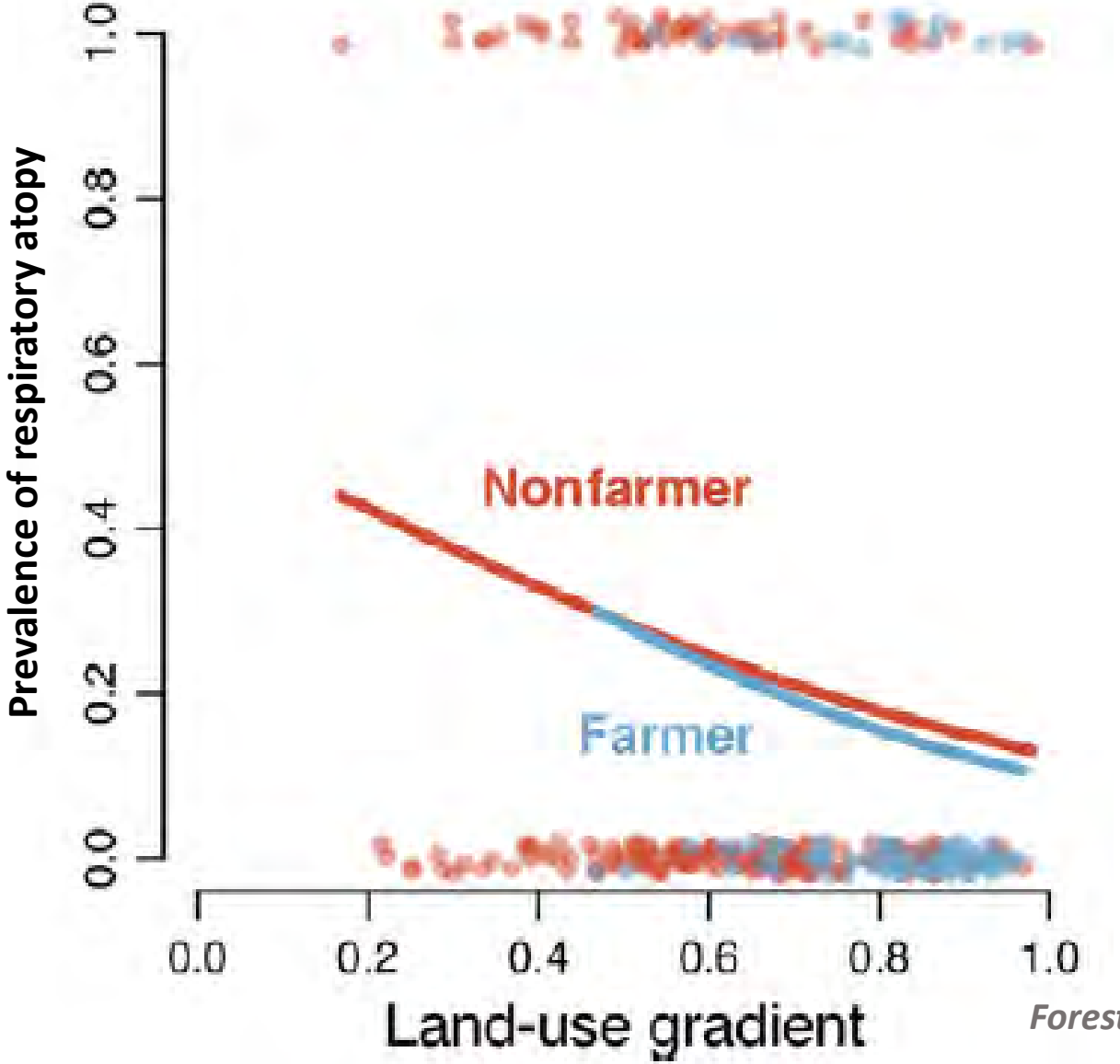
Forest/Agricultural

3-km radius from home

Fig. 1. Relationship between the generic composition of skin microbiota and land use types around the home. The vertical axis shows $PC2_{bac}$, which correlates positively with the generic diversity of proteobacteria and negatively with the diversity of all other bacterial classes (*SI Appendix*, Table S2). The horizontal axis shows $PC1_{env}$, which summarizes variation in land use types within a 3-km radius of the homes of the study subjects and is positively correlated with forests and agricultural land (*SI Appendix*, Table S1). Regression: $F = 9.12$, $df = 1.93$, $P = 0.0033$.

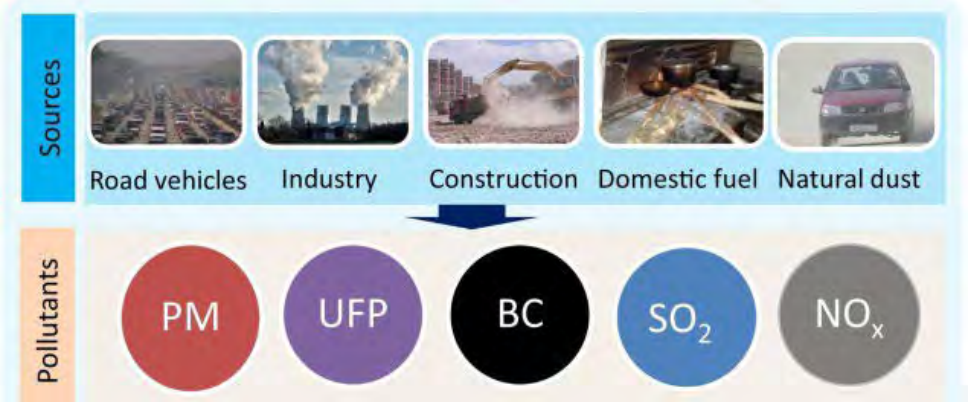
Hanski et al 2012

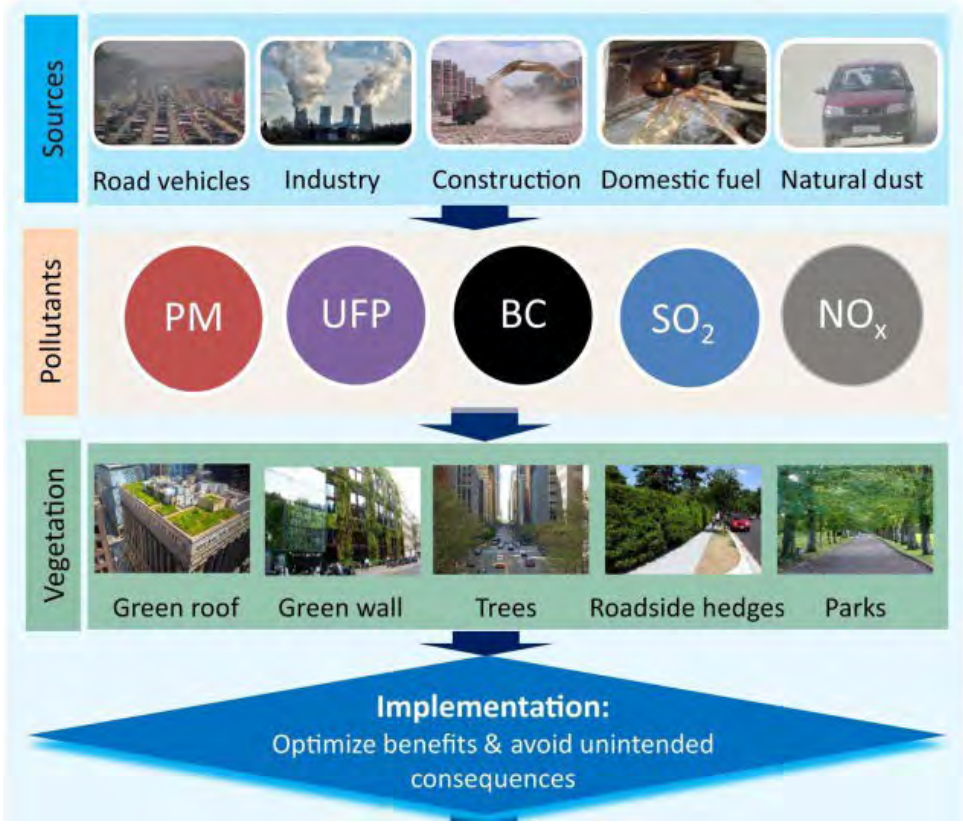
Atopia respiratoria Y Tipo de uso del suelo

