

Are inequalities in neighbourhood food environments contributing to inequalities in diet and diet-related disease?

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Environment and diet – the basic premise

- 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 food environments amplifies individual risk factors. Inequalities in exposure to environmental factors → inequalities in diet / obesity
- **Food environment interventions...** whether area-based or whole population, have potential to be effective strategies for improving eating behaviour and therefore health outcomes?



State of the scientific evidence

- **Asked to focus on the food retail environment**
- **Knowledge about the effect of the food retail environment on diet consists largely of evidence generated mainly from cross-sectional and sometimes from longitudinal epidemiological sources**
- **Researchers and policymakers have demanded better evidence to support 'causal' inference in the environmental determinants of diet**
- **What do we know? How can improve on what we know in order to make better policy decisions?**



1. Correlation studies

- **Key features of poor quality food retail environments:**
 - Disadvantaged neighbourhoods (income/deprivation)
 - A higher proportion of non-white residents (particularly in the USA)
 - A greater proportion of small stores (convenience formats)
 - Supermarkets tend to be further away than convenience/small stores
 - Healthier food is more expensive than unhealthier foods
 - Overall there is less choice (in terms of healthier substitutes and range)
 - Poorer quality food, particularly for fresh products such as fruit and vegetables
 - Perceptions of access are poorer for residents of deprived areas
 - Rural areas may have special problems
 - **Positive associations with diet have been found for all of the above (though volume of evidence varies hugely)**



1. Correlation studies

- **Associations with diet-related outcomes have been found for:**
 - Fruit and vegetable intake (**majority of studies – best evidence**)
 - Diet quality
 - Diet components (ie saturated fat)
 - Specific foods (ie low fat milk)
- **Associations found in the following population groups:**
 - Adults (in the US, particularly African Americans)
 - Children (adolescent and pre-adolescent)
 - Pregnant women
 - Urban and rural populations
 - (nothing really on older people)

