



Sources of air pollution in cities, and benefits of improving air quality in 1000 European cities

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THE URBAN BURDEN
OF DISEASE ESTIMATION
FOR POLICY MAKING

Assessing Health Impacts, Costs, and Benefits of:



In **1,000** European cities

Cities in Depth: Case Studies







- Barcelona
- Brussels
- Munich
- Warsaw
- Basel
- Copenhagen
- Sofia
- Zagreb
- Bradford
- Manchester
- Utrecht

UBDPolicy aims to:

- Improve the estimation of health and well-being impacts and socio-economic costs and/or benefits of major urban environmental stressors
- Advance methodological approaches
- Provide good practices for urban areas to help strengthen evidence-based policy-making at city, national, and EU levels
- Effectively contribute to the development of new and existing urban planning, transport planning, and environmental policies, plans, and initiatives.



Work Packages and Partners

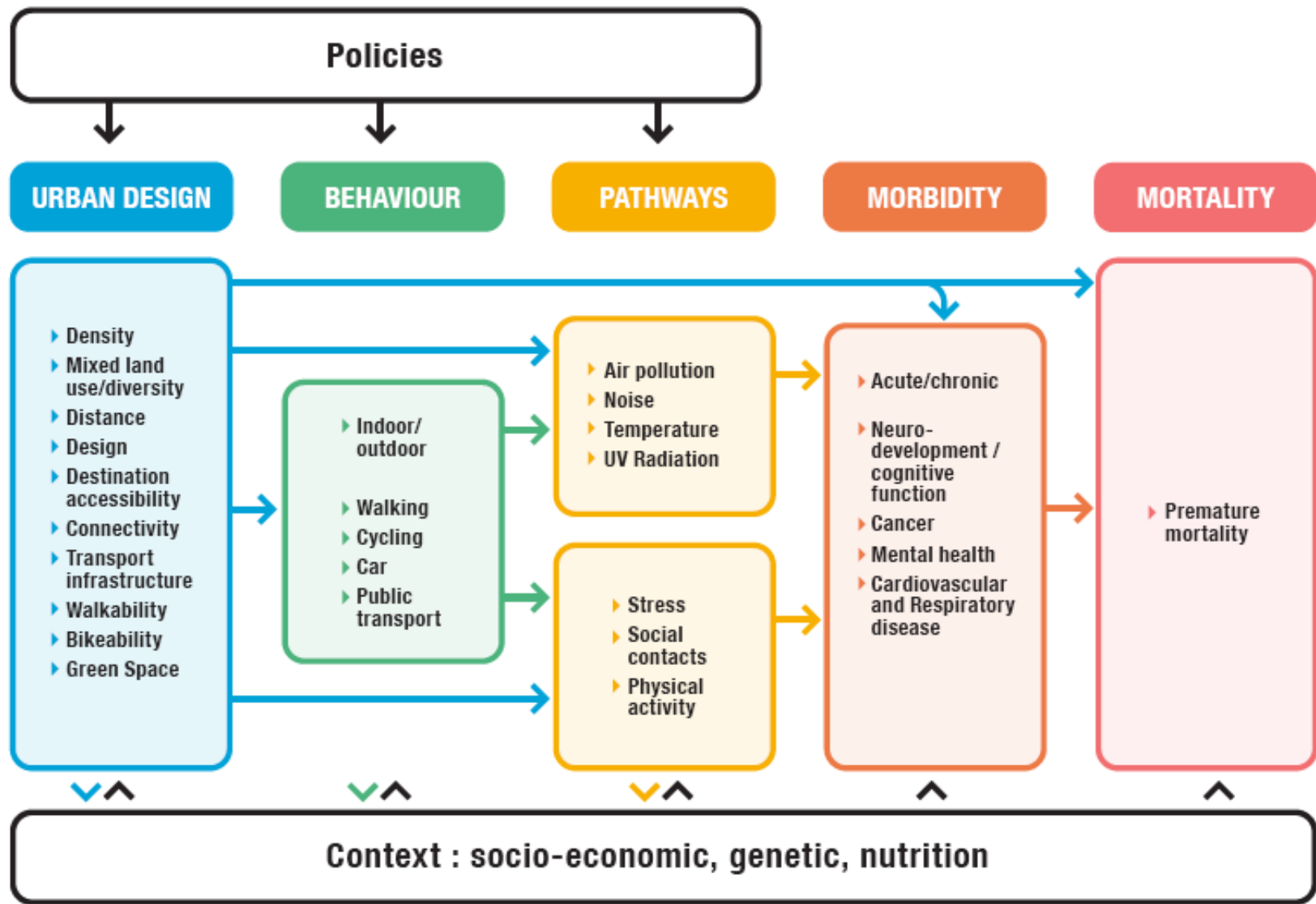
| | | (*Project coordinator) | |
|---|---|---|--|
|  | <div style="border: 1px solid black; padding: 5px; width: fit-content;">WP5: Health and socio-economic assessment</div> | <div style="border: 1px solid black; padding: 5px; width: fit-content;">WP7: Management</div> | |
|  | <div style="border: 1px solid black; padding: 5px; width: fit-content;">WP1: New methods and health analyses</div> | | |
|  | <div style="border: 1px solid black; padding: 5px; width: fit-content;">WP2: New methods and health and well-being indicators</div> | | |
|  | <div style="border: 1px solid black; padding: 5px; width: fit-content;">WP3: Tools and guidelines for cost-benefit analyses</div> | | |
|  | <div style="border: 1px solid black; padding: 5px; width: fit-content;">WP4: Environmental stressors estimates for cities</div> | | |
|  | <div style="border: 1px solid black; padding: 5px; width: fit-content;">WP6: Consultation and knowledge translation</div> | | |

