Milestone Year Seminar Series

The New Urban Health

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Global Burden of NCDs

DEADLY AND NEGLECTED
Non-communicable diseases (NCDs) such as cancer and diabetes caused more deaths and disabilities in 2010 than did infectious ones, but received disproportionately low investment.

DEATHS (MILLIONS)

- Total deaths from all causes: 52.8
- Cardiovascular: 34.5
  - Injuries: 5.1
  - Diabetes, urogenital, blood and endocrine diseases.
  - Diarrhoea and common infectious diseases: 5.3
  - Other: 3.0
  - HIV and tuberculosis: 2.7
  - Neonatal disorders: 2.2
- Cancer: 15.6
- Chronic respiratory disease: 8.0
- Other: 4.4
- Diabetes\(^\d\): 3.8

Gostin (2014) Nature
World is also rapidly urbanising

- By 2050 70% of the global population will be living in cities

- The number of cities will also rise, from 1551 in 2010, to >2000 by 2030

- The number of cities with >10 million will increase from 28 to 40

Modern society is facing two challenges

• Increasing burden of non-communicable disease (NCDs)

• Increasing burden of urbanisation

• NCDs rising faster in cities than elsewhere
Urban environmental factors increasingly important for policy

However, we know that our health is also shaped by our environment.

The homes and neighbourhoods we live in

The health and wellbeing of people who experience homelessness is poorer than that of the general population. Badly maintained homes - and poor living conditions - can also have a negative impact on mental and physical health.\textsuperscript{37} For example:

- There is a clear link between damp, mould and asthma, and rotting floorboards and poorly lit properties can increase the risk of a trip or fall.

- Overcrowded homes – with children sleeping in the living room or sharing a bedroom with a parent – can also harm family relationships, and impact on mental health.

Our mental and physical health is also shaped by the neighbourhoods we live in, including access to green space, community safety and cycling or walking routes.\textsuperscript{38}

Prevention is better than cure: our vision to help you live well for longer

5\textsuperscript{th} November 2018

DHSC
Todays talk

• Look back on the work I was involved in in the Unit since 1995 (!!!!)

• Use examples of work that I and the unit ‘diaspora’ were involved in to briefly chart how the field has evolved and why perhaps we need better theories

• Link into current work and possibilities for the future..
Back to the beginning..
Not really ... a geographer
So..urban environments matter?

You'll be lucky to live to 60 here. But it's not the third world ... it's Glasgow's East End

Shettleston's diet of chips, fags and booze means that life expectancy is actually falling in one of the most deprived parts of the UK.

Three years from now, by the law of averages, Bolly Dunn should be dead. 'When your number's up,' he shrugs, lighting one of 50 roll-ups he will smoke before closing time, 'your number's up.'

There are several empty seats around Dunn in a corner of the Prince Charlie pub in Shettleston, Glasgow. In his mind's eye they are taken by the ghosts of departed friends. They were men who died in their thirties and forties, a fact which no longer here counts as extraordinary.

Men in Shettleston die younger than anywhere else in the country. At 63, life expectancy is 14 years less than the national average and comparable with Iraq and some countries in the Third World. It is also nearly 18 months shorter than a decade ago - Britain's first reduction in lifespan since the Second World War.
This is where I come in as a researcher ..
Particular interest in whether the urban environment is ‘obesogenic’?
Key problem: how can we tell?

Shaw, Dorling & Mitchell (2002)
Policy was a pretty evidence-free zone

Education and debate

“Food deserts”—evidence and assumption in health policy making

Steven Cummins, Sally Macintyre

Assertions can be reported so often that they are considered true (“factoids”). They may sometimes even be used to determine health policy when empirical information is lacking. Steven Cummins and Sally Macintyre use the claimed existence of “food deserts”—poor urban areas where residents cannot buy affordable, healthy food—to illustrate why policy makers need to look more critically at the facts.

In December 2001 a cross party motion on food poverty signed by 198 UK MPs gained its first reading in parliament. The Food Poverty (Eradication) Bill is now waiting to be read for a second time.1 Though this bill is a laudable attempt to introduce a policy designed to improve the nutrition of those with the lowest incomes and in the poorest places, it is an example of how some ideas become accepted as fact though they may not be true. They become “factoids”: assumptions or speculations reported and repeated so often that they are popularly considered true; they are simulated or imagined facts.2 This paper illustrates how, if the social climate is right, facts about the social world can be assumed and hence used as the basis for health policy in the absence of much empirical information.

