



# UPSTREAM



## PROJECT REPORT

Moving planetary health  
upstream in urban development  
decision-making – a three-year  
pilot research project



# UPSTREAM

This report summarises the rationale, methods, main findings and key insights from a three-year pilot, Moving Health Upstream In Urban Development [UPSTREAM].

## ACKNOWLEDGEMENTS

### FUNDER:

We thank Wellcome Trust for their generous support in funding this pilot research project under their ambitious Our Planet Our Health (OPOH) Programme. Wellcome Trust is a politically and financially independent global charitable foundation. It exists to improve health for everyone by helping great ideas to thrive—supporting scientists and researchers,

taking on big problems, fuelling imaginations, and sparking debate. Our Planet, Our Health is Wellcome's initiative in Planetary Health—supporting research, and propelling the translation of ideas into action, to advance our vision: a world in which the natural systems that support health are sustainable across generations, enabling health for all people.

### CASE STUDY PARTNERS:

Special thanks also go to our case study partners and advisors, all of whom have given

their time generously to further the aims and objectives of this research pilot.



### OBSERVER PARTNER:



### ADVISORS:

**Neil Smith**, Founder, Rockwood Capital

**Yolanda Barnes**, Chair, Bartlett Real Estate Institute (formerly Global Head of Research Savills)

**George Ferguson**, Architect and former Mayor of Bristol

**Ian Cox**, Chair of A2Dominion and Managing Partner of Cox Development Partners

**Barra Mac Ruairí**, Director of Estates and Bursar, University of Bristol (formerly Director of Place at Bristol City Council)

# CONTENTS

EXECUTIVE SUMMARY	4
PROJECT RATIONALE	6
AVAILABLE URBAN-HEALTH EVIDENCE & GAPS	7
ECONOMIC VALUATION OF EVIDENCE	9
PRACTITIONER RESPONSE TO ECONOMIC VALUATIONS	14
BARRIERS AND OPPORTUNITIES	16
BRIDGING DIVIDES	20
CLIMATE CHANGE: A STRESS MULTIPLIER	22
PUBLIC ENGAGEMENT	23
KEY INSIGHTS & DISCUSSION	25
RESEARCH TEAM	27
REFERENCES	28

---

**Design:** GreenHat

Printed on FSC® paper using vegetable-based inks.



---

**Image credit:** Pg.4 Natalya Letunova, Unsplash. Pg.6 Kaique Rocha. Pg.9 Banter Snaps, Unsplash. Pg.11 Shutterstock. Pg.13 Hector Argüello Canals, Unsplash. Pg.17 Ryoji Iwata, Unsplash. Pg.19 Alice Pasqual, Unsplash. Pg.21 Abraham Barrera, Unsplash. Pg. 23 Banner walks by Eleanor Shipman. Pg.26 Chuttersnap, Unsplash. Pg.29 Robert Bye, Unsplash.

# EXECUTIVE SUMMARY

---

Our urban environments are placing an increasing burden on our life support systems. Despite considerable work in this area, progress is far too slow. Research is needed further upstream in urban governance and in to the role of economic valuation in critical decision-making. This three-year pilot, Moving Health Upstream in Urban Development (UPSTREAM), has made a small, but important contribution to research in this area.

---

**T**he project was made up of three main research strategies – figure 1 below: firstly, to review available evidence linking the urban environment to health outcomes; secondly, to value monetarily the associated cost-benefit; thirdly, to explore barriers and opportunities with the UK's major delivery agencies.

In addition to providing critical data points for the economic valuation, the literature review synthesised a wide body of evidence and started to reveal gaps in evidence (for example, while there appears to be a good deal of data on air pollution that is usable in economic valuation, there appears to be relatively very little on overheating) – see pp.7-8.

The economic valuation valued the potential change in human health between standard or normal design conditions in new build urban housing developments in the UK, and a point, which represents an exemplary or ideal situation. In so doing we have created a useful measure for evaluating the impact of specific housing developments, which provides decision makers with an understanding of the comparative or relative impact between characteristics of the built environment – pp.9-13.

We presented headline valuations to our industry partners in order to understand how it might influence their thinking, how it could change practice, how they might use the data, and what they considered to be missing. Practitioners were already well aware of most health issues, though many found some surprising: in particular, transport noise - despite it being a

well known issue, many practitioners were not aware of the impact it had on child conduct nor the significant cost of medical treatment. There was a strong difference of opinion as to the use of aggregated economic valuations – some felt they were effective; others not. However, there was widespread support for greater use of economic valuation in urban planning, not necessarily in terms of exact metrics, but more in getting a sense of scale and comparing priority areas – pp.14-15.

The 30 interviews with senior decision-makers from across the UK's main delivery agencies provide a rich insight in to the world of urban development decision-making. A main finding is that there is a clear consensus – from both public and private sector actors – that health is not adequately accounted for in urban planning. The second round interviews focused on five



**“A main finding is that there is a clear consensus – from both public and private sector actors – that health is not adequately accounted for in urban planning.”**

core areas for deeper enquiry: valuation, finance, land, partnership and risk. Land control and land values, length of (financial) interest, lack of public sector capacity, quality of relationships and values were all seen as critical. There were a number of issues that seemed to conflict or have no clear solution, the most significant being perhaps the long-term maintenance of public realm – pp.16-18.

Though not central focus areas of the project, the team also examined two areas that link strongly to our research aims and objectives:

firstly, the role of climate change as a stress multiplier for urban health; and secondly, the critical importance of and significant difficulty in bridging divides (between disciplines, organisations, sectors) in order to substantially improve human and planetary health<sup>i</sup> – pp.20-22.

Last, but not least, the UPSTREAM project benefited substantially from a sister public engagement project – iNudge – also funded by Wellcome, which undertook a ‘multi-dialogue’ approach to public engagement that included community events, an enormous sculpture of an air pollution particle, and an online educational game on healthy urban planning. Learning from this has contributed significantly to understanding what is meaningful and effective in this very challenging area of citizen involvement – pp.23-24.

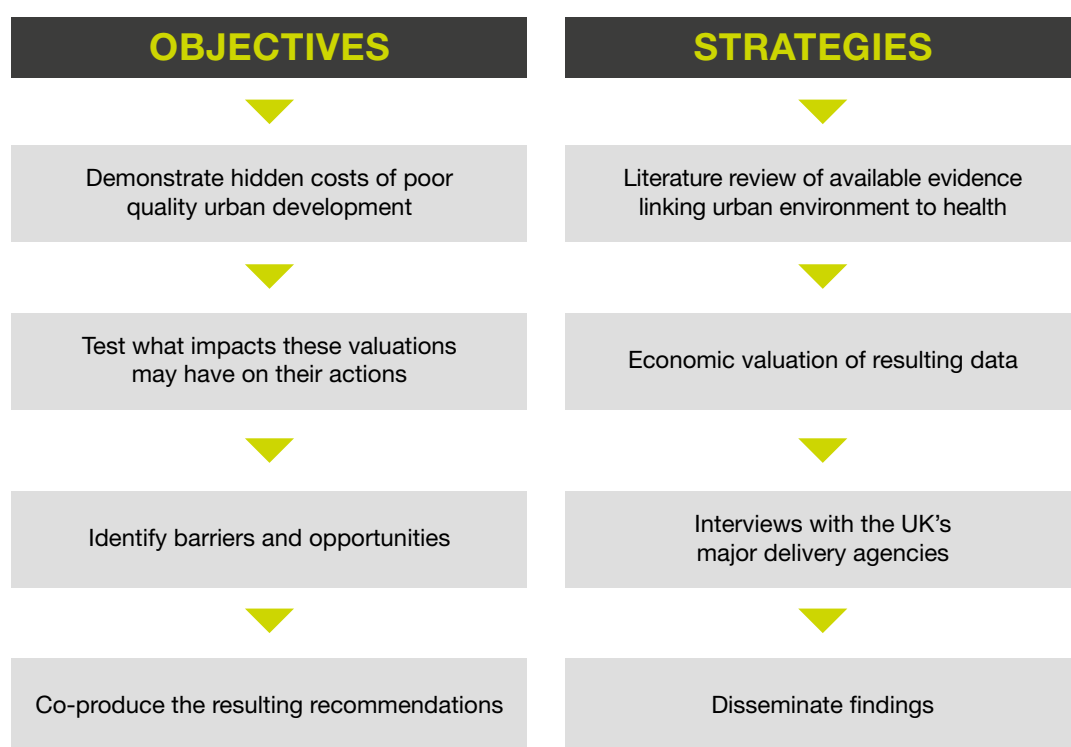


Figure 1: The project was made up of four main objectives and three main research strategies.