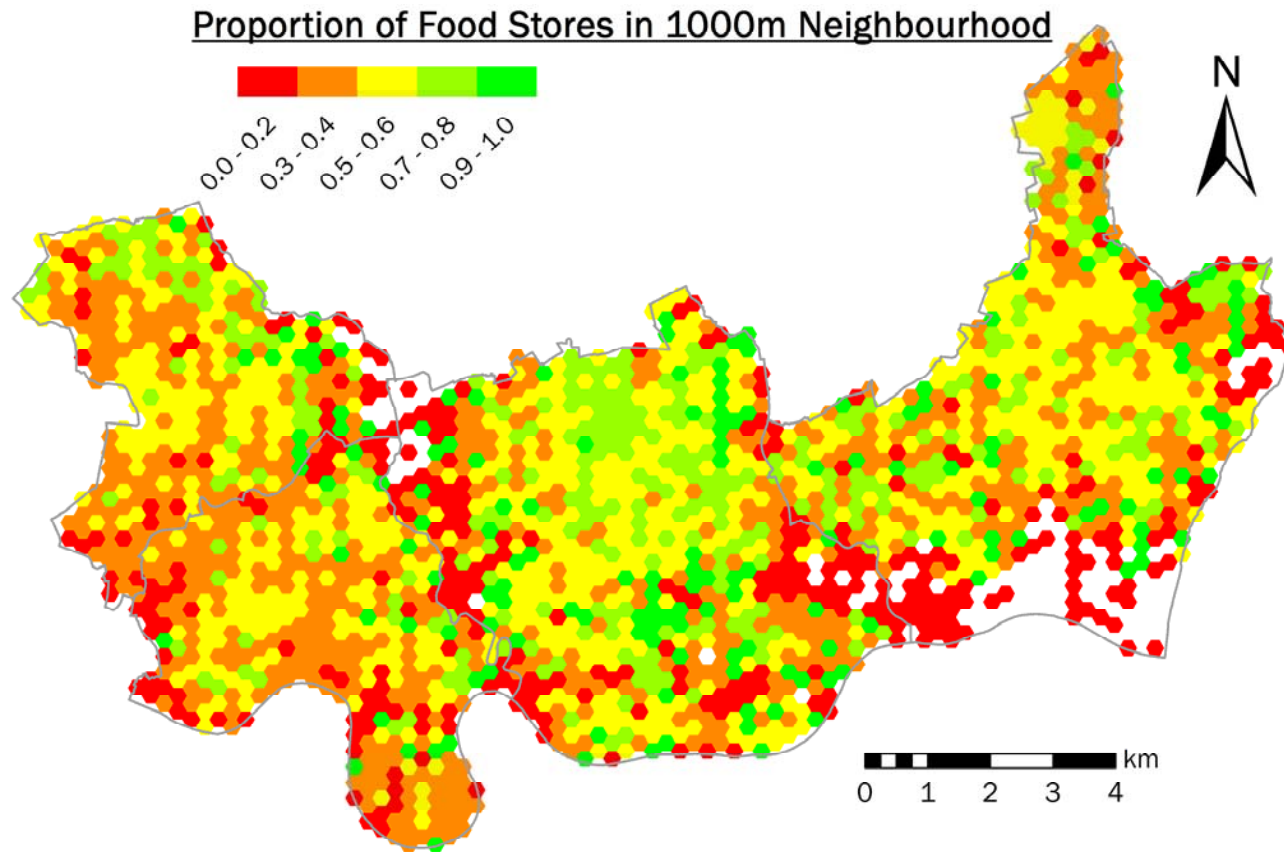


1. Correlational studies - a few caveats

- **Overall cross-sectional studies generally supports the existence of poor quality food environments, though many of the positive studies originate in the USA. Outside of the USA, findings equivocal though it is likely that some disadvantaged neighbourhoods may have poor food access but it maybe very context dependent**
- **Positive associations with diet-related outcomes are overwhelmingly based on US data, the limited evidence base outside of the USA is fairly mixed**
- **Vast heterogeneity in study designs, exposure and outcome assessment methods make it hard to properly synthesise findings (Caspi et al 2012)**



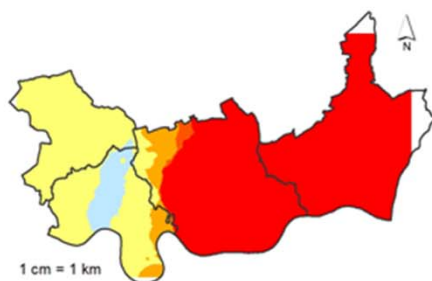
Diversity?



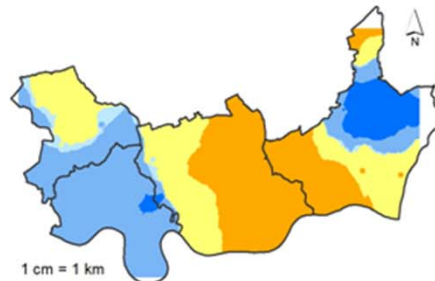
0.5 is balance, >0.5 more grocery stores, <0.5 more fast-food



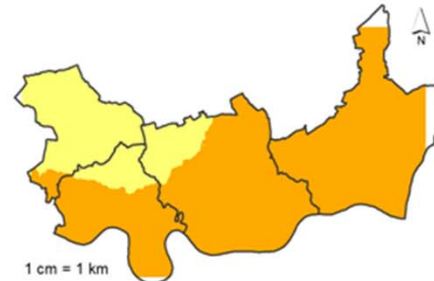
Certain places, rather than all places



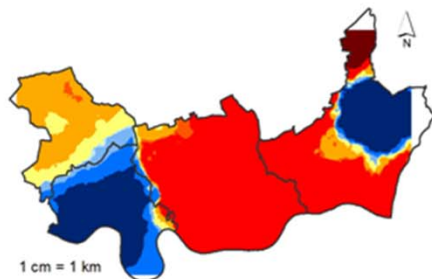
a/ Density of healthy outlets-FC



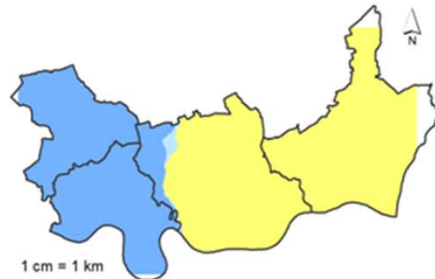
b/ Density of unhealthy outlets-FC



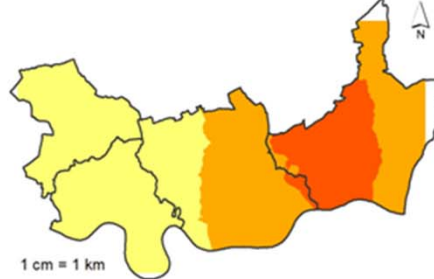
c/ Proportion of healthy outlets-FC



d/ Density of healthy outlets-VC

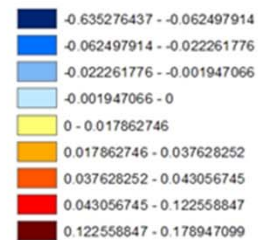


e/ Density of unhealthy outlets-VC



f/ Proportion of healthy outlets-VC

B-coefficients' values



2. Recent longitudinal and larger studies

- Longitudinal and larger sample studies are much rarer – but recently a number of these have been published
- Larger sample studies have found **no association** with school and neighbourhood food environments and diet in children (An & Sturm 2012)
- Longitudinal studies in adults with 15 years (Boone-Heinonnen et al 2011) and 30 years (Block et al 2011) of follow-up have found **no positive impact of supermarket accessibility on diet.**
- Interestingly Block found that increasing proximity to food stores was associated with a small increase in BMI



