

Food environments and obesity - neighbourhood or nation?

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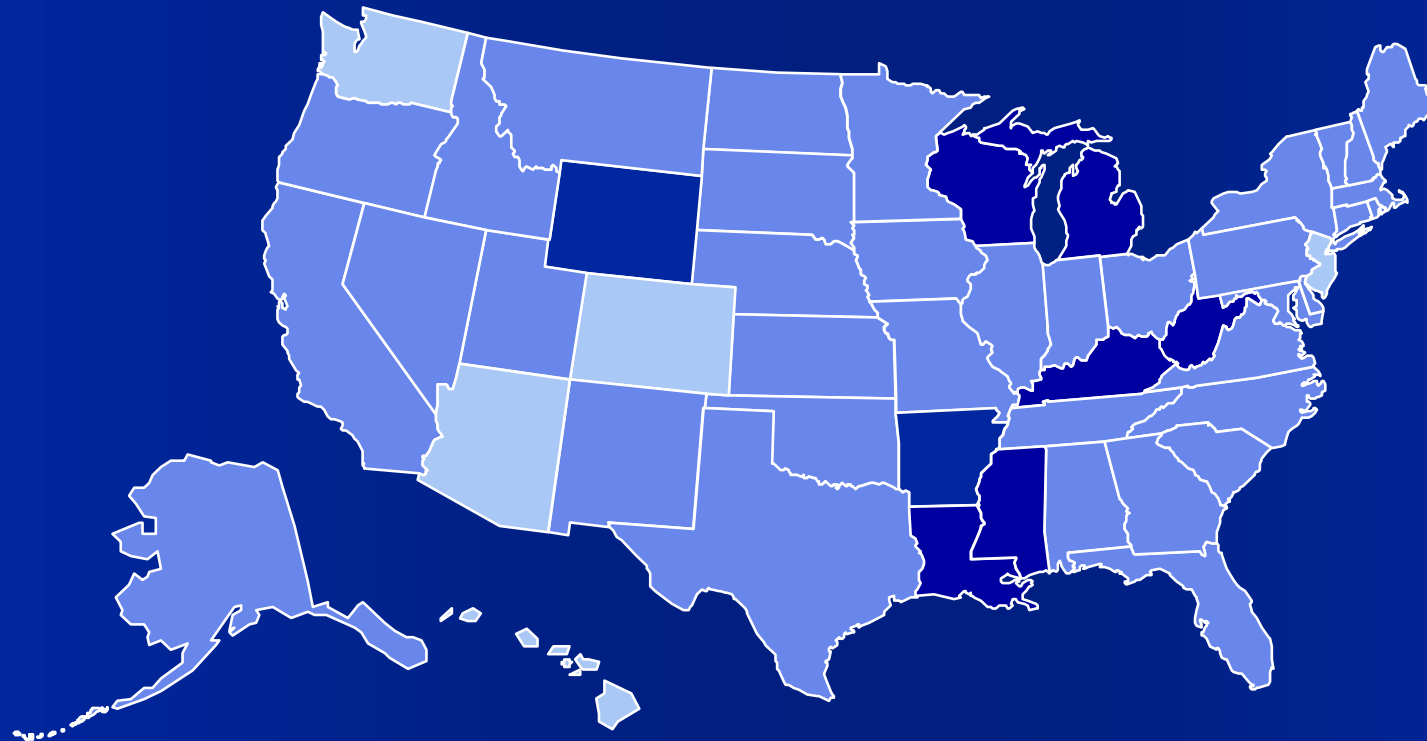
The rise of obesity

- The prevalence of obesity is rising very rapidly in both developed and developing countries
- In 2004 it was estimated that in the UK obesity had an annual combined cost of £3.3 to £3.7 billion
- Directs costs to the NHS of obesity £1.1 billion, indirect costs from premature mortality of £1.1 billion, and economic costs of £1.3 to £1.45 billion through lost years of productivity

