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# The Research Perspective

Health impacts of urban and transport planning and the way forward to build resilient, just and healthy cities for all

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Institute for  
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 EXCELENCIA  
SEVERO  
OCHOA

 Institutió  
**CERCA**  
Centres de Recerca  
de Catalunya

By 2050, 70% of the global population will live in cities...



# Urban and transport planning, environment and health





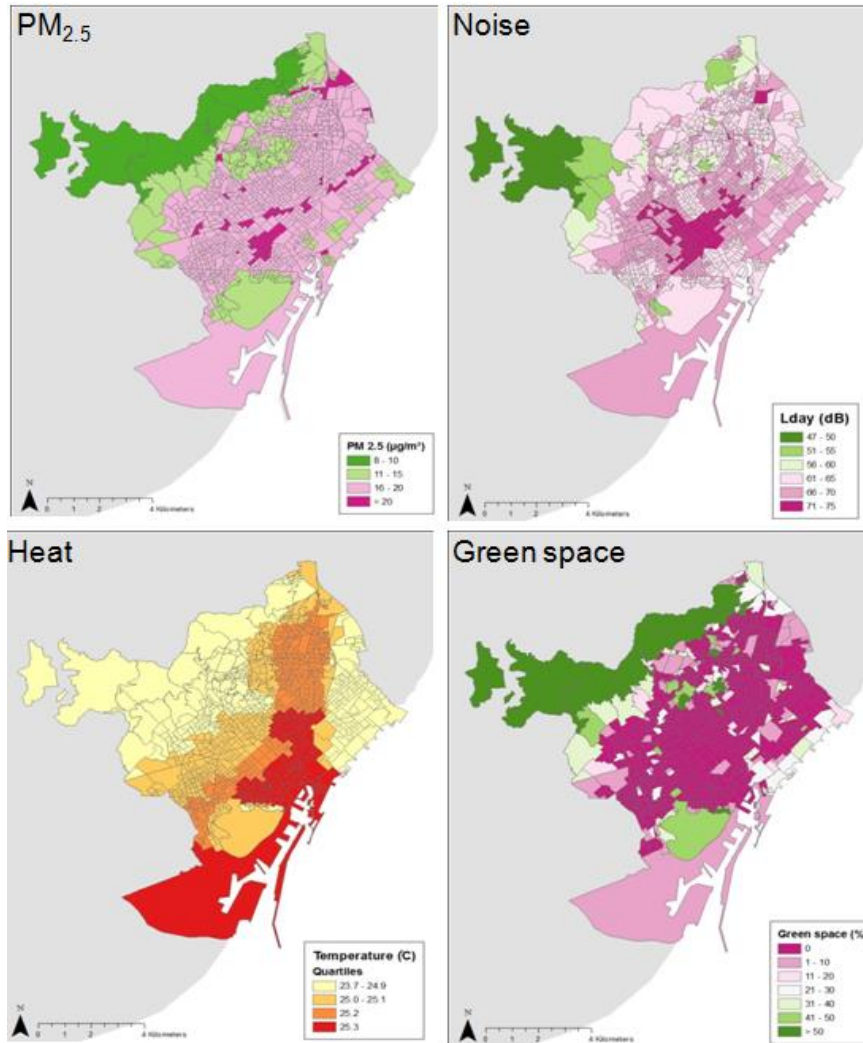
**Dense construction**

**$\approx 16,000$  persons/ km<sup>2</sup>**

**Lots of motor traffic (6,000 vehicles/ km<sup>2</sup>)**

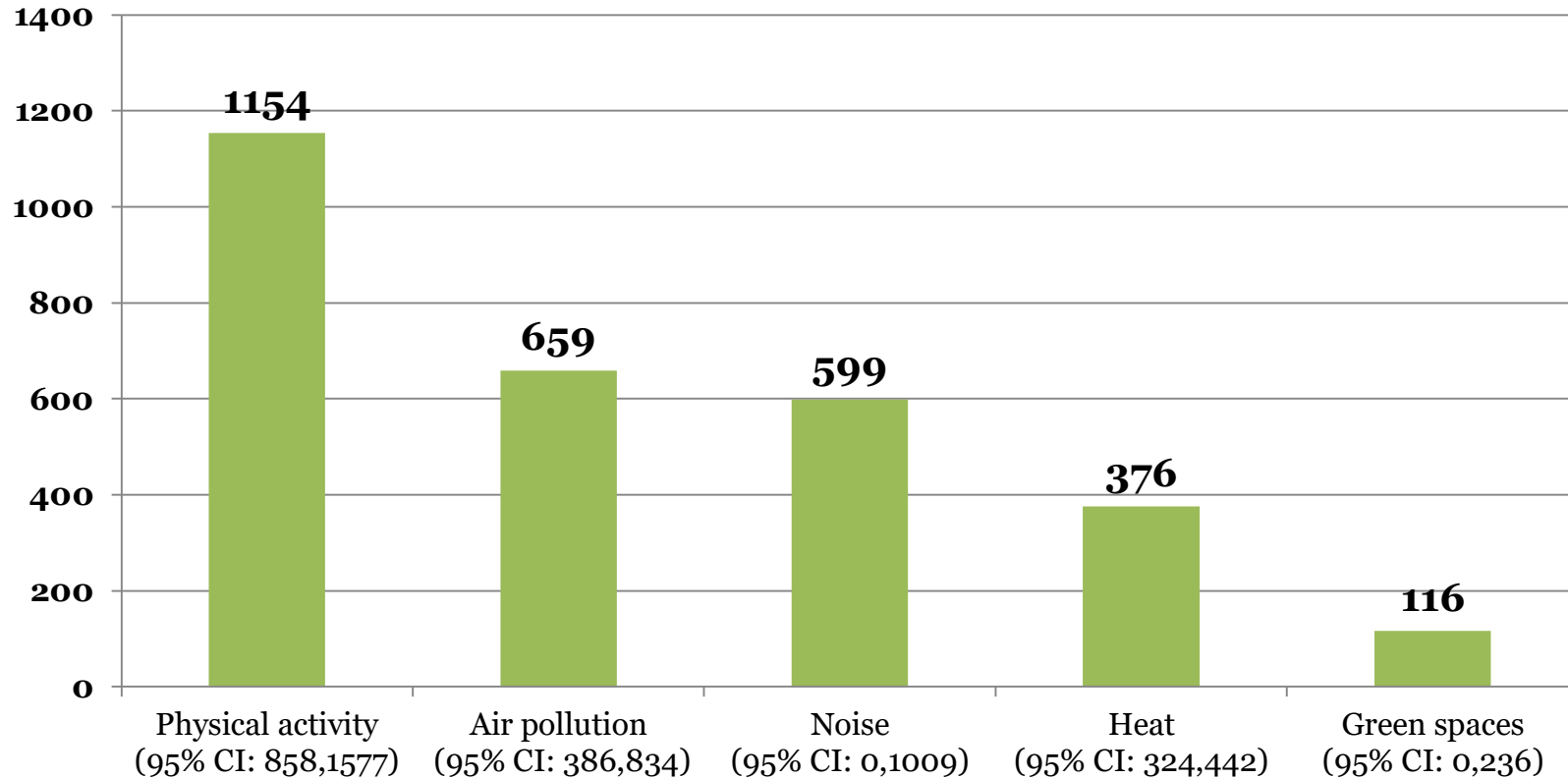
**Little green and open public space**

# Barcelona, Spain



Approx. 70% of Barcelona residents do not comply with WHO physical activity recommendations

# Premature mortality impact



- **2904 premature deaths** (95% CI: 1568, 4098) (→ **almost 20% of mortality**)
- **360 days** (95% CI: 219, 493) of life expectancy
- Approx 30 traffic fatalities

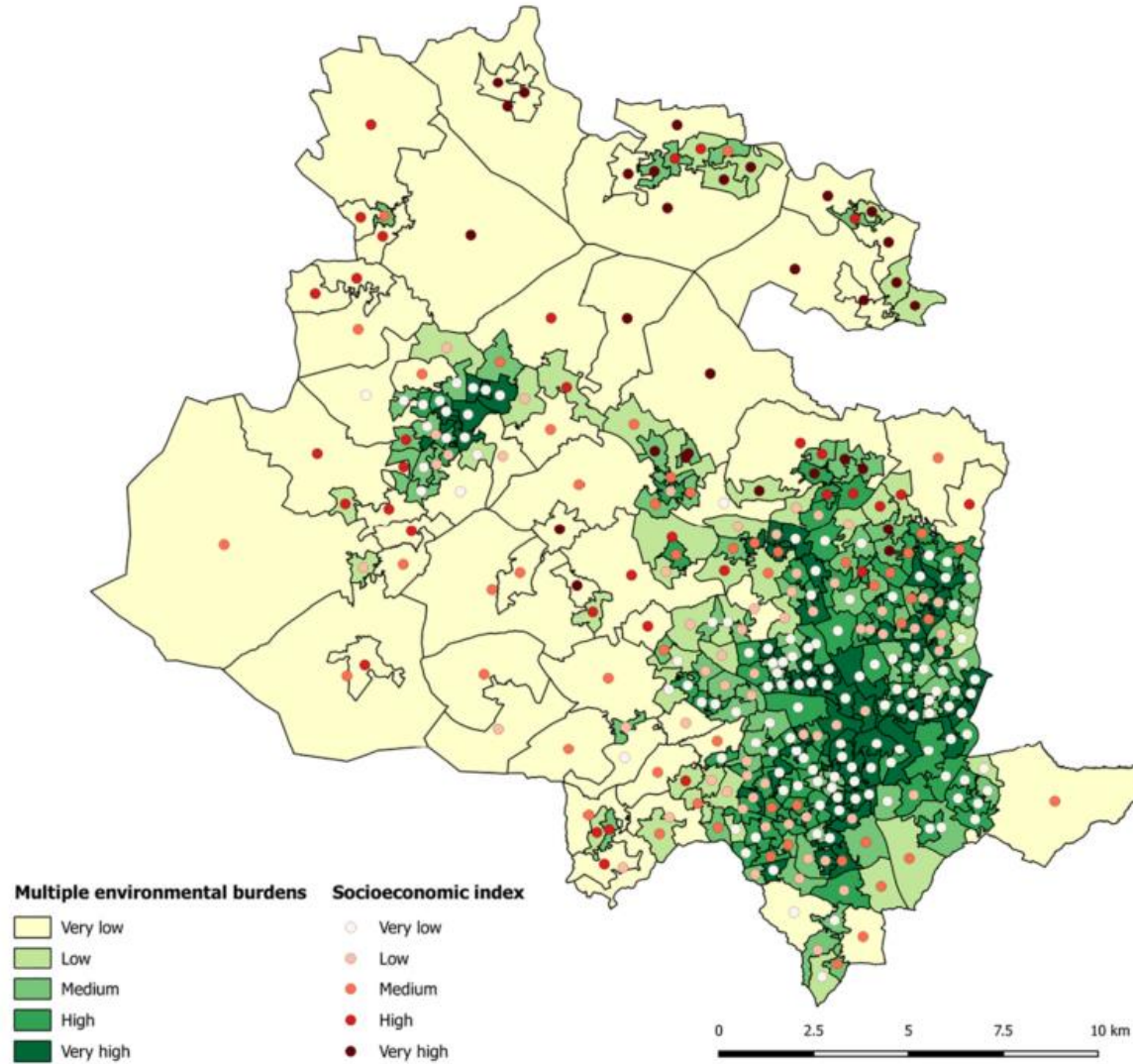
# Exposure levels are often socio-economically patterned...