# PROJECT RATIONALE

Urban planning and public health have an extensive shared history. Although health risks have changed significantly since the first Public Health Acts of the 19th century, the rise of non-communicable diseases (e.g. cancers, diabetes, respiratory illnesses) and global environmental risks are increasingly placing stress on our human and planetary life support systems. <sup>ii iii iv</sup>

**S**ignificant work has been undertaken on healthy and sustainable urban development over recent decades, and a good deal of the available evidence is becoming well known among academic and practitioner communities, yet despite globally renowned workforces in the built environment professions, progress appears marginal in terms of addressing major human and planetary health challenges. <sup>v vi vii viii ix xi xii</sup>

A central proposition in this pilot was that research is needed even further upstream in the urban development process, as is engagement with mainstream public and private sector delivery agencies to co-produce potential interventions. <sup>xiii</sup>

A second central proposition is that our mainstream mechanisms for valuation appear to be failing us. <sup>xiv xv</sup> New methods of economic valuation have started to quantify costs linked to the quality of urban environment: e.g. the £10.7bn annual cost of physical inactivity to the NHS for the treatment of non-communicable diseases; £1.12trn willingness of OECD member states to pay for prevention of 3.5m deaths caused by air pollution; £1.3bn annual damages to UK properties from fluvial and coastal flooding; £4.5bn cost of flooding to insurers since 2000; £14trn estimated cost of global biodiversity decline by 2050 (Natural England, 2009). <sup>xvi xvii xviii xix xx</sup> So a further challenge relates to how we might better value human and planetary health when planning, developing and managing our urban environments.



# AVAILABLE URBAN-HEALTH EVIDENCE & GAPS

In order to a) source data for the economic modelling and b) identify where gaps in evidence are, we conducted five systematic literature reviews of the evidence within the health literature linking the built environment and health.

Of the 26,428 studies identified under the following five thematic areas, 209 studies were carried forward to review:

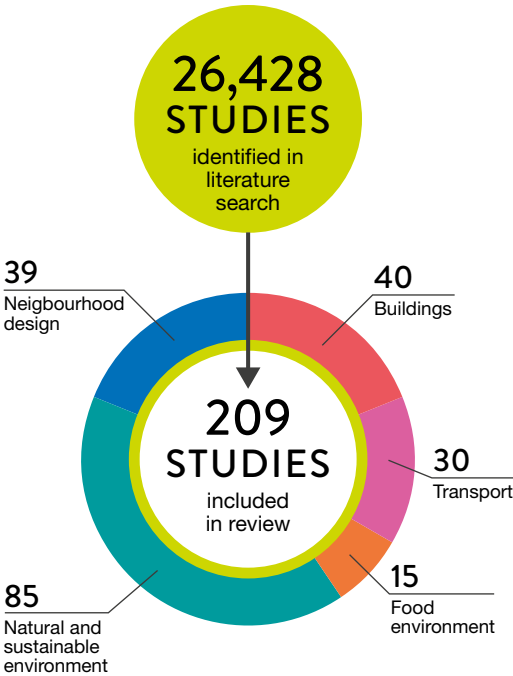


Figure 2 (above): Breakdown of studies included in review

The review findings do not reveal much more than is already known – see practitioner response to economic valuation below – but the full synthesis (peer reviewed papers are in production) will provide a comprehensive summary of the nature and the quality of the evidence as a whole.

The subsequent five gap analyses identified a wide range of areas of uncertainty – see chart below – the most significant gaps of which are:

- The impact and outcomes of overheating<sup>xxi</sup>

- The impact of design of non-residential buildings on health
- The role of climate change in relation to the built environment and health
- The impact of neighbourhood walkability on obesity

TYPOLGY CHARACTERISTICS	NO. STUDIES
Air quality	67
Walkability	21
Noise	18
Green space	17
Road safety	16
Housing Affordability	11
Cycling	10
Fast food outlets	9
Damp	9
Cold	8
Green space - quality	7
Supermarket	7
Fear of serious crime	7
Amenities within walking distance	6
Ventilation	6
Public transport links	5
Proximity to main road	5
Convenience stores/ small shops	5
% socio-economic status of area	5
Overheating	3
New or regeneration	2
Recreational space/ playgrounds	2
Sports provision	2
Falls intervention	2
Renewal of interiors	2

Figure 3 (above): Number of studies with data points usable in economic valuation

	Physical activity	Asthma	Mental Wellbeing	Functional loss	Hypertension	Health and wellbeing	Neurodegenerative conditions	Obesity and overweight	pre-diabetes/ diabetes	Collisions and injury	Cardiovascular diseases	Mortality and premature death	Air pollution
Street lighting													
Amenities, facilities and recreational areas (malls, etc.)	 												
Green space and public open space (parks etc.)	  											 	
Quality of the neighbourhood (trash, litter, graffiti etc.)													
Neighbourhood walkability	 												
Neighbourhood safety													
Neighbourhood deprivation and socio-economic status													
Transport infrastructure (side walks and public transport infrastructure)	 			 									
Street design and connectivity													
Air quality and Traffic-related air pollution													
Features of driveway													
Traffic and related noise				 									
Density													

Table 1: Example gap analysis - one of five - based on the evidence from the project's literature review. Colour (Green/Amber/Red) denotes quality of evidence (H/M/L). Size denotes number of studies.



# ECONOMIC VALUATION OF EVIDENCE

How do we value human health? Some have challenged the ethics of placing a value on the health of an individual. However, without understanding the scale of human health using a comparative metric in the planning context, it is easy for health to fall further down the agenda, particularly as the true cost of health is often underestimated.

In this piece of work we attempt to value the potential change in human health between standard or normal design conditions in new build urban housing developments in the UK, and a point which represents an exemplary or ideal situation.

It is important to emphasise, that the results presented below represent only the potential movement between these two situations. We have excluded conditions not normally seen in new build housing, for example, lack of tapped water supply, lack of adequate floors, or lack of central heating systems.

## METHOD

Using the impact pathway approach, a model was created which could forecast, quantify and monetise the impact of different characteristics of the environment onto a standard population of 1,000 people for a single year. In this way the outputs could be up scaled to apply to different populations, i.e. a single development or a whole neighbourhood, and for different timescales.