Obesity Trends* Among U.S. Adults

BRFSS, 1992

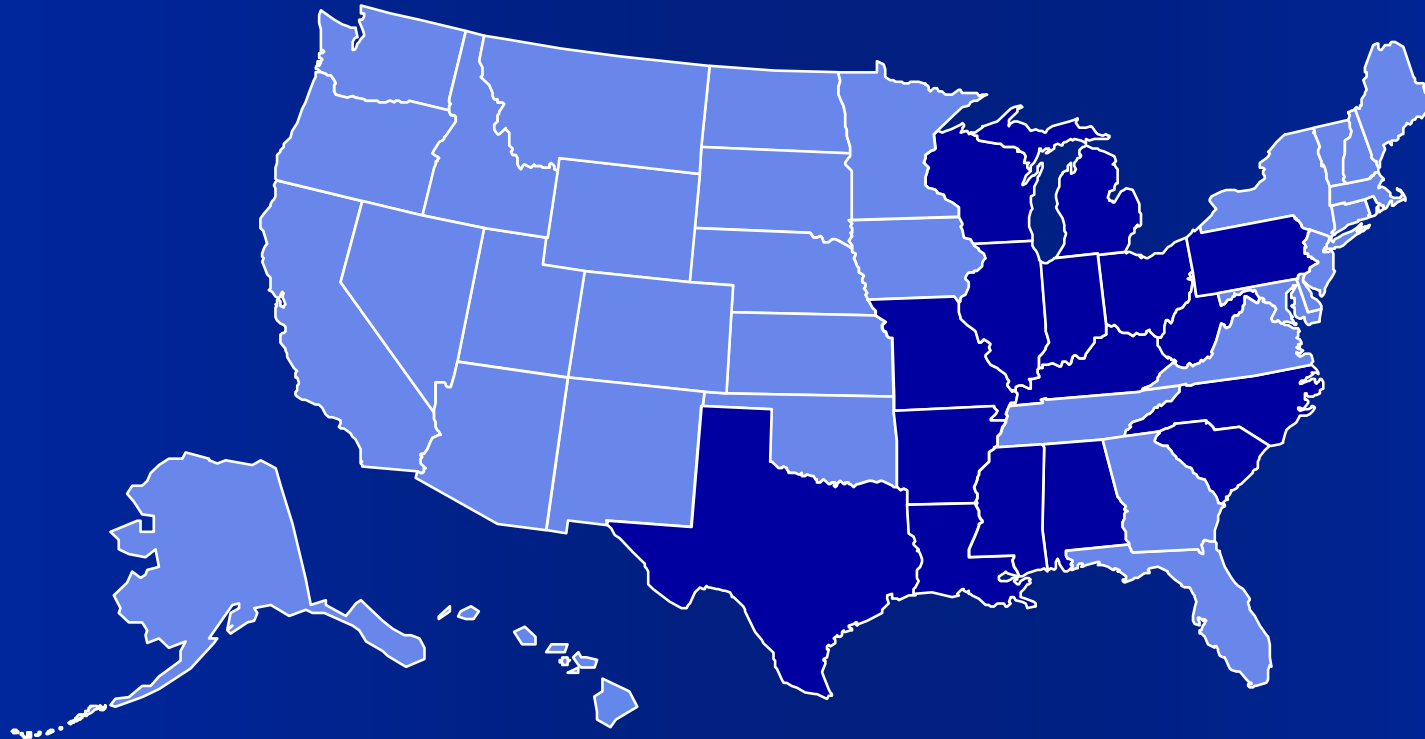
(*BMI ≥ 30 , or ~ 30 lbs overweight for 5' 4" person)