Project Duration

January 2023 – December 2026

Budget

5M EUR

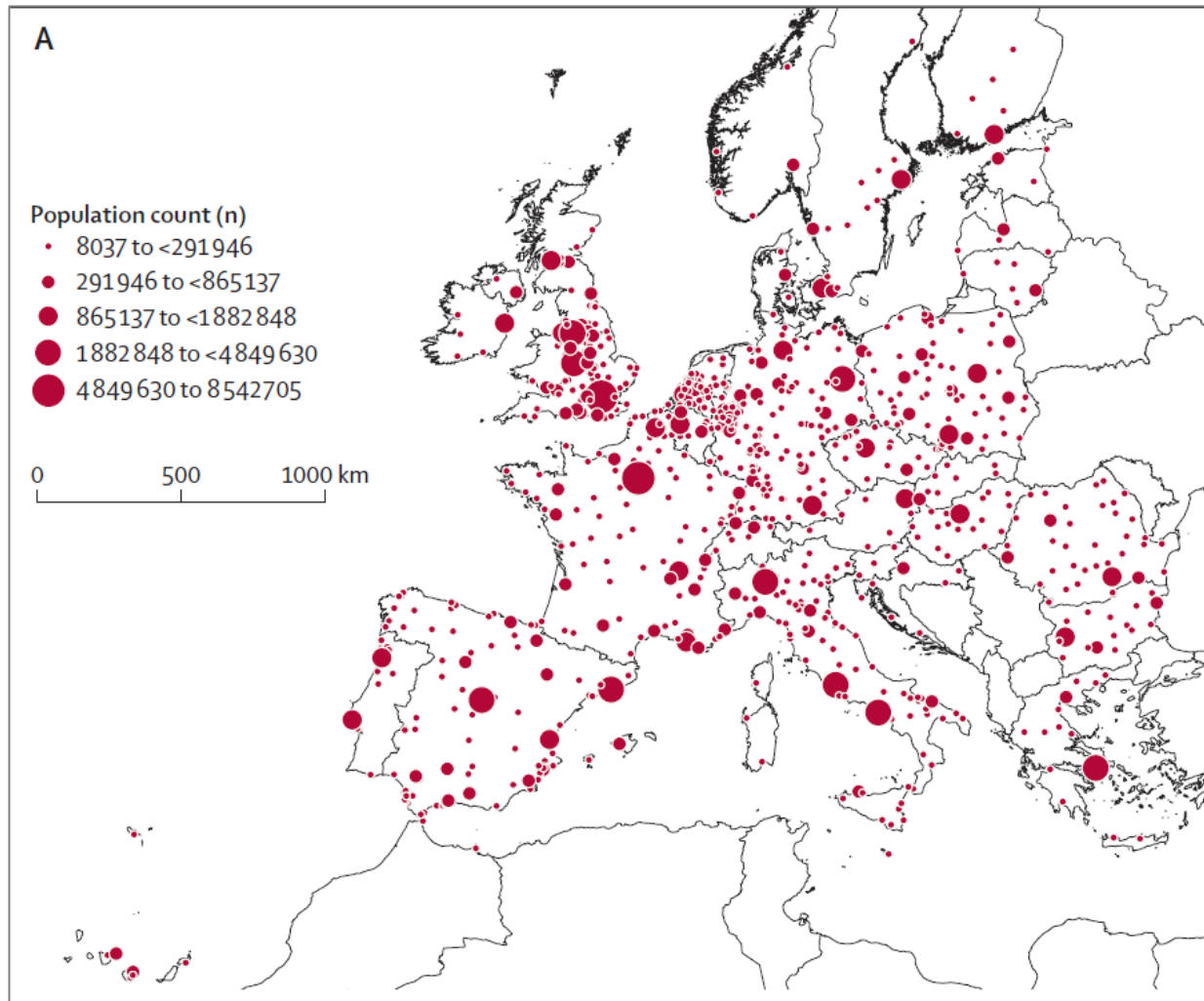


Nieuwenhuijsen 2016 and 2018

Holistic and systematic approach

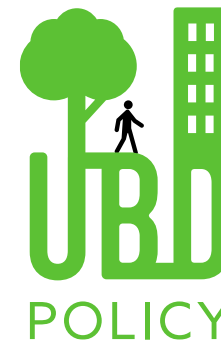


European cities



Almost 1000
European cities

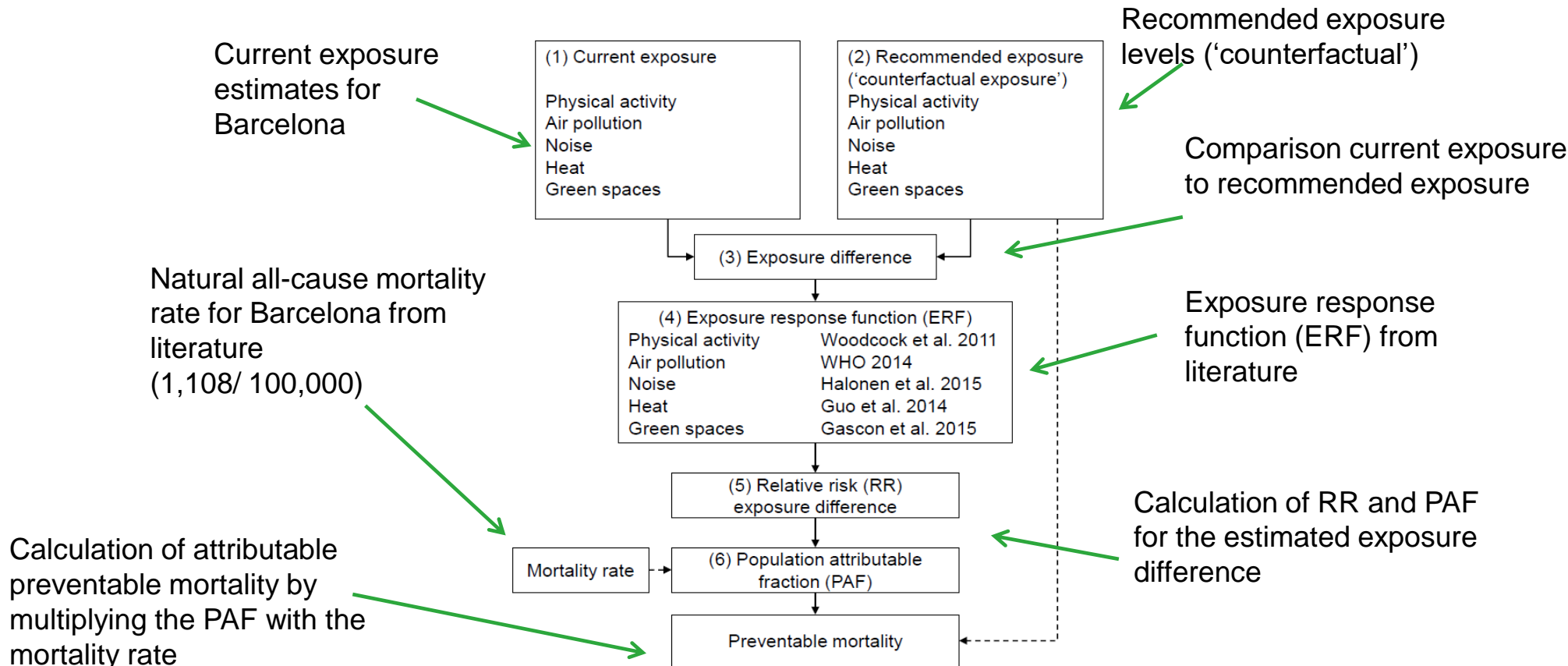
Health impact
assessment



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Urban and TranspOrt Planning Health Impact Assessment tool (UTOPHIA)



CITIES IN EUROPE COULD AVOID UP TO

166,000 deaths each year

by meeting the

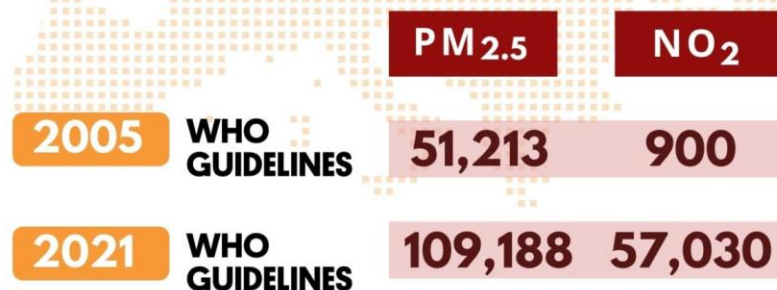
**New WHO Global
Air Quality Guidelines**

<https://isglobalranking.org/>

ISGlobal ——— Ranking of **Cities**

#ISGlobalRanking

AVOIDABLE DEATHS IN EUROPEAN CITIES



| | PM _{2.5} (95% CI) | Nitrogen dioxide (95% CI) |
|--|----------------------------|---------------------------|