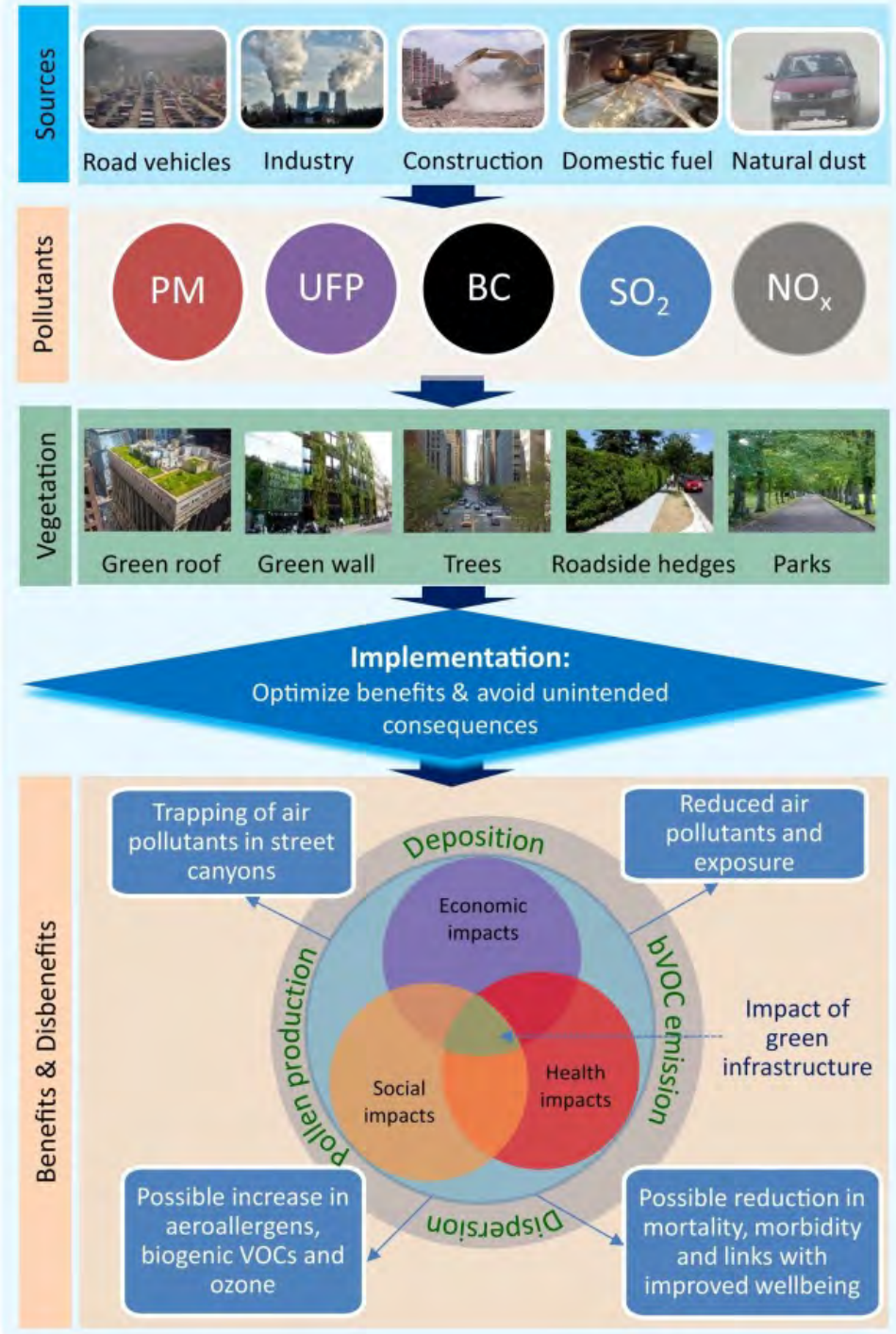


Forest/Agricultural

Ruokolainen et al. 2015


Sources
Road vehicles
Industry
Construction
Domestic fuel
Natural dust
Pollutants
PM
UFP
BC
SO_2
NO_x


Sources
Road vehicles
Industry
Construction
Domestic fuel
Natural dust
Pollutants
PM
UFP
BC
SO_2
NO_x
Vegetation
Green roof
Green wall
Trees
Roadside hedges
Parks
Implementation:
Optimize benefits & avoid unintended consequences


Sources
Road vehicles
Industry
Construction
Domestic fuel
Natural dust
Pollutants
PM
UFP
BC
SO_2
NO_x
Vegetation
Green roof
Green wall
Trees
Roadside hedges
Parks
Implementation:
Optimize benefits & avoid unintended consequences
Benefits & Disbenefits
Trapping of air pollutants in street canyons
Reduced air pollutants and exposure
Deposition
Economic impacts
bVOC emission
Pollen production
Social impacts
Health impacts
Impact of green infrastructure
Dispersion
Possible increase in aeroallergens, biogenic VOCs and ozone
Possible reduction in mortality, morbidity and links with improved wellbeing