Obesity Trends* Among U.S. Adults

BRFSS, 1994

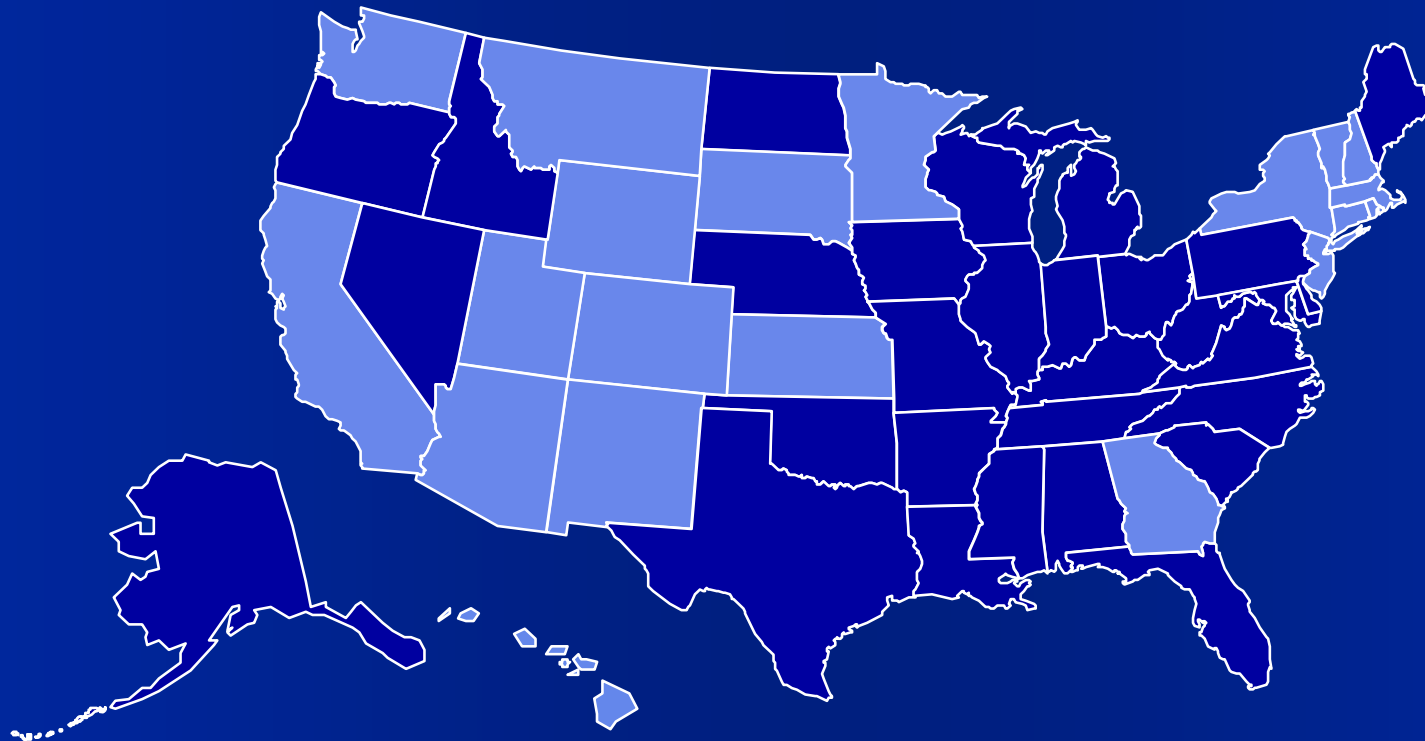
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Obesity Trends* Among U.S. Adults