| 2005 WHO Global Air Quality Guidelines | 51 213 (34 036–68 682) | 900 (0–2476) |
| 2021 WHO Global Air Quality Guidelines | 109 188 (72 846–145 947) | 57 030 (0–155 257) |
| Lowest level in any city | 124 729 (83 332–166 535) | 79 435 (0–215 165) |

Table: Number of premature deaths that could be prevented in European cities if PM_{2.5} and nitrogen dioxide concentrations met guidelines or lowest levels

Khomenko et al 2021

Top 6

EUROPEAN CITIES WITH THE HIGHEST MORTALITY DUE TO AIR POLLUTION



ISGlobal ——— RankingOfCities

PM_{2.5}

- 1 **BRESCIA**
Italy
- 2 **BERGAMO**
Italy
- 3 **KARVINÁ**
Czech Republic
- 4 **VICENZA**
Italy
- 5 **SILESIA METROPOLIS**
Poland
- 6 **OSTRAVA**
Czech Republic

NO₂

- 1 **MADRID** (Metropolitan area)
Spain
- 2 **ANTWERP**
Belgium
- 3 **TURIN**
Italy
- 4 **PARIS** (Metropolitan area)
France
- 5 **MILAN** (Metropolitan area)
Italy
- 6 **BARCELONA** (Metropolitan area)
Spain