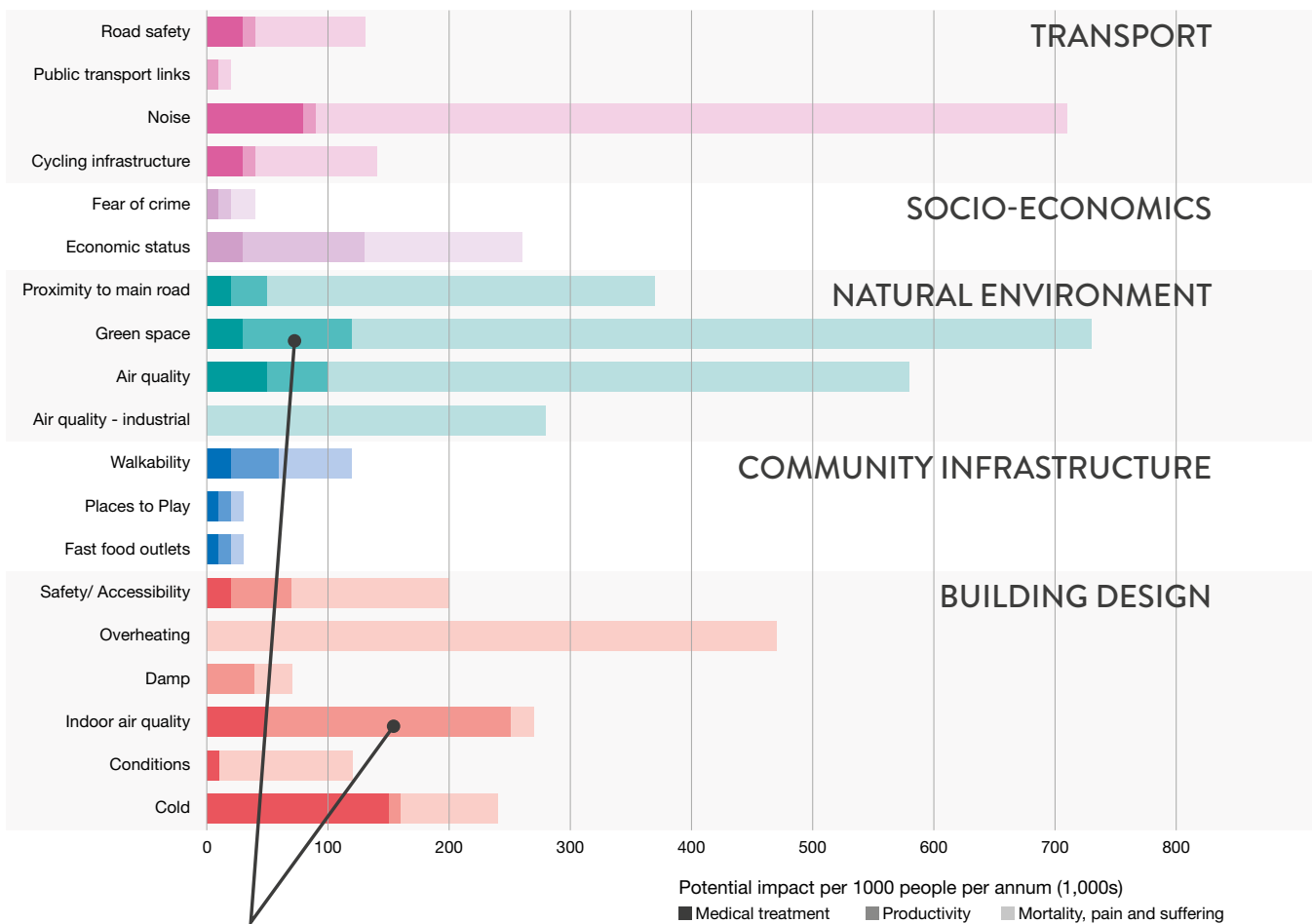
The value of health impacts from housing is calculated using evidence from housing studies where a measurable association between characteristics of urban development and human health have been established, such as an Odds Ratio (OR). This was applied to a hypothetical population of 1,000 people and the change in number of cases of ill health was forecast. This health impact is valued by applying a rate for Societal Cost of Illness (SCOI) which includes values for direct medical costs, lost productivity and the disutility of associated pain and suffering.

Values for SCOI were derived from existing valuation studies. We have presented information in the form of an interval; the largest potential movement between the most adverse and the most optimal conditions in the UK new urban housing context.

## RESULTS: 26 CHARACTERISTICS WITH 60 HEALTH OUTCOMES

The top five characteristics with the largest potential for impact were green space, air quality, noise, overheating and proximity to a main road.

### KEY FINDINGS



“For example, the evidence suggests that poor indoor air quality costs £250 per person per year mainly in terms of lost productivity (due to headaches), while lack of green space costs over £220 per person per year due to mental health problems alone.”

Table 2: Potential interval value of impact per characteristic of housing design, including all components of SCOI



## OVERHEATING UNPACKED

### FOCUS ON MORTALITY:

The only health outcome associated with excess heat is increased mortality, although obviously this hides within it multiple health impacts. A reference value was chosen based on a study which compared deaths during heatwaves in Rome and Stockholm (Oudin Astrom 2015). Mueller 2017, looking at Barcelona, found that additional preventable deaths were attributable to overheating, but did not give an OR. We have used the scenario based on Astrom's Stockholm outcomes as more appropriate to the UK context. This study found that during heatwaves, mortality increased by 8% compared to a normal summer.

We calculated the impact of an increase in 8% on the same age group in our hypothetical cohort. In a normal year we forecast 3 deaths in this age group (50-90). We found the impact of overheating could be an additional case per every four years (0.25 per year).

The reference value per case of mortality is £2,000,000: this is based on a method of valuation which uses disutility as the only valuation source, so it has not been possible to split this into component costs. This gives an annual value of £469,791 (range 138,295 to 1,211,896, here reflecting the variation in values for mortality).

## NOISE UNPACKED

Several health outcomes are in this category: Activity, Child conduct disorders, Hypertension, Diabetes, Mental health and Mortality. All of the above outcomes were negatively associated with increases in traffic related noise, including noise from roads, railway and aircraft.

### FOCUS ON CHILD CONDUCT DISORDER:

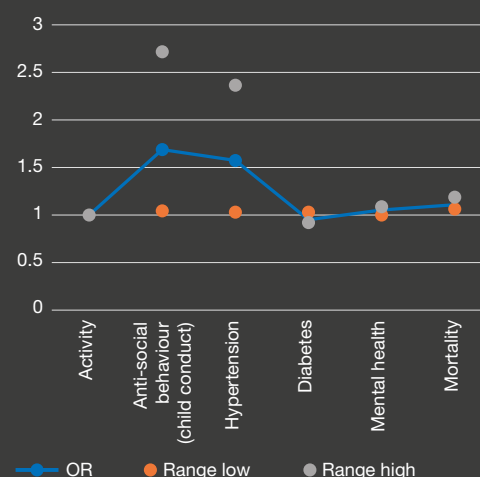
Dreger (2015) investigated the influence of different sources of environmental noise at home on incident mental health problems among school-aged children in Germany. The study found that after adjusting for covariates, exposure to road traffic noise at night was significantly associated with conduct problems (RR=1.57, 95% CI=1.04 to 2.38). Noise by neighbours during the day was also associated with conduct problems and hyperactivity.

We forecast the same Risk Ratio increase of 1.57 on a hypothetical group of 1,000 people. In an ordinary group of 212 schoolchildren, we forecast 11 cases of conduct disorders per year. The impact of the increase in noise levels was forecast as 6 more cases (range 0-15).

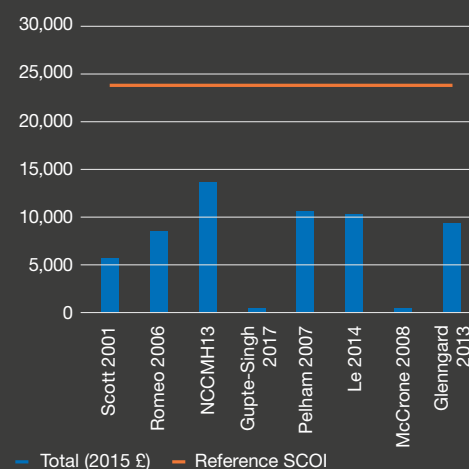
Child conduct disorder SCOI is valued at £24,096 per year: this is a reference value taken from a range of valuation studies. Child conduct disorders include medical treatment costs, lost or additional education, crime and childcare.

The forecast additional cost of noise for this outcome is £145,000. The largest burden of cost falls on the police and criminal justice service, followed by disutility. The cost to the NHS is relatively small; only £7,759.

### Range of Odds Ratio results for health outcomes associated with noise



### Comparison of valuations for total SCOI: Child Conduct



NB variation between elements included in cost - no one study explored SCOI

The range of values is 6,112 to 522,011, which reflects the wide range of impact uncertainty found in the study (range of risk ratio is 1.04 – 2.38), which leads to uncertainty in the number of forecast additional cases (0-15).

## UNCERTAINTY AND EVIDENCE GAPS

Uncertainty is a major feature of this project, because of the multiple variables included in the model. This leads to large ranges of uncertainty in the final results, in some cases by several orders of magnitude. Incidence rates and valuation evidence for some conditions are missing or incomplete. The weight of evidence available varies widely, along with the type of conditions studied.



## HOW CAN THIS WORK BE USED?

We have created a useful measure for evaluating the impact of specific housing developments, which provides decision makers with an understanding of the comparative or relative impact between characteristics of the built environment. Instead of other methods which use Years of Life Lost (YLL) as the outcome, this method gives us a much broader understanding of the impact with spread of cost burden for illness, and the relationship between all agents in providing a healthy environment.