THIS IMAGE HAS NOT BEEN MODIFIED. IT'S TIME TO CHANGE THAT.  
ERASE THE DIFFERENCE AT [WWW.ROBERTOHERNANDEZ.COM](http://WWW.ROBERTOHERNANDEZ.COM)



# Bradford, UK





# Bradford, UK

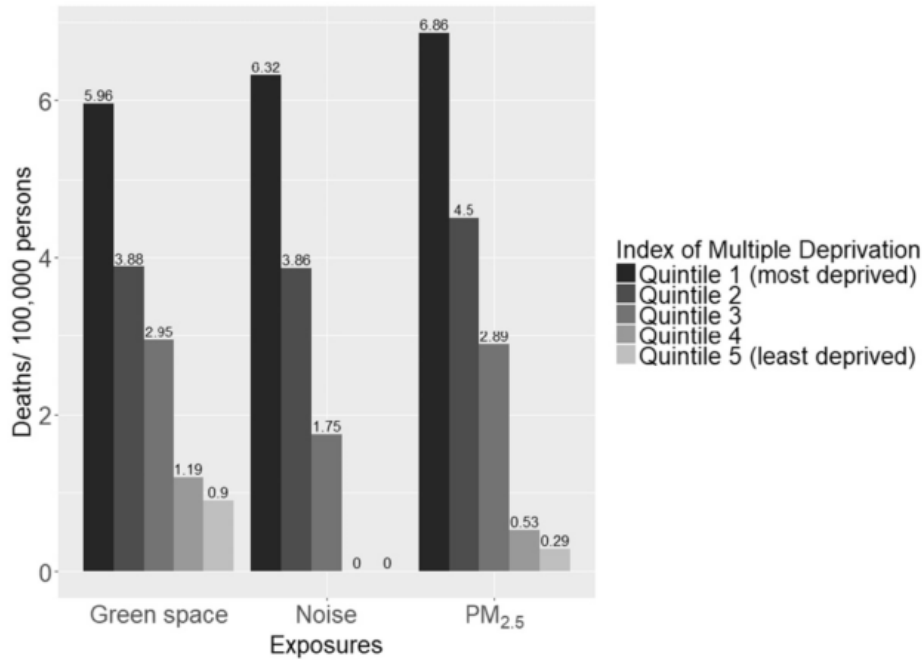


Fig. 4. Standardized mortality impacts by LSOA-level deprivation score.

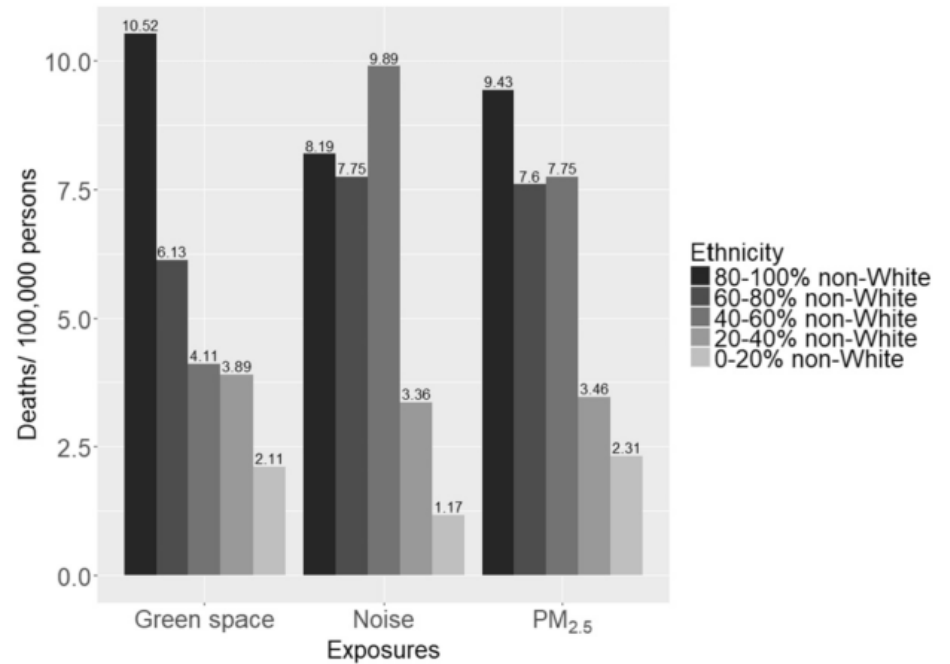
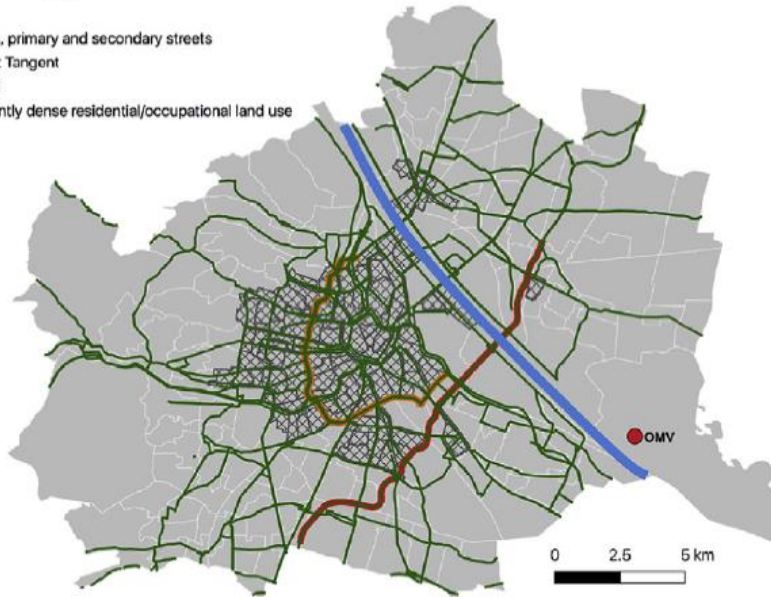


Fig. 5. Standardized mortality impacts by LSOA-level ethnicity.

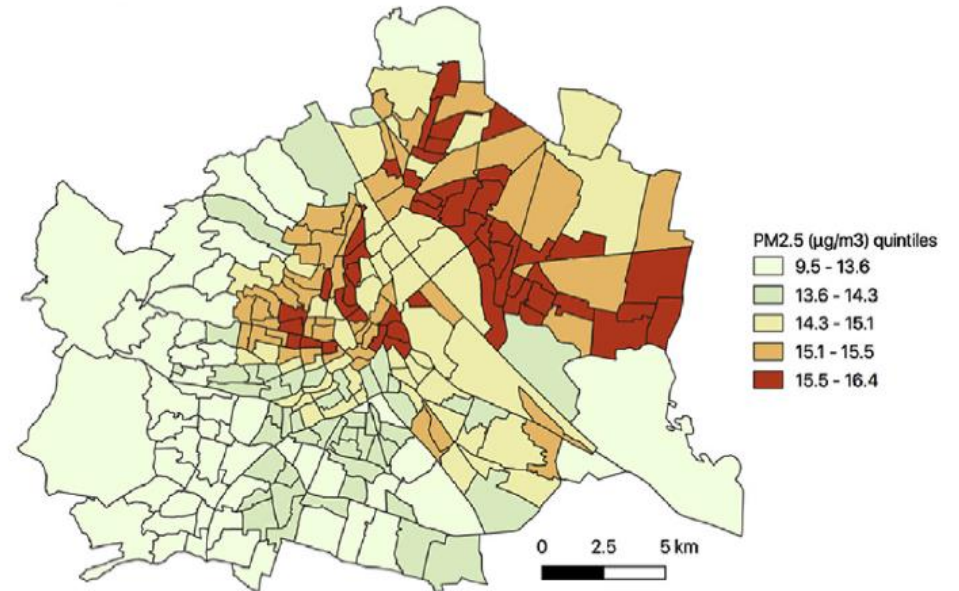
# Vienna, Austria

A

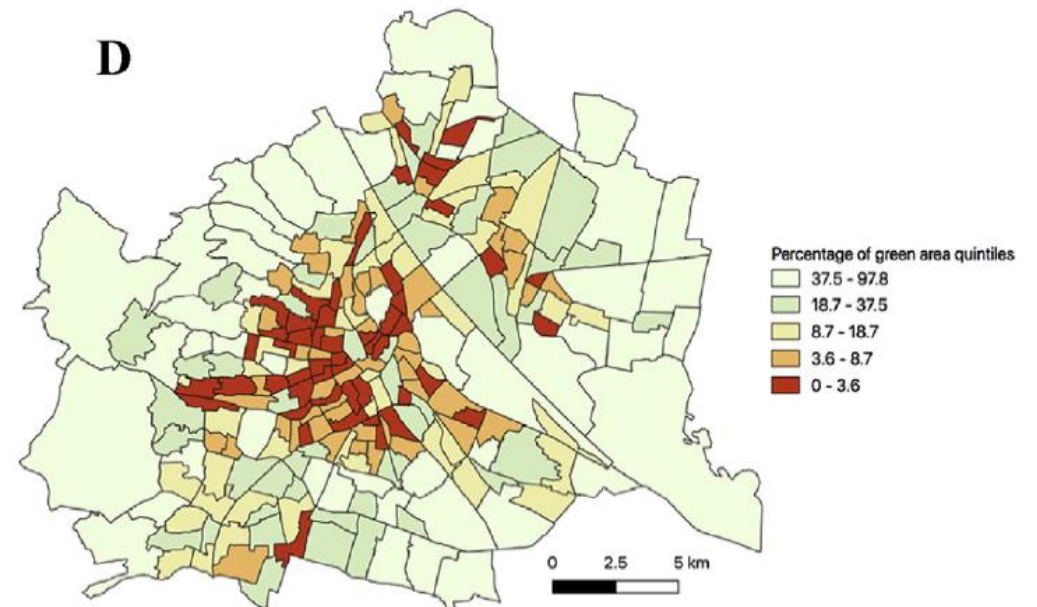
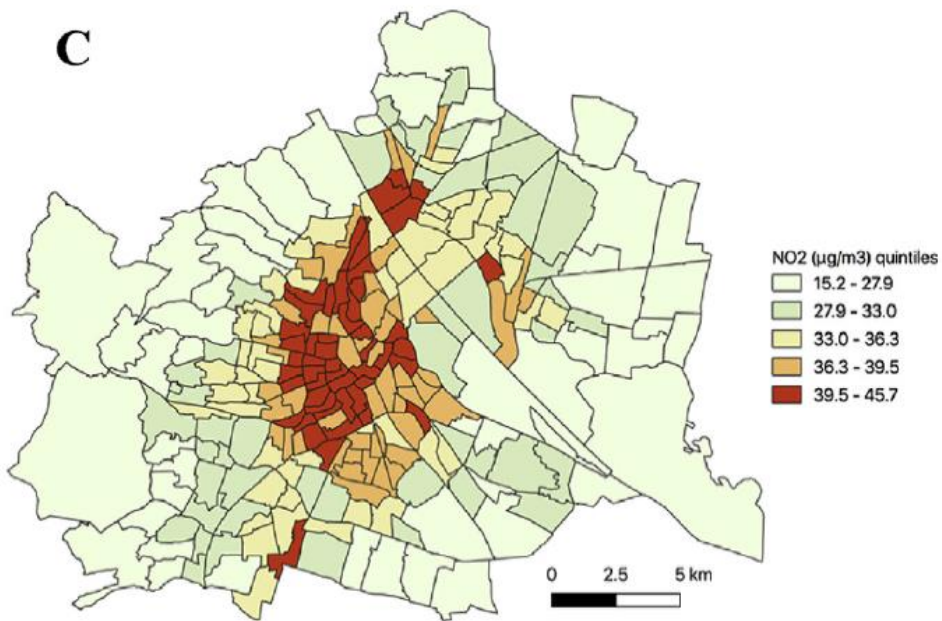
- Motorways, primary and secondary streets
- South-East Tangent
- Gürtel road
- ⊠ Predominantly dense residential/occupational land use