The bill

The bill’s provisions require the secretary of state to publish and implement a strategy for abolishing food

Summary points

Factoids are assumptions or speculations reported and repeated until they are considered true.

They are sometimes used to determine health policy when empirical information is lacking.

The assumption that in the United Kingdom there are poor urban areas where residents cannot buy affordable, healthy food (“food deserts”) is a factoid.

Policy strategies to combat the existence of food deserts exemplify how factoids can influence health and social policy.

The burden of proof, or demand for evidence,
What do we know about the distribution of environmental risks for diet?

Key question: Does ‘deprivation amplification’ exist?

The location of food stores in urban areas: a case study in Glasgow

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Director, MRC Social & Public Health Sciences Unit, University of Glasgow, Glasgow, Scotland

Keywords Food stores, Food deserts, Distribution, Deprivation, Locality, Glasgow

Abstract During the late 1990s there has been an increasing interest in the concept of “food deserts” (populated areas where there are more likely to be found their prevalence and ditributed food outlets in the Greater on spatial variations in the in 9 sample (n = 246) of a existence of food deserts, a localities and postcode dist

A Systematic Study of an Urban Foodscape: The Price and Availability of Food in Greater Glasgow

Steven Cummins and Sally Macintyre

Summary. Previous research has suggested that foods which are beneficial to health may be more expensive, and more difficult to obtain, in deprived compared with more affluent areas, and that this may help to explain the greater adherence to healthy eating guidelines consistently reported in more affluent areas of the UK. In this paper, we report on an investigation of the price and availability of 57 foods, previously defined as representing a ‘modest but adequate diet’, in different retail formats and areas differing in socioeconomic deprivation within Greater Glasgow. In this setting, shop type was the main predictor of food price and availability, cheaper prices and greater availability being mainly found in multiple and discount stores, which were more likely to be located in more deprived rather than affluent areas. Prices did not vary greatlyer in poorer areas. Foods cheaper the consumption of which current study these findings point to the need in food price and availability, and

Neighbourhood food environment and area deprivation: spatial accessibility to grocery stores selling fresh fruit and vegetables in urban and rural settings

Dianna M Smith,1 Steven Cummins,1 Matthew Taylor,2 John Dawson,2,3,4 David Marshall,2 Leigh Sparks3 and Annie S Anderson3
Understanding the food environment

Proliferation of fast-food in the UK

GIF: McDonalds from 1974

Thanks to Dan Lewis
Neighbourhood fast food environment and area deprivation—substitution or concentration?

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Abstract

It has been hypothesised that deprived neighbourhoods have poorer quality food environments which may promote the development of obesity. We investigated associations between area deprivation and the location of the four largest fast-food chains in Scotland and England. We found statistically significant increases in density of outlets from more affluent to more deprived areas for each individual fast-food chain and all chains combined. These results provide support for a ‘concentration’ effect whereby plausible health-damaging environmental risk factors for obesity appear to be ‘concentrated’ in more deprived areas of England and Scotland.

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Table 2
Mean number of fast-food chain restaurants (McDonald’s, Burger King, KFC and Pizza Hut) per 1000 people by IMD quintile, for England, Scotland, and both countries combined

<table>
<thead>
<tr>
<th>IMD quintile\textsuperscript{a}</th>
<th>England</th>
<th>Scotland</th>
<th>England and Scotland</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean</td>
<td>N</td>
<td>Mean</td>
</tr>
<tr>
<td>1 (most affluent)</td>
<td>0.0172</td>
<td>170</td>
<td>0.0157</td>
</tr>
<tr>
<td>2</td>
<td>0.0328</td>
<td>323</td>
<td>0.0328</td>
</tr>
<tr>
<td>3</td>
<td>0.0446</td>
<td>434</td>
<td>0.0420</td>
</tr>
<tr>
<td>4</td>
<td>0.0606</td>
<td>585</td>
<td>0.0849</td>
</tr>
<tr>
<td>5 (most deprived)</td>
<td>0.0817</td>
<td>795</td>
<td>0.0478</td>
</tr>
<tr>
<td>Total</td>
<td>0.0474</td>
<td>2307</td>
<td>0.0447</td>
</tr>
</tbody>
</table>

ANOVA

\textit{F} = 63.658, p = 0.000

\textit{F} = 6.174, p = 0.000

\textit{F} = 58.339, p = 0.000

Actual numbers of outlets (\textit{N}), ANOVA \textit{F}-test (\textit{F}) and significance (\textit{p}).