It may be useful to use the results of this work in helping developers to prioritise areas for focusing resource, informing and enhancing existing tools such as Health Impact Assessments, for example.

However, many gaps exist in the evidence, in the association between some conditions and characteristics, and in the evidence pertaining to value of illness. We recommend that further research should take place into the relationship between positive behaviours such as activity and health outcomes. Valuation evidence should also be investigated for diabetes, stroke, and illness affecting child development in particular.

Figure 4: Bubbles show weight of evidence the literature revealed in each area. There were significantly more studies found on the natural environment (including air pollution), compared to buildings, community infrastructure, socio-economics and transport. The literature review started using search terms related to 'food' and 'neighbourhood design', which revealed comparatively few studies.





# PRACTITIONER RESPONSE TO ECONOMIC VALUATIONS

Interviewees were each presented with two graphs – see economic valuation above – that illustrated concisely the key findings from the economic valuation. They were then asked four questions – listed here below. The responses were developed into emergent themes.

1. Does this evidence influence your thinking?
2. How could this evidence change practice?
3. How might you use this data?
4. Is there any more information you would find useful?

Figure 5: Questions presented to interviewees on the headline economic valuations

## KNOWLEDGE OF HEALTH:

- The interviewees appeared largely familiar with most of the health issues linked to the urban environment, particularly the importance of green space and air quality, as well as quality of buildings, socio-economic aspects and mental health – see graphs below.
- The greatest surprise for most was the evidence linking noise from transport to the cost of treatment of child conduct disorder – see graph below. The links between air pollution and dementia was also a surprise for a number of interviewees.
- There was also surprise at lack of evidence in certain well-known areas (e.g. that our evidence did not show fast food as a significant cost and was not linked to weight gain).
- Overwhelmingly, interviewees viewed the economic valuation as very useful, although not necessarily the value in £s, rather the scale and difference between them.

## Known urban-health links

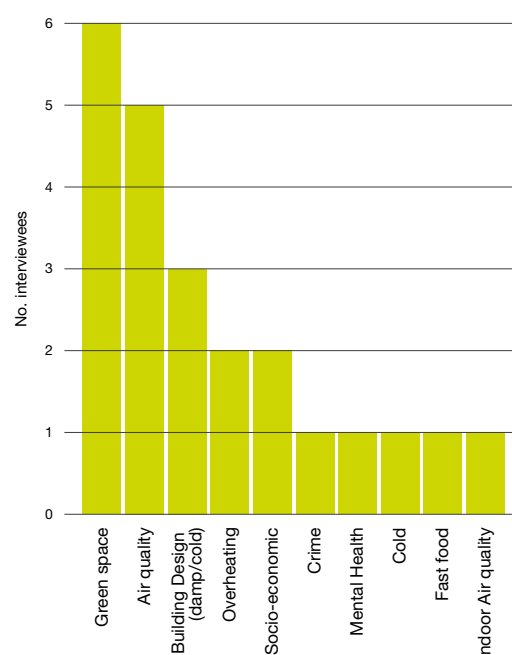


Figure 6: Interviews suggest that most health outcomes are known to urban development agencies. (Note: The numbers above are from field notes and are used to illustrate interviewee response; they should not be viewed as a comprehensive assessment).

“...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...”

“These are big numbers!”

- There was a difference of opinion as to the use of aggregated economic valuations. One saw the economic data as ‘too macro’ (to be used effectively) and flagged that the credibility depends on the underlying assumptions, while another emphatically supported the use of aggregated numbers in influencing policy.

### PRIORITISATION AND ‘STORY-TELLING’:

- A recurring theme from many interviewees was the need to build this economic valuation evidence into a wider narrative system of ‘story-telling’: e.g. one suggested it would make a useful ‘aide memoir’ or vision statement, and enable prioritisation and agenda setting.

“I think it (the economic valuation) helps to tell the story of the place.”

### INTEGRATING ECONOMIC VALUATION OF HEALTH:

- Proposals for how to integrate economic valuation of health in to the urban planning system were many and wide ranging, but there was an overall sense that the solution was for someone else to address. Solutions were systems-wide and included:
  - National funding (e.g. Treasury’s Green Book, Housing Infrastructure Fund)
  - Regulations (e.g. Building Regulations, National Standards)
  - Planning Permission and Local Policy (e.g. Evidence for Local Plan, Guidance)

### TRANSLATION & IMPACT:

- In addition to underlining the importance of clear and targeted communications via the usual channels (i.e. public health officers, masterplans), one strongly asserted it needs to be fed in at Chief Executive level due to dislocation further down the organisational hierarchy.
- It was suggested by several interviewees that the economic valuation might be used

to strengthen the business case for more health-focused activity (e.g. engaging with Local Enterprise Partnerships on issues of productivity; adding to the business case for infrastructure funding).

- It was also flagged that there is no dedicated body that translates research effectively for the private sector.

“It’s very difficult to get the link between academic research and what actually is read by people in the private sector. There doesn’t seem to be a body to be able to package it up and get it to us in bite-size form.”

#### Unknown urban-health links

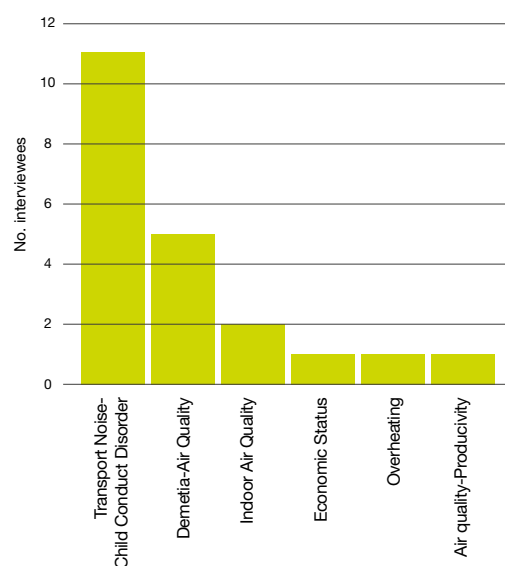


Figure 7: Of particular surprise were the links between transport noise and child conduct disorder, and air quality and dementia. Hyphens between urban form aspect and health outcome indicate link was the surprise (e.g. link between noise and transport).

“...the problem with public policy (is that) they’re all wicked problems... because there’s a complex web of interacting systems behind it which in themselves are quite difficult to intervene in”

# BARRIERS AND OPPORTUNITIES: VIEWS OF INDUSTRY PRACTITIONERS

30 hour-long interviews generated almost 500 pages of transcriptions, and provide a small, but rich and valuable health-focused insight in to the world of urban development decision-making. The following highlights key findings; full academic papers are scheduled for 2019.

**A** crucial finding is that **there was clear consensus - from both public and private sector - that health is not adequately accounted for or adequately resourced in urban planning.** However, there was also no clear route to doing so, particularly with regards to the question of who pays.

## FINANCE:

The role of investors was widely acknowledged as critical, yet so far there is seen to be only marginal engagement. Short-term horizons were flagged by many as key issues, but it was also pointed out that short-term finance has a critical role to play. Greater investment in the public sector is seen widely as desirable, alongside a need for “enlightened investors”.

“Not so long ago there was a bit more about maximising stakeholder value, but it’s definitely shareholder value today... that makes a big impact...”

“...making a profit, but not profiteering...”

## PUBLIC REALM:

The question of who pays for public realm (its long term maintenance, in particular) is recognised as a significant challenge. There are some exemplars of high quality stewardship in estate management, but these tend to be limited to high value (often city centre) locations.

