

The economic case for healthier urban development: the UPSTREAM project

Presentation at *3rd Annual Public Health & Sustainable Transport Summit*

City Hall, Bristol, Thursday 27 March 2019

Eleanor Eaton, University of Bath





MOVING HEALTH
UPSTREAM
IN URBAN DEVELOPMENT DECISION MAKING

FIND OUT MORE

urban-health-upstream.info

A word about valuing health



A word cloud of health economics terms on a dark background. The words are written in white and green. The terms include: Willingness, Value, Ratio, Pay, Years, Adjusted, Quality, Social Value, Life, Incremental, Adjusted, Lost, Effectiveness, Statistical, Cost, Disability, and Life.

Societal value of illness



Direct costs
(NHS, Social Care)



Indirect Costs
(Productivity,
loss of earnings)



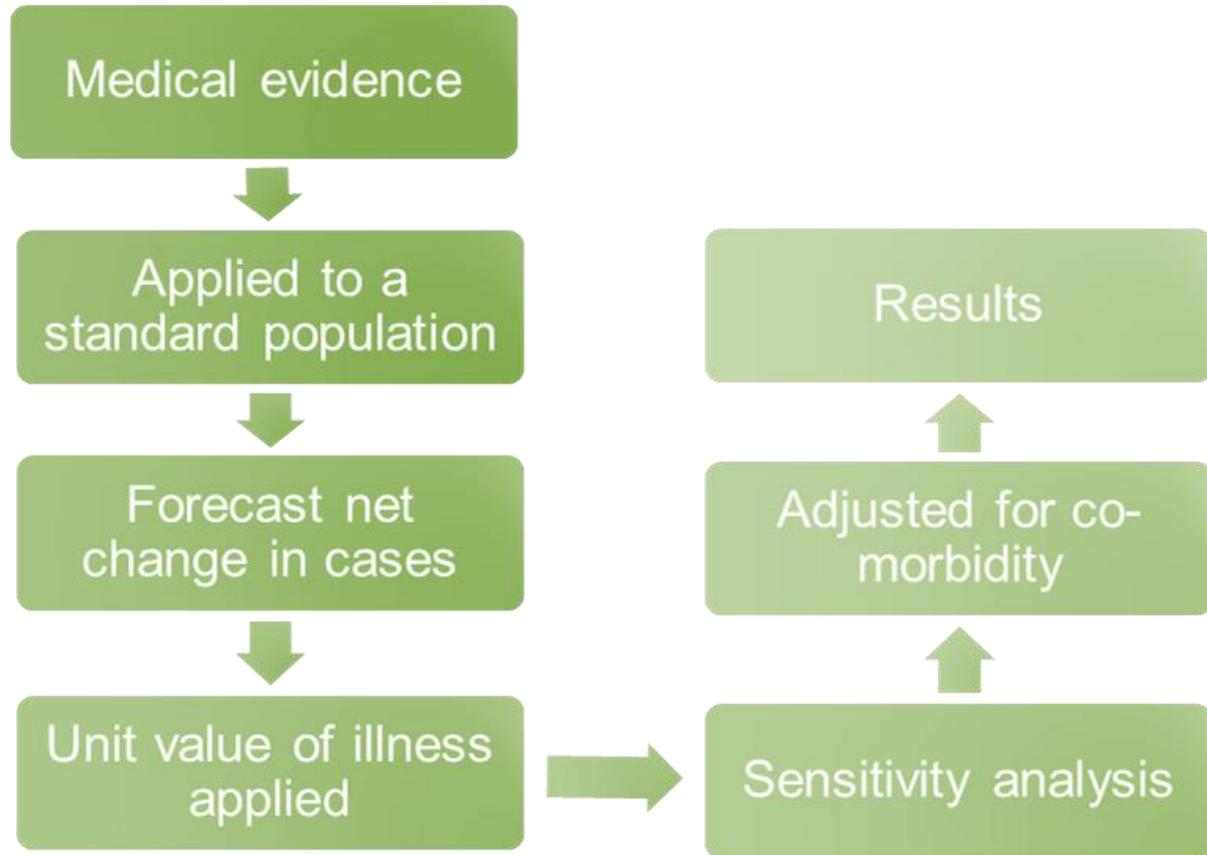
Disutility
(Mortality,
pain and suffering)