BRFSS, 1996

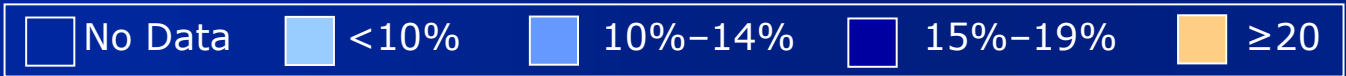
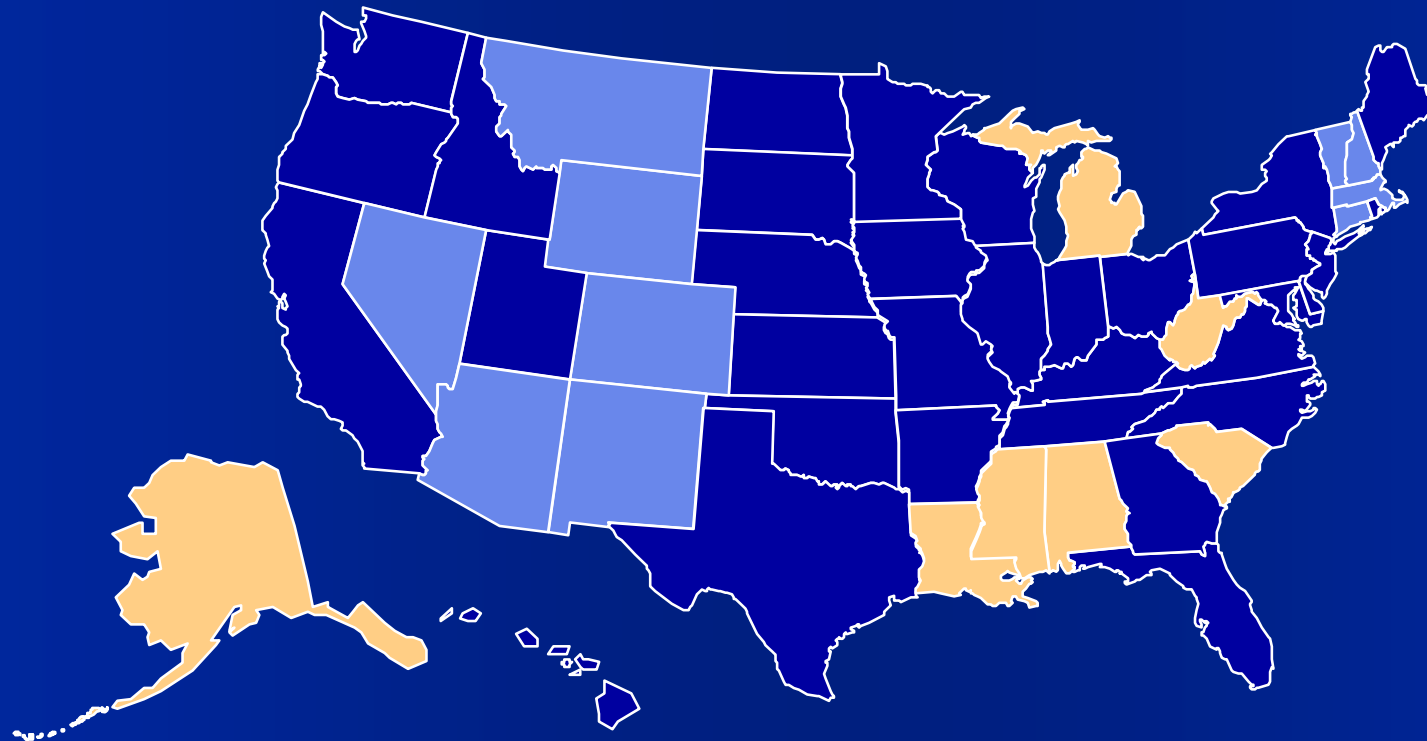
(*BMI ≥ 30 , or ~ 30 lbs overweight for 5' 4" person)