## RESEARCH INTERVIEW METHOD | SUMMARY

- Two rounds of semi-structured, expert-led (‘elite’) interviews
- Sample of 15 interviewees; 13 from UK’s mainstream development agencies (6 private; 7 public) operating primarily in England; 2 from new start-up
- 500 pages of transcripts
- 13 initial themes; 5 areas of deeper enquiry; 10 emergent themes
- Thematic analysis through integrated synthesis, coding and review

SECTOR / ORG.	NO.	POSITION
<b>Private</b> Developers, Asset Managers, Investors	6	Senior Executives Departmental Leads
	2	Sustainability/ Health Leads
<b>Public</b> City and District Councils	5	Senior Officers and Cabinet Members
	2	Sustainability/ Health Leads

## INITIAL THEMES EMERGENT THEMES

Priorities	Valuation*
Understanding of health	Finance*
Process	Politics
Barriers	Land*
Relationships	Public Realm
Valuation	Government
Existing mechanisms	Human resource
Example initiatives	Partnership*
Opportunities	Knotty problems
Exemplars	Risk*
Risks	
Networks	*Areas of deeper enquiry
Next steps	



### **POLITICS:**

Short-termism of political cycles are widely acknowledged as a perennial issue with few clear opportunities. It is also a highly complex challenge area, which falls beyond the scope of this project to explore.

*“Politicians benefit from announcing a policy; they don’t always benefit from its delivery.”*

### **LAND:**

Land was a very significant and, in one case, potentially highly contentious area of enquiry. There was clear consensus as to the fundamental importance of its control; it was widely acknowledged that disposal decisions do not consider health in any meaningful way; and capturing land value was widely supported by both public and private sector, although one interviewee reported it to be potentially ‘dangerous’.

*“I think it’s very dangerous when you try and intervene in things like (land value capture).”*

*“It all comes down to how the land is released, for how much, and to whom.”*

*“Where the NHS is a land holder, then surely it should be thinking about helping itself; do they maximise short-term gain, or could they start thinking about things on a slightly longer term scale?”*

### **GOVERNANCE:**

The role of public sector planning was widely seen as both pivotal in achieving health outcomes, and also largely ineffectual. The private sector was open to increased building standards, policy and guidance to provide clarity, as long as it’s fairly applied. The alignment of policy with industry’s ability to implement is likely to be critical (e.g. PPG3 and the policy push for densification was cited, which presented major challenges for the mainstream implementers).

*“Housing is not an area where you can let the market run free and just hope for the best.”*

*“...we developers would do these if there was a level playing field...”*

### **CAPACITY:**

There was clear consensus that lack of capacity within local government was a major barrier, and yet there seemed very little opportunity for improvement in this area other than via greater levels of resourcing, although greater autonomy (e.g. localised public revenue collection) was cited.

*“Anybody that becomes any good or makes any real progress in a local planning authority tends to get snapped up by the private sector and I don’t know exactly what you could do about that.”*

## **PARTNERSHIP:**

There was clear consensus that effective partnership is fundamental to quality and yet it relies on a range of intangible elements (e.g. trust, shared values). Track record was clearly important, but there also appeared to be a lack of choice of partners.

*“You’ve got to understand what you’re putting into the pot and be able to value that. If it’s only 10% of the partnership then you only get 10% of the control.”*

*“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.”*

## **RISK:**

Risk appears central to the question of health in urban development. It was suggested that there is no investment in prevention due to lack of evidence and future unknowns. There was also an apparent conflict in that developers are expert in taking on risk, yet must also de-risk fully in order to satisfy shareholders.

*“The (house-builder) industry gets judged on its returns and in particular how it returns on capital employed. This means it’s difficult to find long term investments, and why the pure house-building sector doesn’t really get involved in private rented. That’s a big investment that has different types of returns.”*

## **KNOTTY PROBLEMS**

There were a number of issues that seemed to conflict or have no clear solution in addition to those described above, including:

- Developers are proactively starting to use social value in demonstrating the (unrecognised) social benefits of their development, but also queried the feasibility of it being integrated in to the planning process.
- There is no clear consensus on what good quality environments look like: e.g. greener, car-led suburbia or greyer, low-car city centres.
- Private sector lending is more expensive, but public sector borrowing is politically difficult.
- House-buyers are often expected to foot the bill for any additional cost, but house prices already too high for many.

*“Prices are very expensive anyway. Are you saying that good health is something that’s a commodity, which is therefore available to those with greater wealth?”*

*“At the end of the day it’s all about stories; we can say whatever we want, but everything we do is stories.”*







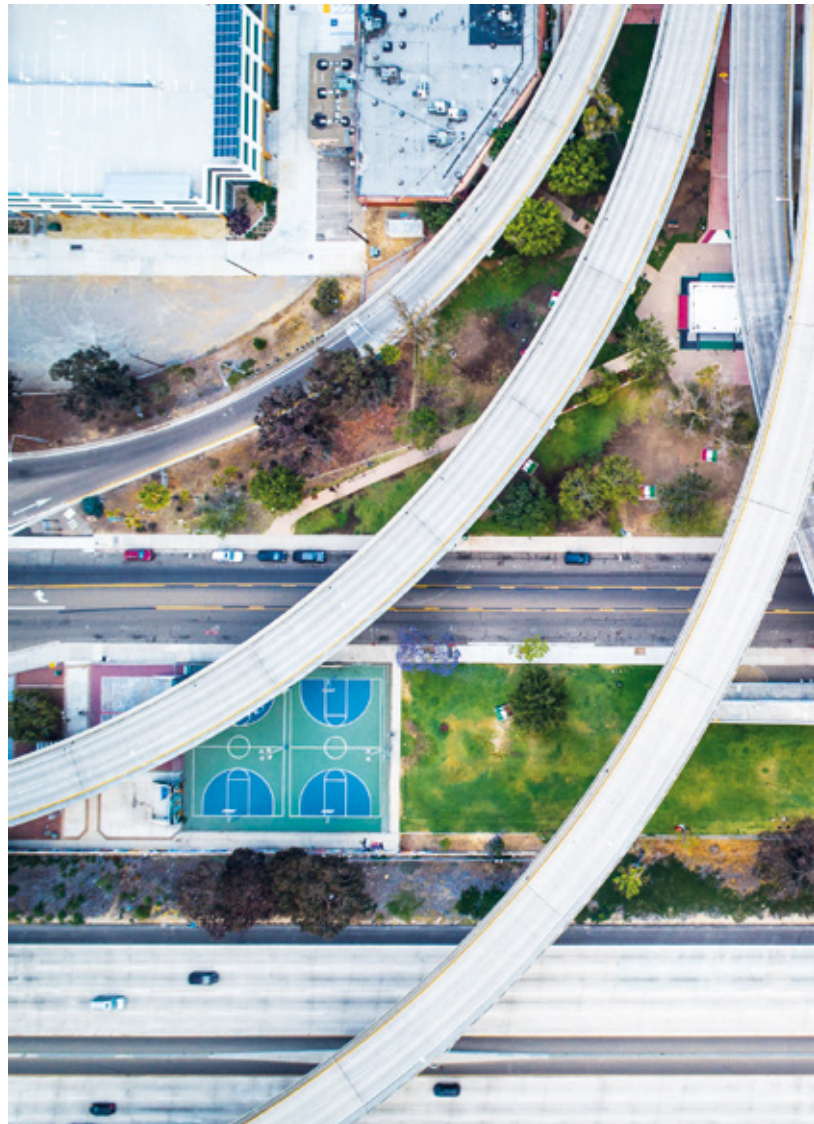
# BRIDGING DIVIDES

A core focus of the project was on achieving meaningful and effective ‘transdisciplinarity’ – a term used in academic circles to denote a way of working that enables the cross-fertilisation of knowledge and experiences from people in several academic disciplines, built environment professions and policy making institutions. Our project confirms that **transdisciplinarity can bridge the applicability gap between information, knowledge and practice**, while addressing impacts on land-use planning processes and public health outcomes in real world situations.

**A**t the outset, we agreed on terminology: *Disciplinarity* refers to the specialisation and fragmentation of academic disciplines such that each discipline has its own concepts, definitions and methodological protocols for the study of its precisely defined domain of competence. For example, in the domain of environmental sciences, different definitions, concepts and methods exist in biology, chemistry, geology and physics. This means that collaboration across disciplinary boundaries will not be easy until a common understanding is achieved.

*Multi-disciplinary* refers to an additive research agenda that accepts each researcher remaining within his/ her discipline and applying its concepts and methods without collaboration with other researchers.<sup>xxiv</sup> This approach is frequently applied in environmental impact assessments of large-scale housing and urban development projects (EIA).