#ISGlobalRanking



Khomenko et al 2021

<https://isglobalranking.org/>

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Results

Sectoral contributions to PM_{2.5} mortality

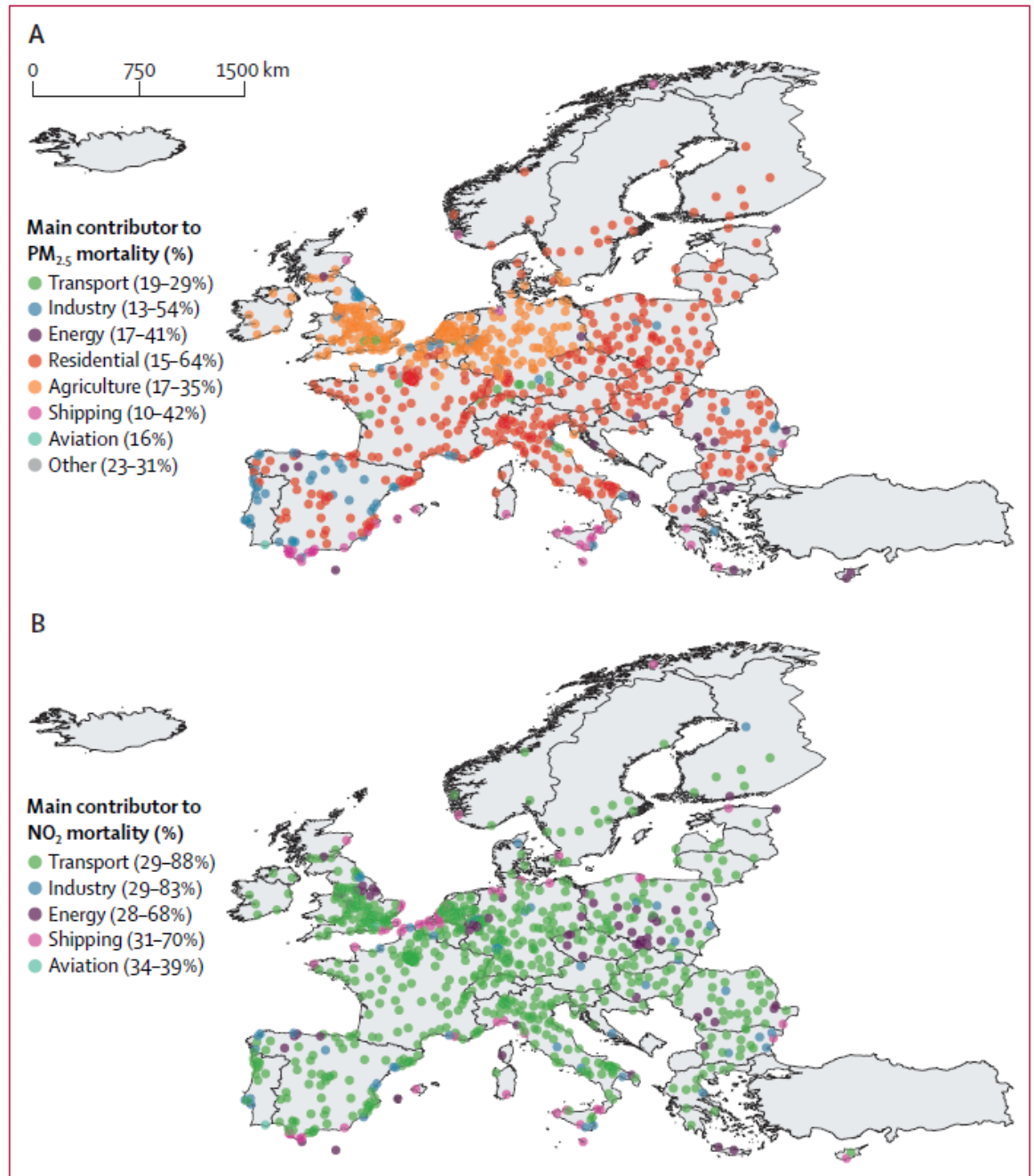
- Residential (22.7%)
- Agriculture (18%)
- Industry (13.8%)
- Transport (13.5%)
 - Energy (10%)
 - Natural (8.8%)
 - Shipping (5.5%)

Sectoral contributions to NO₂ mortality

- Transport (48.5%)
- Industry (15%)
- Energy (14.7%)
- Residential (10.3%)
- Shipping (9.7%)

Results

Transport (for NO_2), **agriculture** and **residential** (for $\text{PM}_{2.5}$) sectors are the main contributors to air pollution related mortality.



Results

Spatial contributions to PM_{2.5} mortality

- City (**13.5%**)
- Country (46.8%)
- Transboundary (27%)

City contributions at **22.3%** in cities of largest area (> 300 km²) and at **29.9%** among European capitals.

Spatial contributions to NO₂ mortality

- City (**34.4%**)
- Country (48.9%)
- Transboundary (16.7%)

City contributions at **52.2%** in cities of largest area (> 300 km²) and at **62.7%** among European capitals.

The screenshot displays the ISGlobal Ranking of Cities website. The top left section, on an orange background, features the title "ISGlobal Ranking of Cities" and the subtitle "Urban health study in 1,000 European cities". The top right section, on a green background, asks "How is your city ranked?" and lists metrics: "Check the air quality, green space, noise and mortality data". Below this is a search bar with a magnifying glass icon and the placeholder text "CITY NAME". The bottom left section, on a dark blue background, is titled "RANKINGS" and asks "Which European cities have the highest and lowest mortality due to urban exposures?", accompanied by three stars numbered 1, 2, and 3. The bottom right section consists of three colored rows: an orange row for "AIR POLLUTION" with a car icon and a "SEE THE RANKING" link; a light green row for "GREEN SPACE" with a tree icon and a "SEE THE RANKING" link; and a purple row for "NOISE" with a car and speaker icon and a "SEE THE DATA" link.