↑ Air purification and microclimate regulation

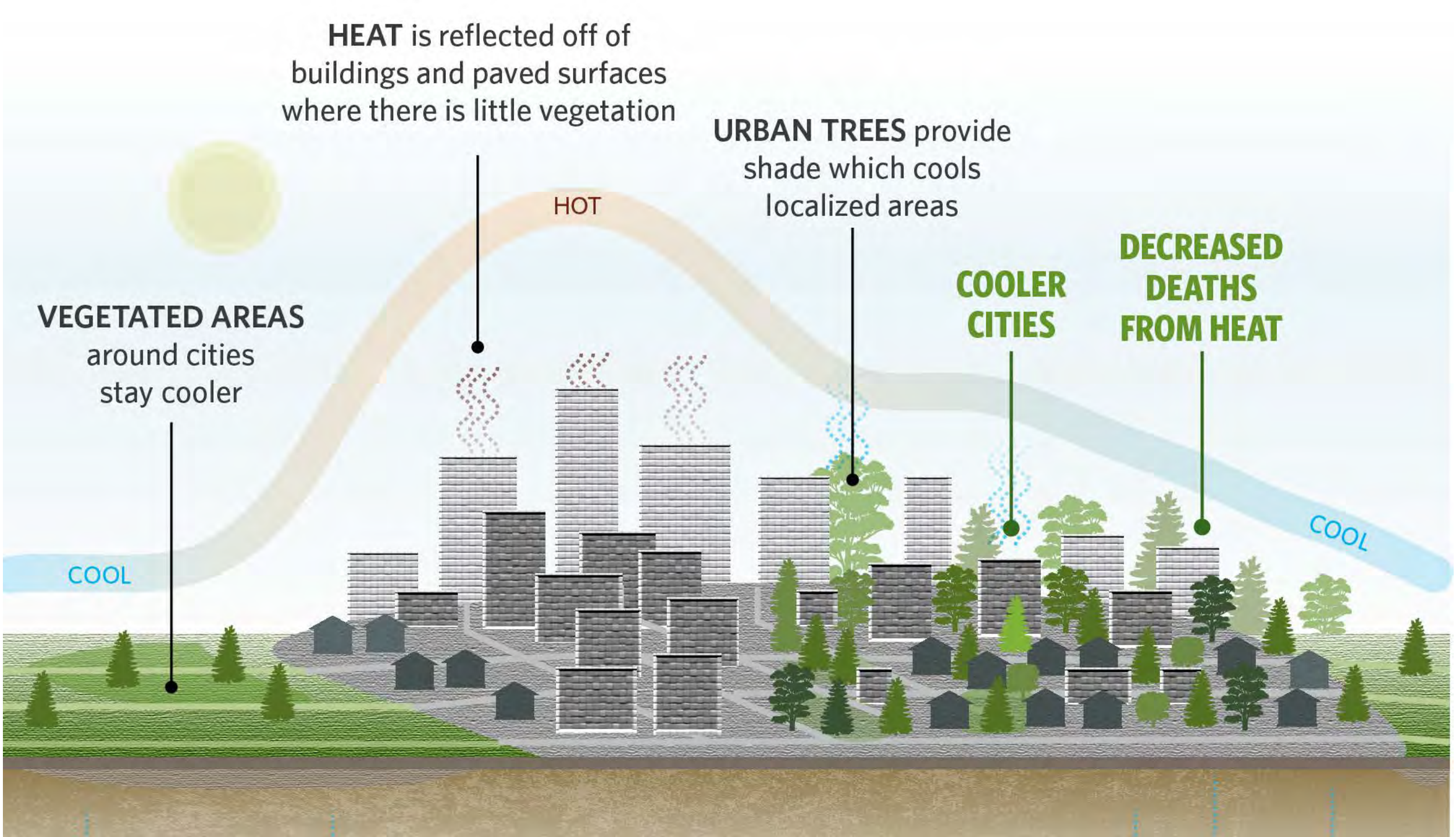
↑ Vegetation structure complexity

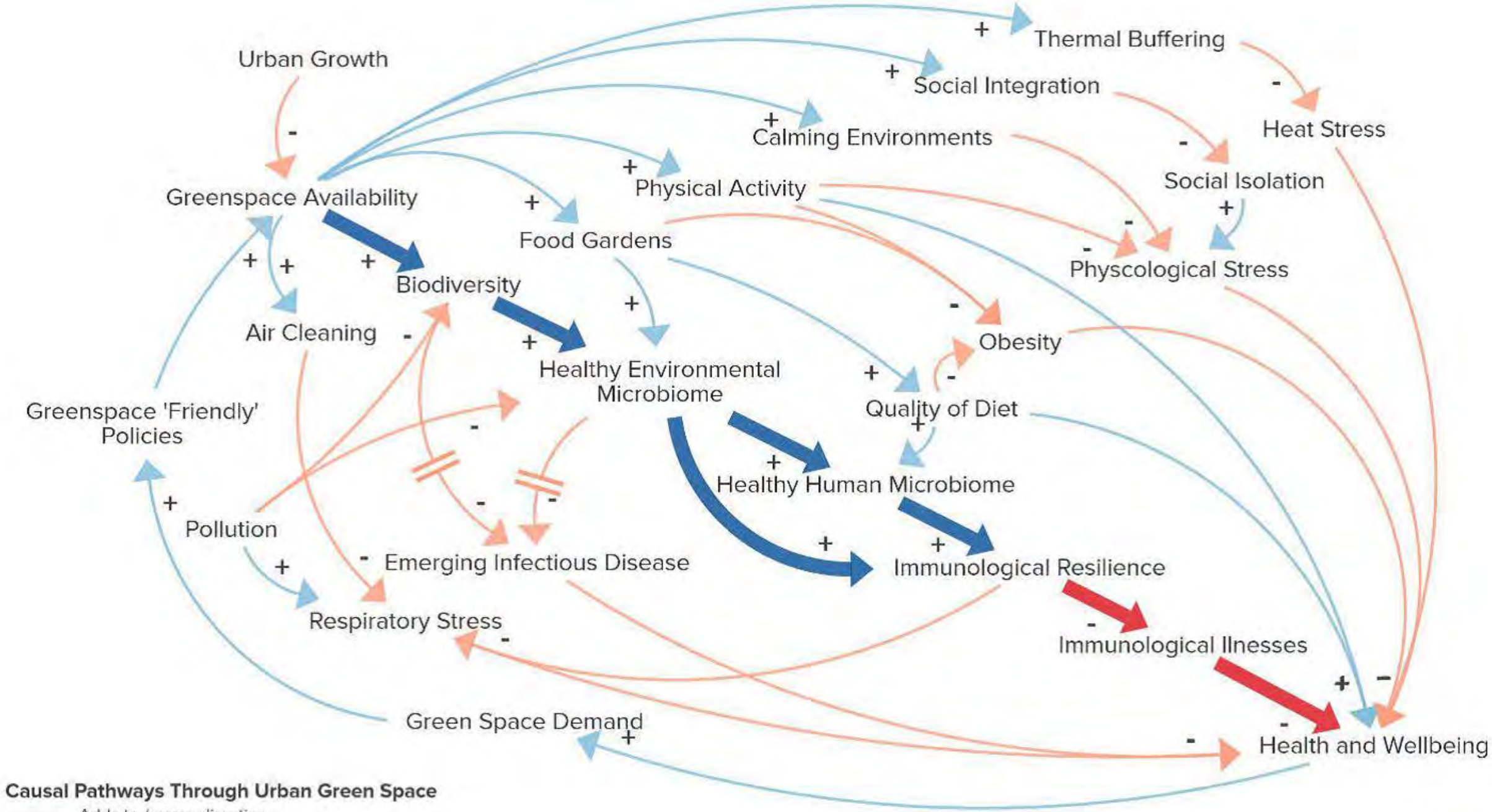
↑ Management intensity

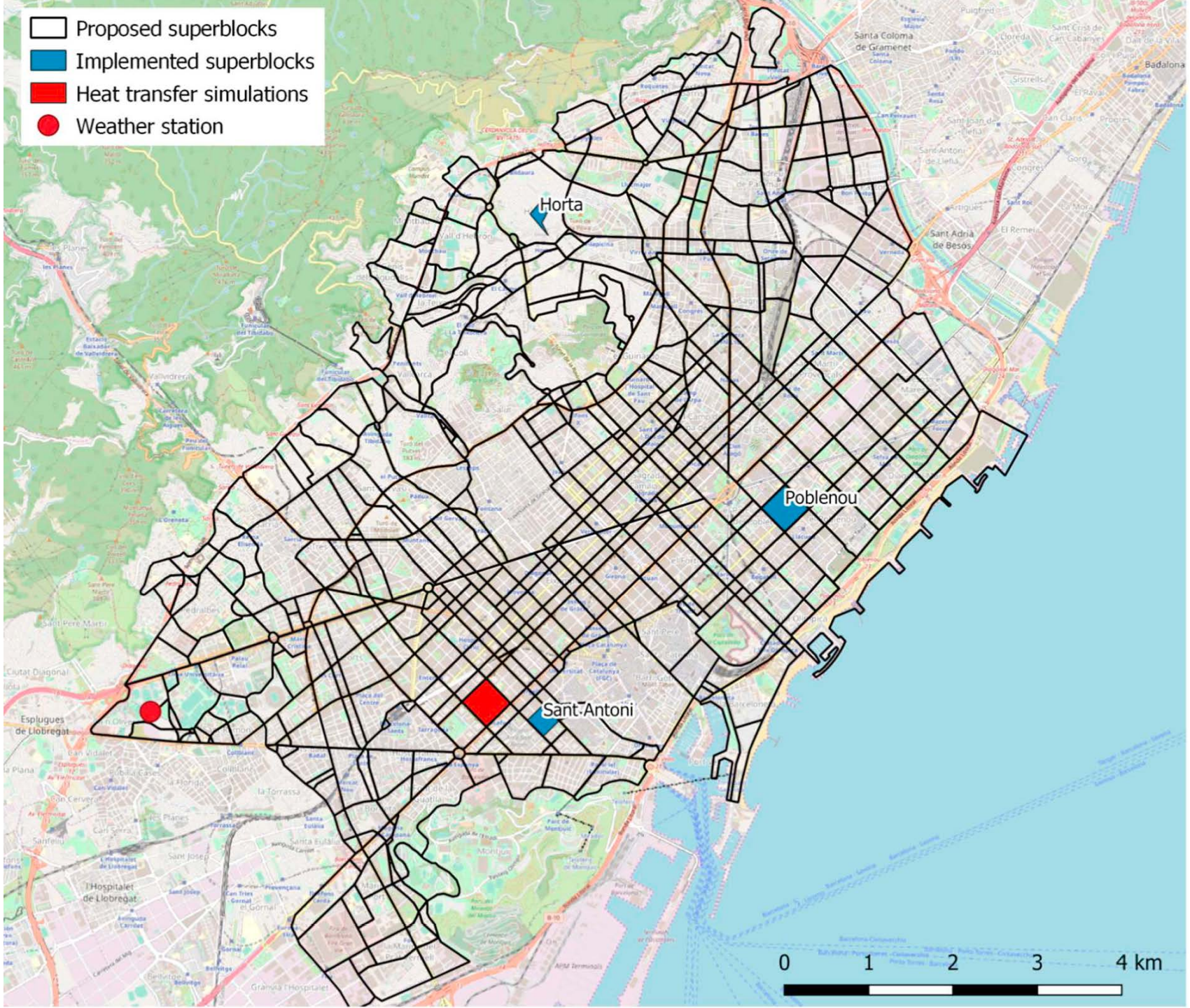
Vegetation structure and management matters to the provision of ecosystem services in urban green spaces

Icons created by Cesar Pomaro, Ángel Santos Freyta, Jacqueline Fernandes and Luis Prado from the noun project

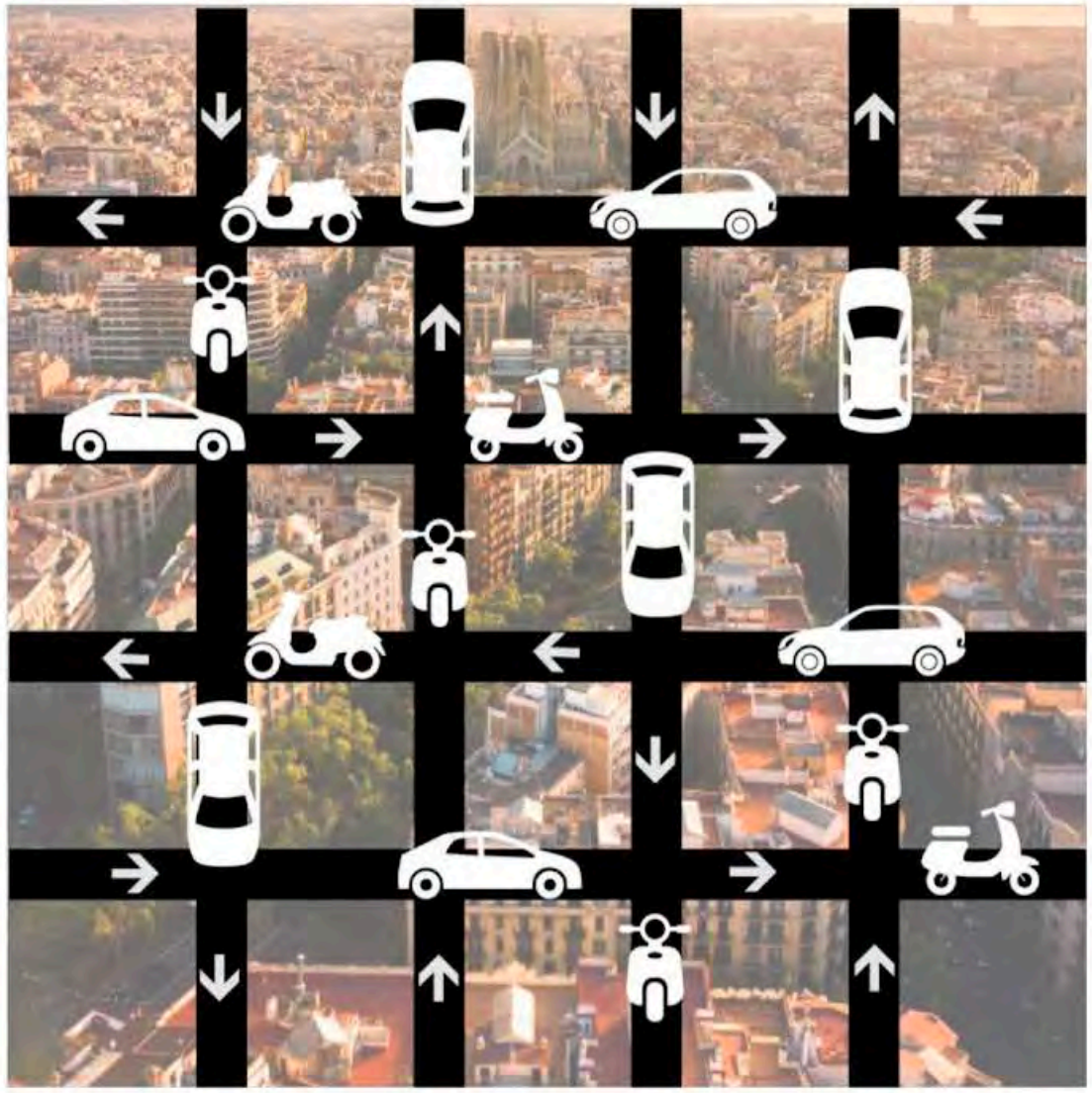

HSBC


HEAT is reflected off of buildings and paved surfaces where there is little vegetation
HOT
URBAN TREES provide shade which cools localized areas
VEGETATED AREAS around cities stay cooler
COOL
COOLER CITIES
DECREASED DEATHS FROM HEAT
COOL