Obesity Trends* Among U.S. Adults

BRFSS, 1998

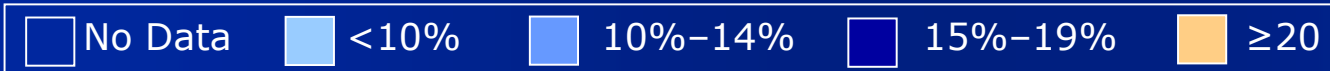
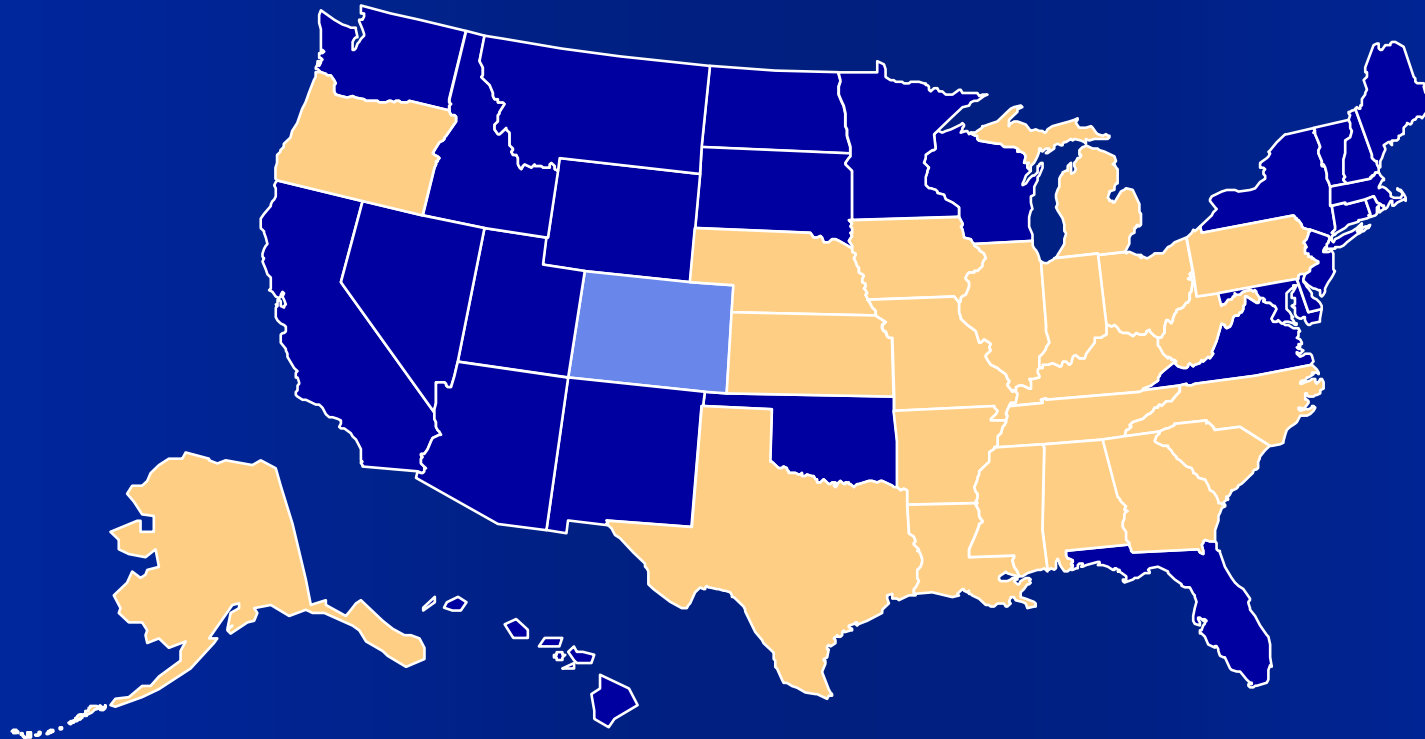
(*BMI ≥ 30 , or ~ 30 lbs overweight for 5' 4" person)



