THE POWER OF PLACE:
PATHWAYS TO A HEALTHY URBAN LIVING

Mark J Nieuwenhuijsen
Each year worldwide there are:

- 4.2 million deaths due to ambient air pollution
- 3.2 million deaths due to lack of physical activity
- 1.2 million deaths due to traffic fatalities

WHO, GBD

- Climate crisis
- Population growth and ageing
- Urbanization (70% live in cities soon)
2904 premature deaths (20%) annually in Barcelona due to suboptimal urban and transport planning

Mueller et al EHP 2017; 125: 89-96
DEATHS DUE TO POOR URBAN AND TRANSPORT PLANNING BARCELONA

2904 premature deaths (95% CI: 1568, 4098) (→ almost 20% of mortality)

Mueller et al EHP 2017; 125: 89-96
SOLUTIONS

• Land use changes
• Reduce car dependency
• Move towards public and active transportation
• Greening cities
Using a health impact assessment framework, they estimated the population health effects arising from alternative land-use and transport policy initiatives in six cities. Land-use changes were modelled to reflect a compact city in which land-use density and diversity were increased and distances to public transport were reduced to produce low motorised mobility, namely a modal shift from private motor vehicles to walking, cycling, and public transport.
One DALY can be thought of as one lost year of "healthy" life.
DALYs for a disease or health condition are calculated as the sum of the Years of Life Lost (YLL) due to premature mortality in the population and the Years Lost due to Disability (YLD) for people living with the health condition or its consequences:

393 (Copenhagen) to 826 (Boston) DALYs saved per 100,000 people annually

Stevenson et al Lancet 2016; 388:2925-2935
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

Mueller et al 2019, Env Int
Annual Premature Deaths that the "Superblocks" Model Could Avoid in Barcelona

ELECTRIC CARS
50% of car trips < 5 km

THIS ONE RUNS ON MONEY
AND MAKES YOU FAT

THIS ONE RUNS ON FAT
AND SAVES YOU MONEY
Benefits of physical activity well outweigh the risks of air pollution and accidents for cyclists.

167 European cities, 75M people
PREMATURE DEATHS PREVENTED

• 10,091 premature deaths prevented annually in 167 European cities (75M people) if the mode share of cycling went up to 24.7%

GREEN AND LIVEABLE

- Greening cities has many health benefits including longer life expectancy, fewer mental health problems, better cognitive function, better mood and healthier babies
- It mitigates air pollution, heat and noise levels.
- CO2 sequestration
- Replacing roads and parking with green environments can be one way forward to change an environment from detrimental to beneficial.

Nieuwenhuijsen et al 2017, Epidemiology
Land cover analysis in 2008 showed that tree canopy covered 20% of land area. Of the 155 neighborhoods, 19 already met or exceeded the 30% tree canopy goal, and 102 neighborhoods could meet the goal by planting and establishing trees in areas currently covered with grass and/or shrub. The remaining 34 neighborhoods would require removal of impervious surface to meet the 30% cover goal.
Green spaces and mortality: a systematic review and meta-analysis of cohort studies

David Rojas-Rueda, Mark J Nieuwenhuijsen, Mireia Gascon, Daniela Perez-Leon, Pierpaolo Mudu

Summary
Background Green spaces have been proposed to be a health determinant, improving health and wellbeing through different mechanisms. We aimed to systematically review the epidemiological evidence from longitudinal studies that have investigated green spaces and their association with all-cause mortality. We aimed to evaluate this evidence with a meta-analysis, to determine exposure-response functions for future quantitative health impact assessments.

Methods We did a systematic review and meta-analysis of cohort studies on green spaces and all-cause mortality. We searched for studies published and indexed in MEDLINE before Aug 20, 2019, which we complemented with an additional search of cited literature. We included studies if their design was longitudinal; the exposure of interest was measured green space; the endpoint of interest was all-cause mortality; they provided a risk estimate (ie, a hazard ratio [HR]) and the corresponding 95% CI for the association between green space exposure and all-cause mortality; and they used normalised difference vegetation index (NDVI) as their green space exposure definition. Two investigators (DR-R and DP-L) independently screened the full-text articles for inclusion. We used a random-effects model to obtain pooled HRs. This study is registered with PROSPERO, CRD42018090315.

Findings We identified 9298 studies in MEDLINE and 13 studies that were reported in the literature but not indexed in MEDLINE, of which 9234 (99%) studies were excluded after screening the titles and abstracts and 68 (88%) of 77 remaining studies were excluded after assessment of the full texts. We included nine (12%) studies in our quantitative evaluation, which comprised 8 324 652 individuals from seven countries. Seven (78%) of the nine studies found a significant inverse relationship between an increase in surrounding greenness per 0.1 NDVI in a buffer zone of 500 m or less and the risk of all-cause mortality, but two studies found no association. The pooled HR for all-cause mortality per increment of 0.1 NDVI within a buffer of 500 m or less of a participant’s residence was 0.96 (95% CI 0.94–0.97; I², 95%).
646 premature deaths (4.7% of total) prevented annually

Averted cost $6.2 billion annually
ALDERHEY HOSPITAL LIVERPOOL BEFORE AND AFTER
Multisectorial approach

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

Making cities healthier worldwide

Courtesy of Jo Ivey Boufford
Mark Nieuwenhuijsen · Haneen Khreis  Editors

Integrating Human Health into Urban and Transport Planning
A Framework

This volume brings together the world’s leading experts on urban and transport planning, environmental exposures, physical activity, health and health impact assessment to discuss challenges and solutions in cities. The book provides a conceptual framework and work programme for actions and outlines future research needs. It presents the current evidence-base, the benefits of and numerous case studies on integrating health and the environment into urban development and transport planning.

Within cities there is a considerable variation in the levels of environmental exposures such as ambient air pollution, noise, and temperature, green space availability and physical activity. Many of these exposures, and their adverse health impacts, are related to and are being exacerbated by urban and transport planning and policy. Emerging research suggests that urban and transport planning indicators such as road network, distance to major roads, traffic density, household density, industry, and natural and green space can explain a large proportion of the variability in environmental exposures and therefore represent important and highly modifiable factors.

The urban environment is a complex interlinked system. Decision-makers need not only better data on the complexity of factors in environmental and developmental processes affecting human health, but also an enhanced understanding of the linkages between these factors and health effects to determine at which level to target their actions most effectively. In recent years, there also has been a shift from trying to change at the national level to more comprehensive and ambitious actions being developed and implemented at the regional and local levels. Cities have come to the forefront of providing solutions for environmental issues such as climate change, which has co-benefits for health, but yet need better knowledge for wider health-centric action. This book provides the latest and most up-to-date information and studies for academics and practitioners alike.