\textsuperscript{a}Quintiles each contain 6496 or 6497 English SOAs and 1301 Scottish data zones (7797 or 7798 in total).
Associations between fast food and physical activity environments and adiposity in mid-life: cross-sectional, observational evidence from UK Biobank

Kate E Mason, Neil Pearce, Steven Cummins

Summary

Background The built environment might be associated with development of obesity and related disorders. We examined whether neighbourhood exposure to fast-food outlets and physical activity facilities were associated with adiposity in UK adults.

Methods We used cross-sectional observational data from UK Biobank. Participants were aged 40–70 years and attended 21 assessment centres between 2006 and 2010. Using linked data on environments around each participant’s residential address, we examined whether density of physical activity facilities and proximity to fast-food outlets were associated with waist circumference, body-mass index (BMI), and body fat percentage. We used multilevel linear regression models adjusted for potential confounders, and conducted several sensitivity analyses.

Findings Complete case sample sizes were 401917 (waist circumference models), 401435 (BMI), and 395640 (body fat percentage). Greater density of physical activity facilities within 1000 m of home was independently associated with smaller waist circumference and lower BMI and body fat percentage. Compared with people with no nearby facilities, those with at least six facilities close to home had 1.22 cm smaller waist circumference (95% CI −1.64 to −0.80), 0.57 kg/m² lower BMI (−0.74 to −0.39), and 0.81 percentage points lower body fat (−1.03 to −0.59). Living further from a fast-food outlet was weakly associated with waist circumference and BMI, mostly among women. Compared with people living fewer than 500 m from a fast-food outlet, those living at least 2000 m away had 0.26 cm smaller waist circumference (−0.52 to 0.01).

Interpretation This study shows strong associations between high densities of physical activity facilities and lower adiposity for adults in mid-life. We observed weaker associations for access to fast food, but these are likely to be underestimated owing to limitations of the food environment measure. Policy makers should consider interventions aimed at tackling the obesogenic built environment.

Funding Commonwealth Scholarship Commission, Wellcome Trust Institutional Strategic Support Fund.

Mason K et al (2018)
Lancet Public Health
Environmental interventions to improve diet

• Living in a deprived area is associated with the prevalence of obesity and poor diet... independently of individual risk factors. Environment matters.

• Deprivation amplification: exposure to poor quality neighbourhood food environments amplifies individual risk factors

• Inequalities in exposure to local environmental factors → inequalities in obesity etc.

• Food environment interventions... effective strategies for creating population-wide improvements in eating behaviour and therefore health outcomes?
What of we improve the food environment? Can we make the ‘food-desert’ bloom?

Mrs. Obama discussed plans to build or transform about 1,500 markets in areas identified as food deserts, in theory making healthier foods, such as fruit and vegetables, more available to about 9.5 million citizens in impoverished rural and urban areas.

(Chicago Sun-Times)
Two environmental intervention studies

COMMUNITY HEALTH

By Steven Cummins, Ellen Flint, and Stephen A. Matthews

New Neighborhood Grocery Store Increased Awareness Of Food Access But Did Not Alter Dietary Habits Or Obesity

SHARING FOR FOOD

By Tamara Dubowitz, Madhumita Ghosh-Dastidar, Deborah A. Cohen, Robin Beckman, Elizabeth D. Steiner, Gerald P. Hunter, Karen R. Flórez, Christina Huang, Christine A. Vaughan, Jennifer C. Sloan, Shannon N. Zenk, Steven Cummins, and Rebecca L. Collins

No change in BMI or F&V consumption

No change in BMI or F&V consumption BUT

↓ 178-228 Kcal/day
↓ 3.34 sugar gms/day

↓ 178-228 Kcal/day
↓ 3.34 sugar gms/day
Reality check!!!!