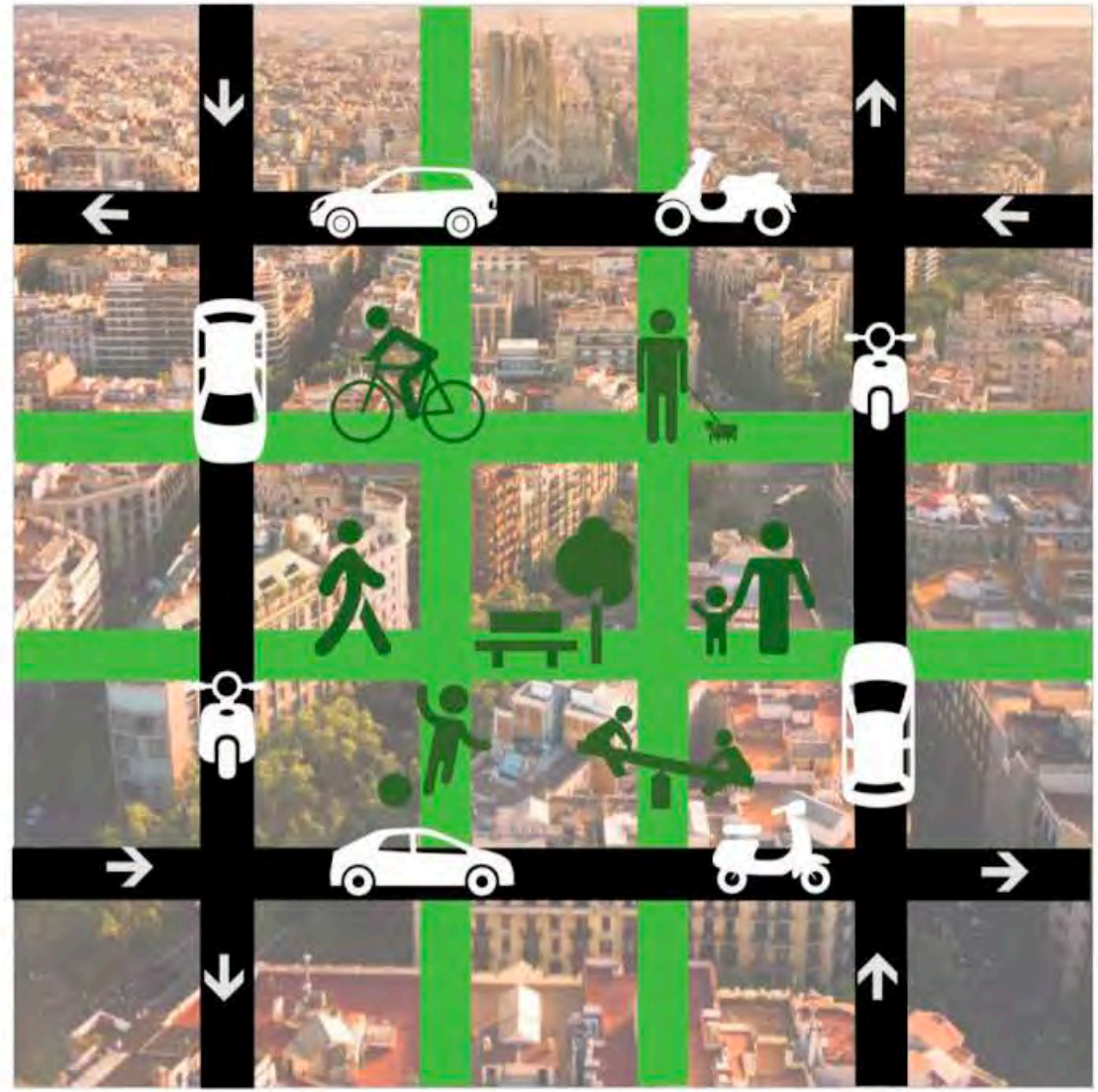

Urban Growth
Thermal Buffering
Social Integration
Heat Stress
Calming Environments
Social Isolation
Greenspace Availability
Physical Activity
Food Gardens
Physcological Stress
Biodiversity
Air Cleaning
Obesity
Healthy Environmental Microbiome
Quality of Diet
Greenspace 'Friendly' Policies
Healthy Human Microbiome
Pollution
Emerging Infectious Disease
Immunological Resilience
Respiratory Stress
Immunological Illnesses
Green Space Demand
Health and Wellbeing
Causal Pathways Through Urban Green Space
Adds to / same direction
Subtracts from / opposite direction
HUMI 2017



503 Supermanzanas
Barcelona



Baseline situation



Superblocks model

Barcelona Superblock San Antoni

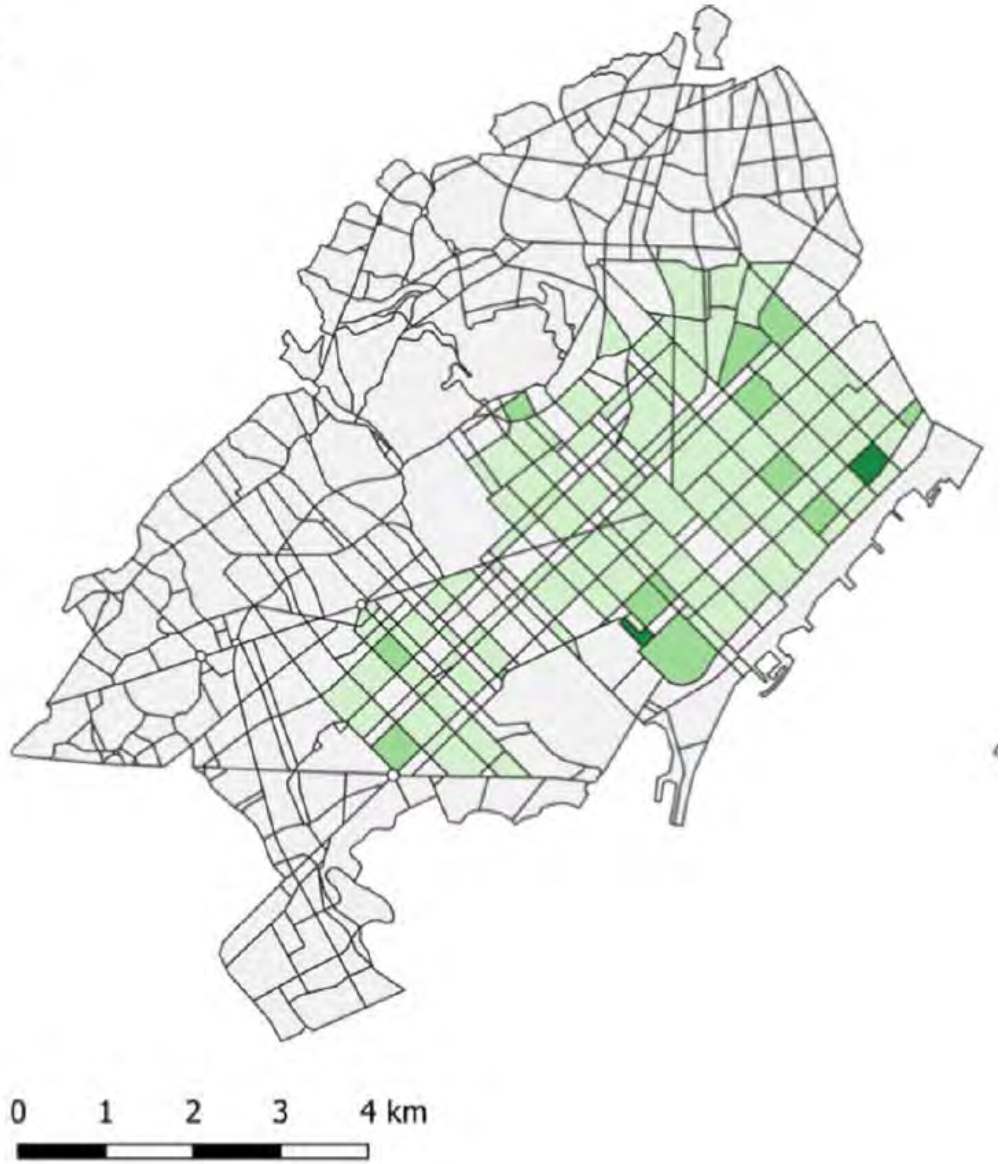
Before

After

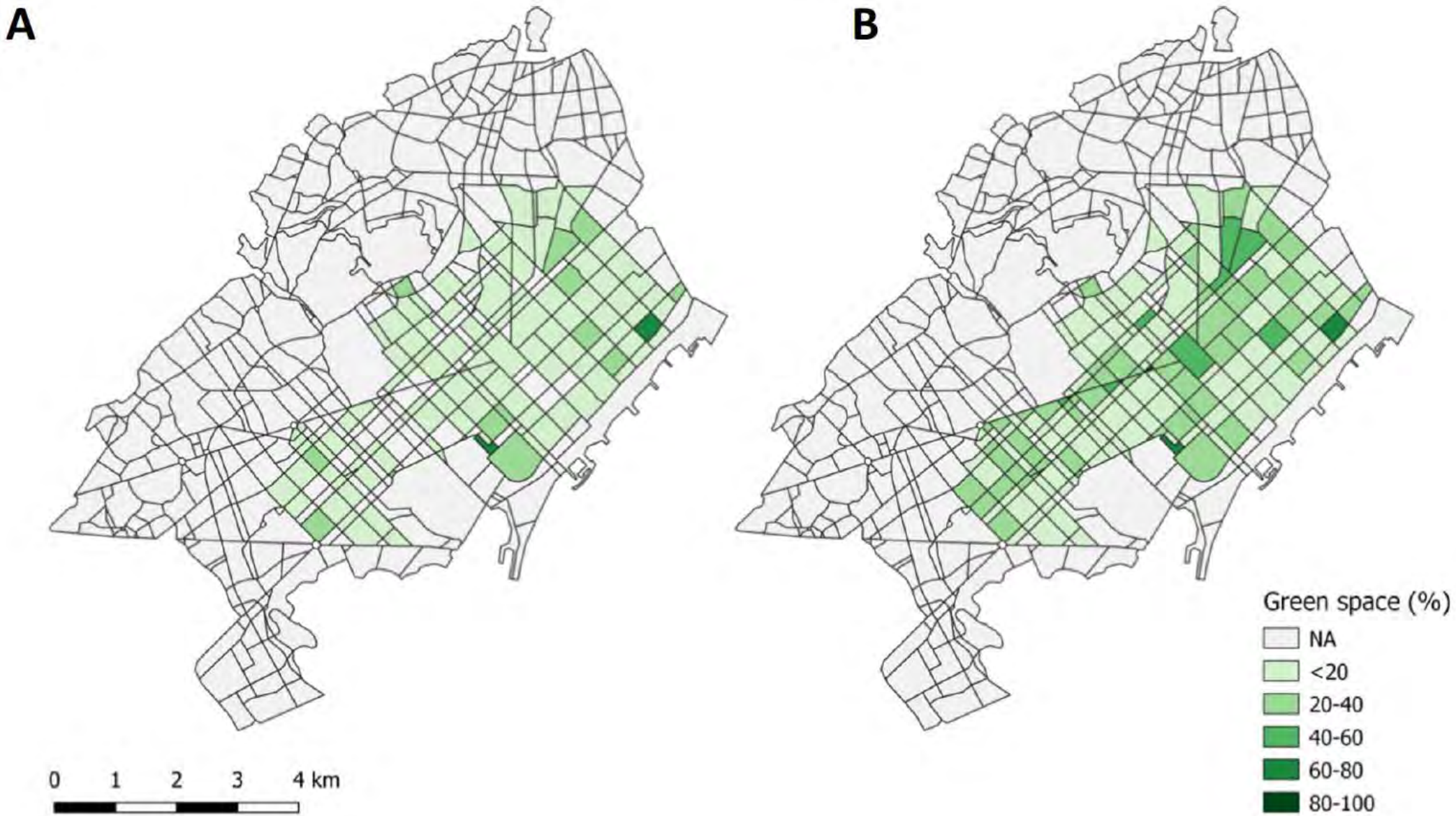
ISGlobal Barcelona Institute for Global Health

Green space (%)