<https://isglobalranking.org/>

Air pollution

More stringent EU legislation

Local air quality plans, coordinated with actions at national and international levels



Local actions (NO₂)

- Low emission zones
- Changes in urban design
- Urban greening
- Accessibility and proximity
- Public and active transport
- Speed limits
- Reductions in motorized traffic

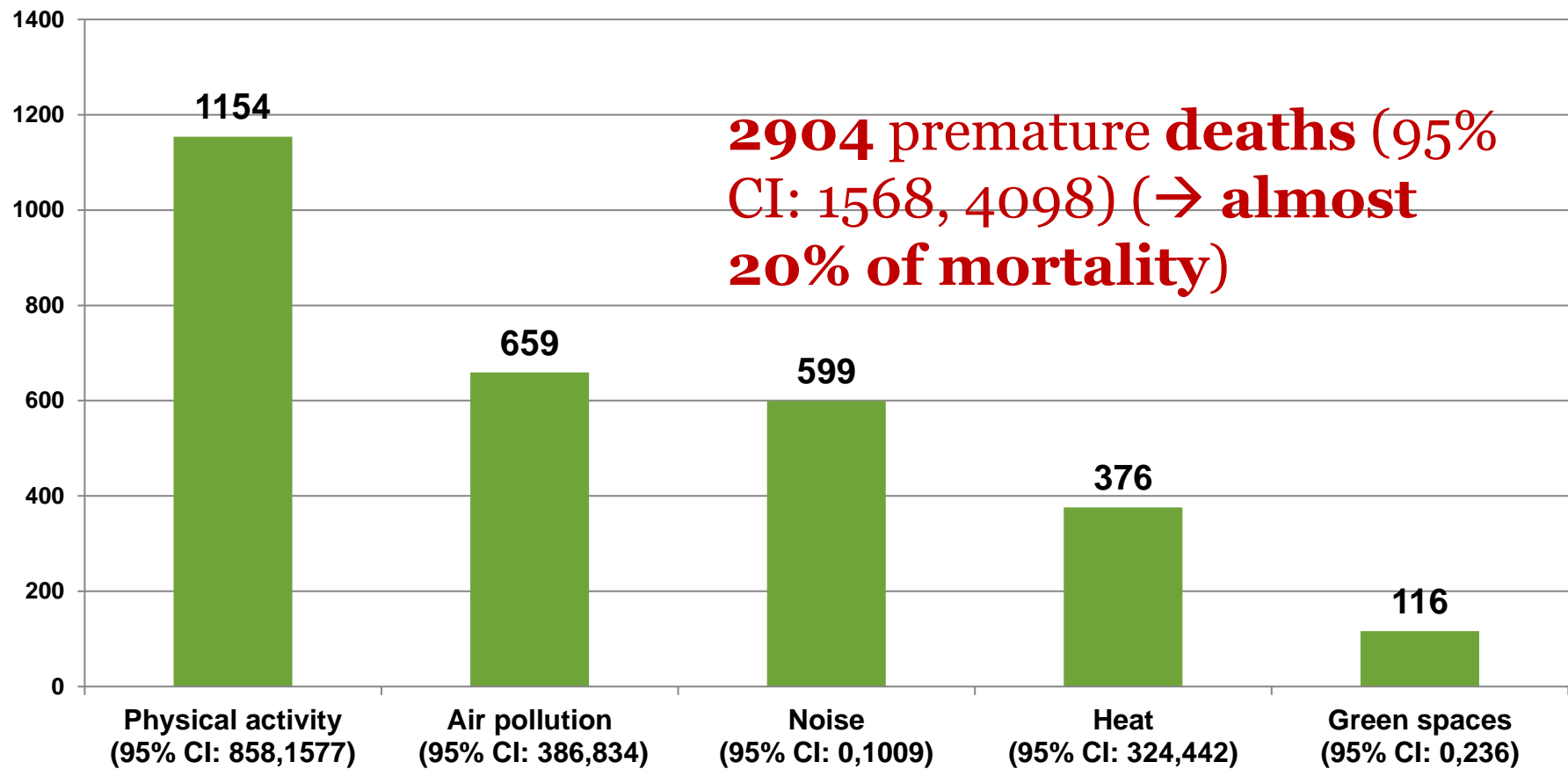
Intersectoral and interregional actions (PM_{2.5})

- Fuel regulations
- Stove replacement schemes
- Fuel burn bans
- Building insulation
- Clean and renewable energy sources
- Manure management and fertilizer use
- Emission controls (transport, industry, shipping)
- Industrial materials, fuels and processes optimization
- Complete phasing out of coal and fossil fuel burning