Our solution: Quantifying the potential impact of characteristics of urban form



Methodology



Long term effects of traffic noise

PM2.5

PM2.5 absorbance

N²

How did we do it?

not exceed 10µg/m³)Noise: daytime outdoor noise levels should not exceed equivalent sound pressure levels above 55Green space: universal access to green space defined as living within 300-m linear distance of a green space ≥0.5 haHeatPhysical activity"

Over 400 outcomes

distance of a green space ≥0.5 haHeatPhysical activity"

NOx

NOx

NOx

NOx

NOx

Green space

exposure to air pollution from traffic emissions

exposure to air pollution from traffic emissions

PM2.5 and its constituents- elemental carbon, organic carbon, sulphates, nitrates, iron, potassium, silicon and zinc

PM2.5 and its constituents- elemental carbon, organic carbon, sulphates, nitrates, iron, potassium, silicon and zinc

PM2.5 and its constituents- elemental carbon, organic carbon, sulphates, nitrates, iron, potassium, silicon and zinc

Traffic related air pollution

PM2.5

PM10

PM10-2.5

Proximity to busy road <50m

PM2.5

PM10

Places to Play

Places to Play

Places to Play

Activity

Diabetes

Obesity

Walking

Cold

Conditions

Conditions

Indoor air quality

Indoor air quality

Indoor air quality

Damn

Sickness absence

Child development

Mortality

Respiratory

Headache

Allergies

Respiratorv

74 reference values

26

Characteristics

5

groupings:

Convenience stores

Fast food outlets

Fast food outlets

Supermarkets

Air Quality

Air Quality - Industrial

Green Space

Green Space

Green Space

Green Space

Green Space

Proximity to main road

Proximity to main road

Proximity to main road

Proximity to main road

Noise

Noise

Noise

Noise

Weight gain

Diabetes

Weight gain

Weight gain

Allergies

Cancer

Cardiovascular

Child development

Diabetes

Dementia

Mortality

Parkinson's Disease

Respiratory

Allergies

Cancer

GP/hospital

Mortality

Respiratory

Activity

Asthma

Diabetes

Mental health

Mortality

Allergies

Diabetes

Dementia

Respiratory

Activity

Anti-social behaviour (child conduct)