Obesity Trends* Among U.S. Adults

BRFSS, 2000

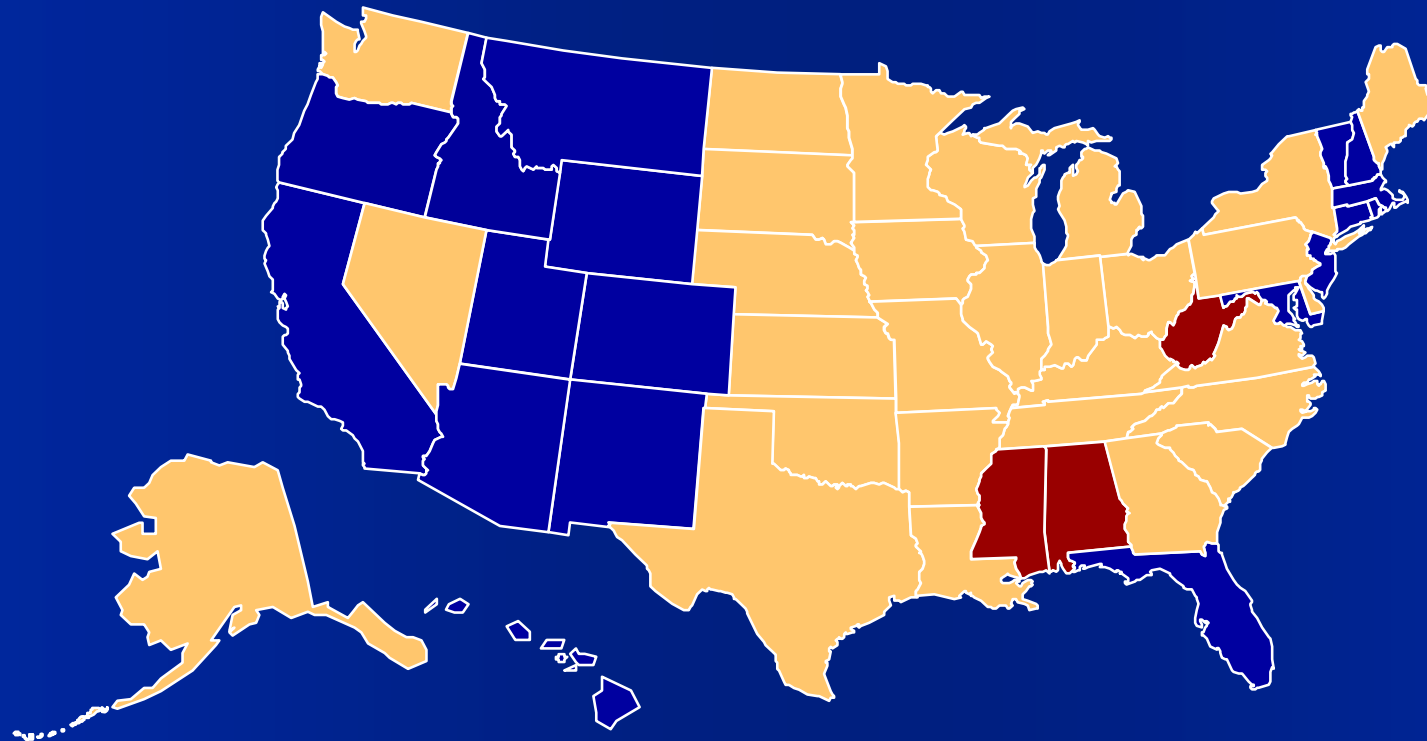
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Obesity Trends* Among U.S. Adults