• Number of plausible candidate environmental risks; but no overwhelming supporting evidence

• Changing urban environmental risks shows equivocal/mixed evidence for health improvement

• All set in a (current) context of increasing health inequalities
The Relationship of the Local Food Environment with Obesity: A Systematic Review of Methods, Study Quality, and Results

Laura K. Cobb¹², Lawrence J. Appel¹²³, Manuel Franco¹⁴, Jessica C. Jones-Smith⁵, Alana Nur¹, and Cheryl A.M. Anderson¹⁶

Objective: To examine the relationship between local food environments and obesity and assess the quality of studies reviewed.

Methods: Systematic keyword searches identified studies from US and Canada that assessed the relationship of obesity to local food environments. We applied a quality metric based on design, exposure and outcome measurement, and analysis.

Results: We identified 71 studies representing 65 cohorts. Overall, study quality was low; 60 studies were cross-sectional. Associations between food outlet availability and obesity were predominantly null. Among non-null associations, we saw a trend toward inverse associations between supermarket availability and obesity (22 negative, 4 positive, 67 null) and direct associations between fast food and obesity (29 positive, 6 negative, 71 null) in adults. We saw direct associations between fast food availability and obesity in lower income children (12 positive, 7 null). Indices including multiple food outlets were most consistently associated with obesity in adults (18 expected, 1 not expected, 17 null). Limiting to higher quality studies did not affect results.

Conclusions: Despite the large number of studies, we found limited evidence for associations between local food environments and obesity. The predominantly null associations should be interpreted cautiously due to the low quality of available studies.


Cobb (2015) Obesity
The Costner Conjecture: *If you build it they will come*

- The implied theory of change that underpins environmental effects and the effectiveness of environmental interventions is based on a relatively simple conceptual model

- *If you build it they will come*
Let's be more sophisticated in our thinking

Understanding and representing ‘place’ in health research:
A relational approach

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Commentary

Neighbourhood food environment and diet—Time for improved conceptual models?

Commentary: Investigating neighbourhood effects on health—avoiding the ‘Local Trap’

Steven Cummins
Are environmental effects universal?

Two big theoretical assumptions that (mostly) persist in published evidence

1. Assumption that environmental effects / effects of environmental interventions are universal and effect everyone equally

2. Assumption that only the physically ‘local’ matters and that people behave in the same way in each neighbourhood.
   - Spatial behaviour varies through time (day, week, month, year, lifecourse)
   - Spatial behaviour varies by population sub-group
Environment is important, but maybe not in all places.

Strength and magnitude of associations vary across space in East London.

Clary et al. The local food environment and fruit and vegetable intake: a geographically weighted regression approach in the ORiEL Study. *American Journal of Epidemiology* 184 (11), 837-846.
Food environment effects on BMI modified by underlying individual genetic risk in UK Biobank

Association between proximity to fast-food and BMI stronger for those at increased genetic risk of obesity (polygenic risk score interaction p=0.017)

Particular effect for SNP linked to MC4R, gene that regulates food intake (p=0.009)

Mason, Pearce, Cummins (submitted)
Effect modification by environmental factors on BMI in UK Biobank

Mason, Pearce, Cummins (2018) submitted
Environmental effects more complex than originally thought

*How do we deal with this?*
Urban health: still a ‘wicked problem’ and a ‘social mess’

**Wicked Problems**

*Horst Rittel (design theorist; planner)*

"a problem whose social complexity means that it has no determinable stopping point“

“social problems cannot be meaningfully correct or false; and it makes no sense to talk about "optimal solutions" to these problems... Even worse, there are no solutions in the sense of definitive answers”

**Social Messes**

*Russell Ackhoff (organisational theorist)*

“Every problem interacts with other problems and is therefore part of a set of interrelated problems, a system of problems.... I choose to call such a system a mess.”
Wicked Problems

- There is no definitive formulation of a wicked problem.
- Wicked problems have no stopping rule.
- Solutions to wicked problems are not true-or-false, but better or worse.
- There is no immediate and no ultimate test of a solution to a wicked problem.
- Every solution to a wicked problem is a "one-shot operation"; because there is no opportunity to learn by trial and error, every attempt counts significantly.
- Wicked problems do not have an enumerable (or an exhaustively describable) set of potential solutions, nor is there a well-described set of permissible operations that may be incorporated into the plan.
- Every wicked problem is essentially unique.
- Every wicked problem can be considered to be a symptom of another problem.
- The existence of a discrepancy representing a wicked problem can be explained in numerous ways. The choice of explanation determines the nature of the problem's resolution.