Hypertension

Diabetes

Functional loss

Cold

Conditions

Indoor air quality

Damp

Overheating

Safety/ Accessibility

Convenience stores

Fast food outlets

Places to Play

Supermarkets

Walkability

Walking distance

Air quality - industrial

Air quality

Green space

Proximity to main road

Affordability

Economic status

Fear of crime

Homelessness

Regeneration

Renewal of interiors

Cooling infrastructure

• Building design

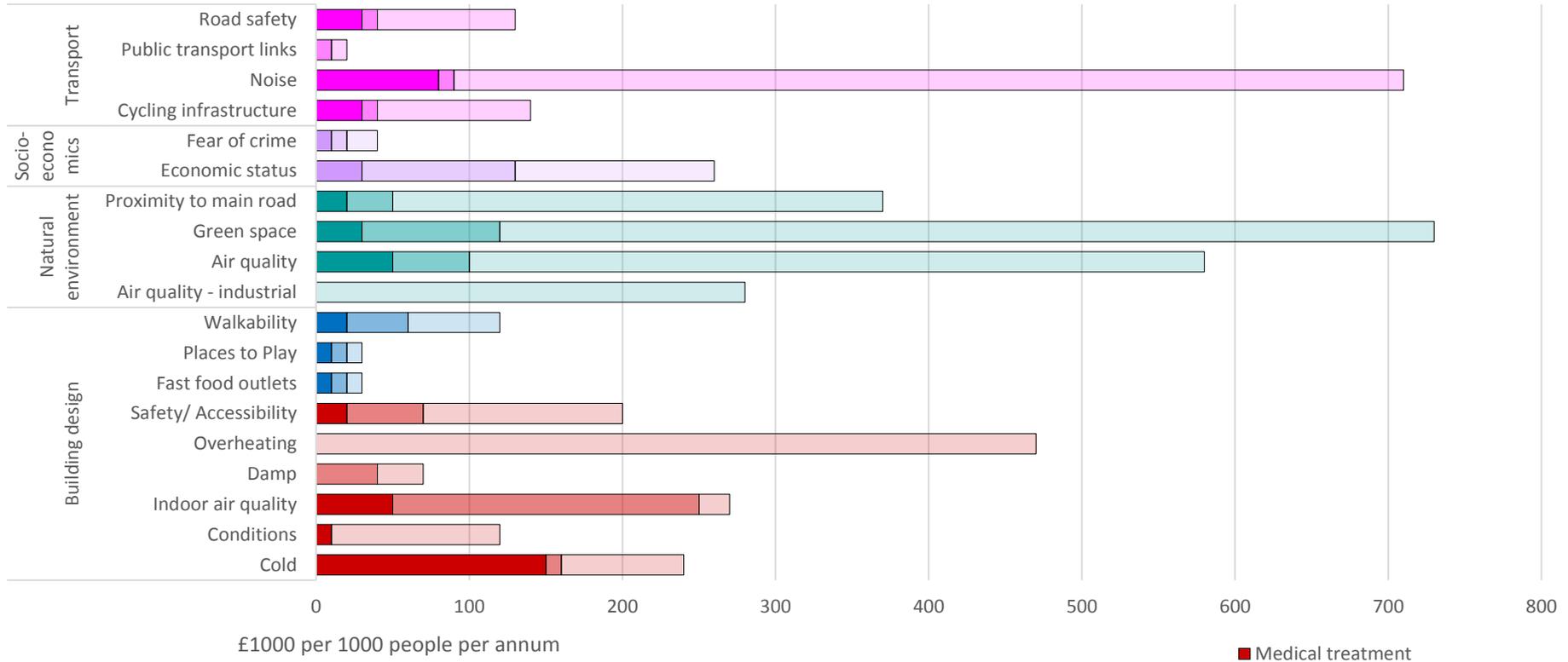
• Community infrastructure

• Natural Environment

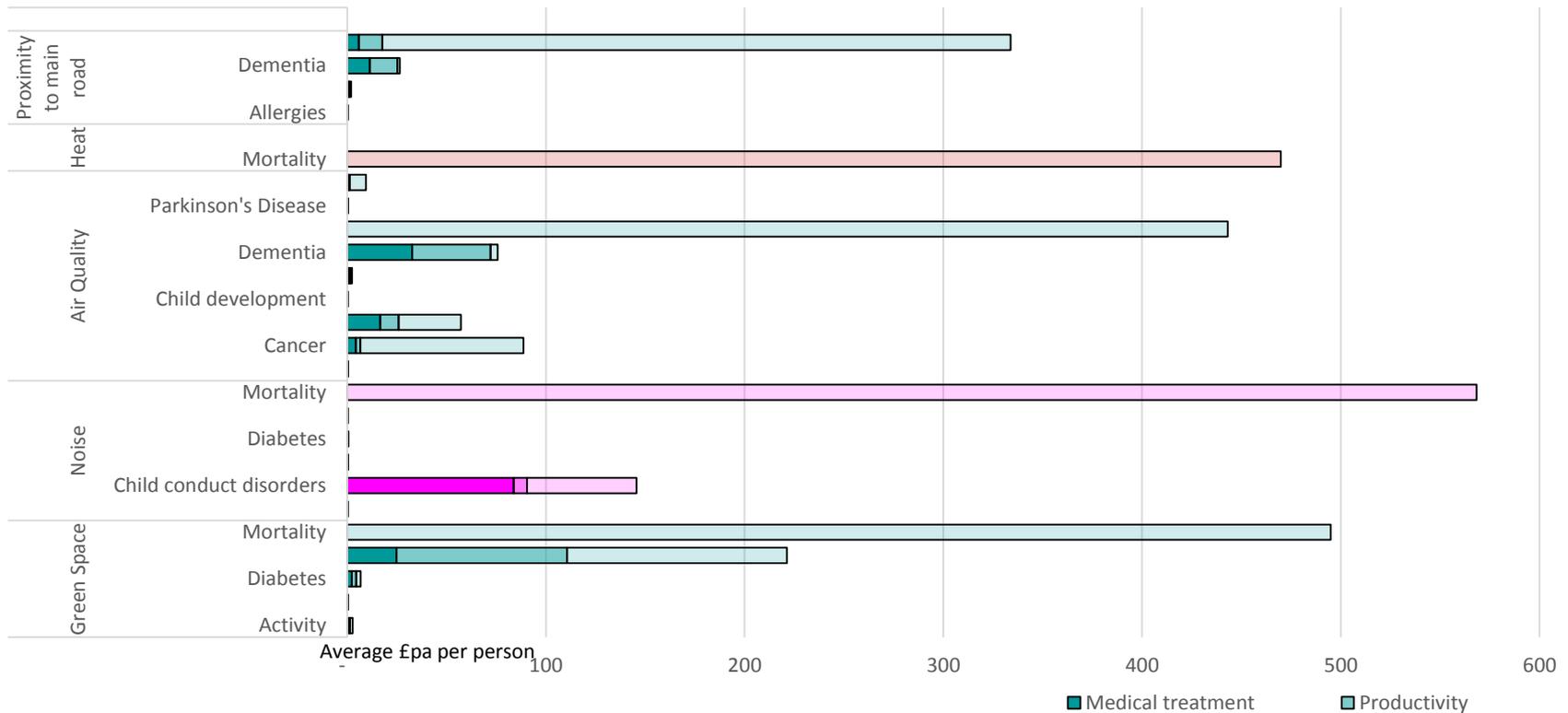
• Socioeconomics

• Transport

What we found



Top 5 characteristics broken into health outcomes: all cost components



Air Quality and Dementia



Oudin (2016) on the association between long-term exposure to traffic-related air pollution and the incidence of dementia in Swedish adults

Dementia status was assessed at baseline and re-assessed every five years for T1, T2, T3, T4 and T5. Land use regression was used to estimate the annual average NOx concentration. Details of potential confounders were recorded from baseline assessment.

The result shows that Participants in the group with the highest exposure were more likely than those in the group with the lowest exposure to be diagnosed with dementia (Alzheimer's disease or vascular dementia), (HR= 1.43 95% CI: 0.998, 2.05) for the highest vs. the lowest quartile).

The estimates were similar for Alzheimer's disease (HR 1.38) and vascular dementia (HR 1.47). The HR for dementia associated with the third quartile versus the lowest quartile was 1.48 (95% CI: 1.03, 2.11).