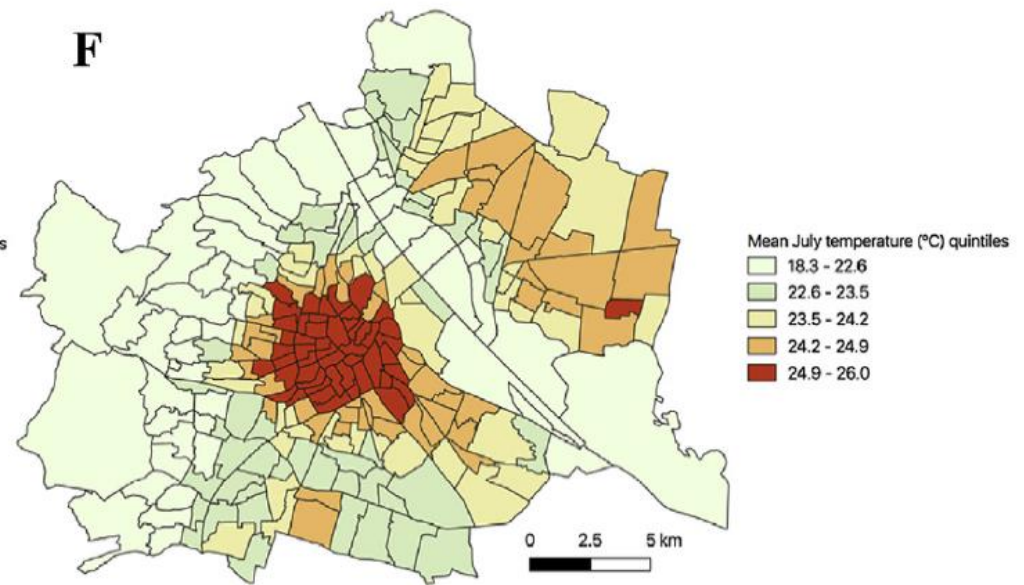
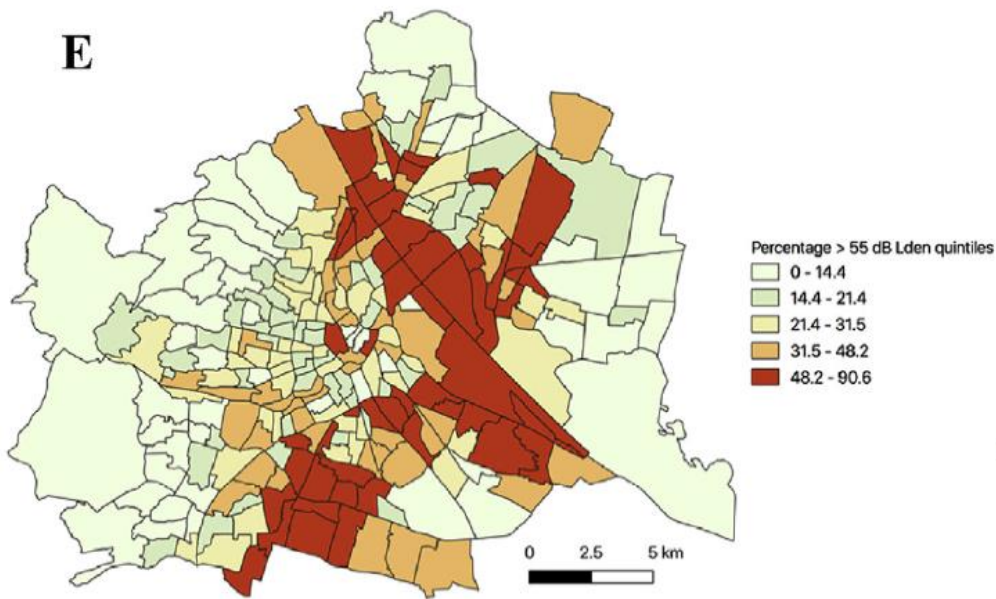
B



# Vienna, Austria



# Vienna, Austria



# Vienna, Austria

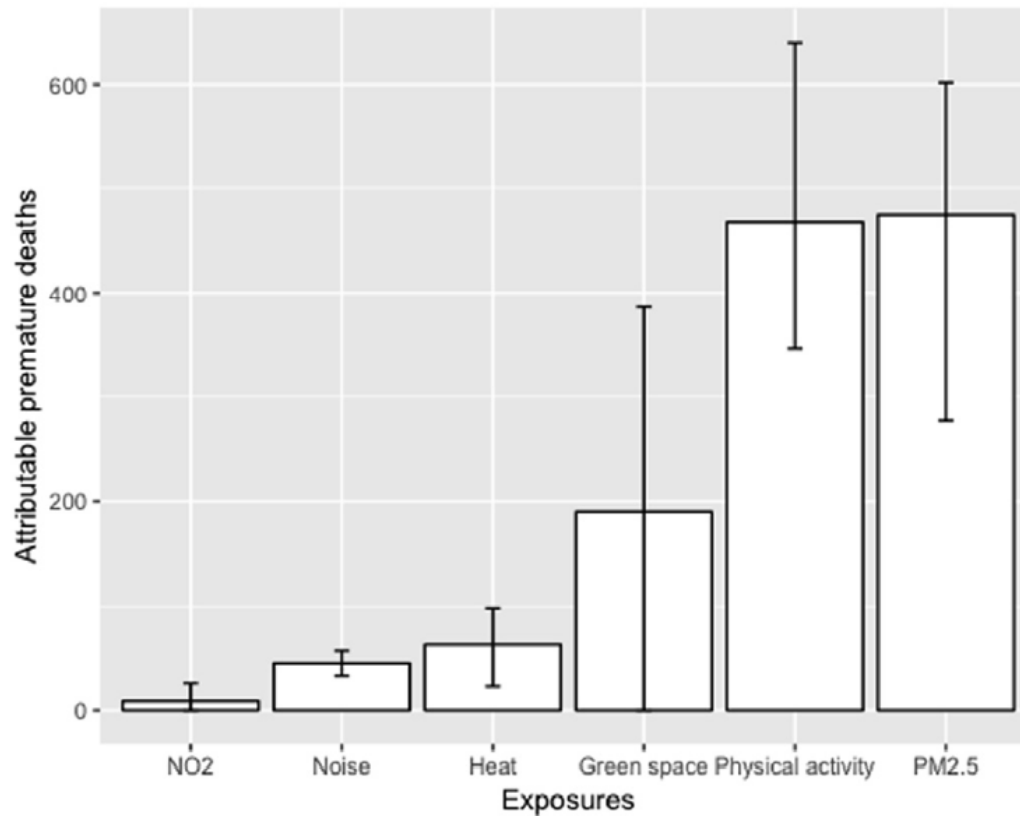
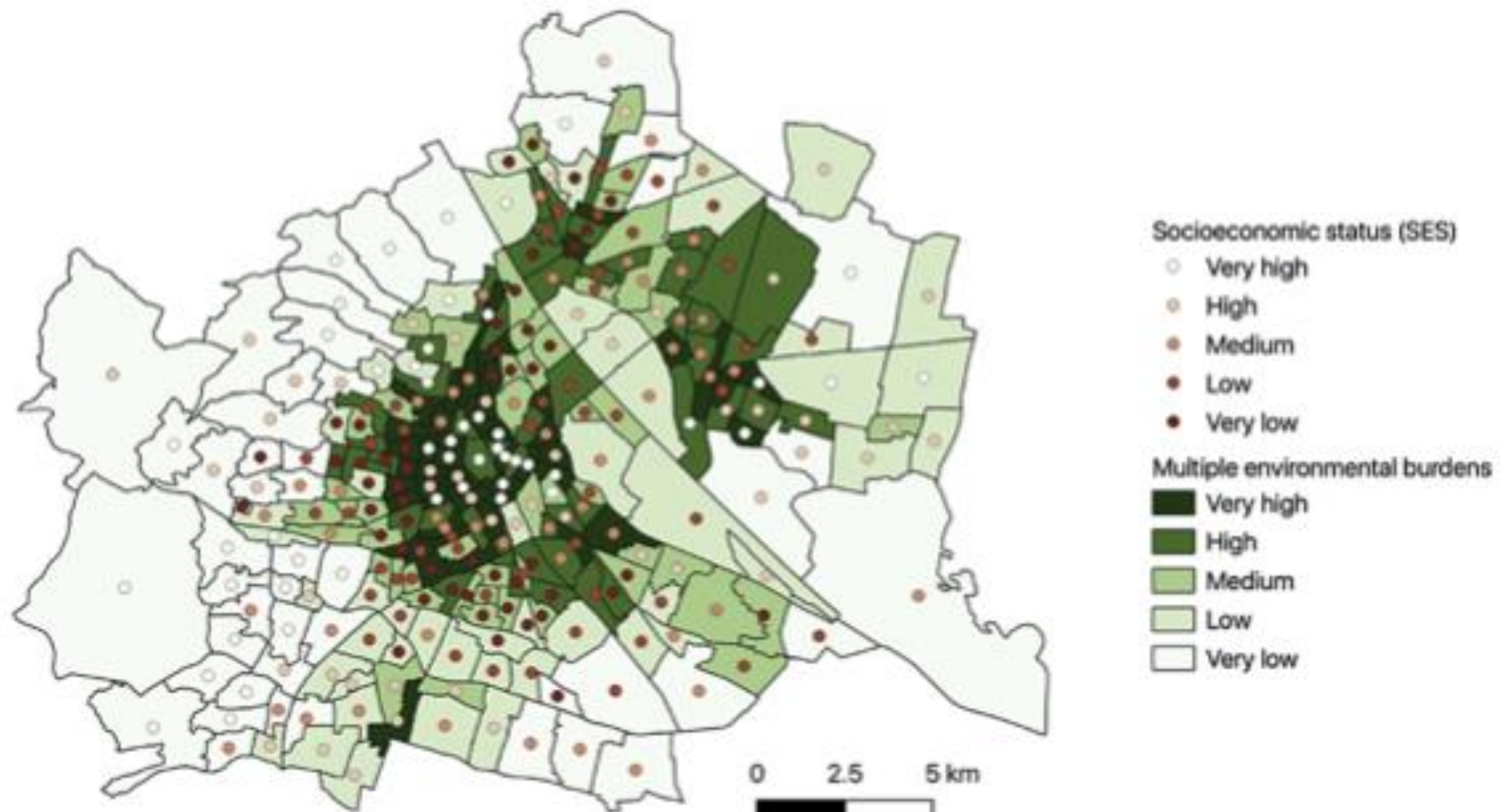
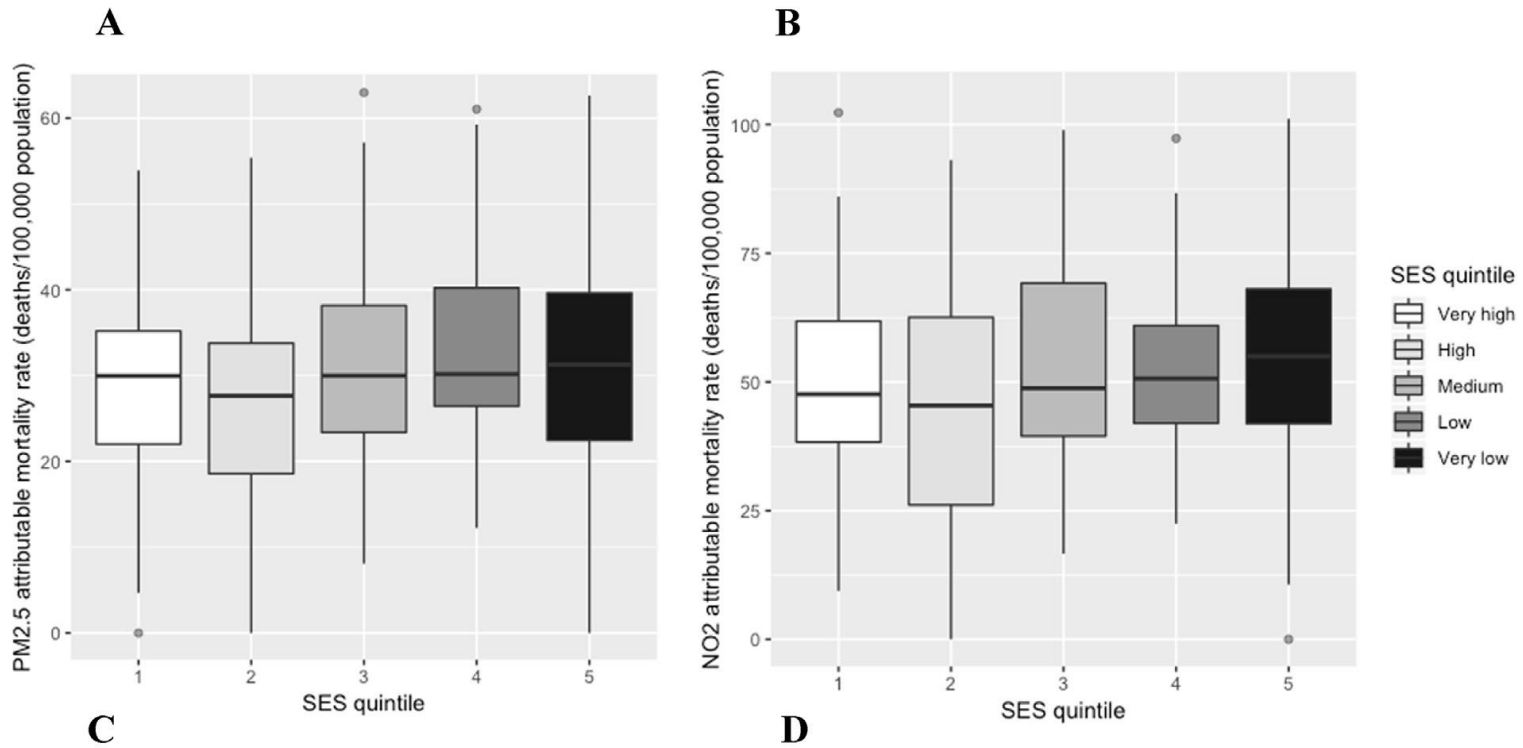