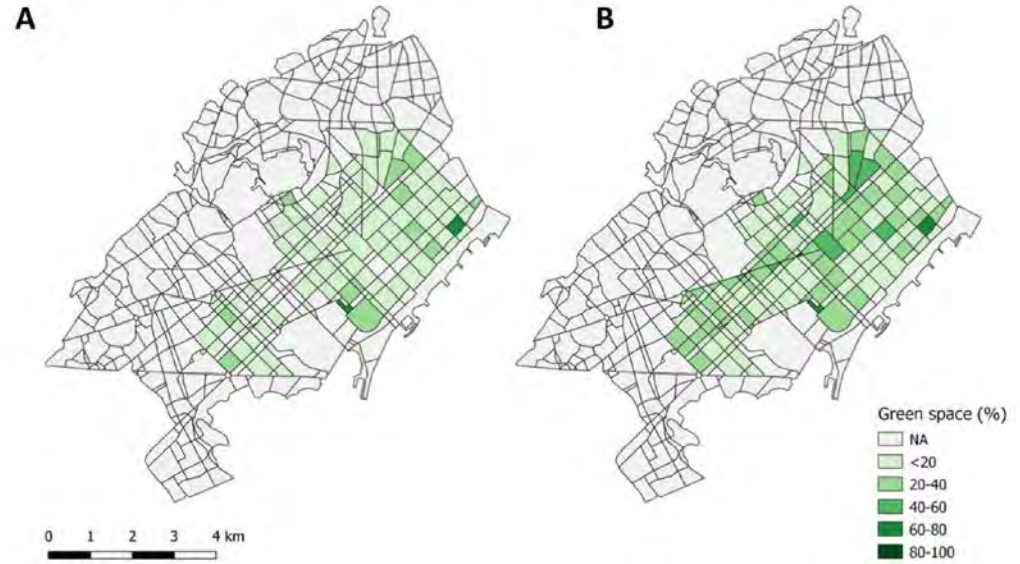
A



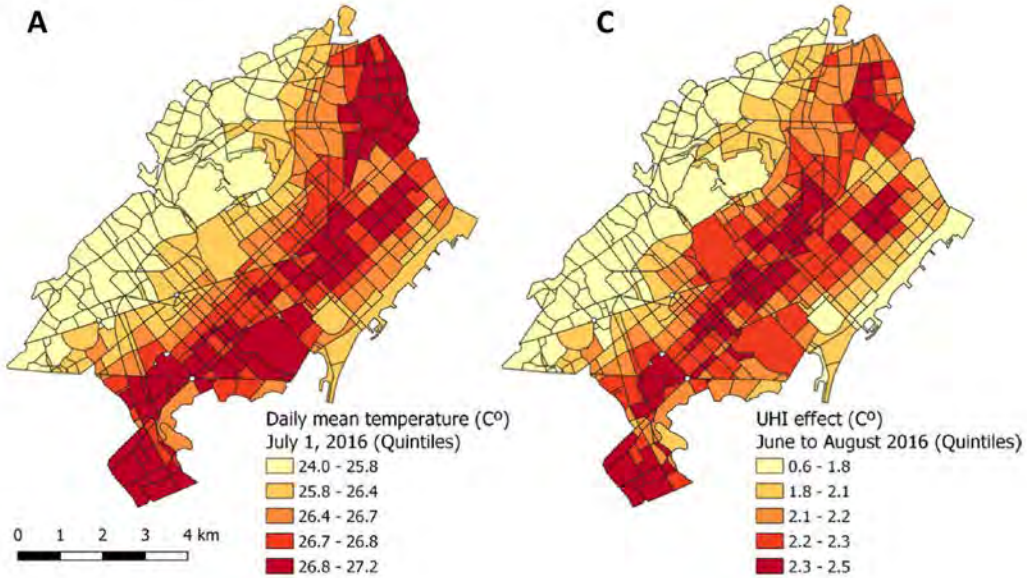
Green space (%)



Green space (%)



Temperature (ºC)



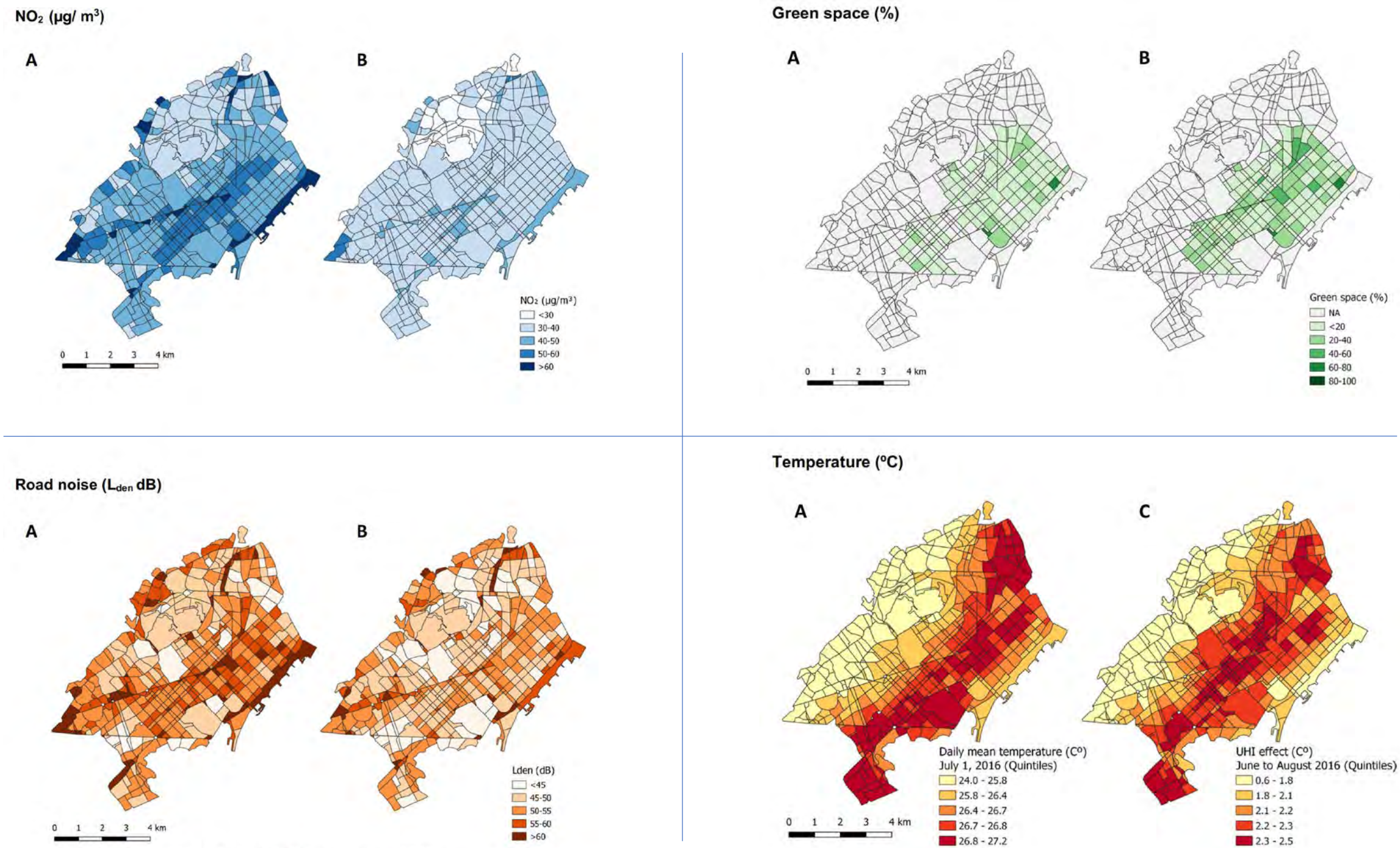
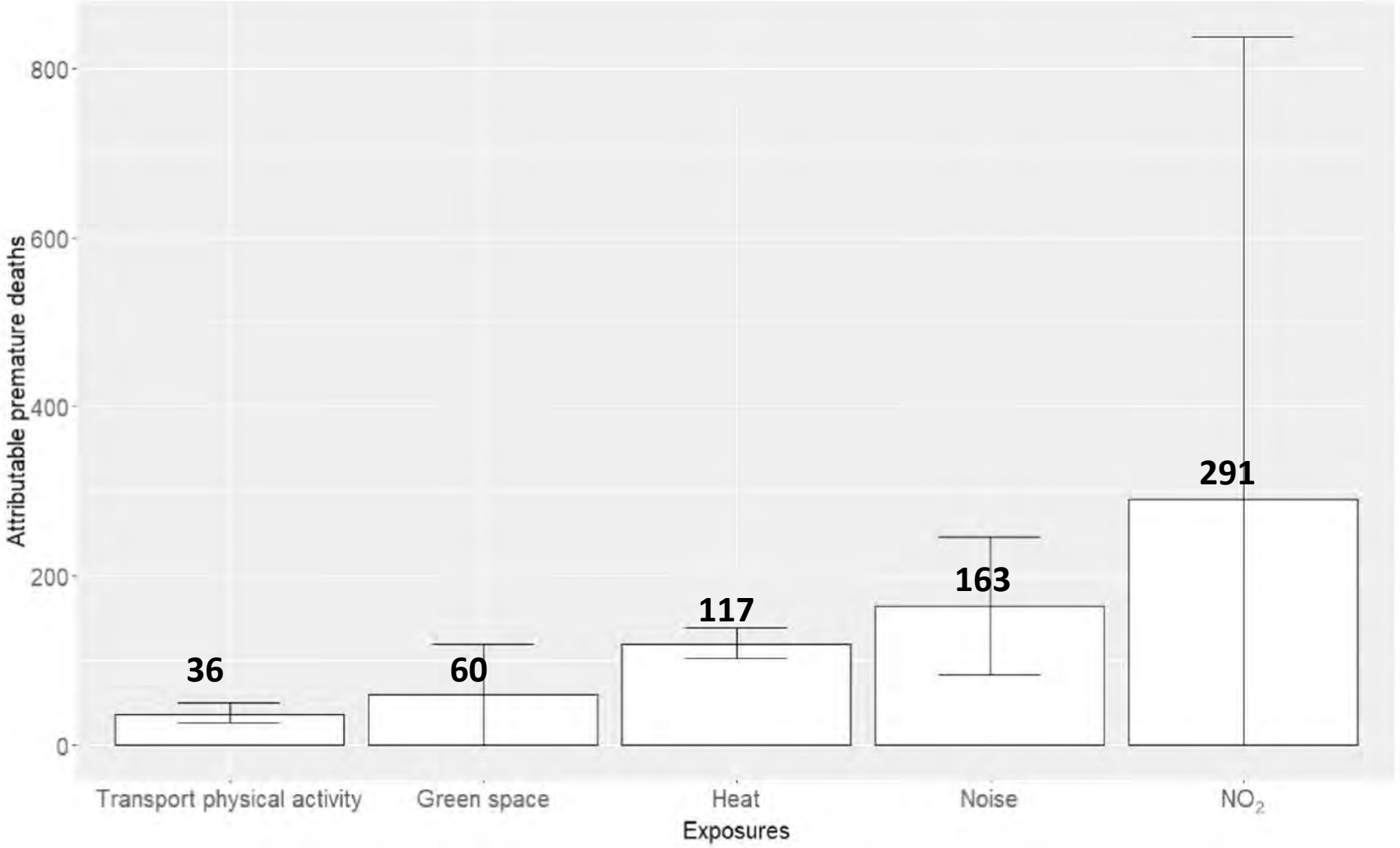


Fig. 5. Baseline and Superblocks environmental exposure levels.