Social messes

- No unique "correct" view of the problem;
- Different views of the problem and contradictory solutions;
- Most problems are connected to other problems;
- Data are often uncertain or missing;
- Multiple value conflicts;
- Ideological and cultural constraints;
- Political constraints;
- Economic constraints;
- Often a-logical or illogical or multi-valued thinking;
- Numerous possible intervention points;
- Consequences difficult to imagine;
- Considerable uncertainty, ambiguity;
- Great resistance to change; and,
- Problem solver(s) out of contact with the problems and potential solutions
Systems thinking – a way of embracing complexity?

• Social and spatial patterning of a health outcome can be conceived as an emergent property of a functioning system

• Individuals interact with their environment
• Individuals interact with each other
• Individuals and environments are dynamic: they adapt and change over time

• Thus population health interventions should be designed in a way they might lead to ‘system’ change (ie food system, transport system)

Key concepts

• Relationships and interactions
• Multiple perspectives
• Boundaries
• Feedback
• Non-linearity
• Dynamism
• Adaptation
• Emergence
• Unintended consequences
Example - MOTIVATE

Modelling Normative Change in Active Travel
• Switching to active travel modes when commuting could mean significant public health gains.

• The built environment is a big structural barrier to active travel, but the built environment is complex and changing it is expensive.

• Commuting is norm directed, we don’t generally think about it.

**AIM:** Create a computer simulation of commuting behaviour and explore the effects of changing local environments, access to resources, and behavioural norms.

**QUESTIONS:**

• What social norms of commuting behaviour minimise or maximise the effectiveness of interventions on active travel?

• Can we simulate, using agent-based models, the potential impact of social norm interventions on the effectiveness of interventions?
“London’s streets should be for active travel and social interaction, but too often they are places for cars, not people.”

“Changing the transport mix will put people back at the heart of the transport system, prioritising human health and experience over traffic dominance.”

“The central aim is for 80 per cent of all trips in London to be made on foot, by cycle or using public transport by 2041.”

The Mayor proposes to make walking and cycling appeal to all Londoners through:
1) Street environments that encourage walking and cycling
2) Making it easy to get around on foot or by cycle
3) Promoting walking and cycling for all Londoners

Neighbourhoods vary in their supportiveness for different transport modes.

Agent characteristics
- Age, sex, ethnicity
- Distance to work (local, city, beyond)
- Access to Car/Bicycle
- Habitual Commute Mode

Agents' norms arise through a combination of:
- Their friends (social network)
- Their neighbours
- Their mobility culture.

The main task of an agent is to commute to work. An agent can use: Walking, Cycling, Public Transport, Private Transport.

Generally, an agent will follow their habit, unless something changes:
- Weather
- Environmental Supportiveness
- Access to resources (car/bike)
- Behaviour of friends or neighbours
- Mobility culture
From simple to complex: thinking about urban environments and health in the future?

• Understand that places shape people; people shape places

• That relationships between individuals and their environments are time and place dependent and dynamic

• Understand that effects of environmental exposures and interventions may be modified by other individual and environmental factors
If we take complexity seriously what are the implications for public health evidence in practice?

- Shift away from simple linear thinking
- Ongoing learning and adaptation of interventions
- Better tracking of proximal, intermediate and distal processes underlying multi-causal health problems/outcomes
- Requires use of new forms of evidence for decision-making (ie not relying on RCTs) to reshape systems
- No ‘magic bullet’

“Within public health a trickle of interest [in complexity] has turned into a river” (Matheson et al, 2017)
A new science of urban health?

Cities are very complex. They involve many systems, including energy, water and sewerage, food, transport, health and biodiversity, as well as economic, social and cultural systems.

This network of systems, interconnections and flows can be described as a ‘system of systems’ that evolve and adapt over time.

The challenge is to develop a new science of urban health that allows us to better understand how modifying urban ‘systems’ can help tackle the wicked problems and social messes of population health.
Thank you!