Fig. 2. Annual environmental exposures attributable premature deaths estimated for Vienna under compliance with international exposure guidelines. Error bars show 95% confidence intervals.

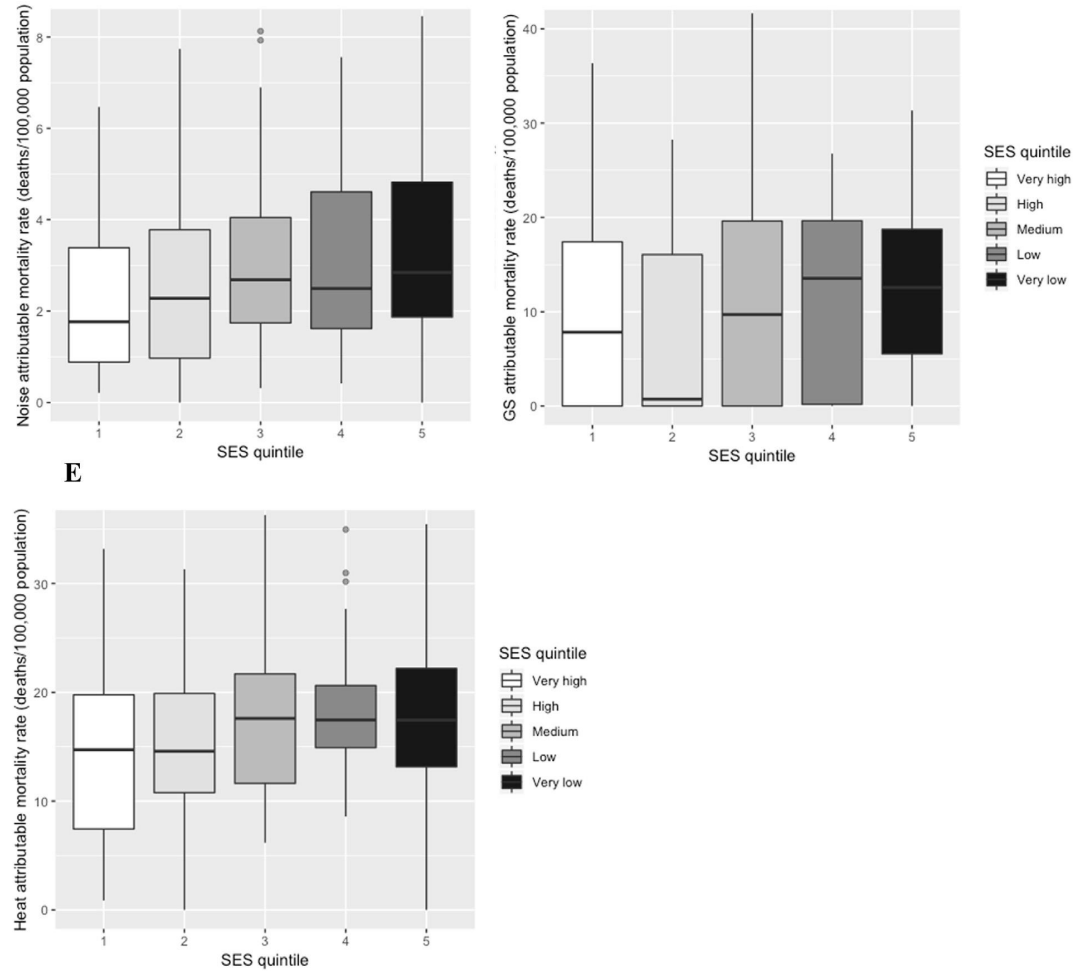
# Vienna, Austria



# Vienna, Austria

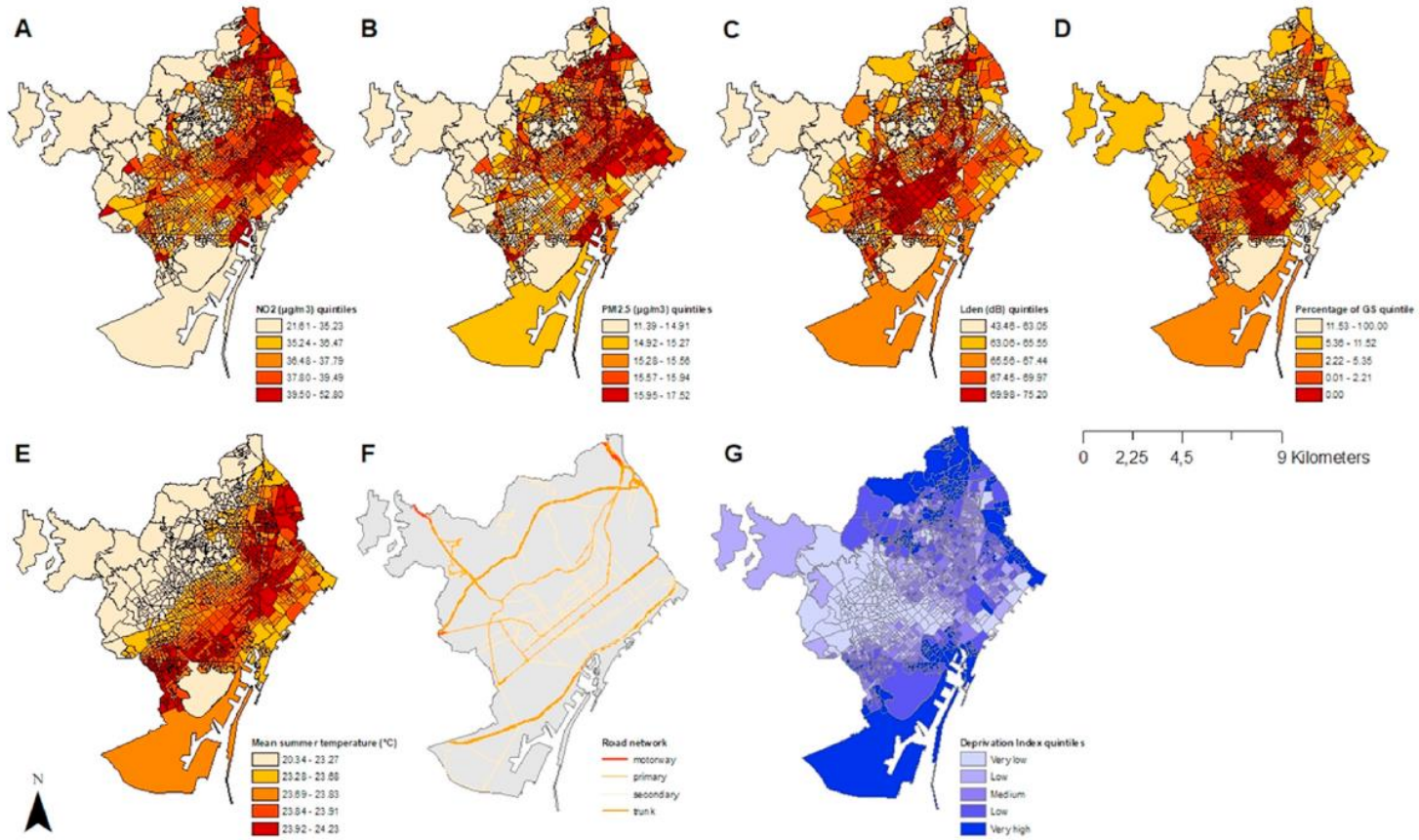


# Vienna, Austria

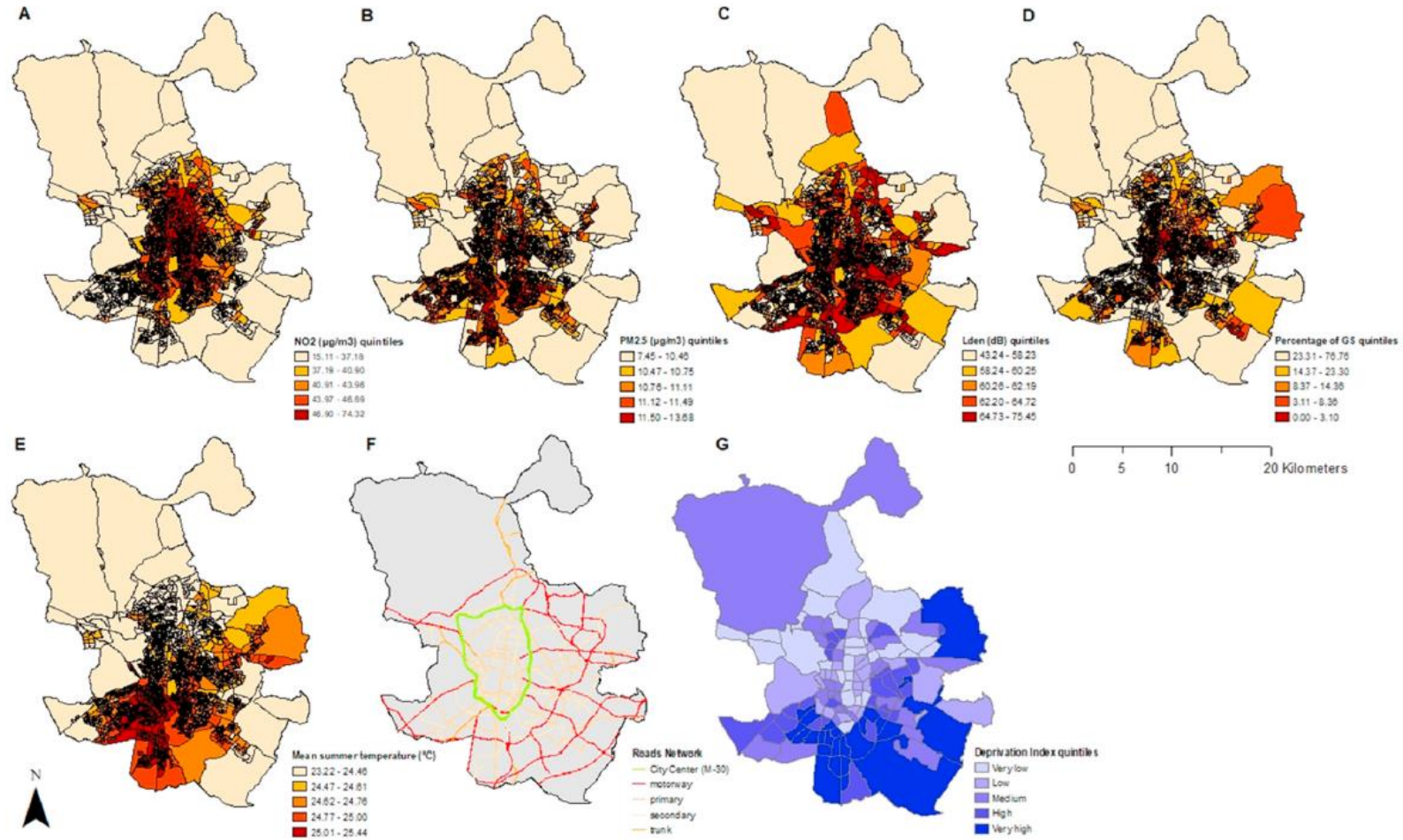




# Barcelona, Spain



# Madrid, Spain





Àrea d'intercanvi Bofons Cerdà

Enllaços

H12 H12

V3  
Car Gavarras