Potential impact of air quality on dementia in our standard population

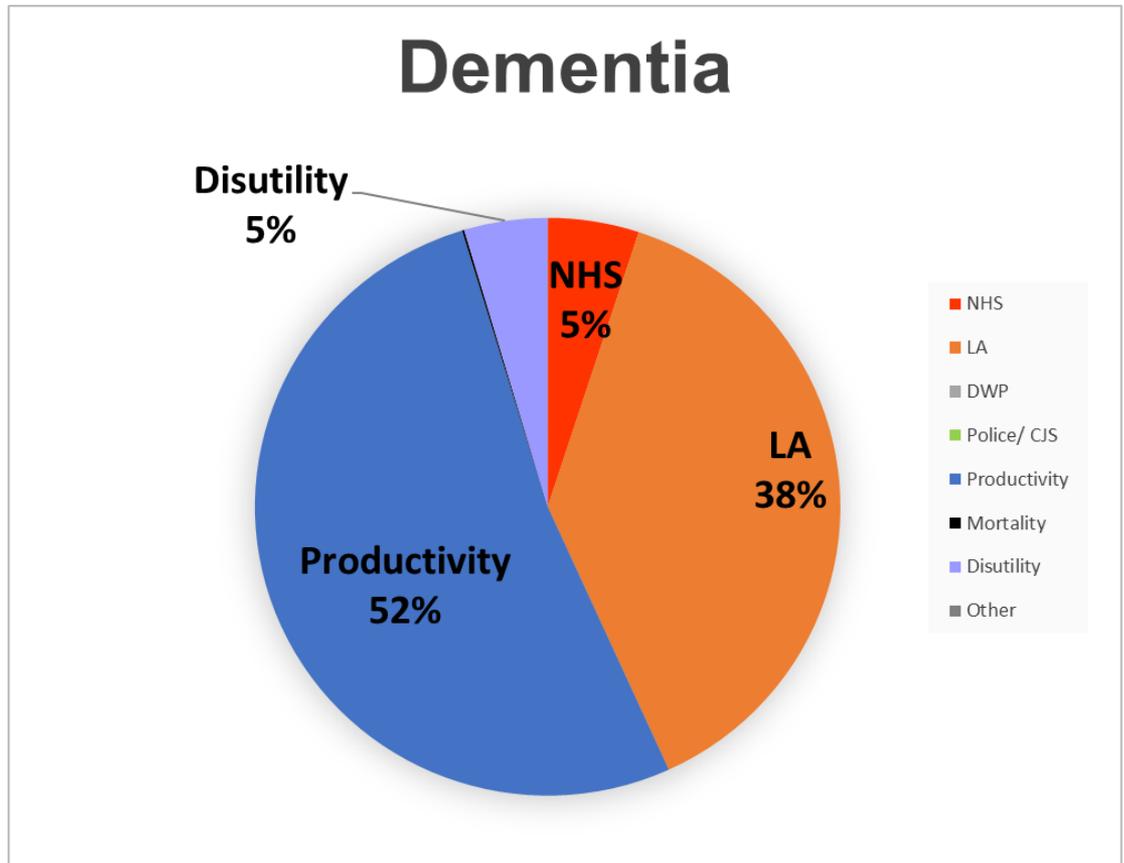


In a group of 563 adults, we found that poor air quality could lead to 2 more cases of dementia (range 0 - 5)

Societal cost of dementia

Total net societal cost of air quality impact per 1,000 affected people for this health outcome could be £75,500.

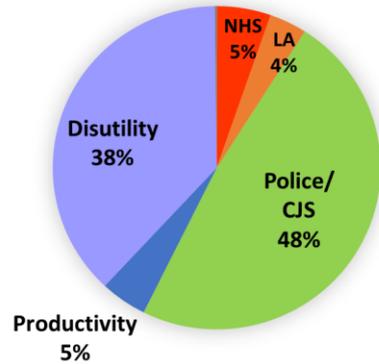
Range: £4,500 to £402,000 per annum



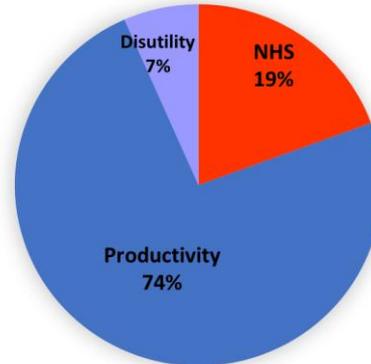
Breakdown of component values for dementia