667
Preventable deaths

Fig. 6. Annual preventable premature deaths estimated for the Barcelona Superblock model.


EDINBURGH
BRADFORD
MANCHESTER
BIRMINGHAM
LONDON

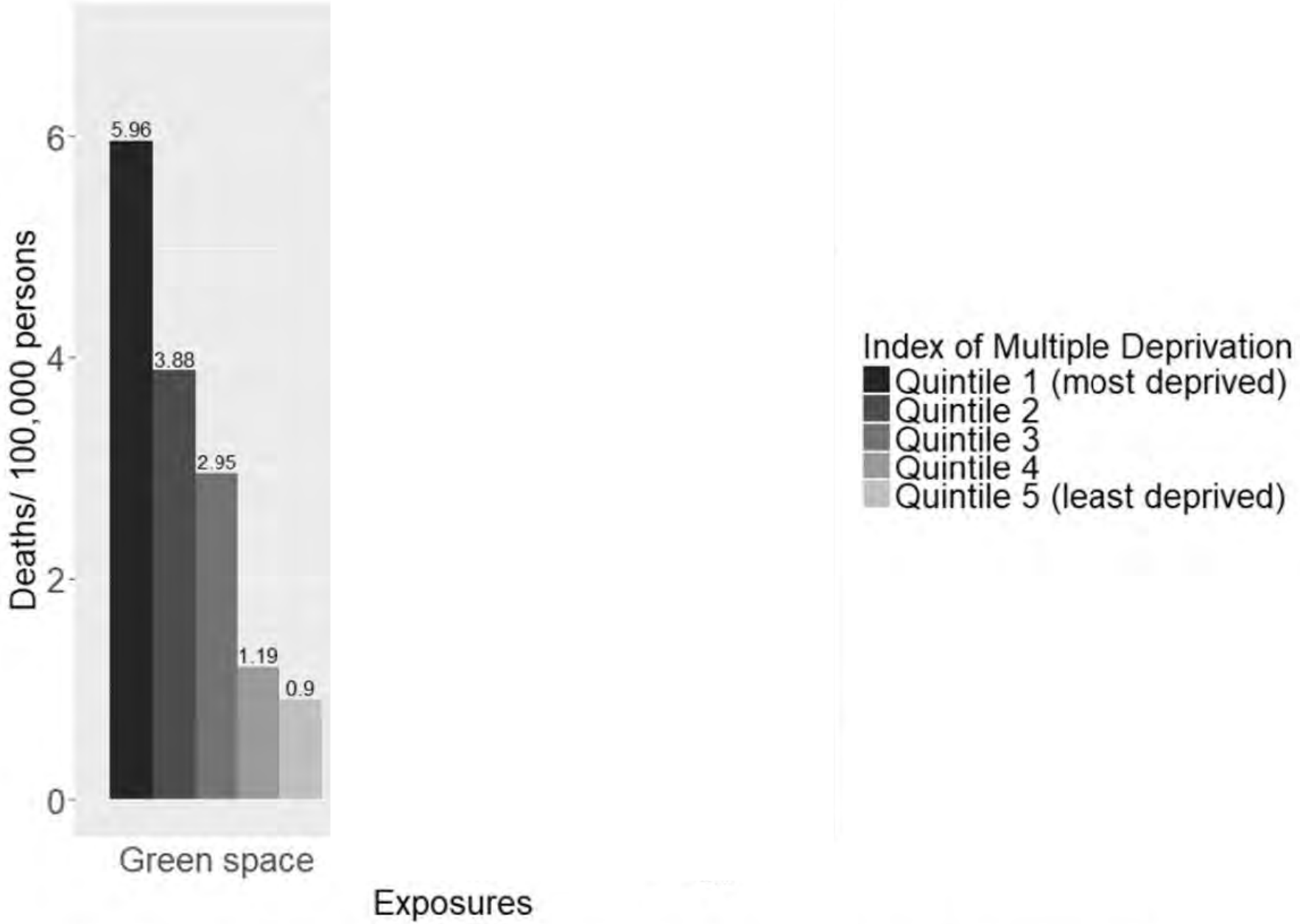


Fig. 4. Standardized mortality impacts by LSOA-level deprivation score.

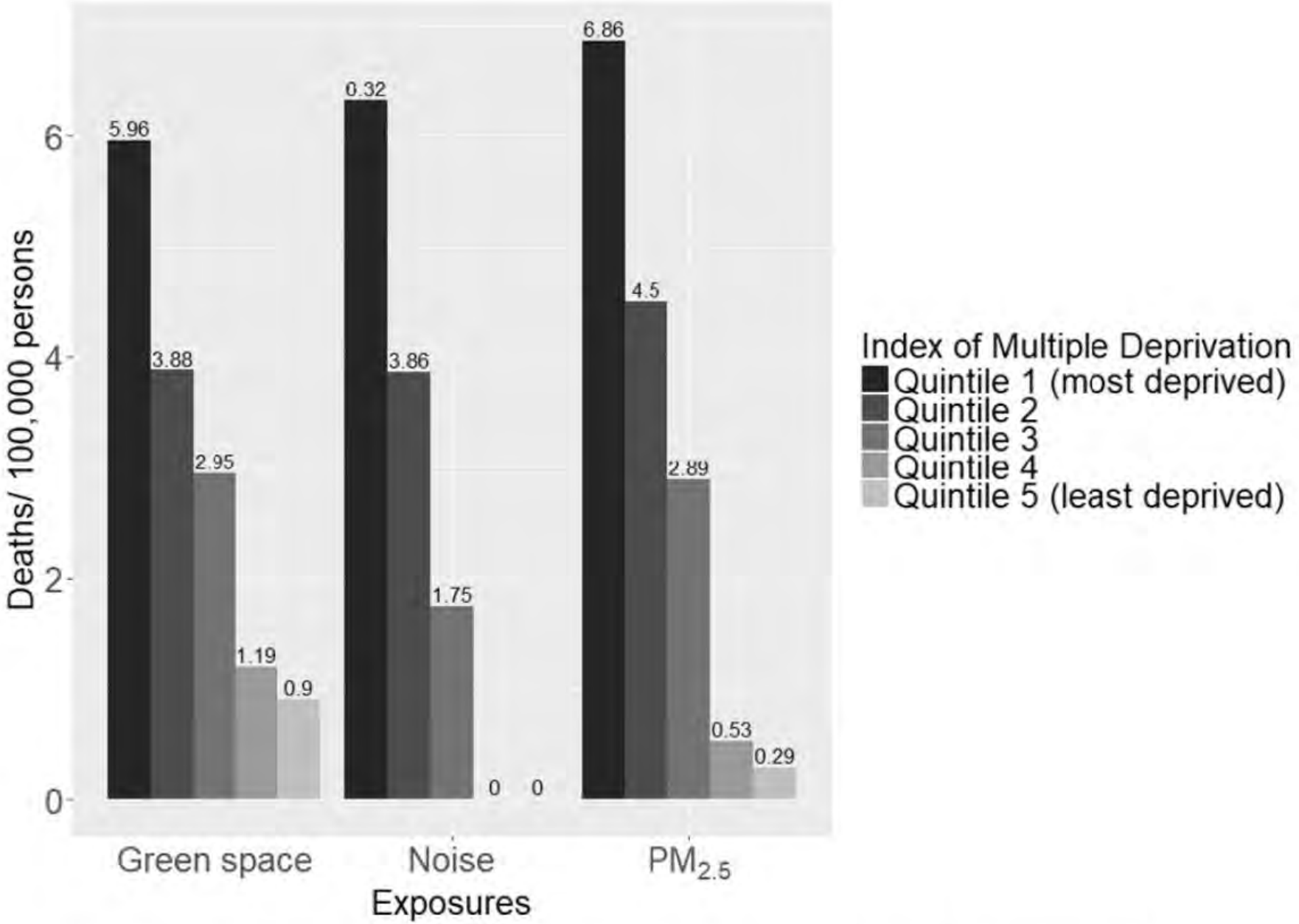
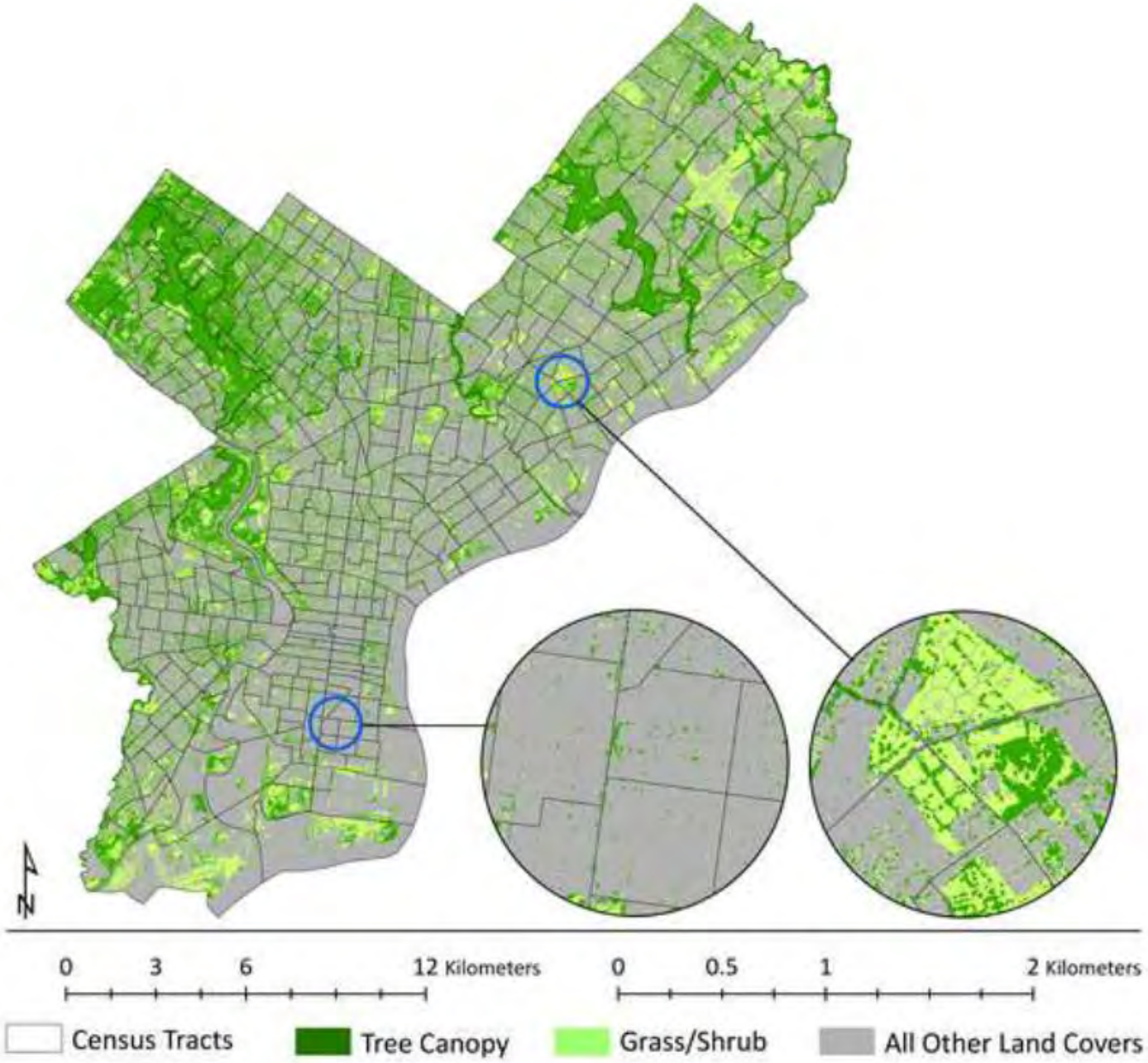