# Solutions in urban and transport planning

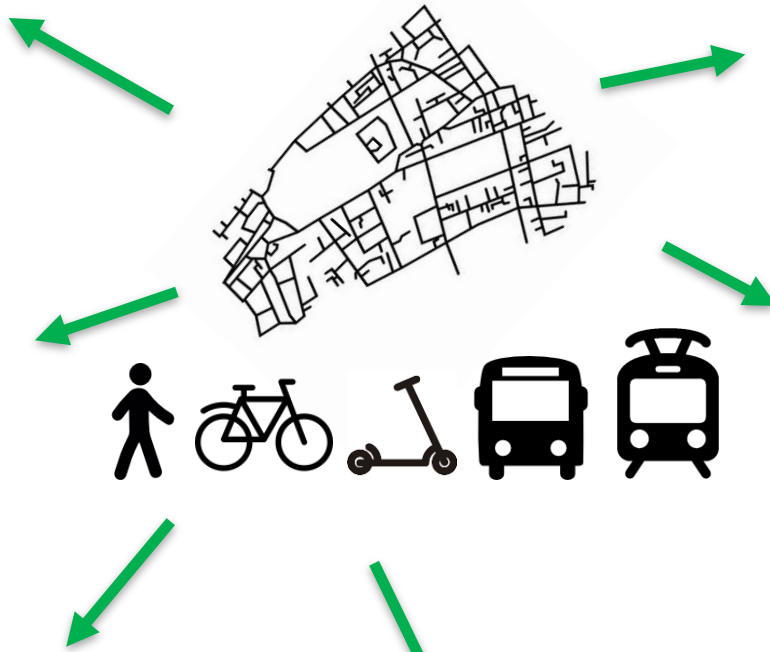
Lack of green and blue space



Air pollution



Physical inactivity



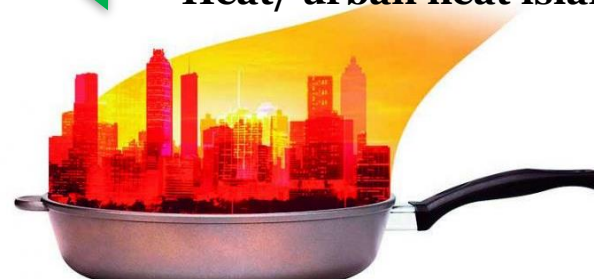
Noise



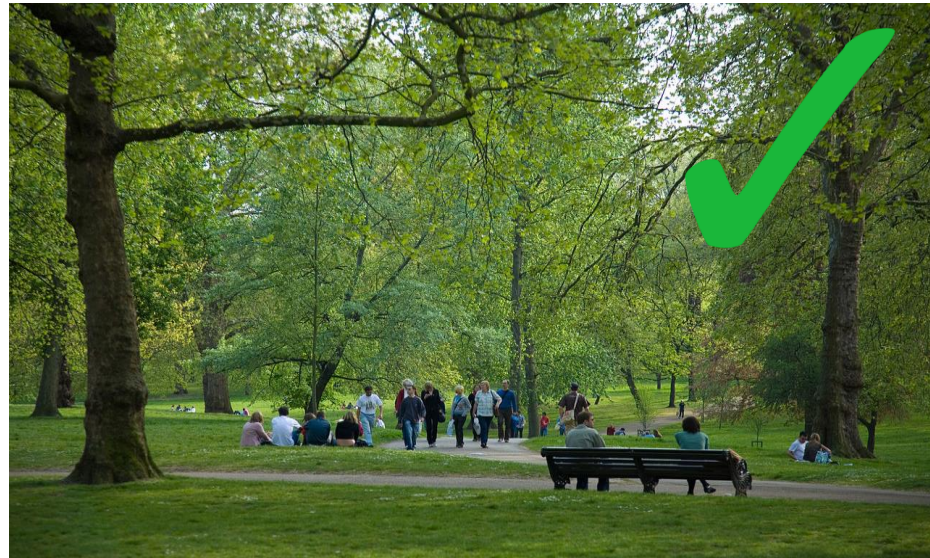
Traffic hazards



Heat/ urban heat island

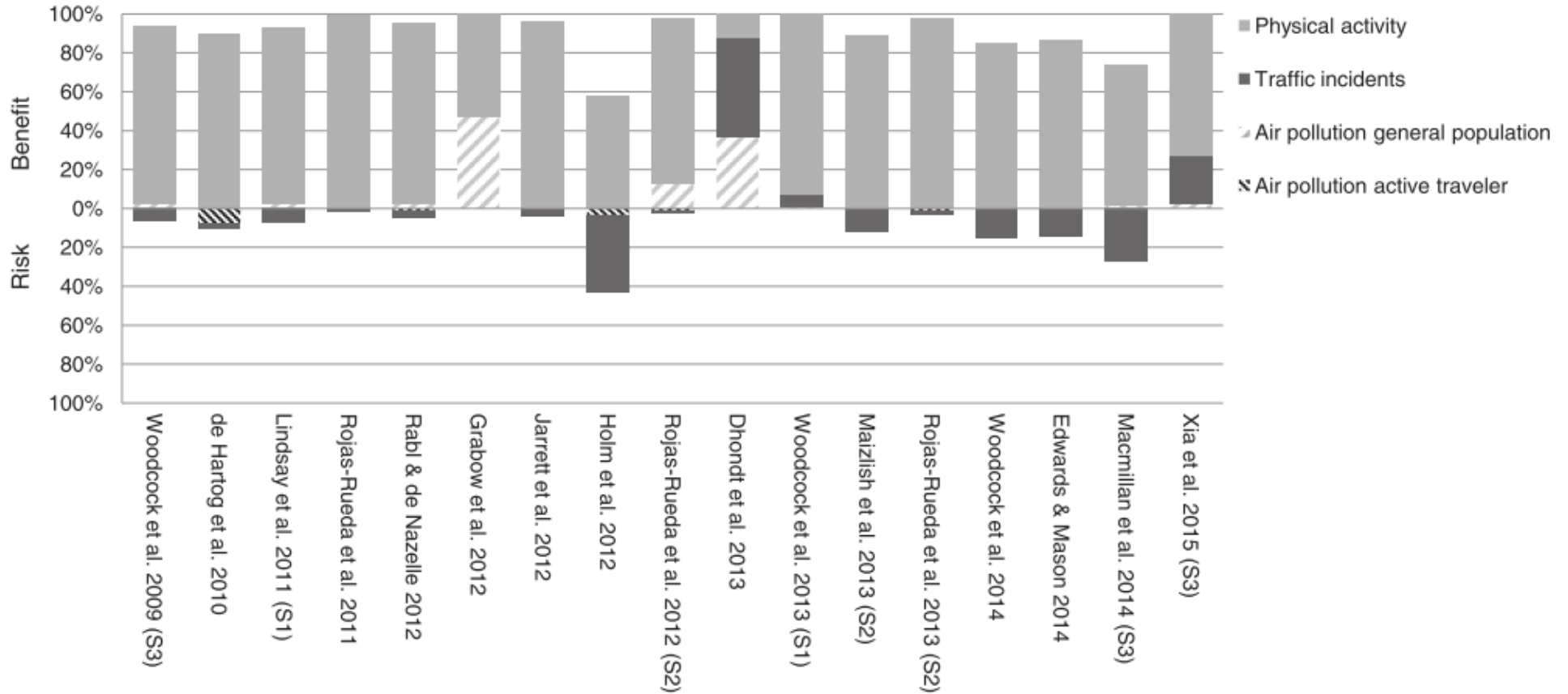


# #CitiesWeWant

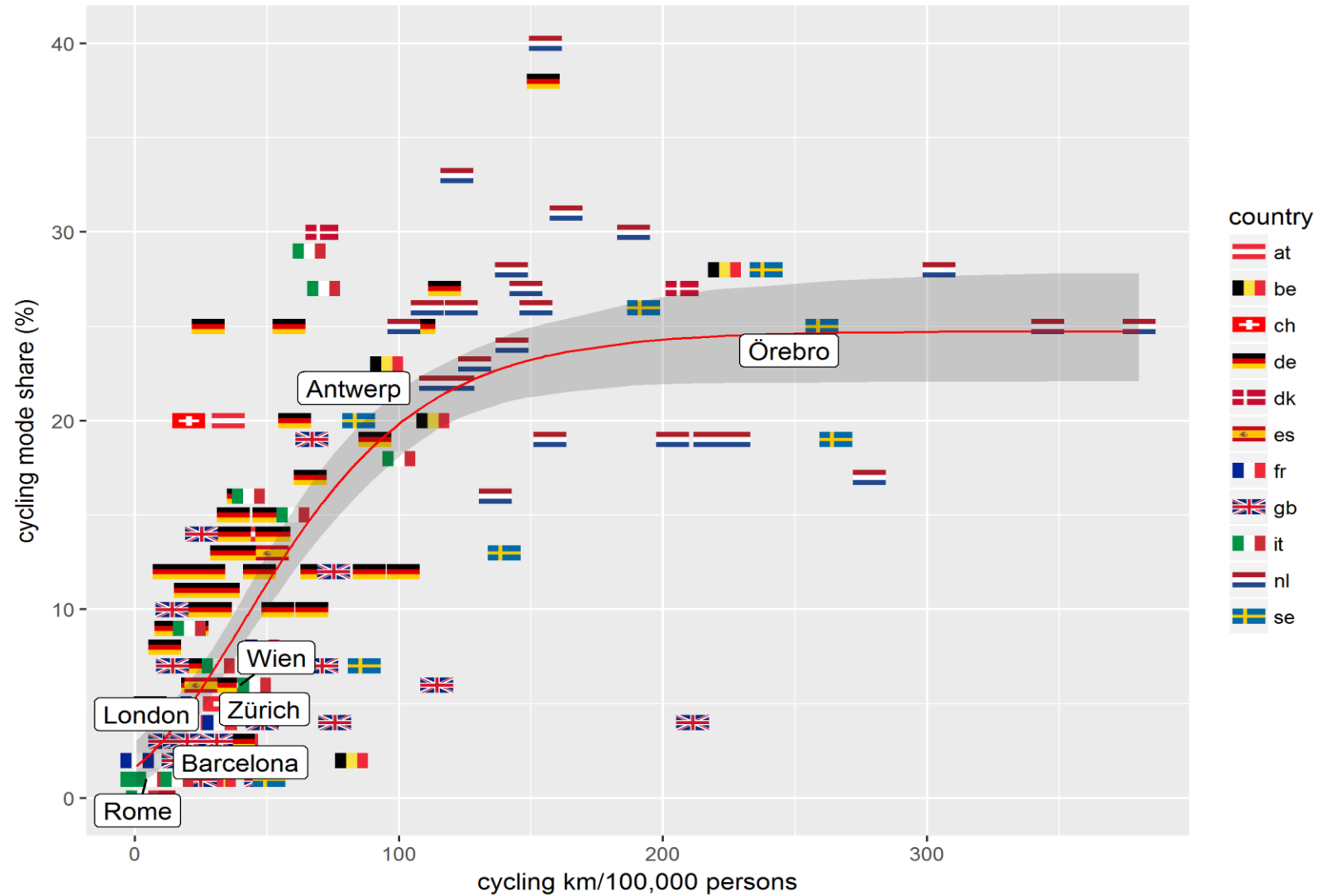


# Active transport health benefits

N. Mueller et al. / Preventive Medicine 76 (2015) 103–114



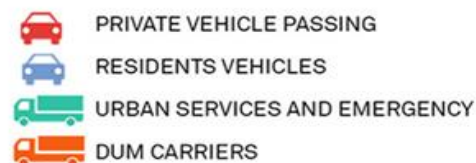
# Cycling infrastructure and modal share