Different societal cost of illness spreads

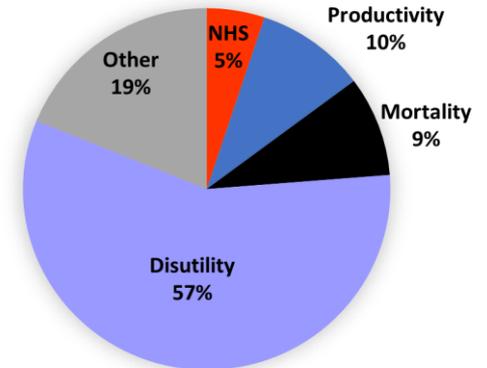
Child conduct disorder



Flu (Infant)



Injuries (RTA)



Walkability and Depression



© Henry Hemming @ Flickr

Melis (2015) on adult men aged 50-64 in Italy:

The aim of the study was to investigate the association between characteristics of the urban environment (density, accessibility by public transport, accessibility to services and public spaces) and prescription of antidepressants (taken as an indicator of mental health).

After adjusting for some potential confounders, high urban density (Incidence Rate Ratio=0.92, 95%CI=0.86-0.97) and high accessibility to public transport (IRR=0.93, 95%CI=0.87-0.98) were associated with lower prescription of antidepressants among men age 50-64.

Accessibility to public transport was associated with lower prescription of antidepressants among women 20-24 (IRR=0.94, 95%CI=0.88-0.99), 34-49 (IRR=0.95, 95%CI= 0.92-0.99) and 50-64 (IRR=0.95, 95%CI=0.92-0.98)

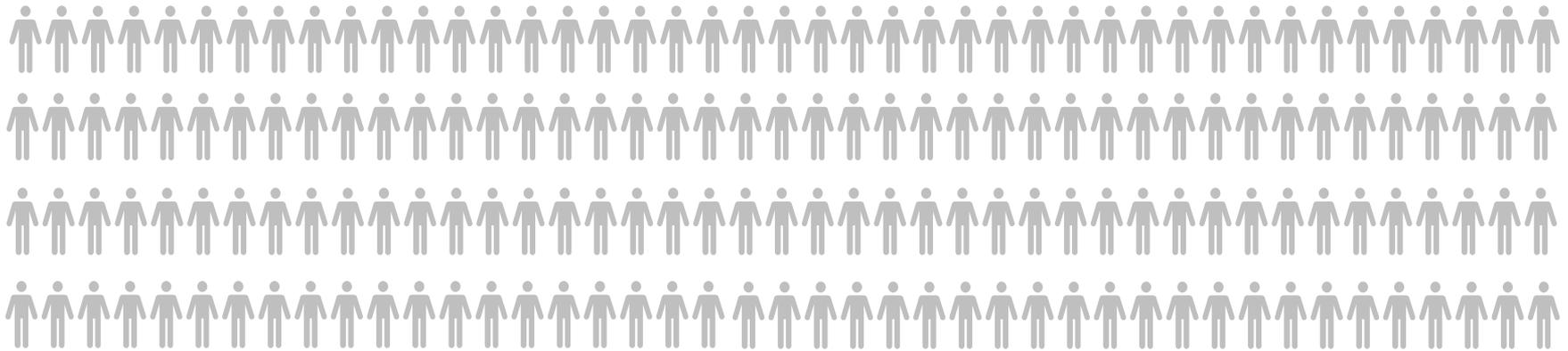
Berke (2007) on adult men over 65 in the United States:

The aim of the study was to investigate the association between neighbourhood walkability and depression among older adults.

After adjusting for potential confounders, there was a significant association between neighbourhood walkability and depressive symptoms in men. Odds ratio for IQR of walkability score was 0.31-0.33, $P=0.02$.