*Interdisciplinary* contributions involve concerted actions and integration that are applied by researchers in at least two different disciplines to achieve a shared research goal about a common subject. In contrast, transdisciplinary contributions incorporate a combination of concepts and knowledge used by academics, other researchers and actors in society, including representatives of the private sector, public administrations and citizens.





*Transdisciplinary* and collaborative planning and participatory design are tangible ways of co-producing new built environments with the involvement of industry, researchers, practitioners, policy makers and citizens.<sup>xxv</sup>

We have shown in this pilot research that:

- Transdisciplinary partnerships can respond more effectively to these demands because they bridge the applicability gap between knowledge and practice.
- Transdisciplinary collaborations occur when action research combined with the participation of stakeholders replaces conventional planning processes grounded only in academic knowledge and professional know-how.
- Transdisciplinary contributions include the active involvement of researchers, policy makers, practitioners and citizens as partners during all the phases of collaborative projects from the outset.
- Given that transdisciplinary projects are co-designed, co-produced and co-implemented they provide a forum and common ground for all the participants to share ideas, information, judgments, knowledge, preferences and values about real world situations and problems.

Finally, our research confirms that the rationale for replacing conventional planning processes by transdisciplinary contributions can be supported empirically by informing stakeholders, and especially those policy makers and decision makers upstream, about the negative impacts of housing and urban development on natural ecosystem services, and social inequity, while also showing that alternatives do exist.

# CLIMATE CHANGE: A STRESS MULTIPLIER

An important area of interest for the project was the link between urban health and climate change. We know that climate change is increasing the mean and variability of temperature and precipitation, resulting in:

- Warmer summers
- More frequent, intense, and longer heat waves
- Heavier precipitation and
- More (and more intense) flood events <sup>xxvi</sup>

**T**hese trends are projected to increase with each additional unit of warming, putting additional stress on human health and well-being. Features of the urban environment will interact with these trends to increase the challenges for human health and well-being over coming decades. Population aging further increases heat-related risks<sup>xxvii</sup>.

Urban areas are hotter than rural areas because cities trap heat from building materials, roadways, and human activities, and from waste heat from buildings and air conditioning. Together, these create urban heat island that increase morbidity during periods of high ambient temperature (Schinas et al. 2018). For example, the urban heat island contributed to total heat-related deaths during a 10-day heatwave in August 2003 in the West Midlands (Heaviside et al. 2016; Taylor et al. 2018). Urban heat islands also can have poorer air quality, contributing to adverse health outcomes.

Climate change is already increasing heat-related mortality<sup>xxviii</sup>, with projections indicating potentially large increases in mortality as temperatures continue to increase<sup>xxix</sup>. There is growing evidence that cities may experience greater heat stress than expected under projections of regional warming because of urban heat island effects<sup>xxx</sup>, although not all projections support this conclusion<sup>xxxi</sup>. The daytime interactions between urban heat islands and heat wave depend on the local background climate, with the interactions projected to diminish in future warmer climates in temperate regions<sup>xxxii</sup>. In contrast, night time interactions are projected to be stronger in future climates. This means potentially less cooling at night during heat waves, a risk factor for heat-related mortality. In the West Midlands under a scenario of medium greenhouse emissions, a typical heat wave in 2080 could increase mortality about 3-fold, taking into account changes in population and the urban heat island, and assuming not change in population adaptation<sup>xxxiii</sup>.

Impervious surfaces in urban areas (e.g. streets, driveways, roofs) increase the risk of flooding, which interacts with the observed and projected increases in extreme precipitation events with climate change to further increase the risks<sup>xxxiv</sup>. Flooding is associated with a range of adverse health outcomes, including increases in mental health problems, particularly post-traumatic stress, depression, and anxiety, that can last long after the flooding event<sup>xxxv</sup>, with greater risks among people who were displaced<sup>xxxvi</sup>. Flooding also can negatively affect health and social care systems<sup>xxxvii</sup>.

The examples of heat waves and flooding illustrate how climate change will be a stress multiplier for urban residents, and the importance of explicitly incorporating climate change into policies and planning.



# PUBLIC ENGAGEMENT: SHAPE OUR CITY

Helping communities to be better equipped to participate in decision-making processes, the Shape Our City team have been working with community groups from the outset, taking a co-development approach to several of the project's key outputs. Our three community hubs overlap closely with some of the most socio-economically deprived in Bristol and the UK.

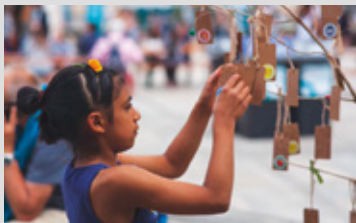
**W**e have communicated some of the urbanisation-relevant public health research revealed by our literature review, as well as the results of the economic valuation, creatively, in visual forms and games that inspire interaction and conversation. The activities culminated in a short newspaper, as a guide and reference for residents, produced by artist Eleanor Shipman, two resident-led health

interventions and a toolkit on how to create change locally, created by MArch students at UWE.

Cities impact people – and people's behaviour and decisions impacts cities. Shape Our City has taken a 'multilogue' approach: starting conversations that lead to the research, and back again, into communities, with the aim of developing and strengthening the feedback loop.

## LAWRENCE WESTON & KNOWLE WEST

Collecting citizens' suggestions for a healthier built environment.



## CITY CENTRE

A jigsaw game, where public participants are asked to guess which valuation – for healthy city interventions – represents the correct potential savings. Played at a range of events in Bristol.



## CITY CENTRE

'Inhale', a sculpture, by artist Luke Jerram, of a diesel soot air pollution particle, 3 million times larger than real life. Here, positioned outside Bristol City hall.



## BARTON HILL

In-community events, where citizens lead walks around their own neighbourhood to determine unhealthy elements of their built environment.



### Legend

2016 wards

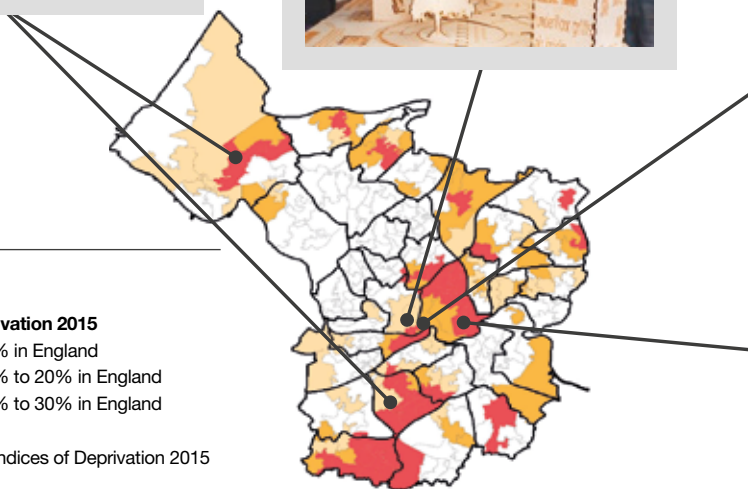
### Index of Multiple Deprivation 2015

Most deprived 10% in England

Most deprived 10% to 20% in England

Most deprived 20% to 30% in England

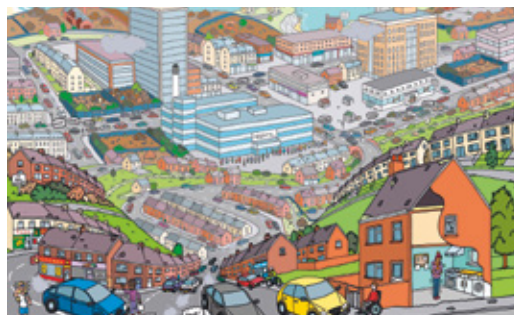
Source: DCLG English Indices of Deprivation 2015





## WAYS 'SHAPE OUR CITY' HAS SUPPORTED COMMUNITY CAPACITY BUILDING FOR DECISION-MAKING:

- Convening events.
- Providing resources.
- Going to where communities already are.
- Not providing all the answers.
- Trusting people to know about their own environment.
- Creating a legacy initiative, based on community preferences.



### WEB GAME

Choose from a shopping basket of health-linked sustainable city interventions, at the city or neighbourhood scales. The tool is gathering information on citizen' priorities and also represents some of the cross-cutting problems, such as air pollution and non-communicable diseases.