## Current Model



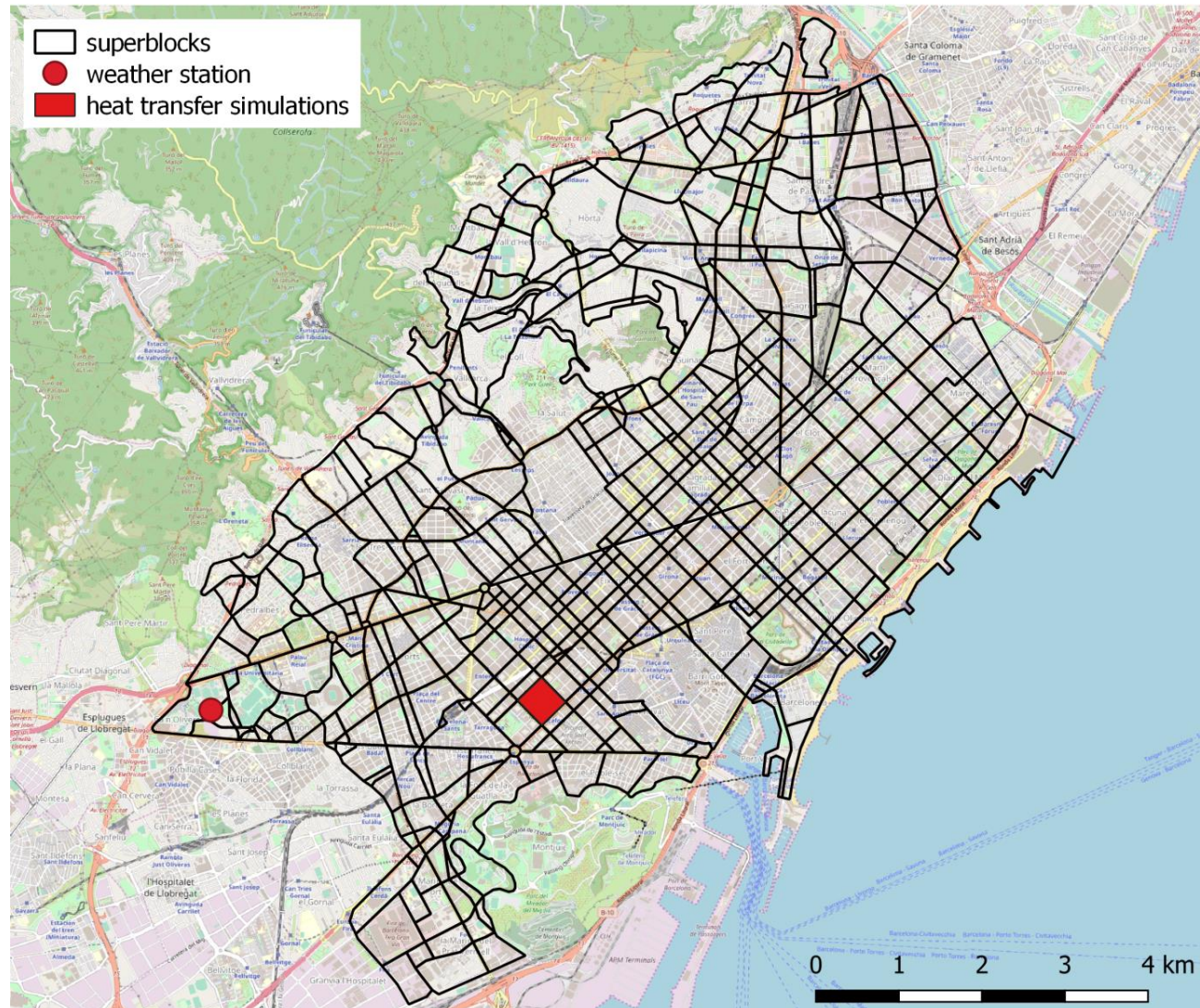
## Superblocks Model



- **Reduce motorized traffic**
- **Reclaim space for people**
- **Promote sustainable mobility and active lifestyles**
  - **Provide urban greening**
- **Mitigate effects of climate change**



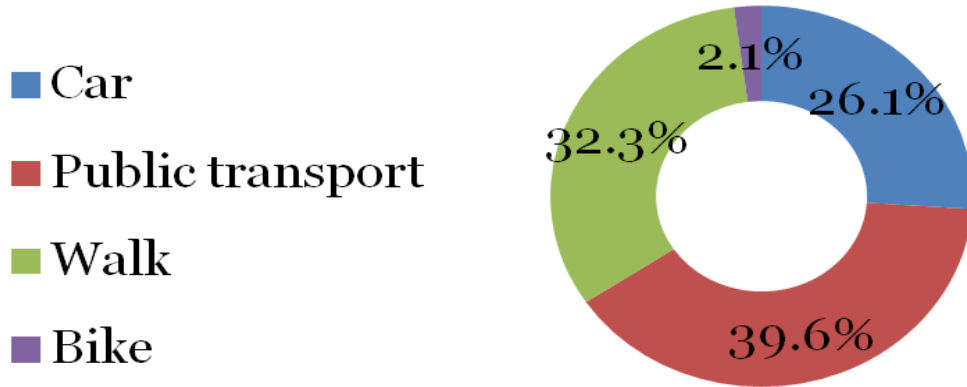
# Barcelona superblocks



# Physical activity

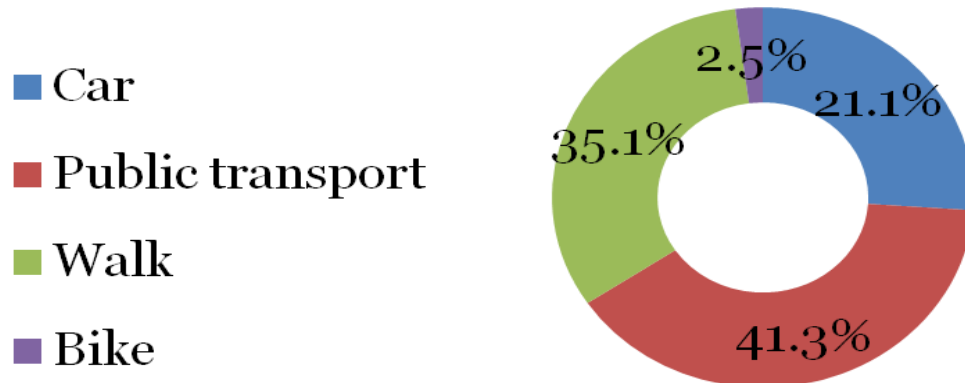
## Baseline Mode Share

4,556,393 trips/ day  
3.5 trips/ person/ day



Car: 1,189,219 trips/ day

## Superblock Mode Share



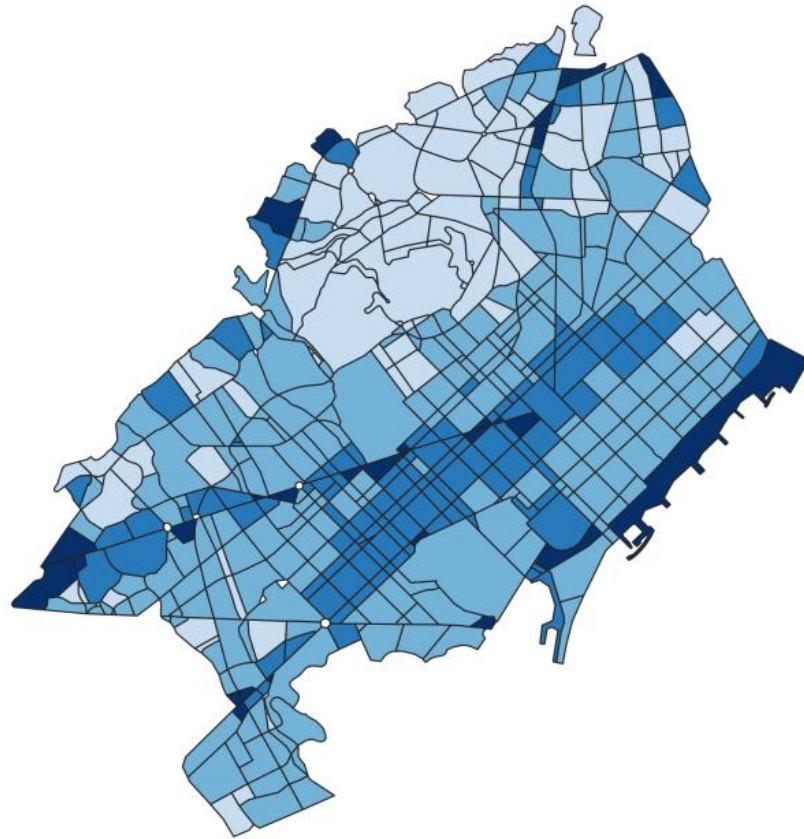
Car: 961,399 trips/ day

- 19.2 % relative reduction

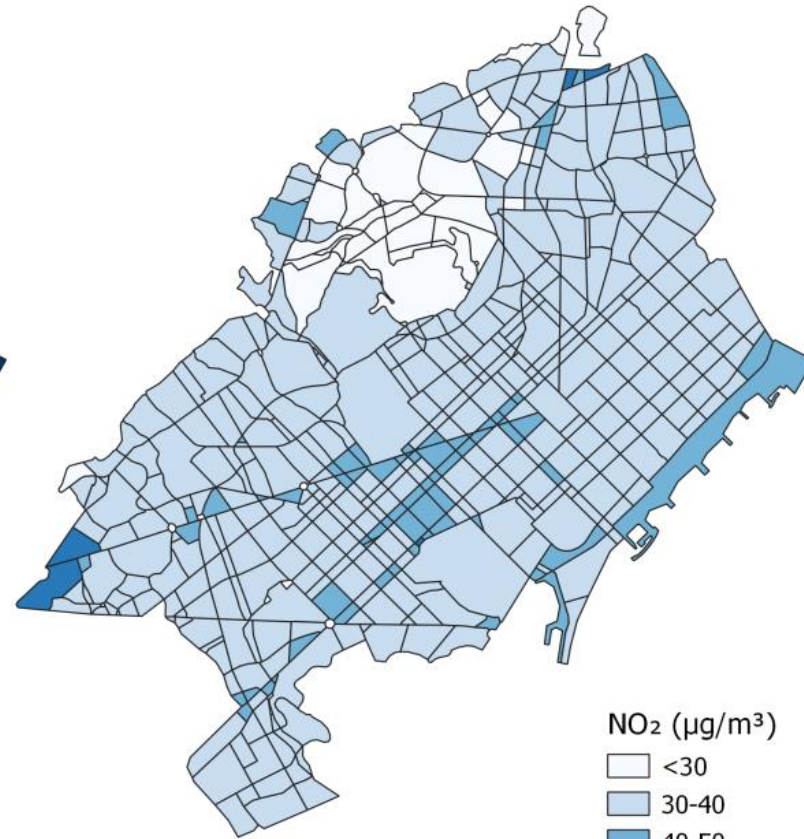
# Air pollution NO<sub>2</sub>

Baseline (2012)