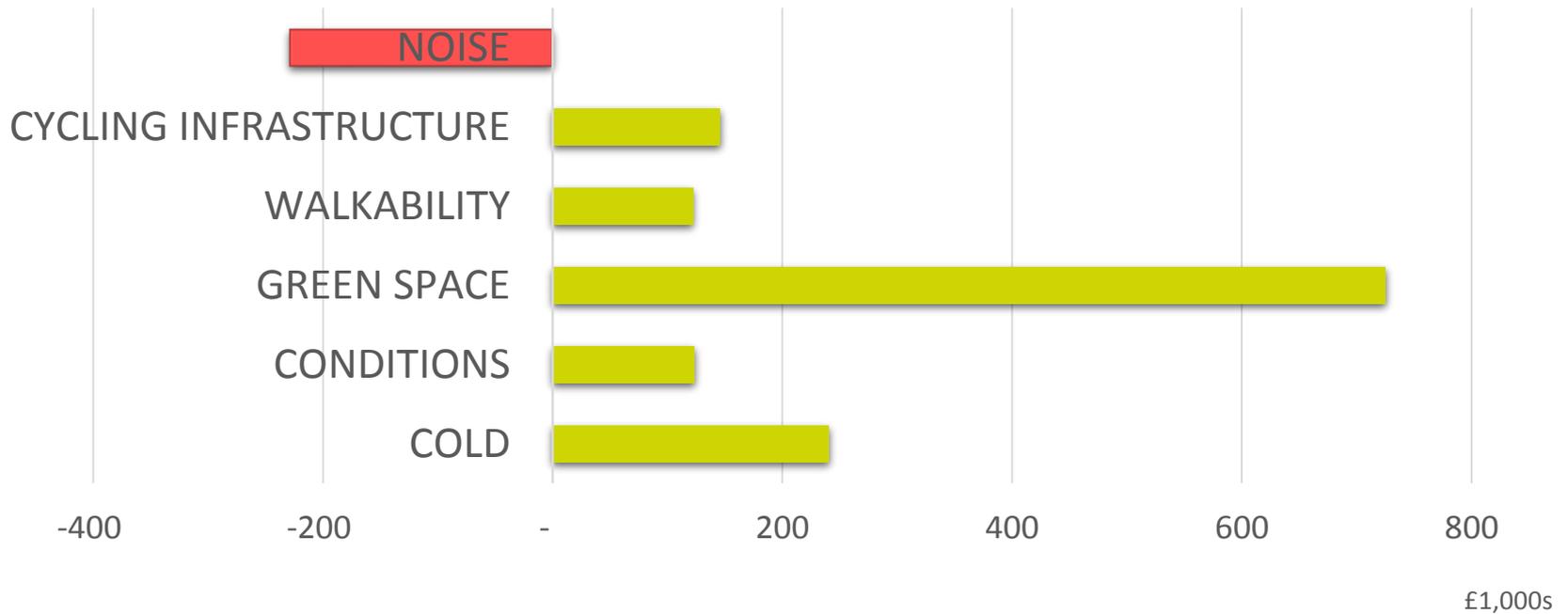
No significant association was observed for women

Potential impact of walkability on depression in our standard population



Improvements to neighbourhood walkability could lead to 7 fewer cases of depression in a group of 172 men (Range -6 to -7)

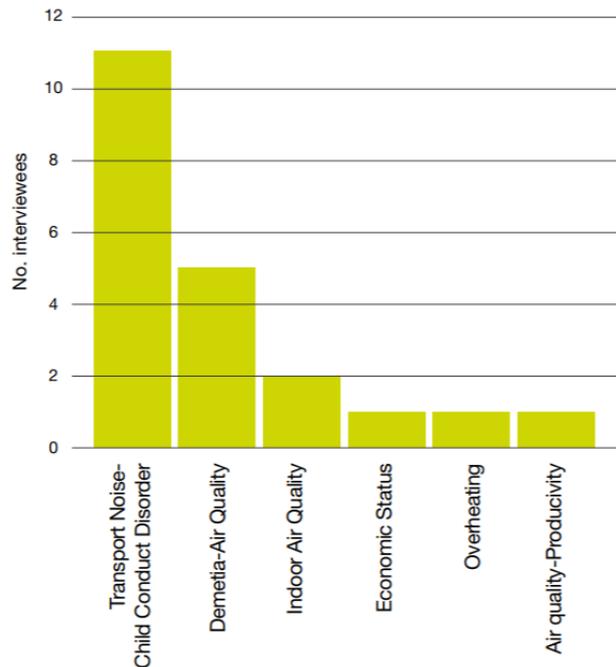
Who pays and who benefits?