**2904 premature deaths (20%) annually in
Barcelona due to suboptimal urban and transport planning**

DEATHS DUE TO POOR URBAN AND TRANSPORT PLANNING BARCELONA



Traffic injury deaths 30

isglobalranking.org

**CITIES IN EUROPE
COULD PREVENT UP TO**

43.000 deaths
each year

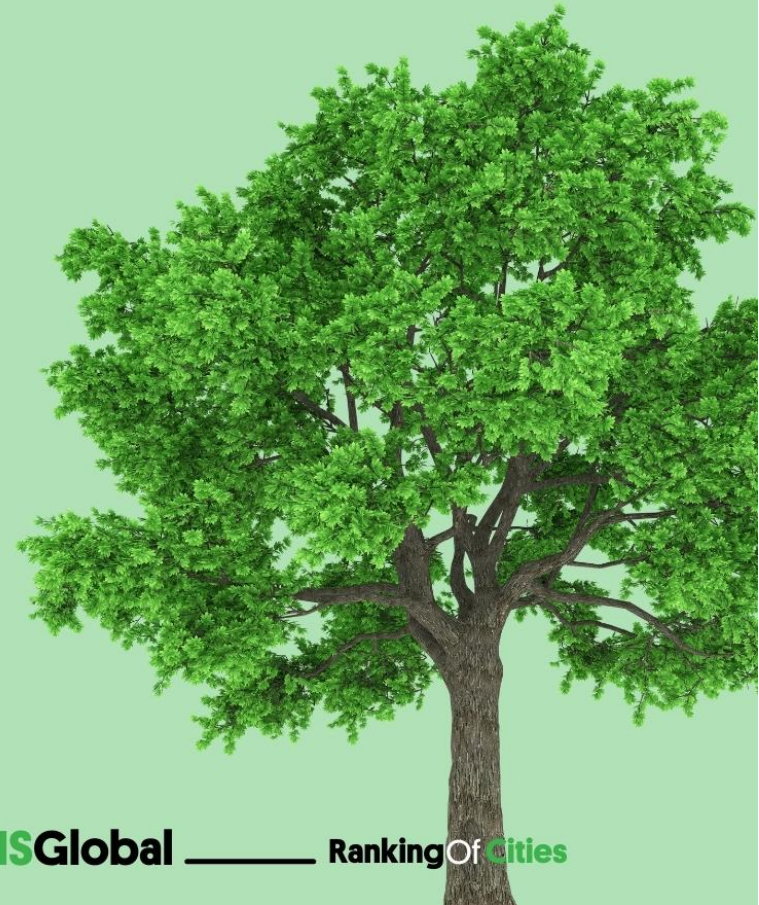
if they achieved the WHO
recommendations on access to

green space.

Over
60% of population has
insufficient access
to green space.

#ISGlobalRanking

ISGlobal _____ Ranking Of Cities



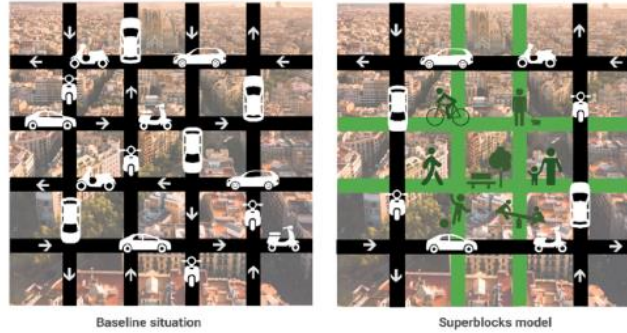
Pereira Barboza et al 2021

<https://isglobalranking.org/>

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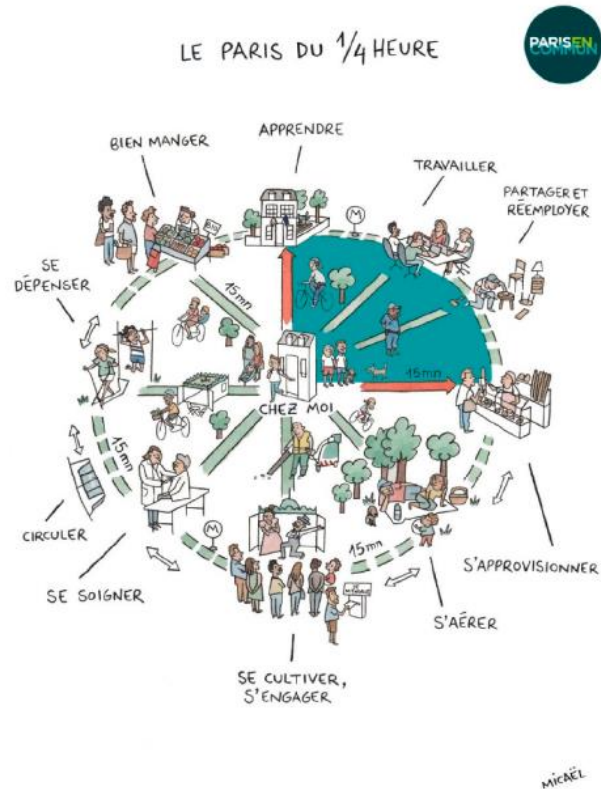