Superblock

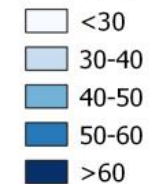


**47.2 µg/m<sup>3</sup>**



**35.7 µg/m<sup>3</sup>**

NO<sub>2</sub> (µg/m<sup>3</sup>)

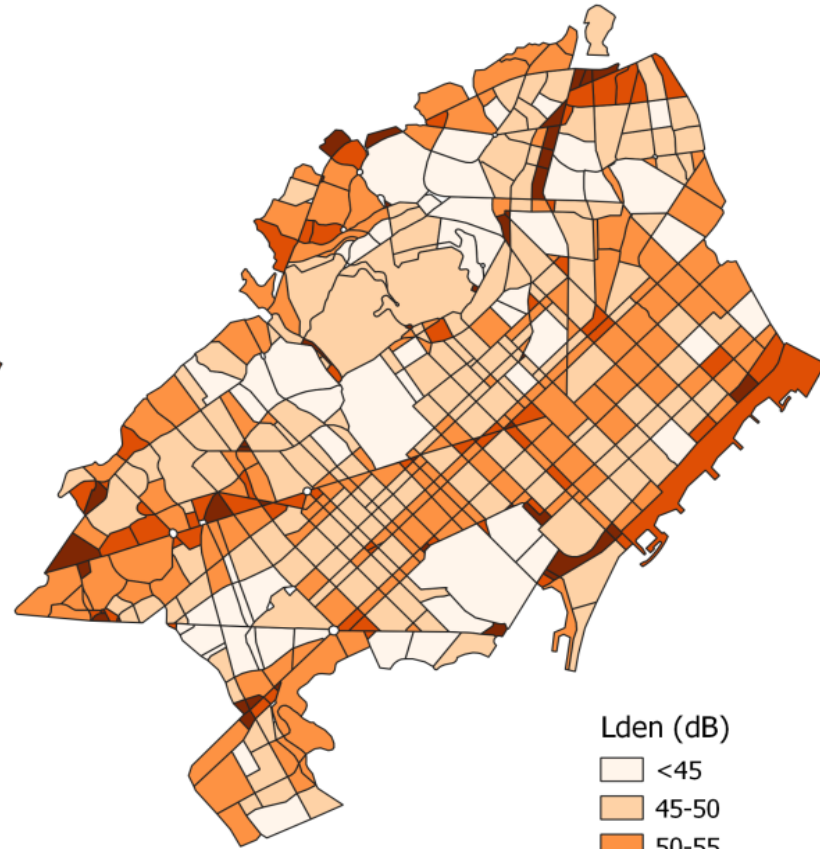
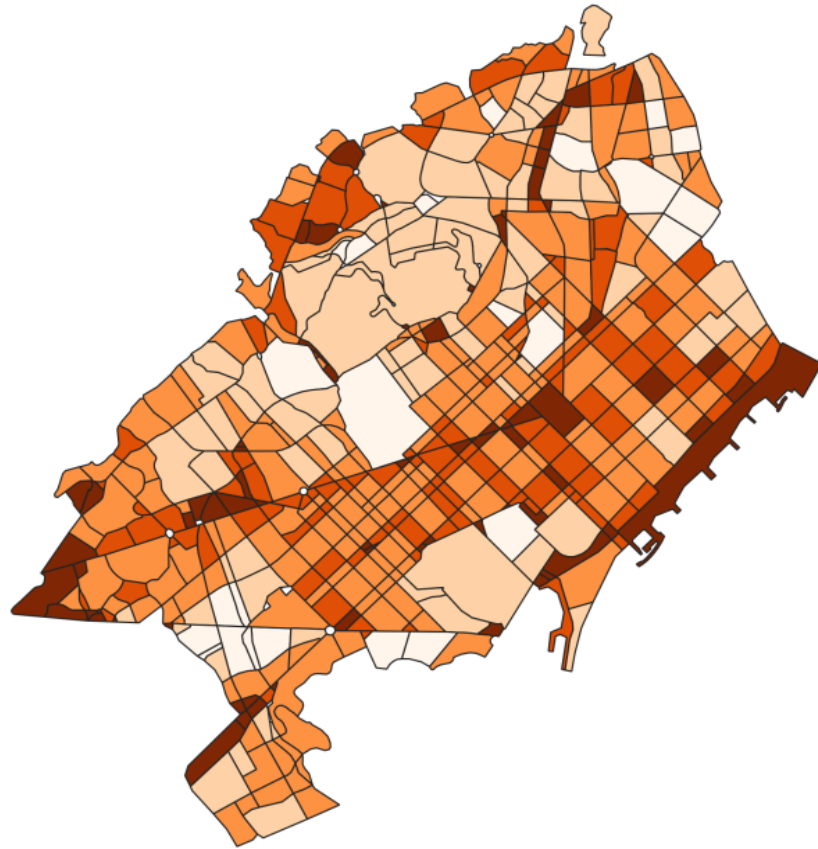


Street Air Quality Model 5.2  
N=1,301,827 (2017)

# Noise 24-h indicator $L_{den}$

Baseline (2016)

Superblock

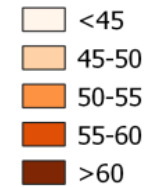


0 1 2 3 4 km

**54.2 dB**

**51.3 dB**

$L_{den}$  (dB)



Computer Aided Noise Abatement software (CadnaA)  
N=1,301,827 (2017)

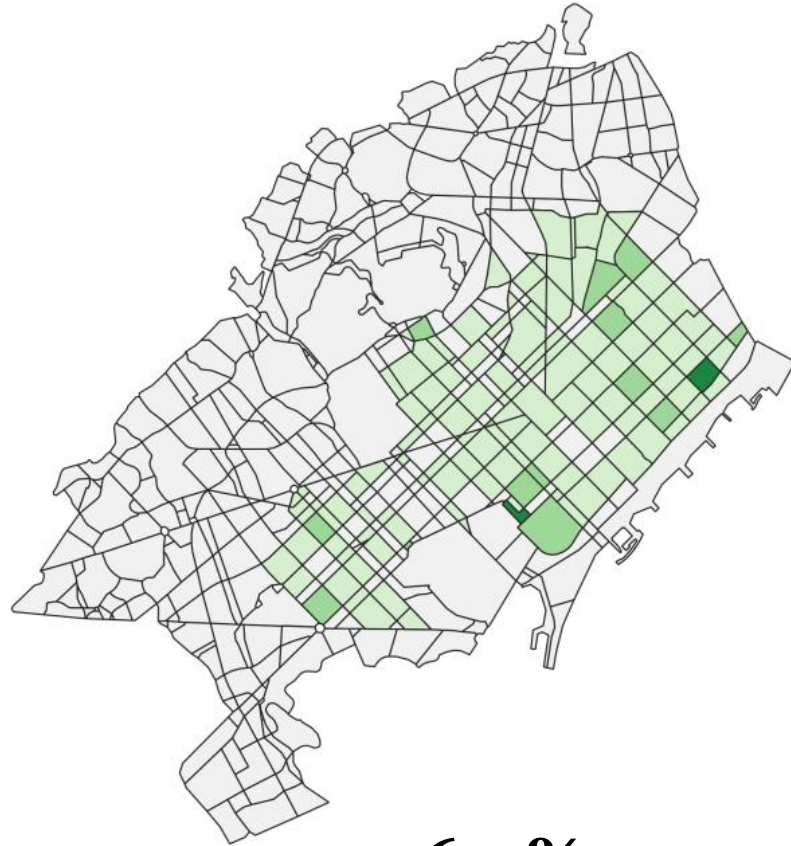
# Green spaces - Eixample



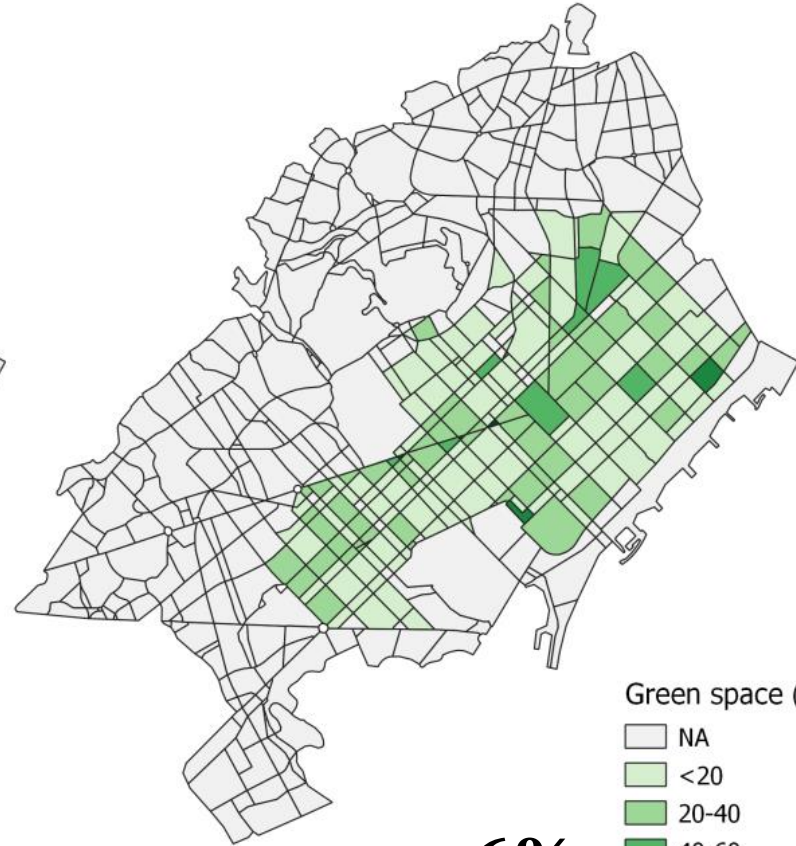
# Green spaces - Eixample

Baseline (2010)