Real world case study: South West England - Forecast annual relative value of health impacts per feature

Developer's responses

Unknown urban-health links

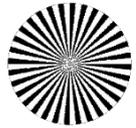


“ ...as a minimum this looks like a really useful checklist of things to think about from a very broad quality of life point of view...that you've got actual costs against it per individual I suspect is less important to us... ”

“ If you are in control of something, you set the agenda. If health, air quality and noise are high up your agenda, then you'll deliver it. ”

“ ...without some kind of public sector intervention I can't see how the private sector can maintain all the public realm... ”

Applications



FOCUS

This approach allows a decision maker to **focus** down onto the scale and relative importance of different design features to give an overview of the health impacts of a proposal.



IMPACT

Useful for identifying the social **impact** of proposals, which in turn could inform negotiations over public goods, such as the maintenance of the public realm.



WEIGHT

This may also be valuable as further evidence to inform **weighting** elements of industry standards such as *Secured by Design* and the *Home Quality Mark*

Limitations



Conclusion

- We have quantified the potential health impact for 26 characteristics of the urban environment in relation to 24 health outcomes
- We have developed an approach which may be applied to a range of development contexts to understand the social impact of different urban forms.
- Unlike other tools, our method uses individual health outcomes and the value of health outcomes in £s, making findings easily accessible to non-health experts and comparable to other cost/benefit assessments.

“...How evidence is framed and localised, who the messenger is and how evidence fits into a broader context and story will all influence how successful it is.”

Contact us

Eleanor Eaton: e.a.eaton@bath.ac.uk

Alistair Hunt: a.s.p.hunt@bath.ac.uk

Visit UPSTREAM: <https://urban-health-upstream.info/>

References

Slide 11:

Oudin, A., Forsberg, B., Adolfsson, A. N., Lind, N., Modig, L., Nordin, M., Nordin, S., Adolfsson, R., ... Nilsson, L. G. (2015). Traffic-Related Air Pollution and Dementia Incidence in Northern Sweden: A Longitudinal Study. *Environmental health perspectives*, 124(3), 306-12.

Slide 16:

Melis, G., Gelormino, E., Marra, G., Ferracin, E., & Costa, G. (2015). The Effects of the Urban Built Environment on Mental Health: A Cohort Study in a Large Northern Italian City. *International journal of environmental research and public health*, 12(11), 14898-915. doi:10.3390/ijerph121114898

Slide 17:

Berke, E. M., Gottlieb, L. M., Moudon, A. V. and Larson, E. B. (2007), Protective Association Between Neighborhood Walkability and Depression in Older Men. *Journal of the American Geriatrics Society*, 55: 526-533. doi:10.1111/j.1532-5415.2007.01108.x

Slide 20:

Black, D; Carmichael, L; Eaton, E; Ebi, K; Hunt, A; Ige, J; Laggan, S; Larbey, R; Lawrence, R; Longhurst, J; Orme, J; Pilkington, P; Prestwood, E; Sardo, M; Scally, G; Williams, B; (2018), *UPSTREAM project report*, available from: https://urban-health-upstream.info/wp-content/uploads/2018/12/Upstream_Brochure_WEB_single.pdf

Slide 23:

Wye et al 2015, quoted in New NHS Alliance and The King's Fund (2016), *Health professionals' attitudes to evidence and the influence it has on decision making*; National Housing Federation (online)

Image Credits: Getty Images; Martin Addison, Gianni, Hands Cristian Bortes, Henry Hemming and Jordan Collective reproduced under creative commons license at Flickr.com.