a) low traffic neighbourhood, London



b) Superblock, Barcelona

NEW URBAN MODELS

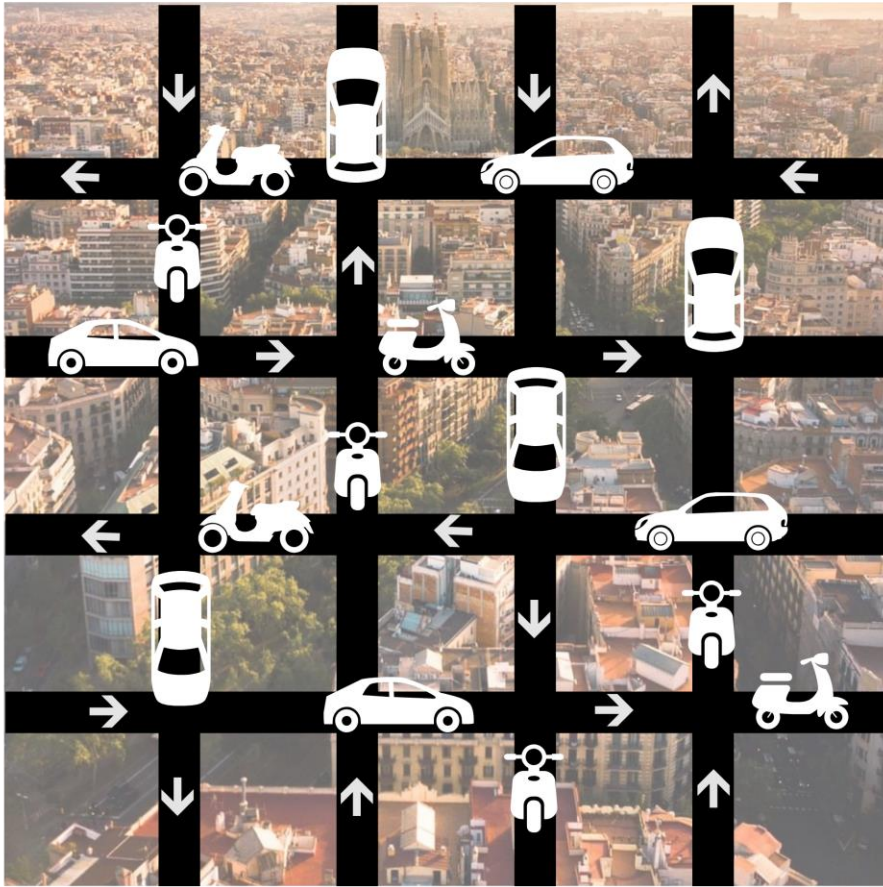


c) 15-minute city, Paris

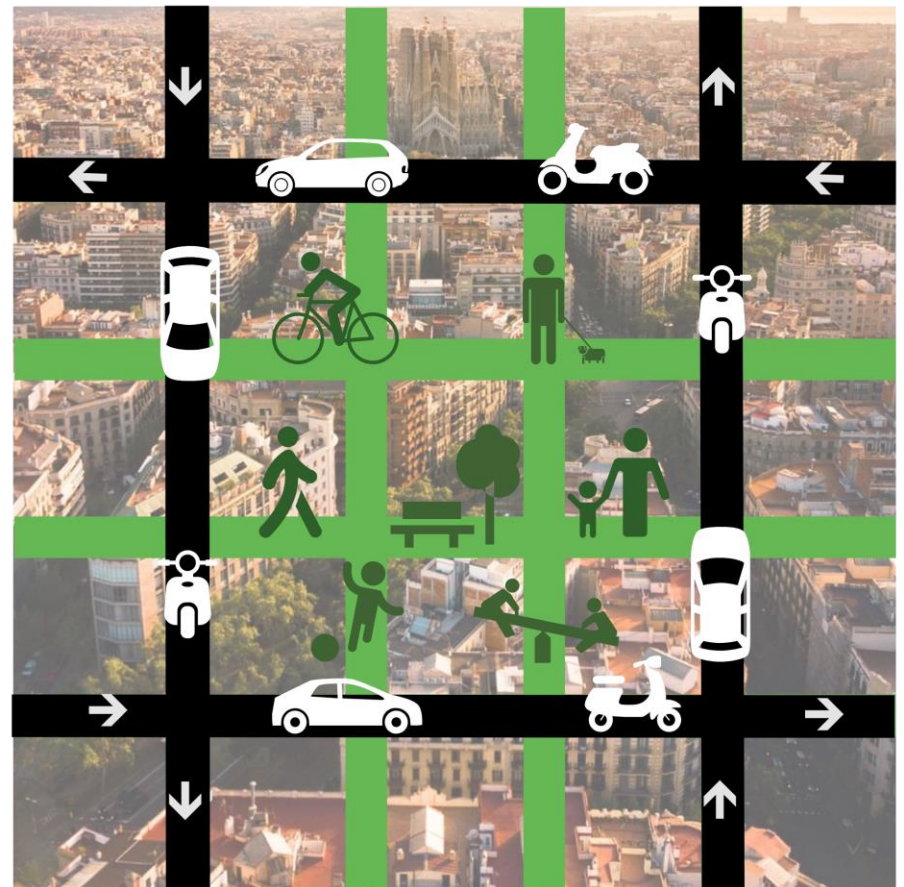


d) Car free Vauban, Freiburg, Germany

BARCELONA SUPER BLOCK MODEL



Baseline situation



Superblocks model



Barcelona Superblock San Antoni

Before

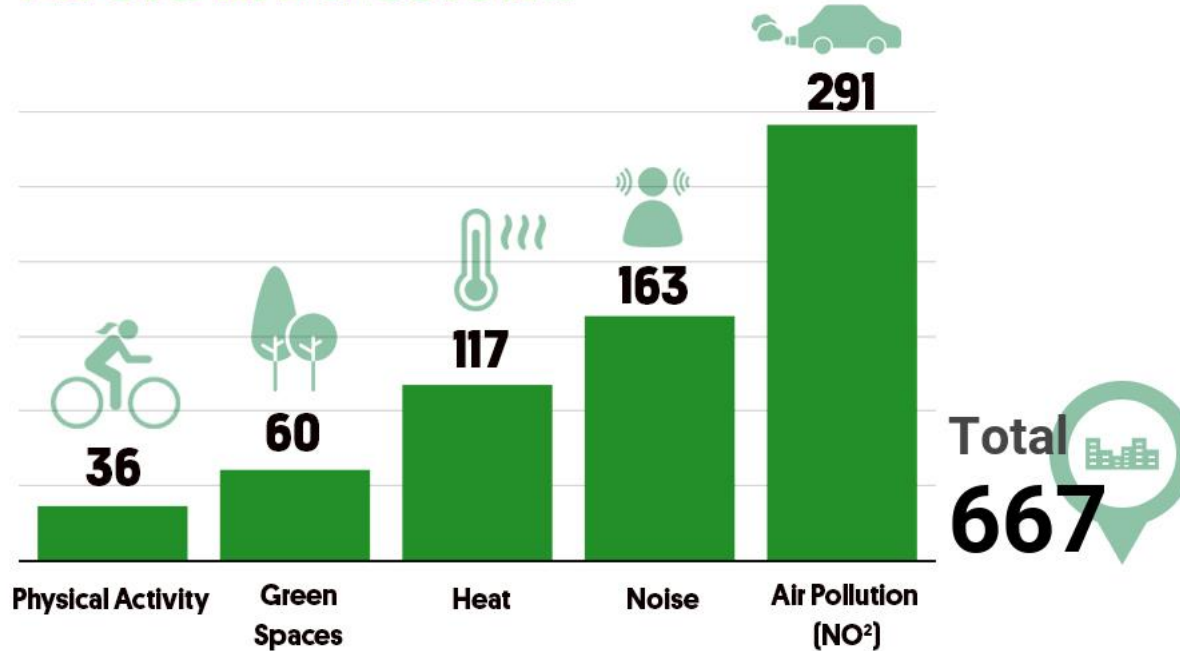


After

BARCELONA SUPER BLOCKS

- **19.2% car reduction**
- **11.5 ug/m³ (24.3%) NO₂ reduction**
- **2.9 dB noise reduction**
- **3 fold increase green space (6.5% to 19.6%)**
- **20% Surface temperature reduction**

Annual Premature Deaths that the "Superblocks" Model Could Avoid in Barcelona