Fig. 4. Standardized mortality impacts by LSOA-level deprivation score.

City of Philadelphia
LIFE • LIBERTY • AND YOU™

FOREST SERVICE
US
DEPARTMENT OF AGRICULTURE

USDA



City of Philadelphia
LIFE • LIBERTY • AND YOU™

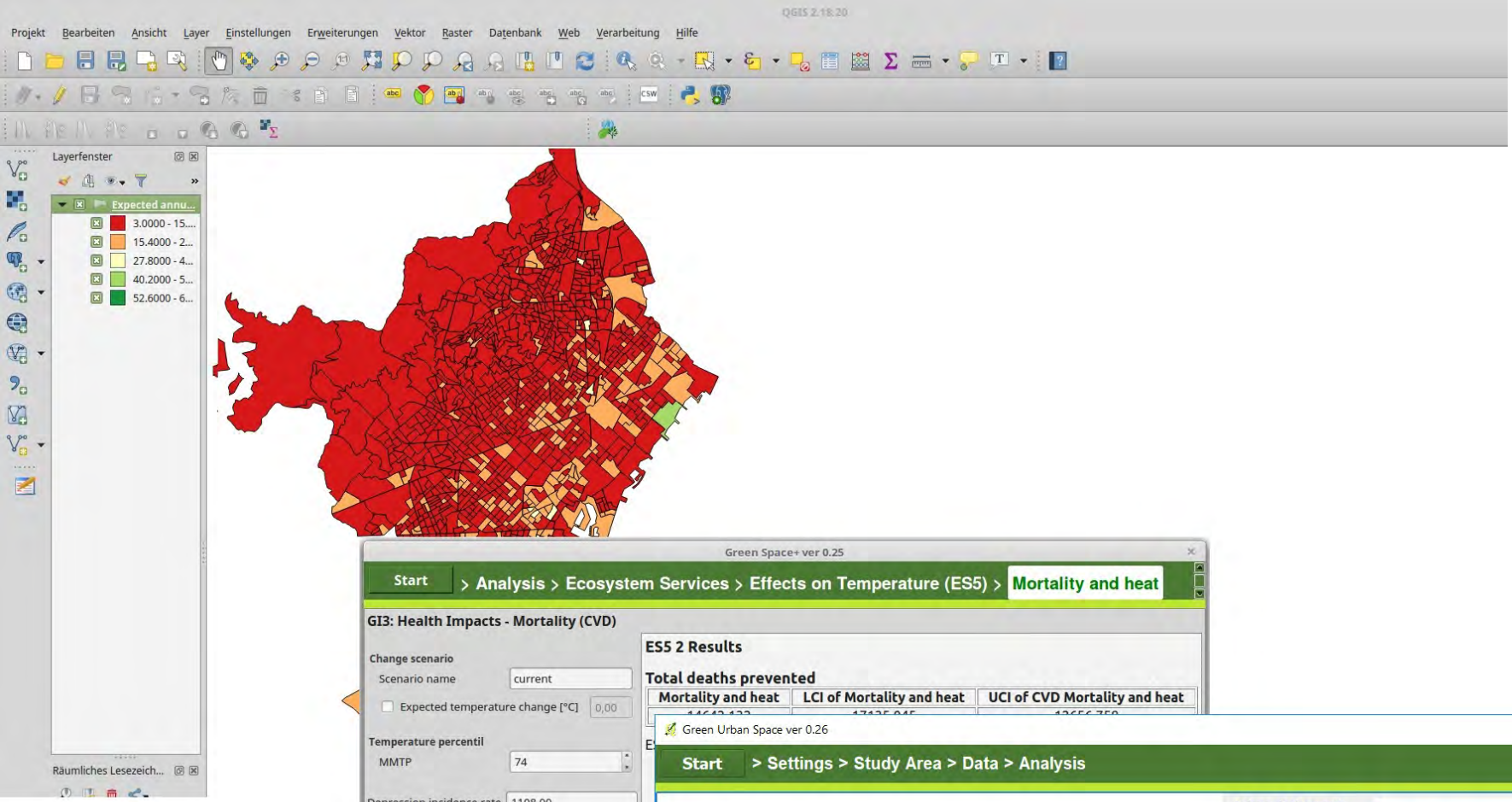
Cobertura arbolada 2025

FOREST SERVICE US DEPARTMENT OF AGRICULTURE

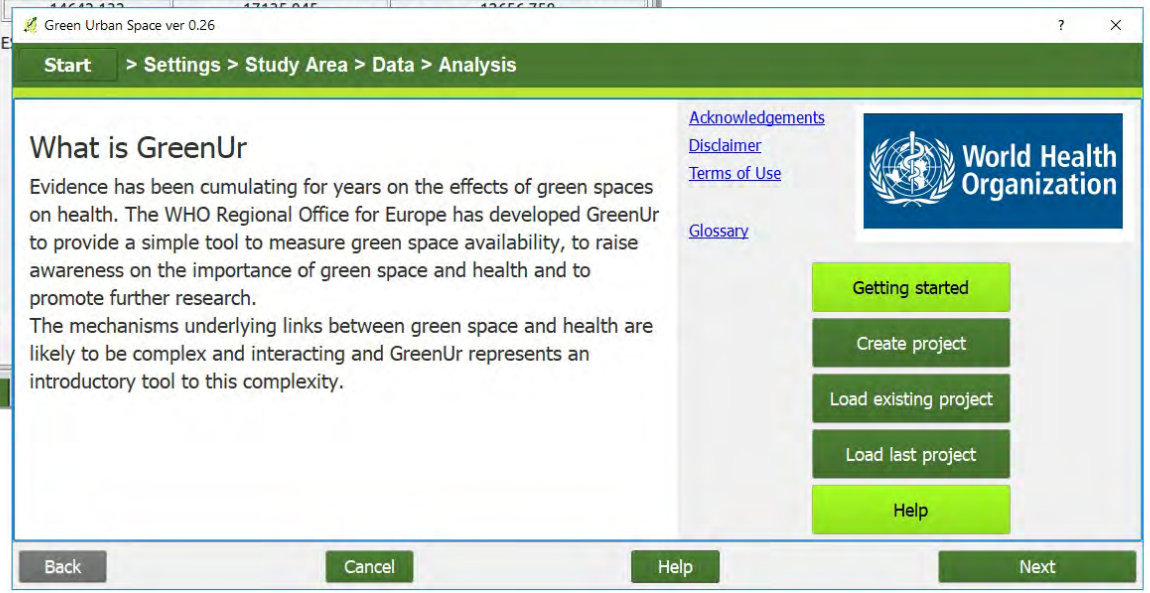
USDA

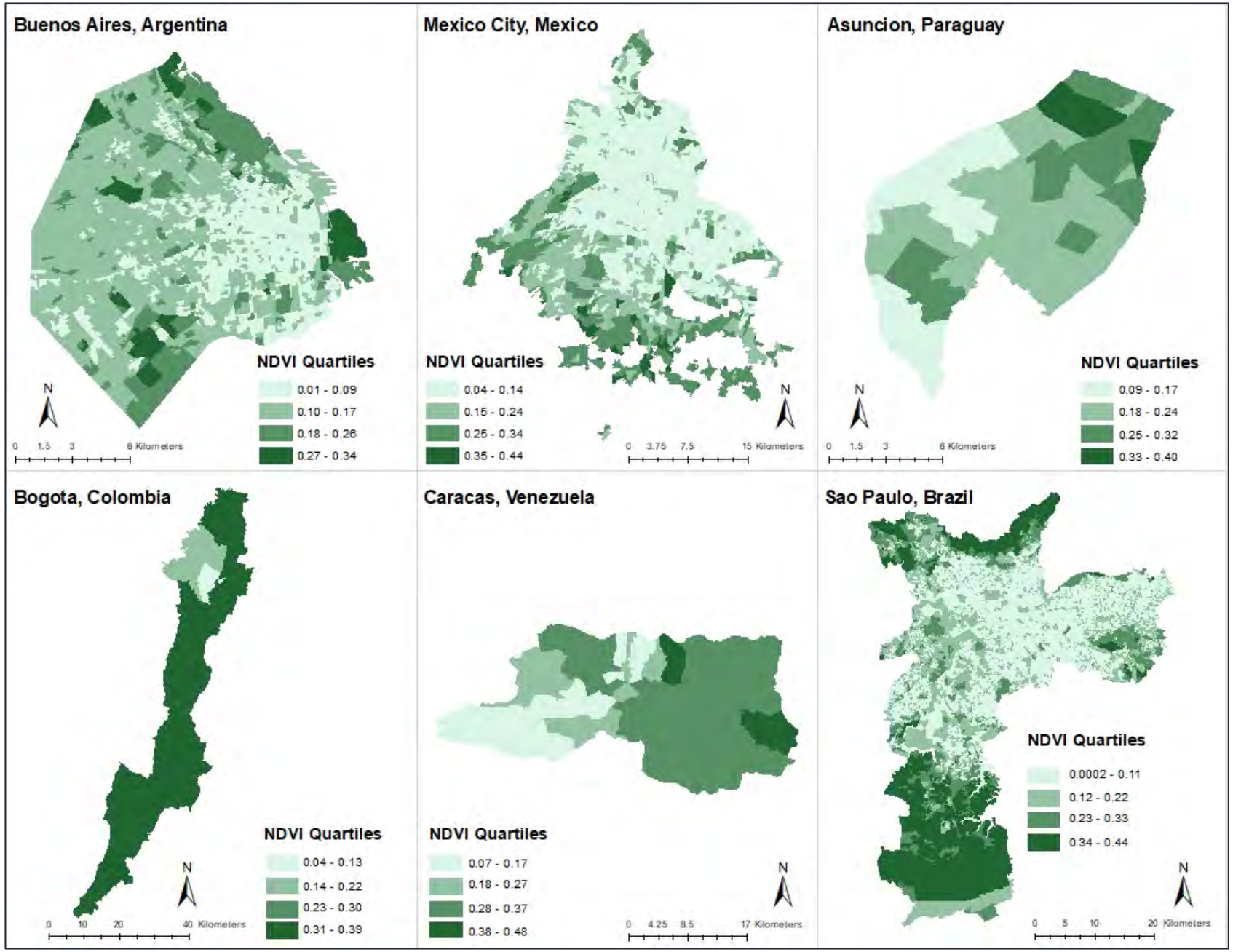
Table 3. Annual preventable premature adult deaths (years 2016-2025) by count and percent, and economic impacts