3. Intervention studies - making food deserts 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)

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3. Intervention studies - supermarkets

- Premise: **increasing access to supermarkets and grocery stores** will translate into improvements in individual diet and lead to a reduction in diet-related health problems... **But where is the evidence?**
- 1. **Un-controlled before-and-after** study in Leeds, reported improvements in fruit and vegetable intake, with the largest impacts seen amongst those with the lowest baseline intakes. **(Wrigley et al. 2003)**
- 2. Controlled before and after quasi-experimental study undertaken in Glasgow found no evidence for any effect on F&V. **(Cummins et al. 2005)**
- 3. Controlled before and after quasi experimental study in Philadelphia found improvements in perceptions of food access but no improvement in F&V intake and BMI **(Cummins et al 2014)**



3. Intervention studies – corner stores

- Premise: improving **in-store** availability of healthy foods will lead to improvements in diet (and obesity)
- Emerging evidence base with few studies, some studies suggest that these interventions **increase availability of fresh fruit** (Song et al 2009, Cavanaugh et al 2014) **and sales** of a range of ‘healthier’ versions of existing options (Dannefer et al 2012)
- Those with most robust design directly assessing effects on diet are not encouraging. For example Lent et al (2014) found in an **RCT** that there was **no change in energy content and BMI** in young people
- However evidence base is far too underdeveloped to draw any firm conclusions



3. Intervention studies – choice architecture

- **Premise: improving in-store marketing ‘nudges’ consumers to better choices**
- **Mainly undertaken in takeaways/restaurants few studies in grocery stores**
- **An integrative review of lab and field studies (Glanz et al 2012) suggests that they may have some utility in the laboratory particularly strategies inc:**
 - **Availability**
 - **Affordabilty**
 - **Prominence**
 - **Promotion or ‘de-marketing’**
- **But these have yet to be tested in the field (fiscal tools?)**



4. Effect modification in trials / evaluations

- Two (interesting but suggestive) studies have investigated how the food retail environment modifies the effectiveness of individual-level interventions for childhood obesity
- Epstein et al (2012) found that **fewer** convenience stores and supermarkets predicted greater reductions in zBMI within four pooled RCTs of child weight management interventions
- Fagg et al (2014) found no direct effects of fast-food environment but found **greater reductions** in BMI as neighbourhood deprivation increased (possibly reflecting unmeasured environmental characteristics)



In summary..

- **Cross-sectional evidence** is fairly consistent in demonstrating effects of the food retail environment on diet in varying population groups and in varying contexts...but only in the USA!
- **Longitudinal evidence** (though rare) does not demonstrate any effects
- **The few intervention studies** within food retail environments report improvements in perceptions in food access and increased availability of healthier foods....but does not appear to translate into behaviour change or impacts on obesity



In summary..

Current evidence is suggestive of an association between community and consumer food environments and dietary outcomes in the USA. However, substantial heterogeneity in study designs, methods and measurement tools makes it difficult to draw firm (global) conclusions.

Ni Mhurchu et al (2014)

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What don't we know? Interesting avenues for further investigation..

- **Intervention studies suggest a that uptake (of retail interventions) may be a key issue – this is the step in the hypothesised causal pathway which is not being bridged. How can we optimise retail interventions so consumers take advantage of the food environment?**
- **The consumer is constantly bombarded with in-store environmental cues. A closer focus on unpacking and testing the influence of a range of in-store marketing influences would be useful**
- **Supermarkets are not a panacea – they increase healthy options but also unhealthy ones we need much more detailed information on changes in shopping behaviour and food purchasing as a result of changes to the food environment (ie substitution effects, total spends)**



What don't we know?

- **Better understanding of the overall ecology of the food system and how the consumer uses it's constituent parts**
- **Seriously consider fiscal interventions and their effects**
- **Is there diversity in disadvantage (not all poor consumers are the same, interventions must be tailored)**
- **Outdated model of food retail industry. The food retail industry is in the throes of reconfiguration (reconfig of discounters increasing market share, increasing importance of non-food retailers, declining spend in major supermarket stores, online shopping, increasing consumption of prepared foods from grocery stores having franchises and fast/food.**
- **What about impacts on inequalities?**



Conclusion

- **We think we know a lot but a close look at the literature suggests otherwise, hugely diverse evidence base with many possible avenues of attack – but more recent work seems to fail to consider impacts on inequalities and focuses on whole populations. Very little research undertaken in the UK**
- **Lot of potential still, but perhaps with a closer focus on uptake of changes in the food retail environment and an emphasis on modifications to the in-store environment**
- **Unhappily for policy makers I would probably not be able to recommend any one particular ‘magic’ bullet**