Source: Mueller et al. Changing the urban design of cities for health: the Superblock model. *Environment International*. 2019

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Multisectoral approach

Multi sectorial and systemic approaches are needed to address current problems and find solutions

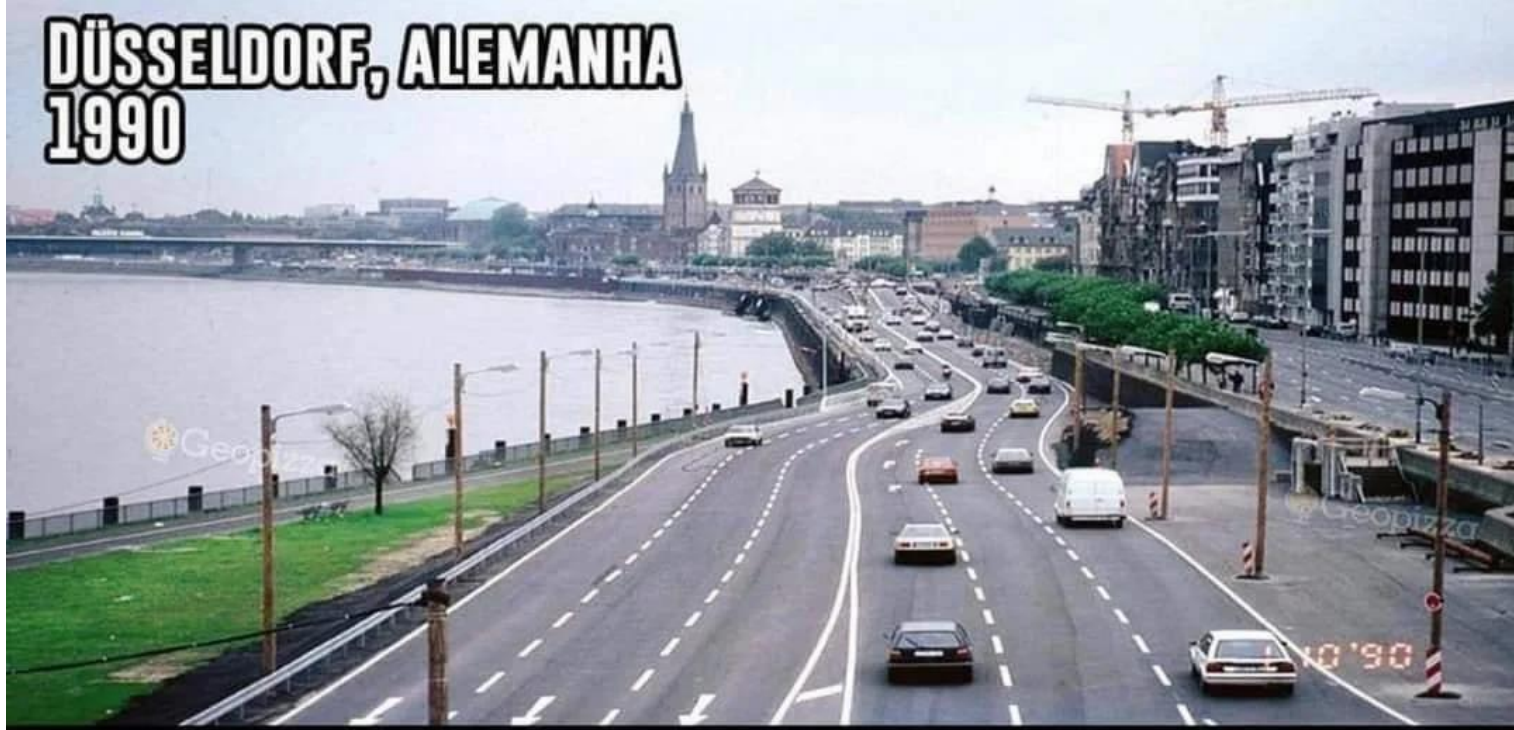




Greening cities

Seoul, Korea

DÜSSELDORF, ALEMANHA
1990



2019





1971

Amsterdam
Archives



2020

schlijper.nl
today



<https://ubdpolicy.eu/>



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<https://ubdpolicy.eu/>



Thank you!



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Big thanks to the whole team!

Questions?

www.isglobal.org

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