## WHY ENGAGE THE PUBLIC IN URBAN DEVELOPMENT?

The public are the 'first responders' for any crisis of health or resilience – citizens are also the most affected by the impacts of any changes in public health status or by city developments.

Despite diverging interests, building a resilient, healthy environment will take collaboration, requiring public entities, private companies and citizens to work co-operatively; the development of compatible goals is a crucial element in improving the effects of the built environment on public health. Sustainable cities can empower residents to affect the implementation, evaluation and possible revision of policies, and citizens' meaningful involvement in decisions about the preferred directions for urbanisation is highly relevant. Indeed, involving citizens in the city's decision-making and planning processes has been shown to increase community resilience

and has already become common practice in major cities in developed countries<sup>1</sup>.

However, traditional forms of public involvement in decision-making have many deficiencies. Misconceptions about the evidence, lack of understanding of data nuances or trade-offs, and lack of representativeness are some of the well-trodden issues. Public engagement research has found that building robustness and public trust into public involvement involves both a normative position (i.e. consultation) and a substantive position (i.e. participation). In a global environment affected by rapid urbanisation, climate change and population growth, we posit that finding ways to improve consultation and participation – and the feedback loops between relevant evidence, UPSTREAM decision-makers and downstream citizens – is an urgent and crucial task.

# KEY INSIGHTS & DISCUSSION

---

This pilot has provided key insights into, 1) what evidence seems to be available for economic valuation and what economic valuation can reveal about the health data, and, 2) what leading practitioners think about this type of economic valuation, and what they see as the main barriers and opportunities in creating healthy urban environments.

---

## THE EVIDENCE AND THE GAPS:

1. The most significant gaps in evidence related to; overheating, design of non-residential buildings, the role of climate change as a stress multiplier, and neighbourhood walkability.
2. Whilst there was significant evidence in the areas of transport, buildings and the natural environment, there was relatively little on 'neighbourhood design'. This may be because it is an overarching term, rather than a specific aspect of built or natural infrastructure.
3. Socio-economic issues, though not initially a central focus of the study, were revealed as a substantial area of evidence in their own right.
4. There was a significant amount of evidence in certain areas (e.g. particularly air pollution, but also walkability, noise, green space, road safety, affordability and housing), but little in other areas (e.g. overheating, public transport links, sports provision)
5. By far the greatest costs appear to be in terms of mortality and wider pain and suffering, and this appears to be due mainly to; noise from transport, lack of quality green space, air quality and overheating.
6. The costs that are most clearly attributable to certain end user payees (e.g. cost of medical treatment and in terms of lost productivity) appear due to; indoor air quality, cold buildings, economic status, lack of green space, air quality and noise from transport.

## ECONOMIC VALUATION, BARRIERS + OPPORTUNITIES

1. Feedback from interviewees was overwhelmingly positive on the usefulness and usability of this form of economic valuation as a means of understanding and communicating priority areas, even though it lacked high level precision.
2. There appears to be a strong divergence of opinion as to whether the use of aggregated numbers (e.g. costs modelled up to national levels) are or are not effective.
3. Most of the interviewees were well aware of many of the health issues, though one or two were relatively unappreciated (in particular, the cost of treatment due to impact of noise from transport on child behavior surprised many).
4. There is a clear consensus that health is not adequately factored into the urban planning process, and also that there is no consensus on how to alter that situation.
5. Control of land, financial time-horizons, quality of relationships, lack of public sector capacity and maintenance of the public realm were all seen as vital components in addressing health inequalities.

## DISCUSSION – FUTURE RESEARCH NEEDS AND POLICY-PRACTICE PRIORITIES:

- This pilot suggests there is a strong demand from both public and private sector for the incorporation of economic valuation of health outcomes within urban planning and development. Many and varied suggestions were given for where and how it may be used. However, there was also no clear agreement or understanding about where and how best to feed these valuations in to the system and a sense that it was the responsibility of others to address this. More research is indicated in this important area and the multiple routes to impact.
- The economic valuation of health evidence derived through this pilot suggest that priority areas for policy-makers and practitioners should be; noise from transport, lack of quality green space, air quality and overheating, indoor air quality, cold buildings, and economic status.
- Both academic and practitioner communities appear well versed in the links between urban environments and health, but there are gaps. Research is needed in order to provide a balanced picture, not least given how essential this data is for the economic valuation. Key areas for further research include: overheating, design of non-residential buildings, the role of climate change as a stress multiplier, and neighbourhood walkability.
- The least developed area of research activity is the exploration of the barriers and opportunities to creating healthy urban environments. There appear to be vital structures, processes and drivers that impact profoundly on the quality of urban change and renewal, including: ownership, time-horizons, track record, trust, public sector capacity, maintenance of public

assets. Despite significant collective knowledge and experience across public and private industry, the system is highly fragmented and complex and there is no coherent understanding of how the system works. Similarly, there is little clarity about how and where the system might need to change in order to enable the creation of healthy urban environments. Collaboration between property investors, policymakers, practitioners, researchers and laypeople should be encouraged in order to ensure constructive dialogue during inclusive processes for the planning of built environments. Further and more intensive research from a human and planetary health perspective is needed in respect of the decision-making that takes place far upstream in urban planning and development.

- Finally, public Engagement is not one-size-fits-all. Citizens should be engaged where they already are and through shared identity (e.g. neighbourhood/geographical locality). It is important to appeal to what people regard as important and to build trust and audience by partnering with community organisers, and creating inviting and interactive spaces that encourage and facilitate engagement.



# RESEARCH TEAM

**Prof Gabriel Scally**, Principal Investigator

**Prof Judy Orme**, Principal Investigator

**Daniel Black**, db+a, Project Director

**Dr Paul Pilkington**, Research Lead  
(Literature Review and Interviews)

**Dr Alistair Hunt**, Research Lead (Economics)

**Eleanor Eaton**, Research Associate (Economics)

**Dr Laurence Carmichael**, Project Faculty Lead

**Dr Ben Williams**, Project Manager and  
Research Fellow

**Janet Ige**, Research Associate

**Dr Emily Prestwood**, Research Associate

**Prof Jim Longhurst**, Senior Advisor

## PUBLIC ENGAGEMENT

**Ruth Larbey**, Project Manager  
(Shape Our City) Science Communication Unit

**Sophie Laggan**, Project Coordinator  
(Shape Our City) Science Communication Unit

**Dr Margarida Sardo**, Project Evaluator  
(Shape Our City) Science Communication Unit

**Eleanor Shipman**, Participatory artist  
(Something Good, Something Useful)

## INTERNATIONAL ADVISORS

**Prof Kristie Ebi**, Advisor  
(Climate Change and Health)

**Prof Roderick Lawrence**, Advisor  
(Inter/trans-disciplinarity)



**The team would also like to thank the following for their time in supported the literature review:** Dr Adrian Davis, Dr Kiron Chatterjee, Sheila Macintosh, Dr Matthew Jones, Dr Danielle Sinnett, Emeritus Professor Hugh Barton, Dr Layla MacCay, Professor Lorraine Gamman.

**The public engagement team would also like to thank the following artists and community groups for their involvement:** Eleanor Shipman, UWE Hands On Bristol, Knowle West Media Centre, Filwood Community Centre, Eight Creative Agency, Barton Hill Settlement and The Network, Hanover Street, Blaise Weston Court Extra Care Estate, Oasis Community Shop, Alive, Luke Jerram, Andy Council, SOTO, Springmead Prep, Whitehall Primary.