BRFSS, 2002

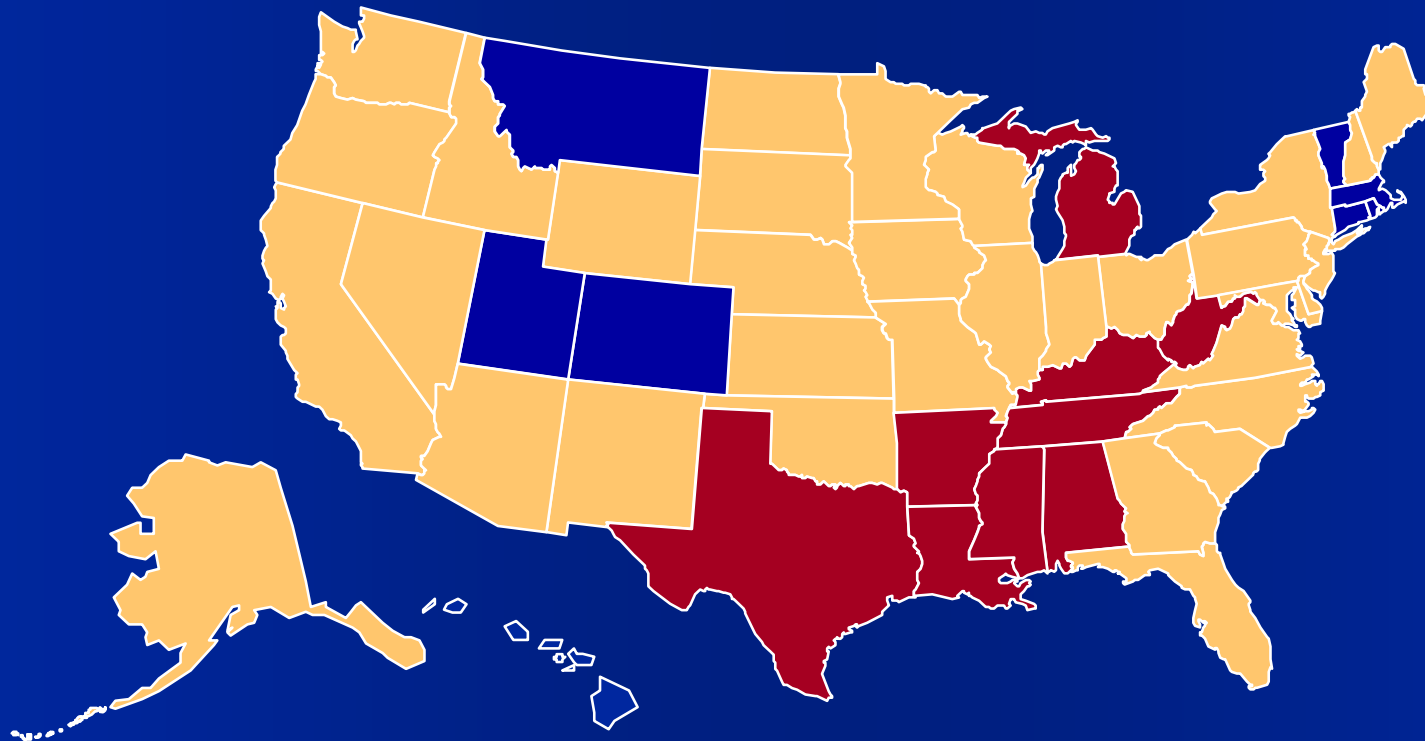
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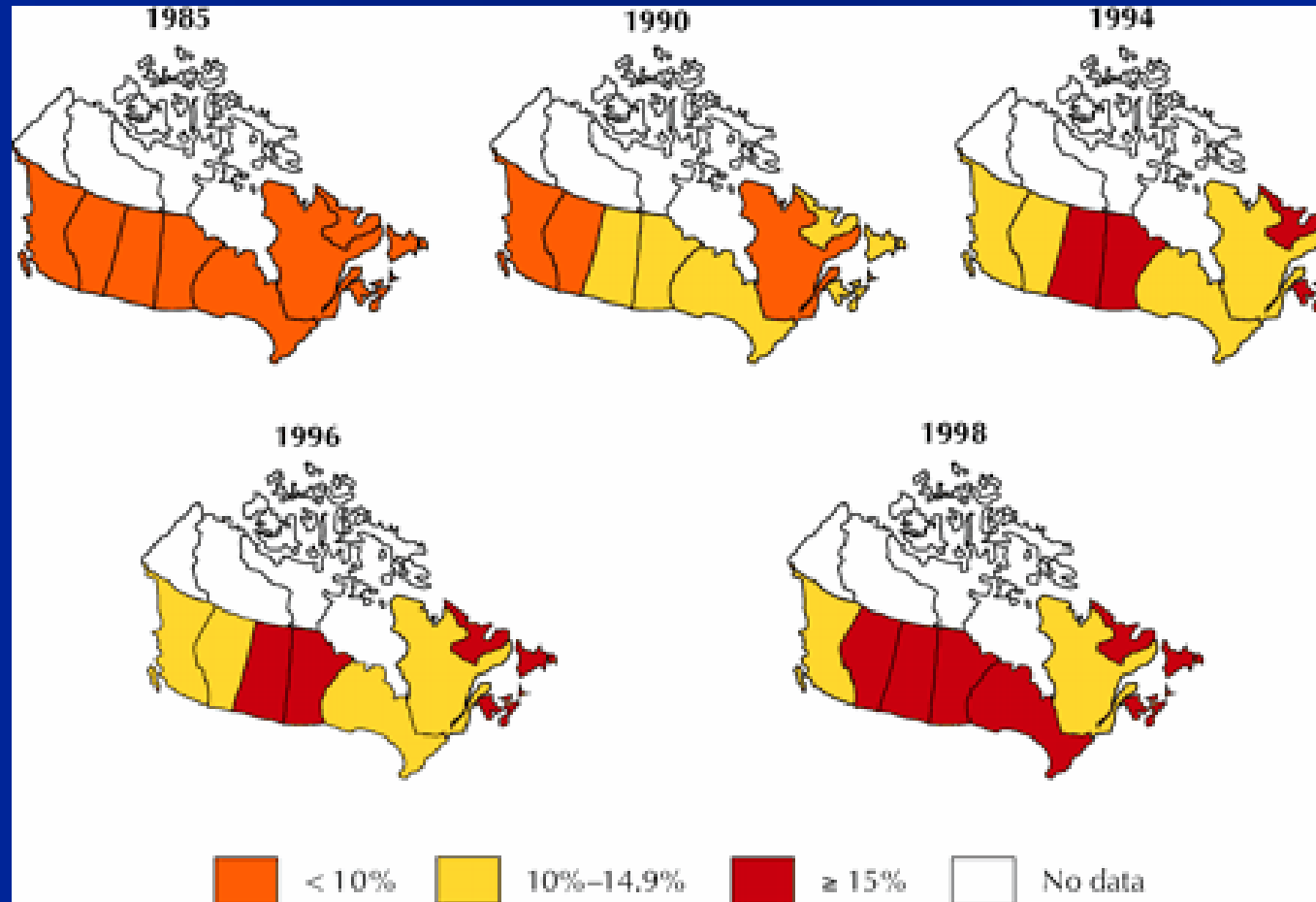