	Preventable Premature Adult deaths				Economic value[1,2]	
	Count	**95% Interval**	**Percent**	**95% Interval**	**Value in millions**	**95% Interval**
SCENARIO 1: 5% increase tree coverage						
Total Mortality						
City-wide	265	(156, 320)	1·9%	(1·1%, 2·3%)	$2,543	($1502, $3075)
SCENARIO 2: 10% increase tree coverage						
Total Mortality						
City-wide	526	(309, 638)	3·8%	(2·2%, 4·6%)	$5,052	($2970, $6125)
SCENARIO 3: 30% tree coverage						
Total Mortality						
City-wide	718	(414, 877)	5·2%	(3·0%, 6·4%)	$6,890	($3981, $8425)

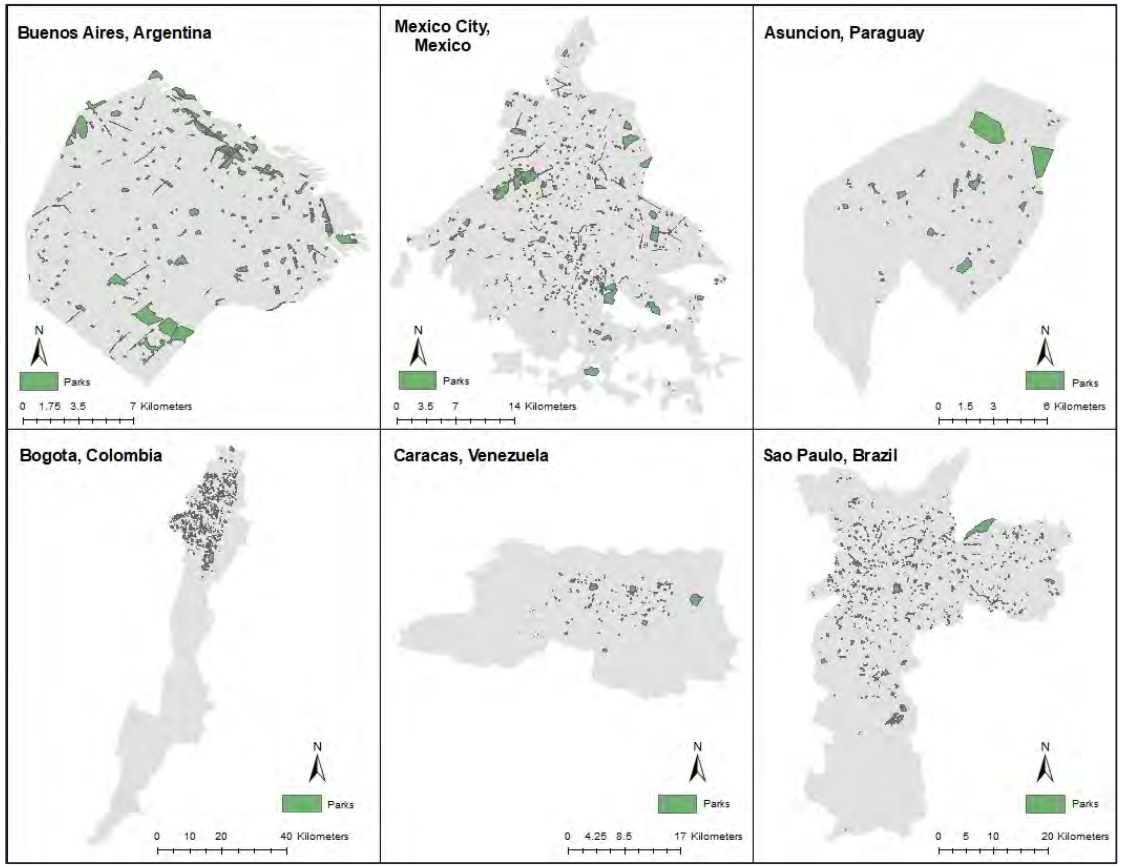

QGIS 2.18.20
Projekt Bearbeiten Ansicht Layer Einstellungen Erweiterungen Vektor Raster Datenbank Web Verarbeitung Hilfe
Layerfenster
Expected annu...
3.0000 - 15....
15.4000 - 2...
27.8000 - 4...
40.2000 - 5...
52.6000 - 6...
Räumliches Lesezeich...

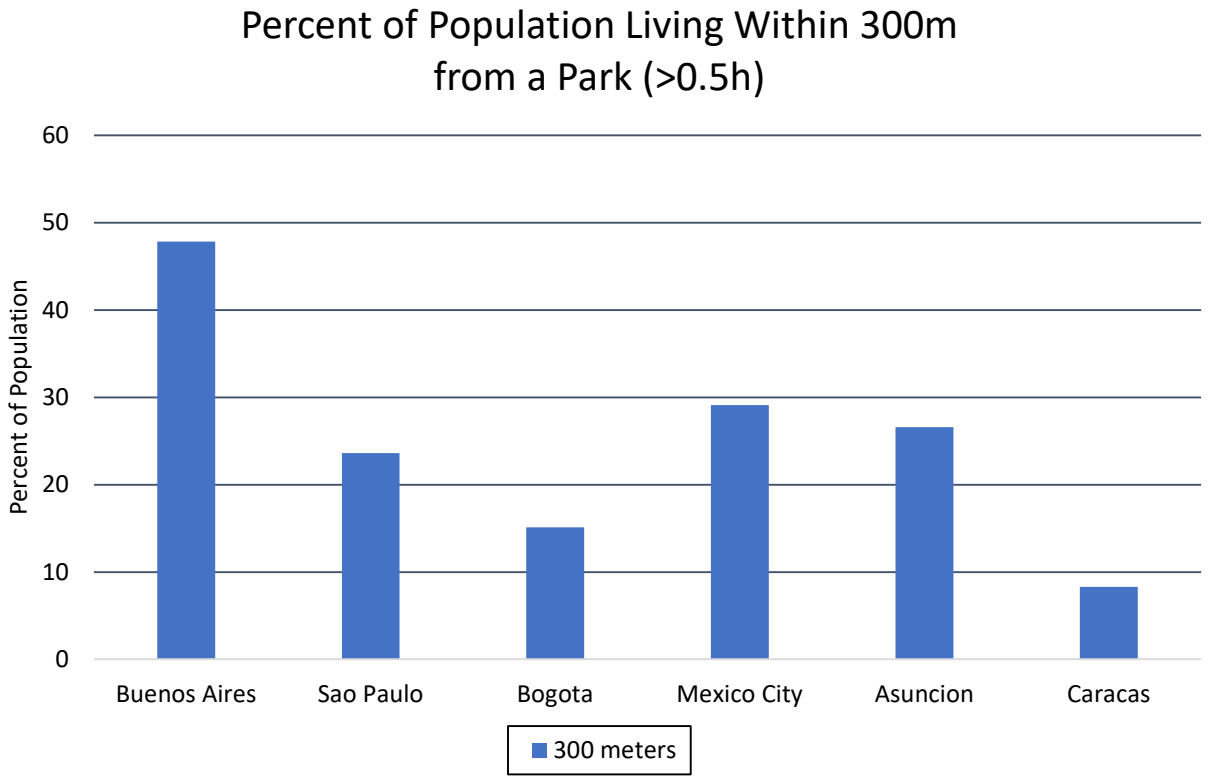
Green Space+ ver 0.25
Start > Analysis > Ecosystem Services > Effects on Temperature (ES5) > Mortality and heat
GI3: Health Impacts - Mortality (CVD)
Change scenario
Scenario name
current
Expected temperature change [°C]
0,00
Temperature percentil
MMTP
74
Depression incidence rate
1108,00
Relative risk (RR)
1,1900
RR lower
1,2300
RR upper
1,1600
Population
pop_map_src
Attribute
pop_ab20
Run Analysis
Back
Cancel
ES5 2 Results
Total deaths prevented
Mortality and heat
LCI of Mortality and heat
UCI of CVD Mortality and heat


Green Urban Space ver 0.26
Start > Settings > Study Area > Data > Analysis
What is GreenUr
Evidence has been cumulating for years on the effects of green spaces on health. The WHO Regional Office for Europe has developed GreenUr to provide a simple tool to measure green space availability, to raise awareness on the importance of green space and health and to promote further research.
The mechanisms underlying links between green space and health are likely to be complex and interacting and GreenUr represents an introductory tool to this complexity.
Acknowledgements
Disclaimer
Terms of Use
Glossary
World Health Organization
Getting started
Create project
Load existing project
Load last project
Help
Back
Cancel
Help
Next



david.rojas@colostate.edu





david.rojas@colostate.edu

COVID-19: SOCIAL DISTANCING IN PUBLIC PARKS AND TRAILS

Gracias!

david.rojas@colostate.edu

@drrbcn

ENVIRONMENTAL AND
RADIOLOGICAL HEALTH SCIENCES
COLORADO STATE UNIVERSITY