# REFERENCES

- i Black, D., Scally, G., Orme, J., Hunt, A., Pilkington, P., Lawrence, R., and Ebi, K. (2018) Moving Health Upstream in Urban Development: Reflections on the Operationalisation of a Trans-disciplinary Case Study, Global Challenges, Wiley.
- ii Barton, H., Tsourou, C., (2000) Healthy Urban Planning. London: Spon Press and Copenhagen: WHO.
- iii Barton, H, Grant, M, Guise, R (2003) Shaping Neighbourhoods: A Guide for Health, Sustainability and Vitality. Spon Press.
- iv HM Government (2010) Healthy Lives, Healthy People: Our strategy for public health in England. Available from: [https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/216096/dh\\_127424.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/216096/dh_127424.pdf)
- v HM Government (2018) Industrial Strategy Booklet. Available from: [https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/364455/industrial-strategy-booklet-3.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/364455/industrial-strategy-booklet-3.pdf)
- vi Urban Villages Forum (1992) Urban Villages: A concept for creating mixed-use urban developments on a sustainable scale. Urban Villages Group.
- vii Urban Task Force (1999) Towards an Urban Renaissance: Final Report of the Urban Task Force.
- viii Dannenberg, A, Frumkin, H, Jackson, R (2011) Making Healthy Places: Designing and Building for Health, Wellbeing, and Sustainability. Island Press.
- ix RTPi (2014) Planning Horizons: Promoting Healthy Cities: Why planning is critical to a healthy future. Available from: [www.rtpi.org.uk/media/1119385/rtpi\\_promoting\\_healthy\\_cities.pdf](http://www.rtpi.org.uk/media/1119385/rtpi_promoting_healthy_cities.pdf)
- x Lancet Commission (2015) Safeguarding human health in the Anthropocene epoch: report of The Rockefeller Foundation–Lancet Commission on planetary health. Available from: <https://www.thelancet.com/commissions/planetary-health>
- xi Academy of Urbanism (2015) Annual Congress X – health, happiness and wellbeing. Available from: <https://www.academyofurbanism.org.uk/annual-congress-x-birmingham/>
- xii ULI (2018) Building Healthy Places Initiative. Website: <https://americas.uli.org/research/centers-initiatives/building-healthy-places-initiative/>
- xiii Black, D., Scally, G., Hunt, A., and Orme, J (2018) We must look further upstream to enable planetary health-literate urban development. The Lancet Planetary Health. Vol 2, No.4, e145-e146, April 2018. Elsevier. [https://www.thelancet.com/journals/lanph/article/PIIS2542-5196\(18\)30045-7/fulltext](https://www.thelancet.com/journals/lanph/article/PIIS2542-5196(18)30045-7/fulltext)
- xiv Carney M. (2015) Breaking the tragedy of the horizon—climate change and financial stability—speech by Mark Carney. <https://www.bankofengland.co.uk/speech/2015/breaking-the-tragedy-of-the-horizon-climate-change-and-financial-stability>
- xv Stern N. (2007) The Stern review: the economics of climate change. <http://www.cambridge.org/ro/academic/subjects/earth-and-environmental-science/climatology-and-climate-change/economicsclimate-change-sternreview?format=PB&isbn=9780521700801#YJvGx3Cvs9P1bsm.97>
- xvi Department of Health (2004) At least five a week: Evidence on the impact of physical activity and its relationship on health; a report from the Chief Medical Officer.
- xvii OECD (2014) The cost of air pollution: Health impacts of road transport. Available from: <http://www.oecd.org/environment/cost-of-air-pollution.htm>
- xviii HM Government (2013) The National Adaptation Programme Report: Analytical Annex; Economics of the National Adaptation Programme.
- xix Association of British Insurers (2014) Flooding. Website: [www.abi.org.uk/Insurance-and-savings/Topics-and-issues/Flooding](http://www.abi.org.uk/Insurance-and-savings/Topics-and-issues/Flooding)
- xx Natural England (2009) No Charge? Valuing the natural environment. Available from: <http://publications.naturalengland.org.uk/publication/36019>
- xxi Ige, J., Pilkington, P., Orme, J., Williams, B., Prestwood, E., Black, D., Carmichael, L. and Scally, G., 2018. The relationship between buildings and health: a systematic review. Journal of Public Health.
- xxii Oudin Åström, D., Schifano, P., Asta, F., Lallo, A., Michelozzi, P., Rocklöv, J. & Forsberg, B. 2015; The effect of heat waves on mortality in susceptible groups: a cohort study of a Mediterranean and a northern European City, Environmental Health 14:30 DOI 10.1186/s12940-015-0012-0
- xxiii Mueller, N., Rojas-Rueda, D., Basagaña, X., Cirach, M., Cole-Hunter, T., Davdand, P., Donaire-Gonzalez, D., Foraster, M., Gascon, M., Martinez, D., Tonne, C., Triguero-Mas, M., Valentín, A., & Nieuwenhuijsen, M. 2017; Health impacts related to urban and transport planning: A burden of disease assessment, Environment International, Volume 107, 2017, Pages 243-257.
- xxiv Lawrence, R. (2010) Deciphering interdisciplinary and transdisciplinary contributions. Transdisciplinary Journal of Engineering & Science, vol. 1 (1): pp. 125-130.
- xxv Lawrence, R. (2015) Mind the Gap: Bridging the divide between knowledge, policy and practice. In: Barton, H., Thompson, S., Burgess, S. & Grant, M. (eds.) The Routledge Handbook of Planning for Health and Well-Being, pp. 74-84, New York, London: Routledge.
- xxvi IPCC. 2018. Summary for Policymakers: Global warming of 1.5°C: an IPCC special report on the impacts of global warming of 1.5°C above pre-industrial levels and related global greenhouse gas emission pathways, in the context of strengthening the global response to the threat of climate change, sustainable development, and efforts to eradicate poverty



- 
- 
- <sup>xxvii</sup> Heaviside C, Macintyre H, Vardoulakis S. 2017. The urban heat island: implications for health in a changing environment. *Current Environmental Health Reports* 4:295-305
- <sup>xxviii</sup> Ebi KL, Ogden NH, Semenza JC, Woodward A. 2017. Detecting and Attributing Health Burdens to Climate Change. *Environmental health perspectives* 125(8)
- <sup>xxix</sup> Ebi KL, Hasegawa T, Hayes K, Monaghan A, Paz S, Berry P. 2018. Health risks of warming of 1.5° C, 2° C, and higher, above pre-industrial temperatures. *Environmental Research Letters*
- <sup>xxx</sup> IPCC. 2018. Summary for Policymakers: Global warming of 1.5°C: an IPCC special report on the impacts of global warming of 1.5°C above pre-industrial levels and related global greenhouse gas emission pathways, in the context of strengthening the global response to the threat of climate change, sustainable development, and efforts to eradicate poverty
- <sup>xxxi</sup> Scott AA, Waugh DW, Zaitchik BF. 2018. Reduced urban heat island intensity under warmer conditions. *Environmental Research Letters* 13 pii: 064003. doi: 10.1088/1748-9326/aabd6c
- <sup>xxxii</sup> Zhao L, Oppenheimer M, Zhu Q, Baldwin JW, Ebi KL, et al. Interactions between urban heat islands and heat waves. *Environmental Research Letters*. 2018;13(3):034003
- <sup>xxxiii</sup> Heaviside C, Vardoulakis S, Cai X-M. 2016. Attribution of mortality to the urban heat islands during heatwaves in the West Midlands, UK. *Environmental Health* 15(Supple):27
- <sup>xxxiv</sup> IPCC. 2012. Managing the Risks of Extreme Events and Disasters to Advance Climate Change Adaptation. A Special Report of Working Groups I and II of the Intergovernmental Panel on Climate Change [Field, C.B., V. Barros, T.F. Stocker, D. Qin, D.J. Dokken, K.L. Ebi, M.D. Mastrandrea, K.J. Mach, G.-K. Plattner, S.K. Allen, M. Tignor, and P.M. Midgley (eds.)]. Cambridge University Press, Cambridge, UK, and New York, NY, USA, 582 pp
- <sup>xxxv</sup> Jermacane D, Waite TD, Beck CR, Bone A, Amlot R, et al. 2018. The English National Cohort Study on Flooding and Health: the change in prevalence of psychological morbidity at year two. *BMC Public Health* 18:330
- <sup>xxxvi</sup> Munro A, Kovats RS, Rubin GJ, Waite TD, Bone A, et al. 2017. Effect of evacuation and displacement on the association between flooding and mental health outcomes: a cross-sectional analysis of UK survey data. *Lancet Planetary Health* 1:e134-e141
- <sup>xxxvii</sup> Curtis S, Fair A, Wistow J, Val DV, Oven K. 2017. Impact of extreme weather events and climate change for health and social care systems. *Environmental Health* 16(Suppl):128





# UPSTREAM

[www.urban-health-upstream.info](http://www.urban-health-upstream.info)