Superblock

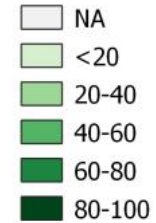


**6.5%**



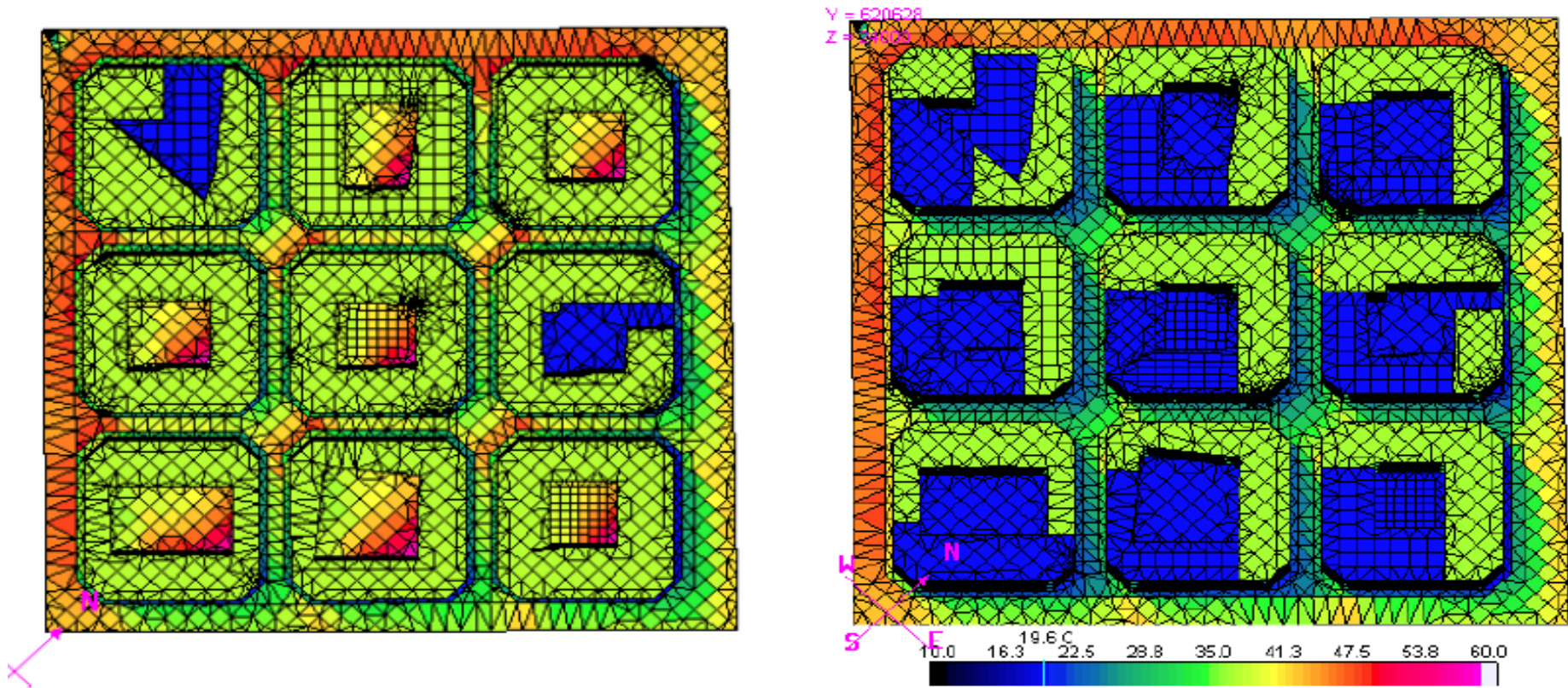
**19.6%**

Green space (%)



Datos cartográficos del Ayuntamiento de Barcelona (2010)  
N=464,216 (Eixample)

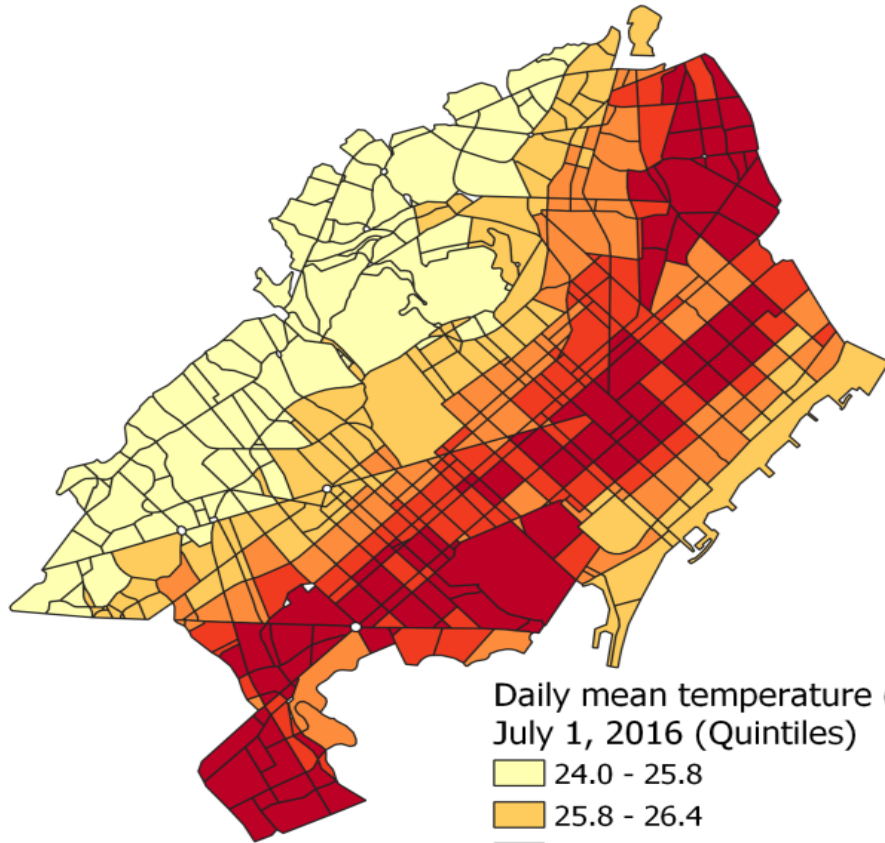
# Urban heat island effect



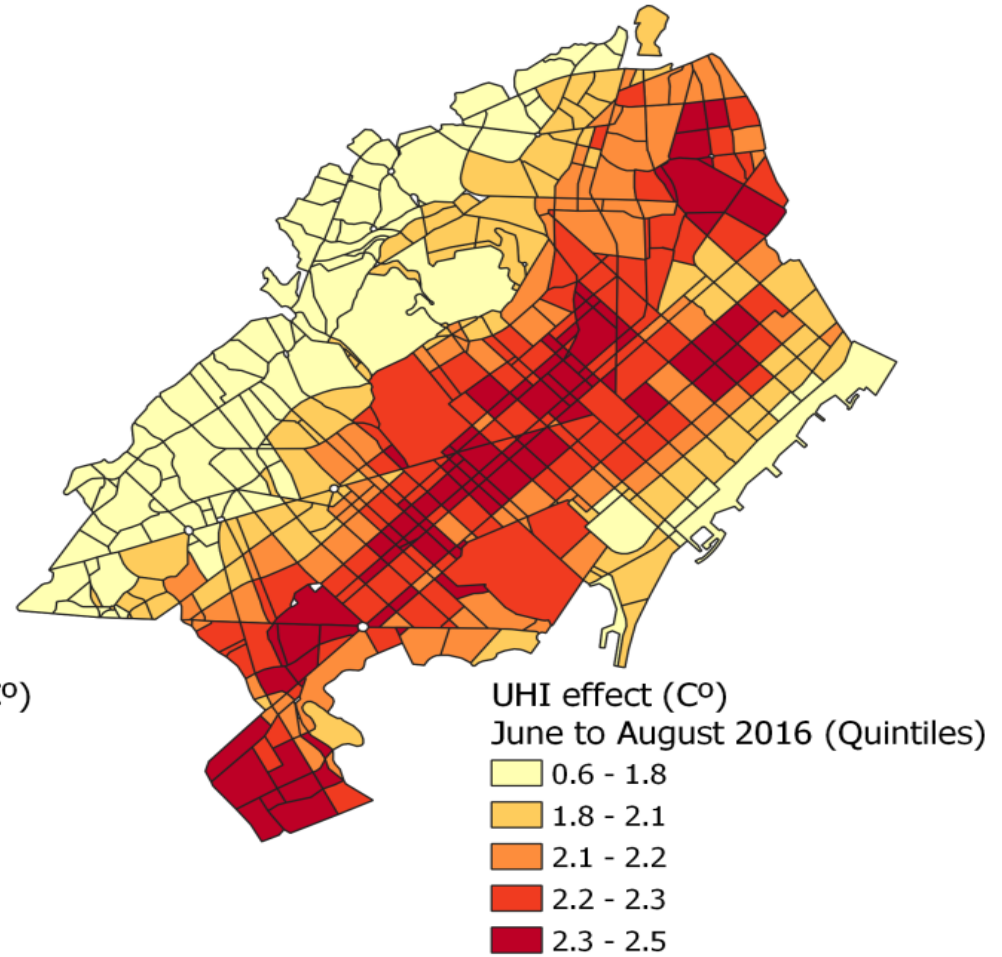
# Temperature/ UHI effect

Baseline (2010)

Superblock



0 1 2 3 4 km





# Premature mortality impacts

**667 premature deaths preventable (95% CI: 235-1,098)**

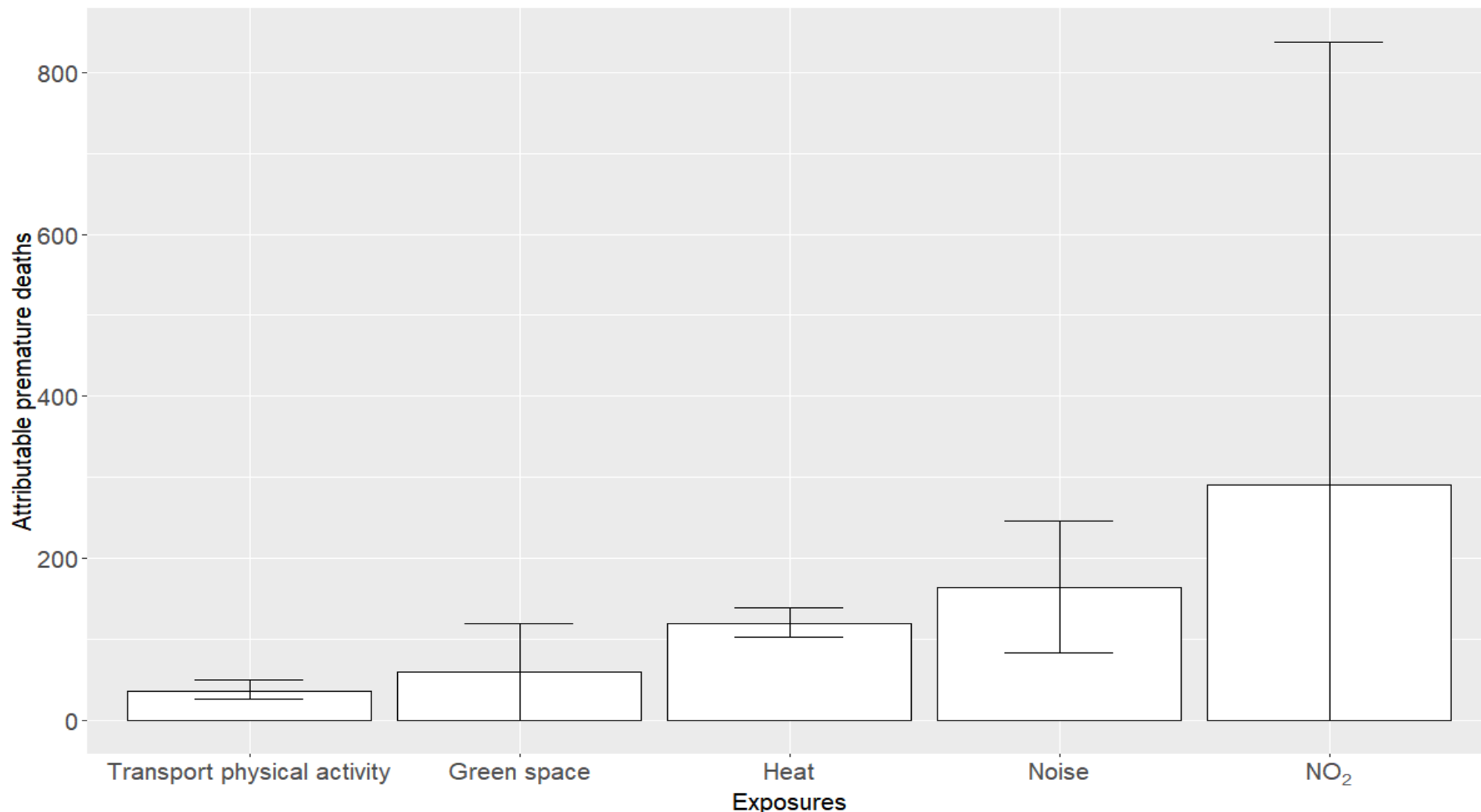
36 deaths  
95% CI: 26-50

60 deaths  
95% CI: 0-119

117 deaths  
95% CI: 101-137

163 deaths  
95% CI: 83-246

291 deaths  
95% CI: 0-838



**≈ 5% of premature mortality**

**Thank you. Any comments or questions?**

**ISGlobal**

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**A partnership of:**