Obesity Trends* Among U.S. Adults

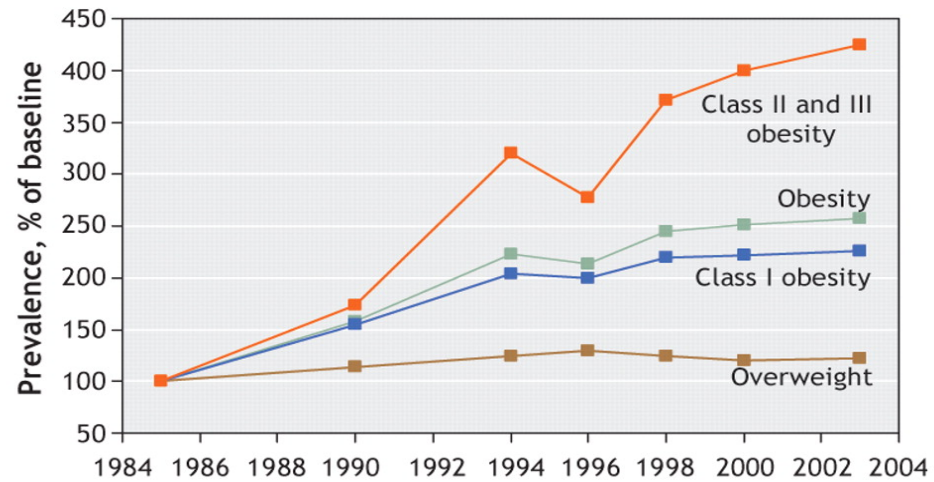
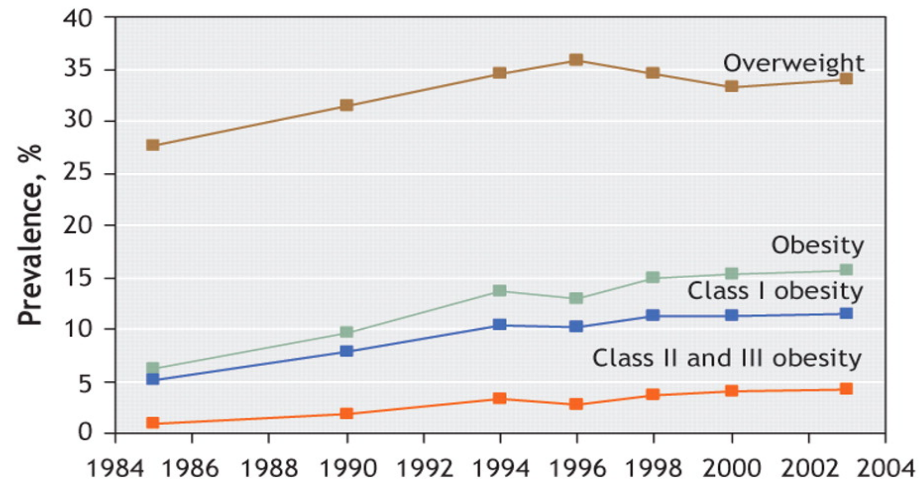
BRFSS, 2004

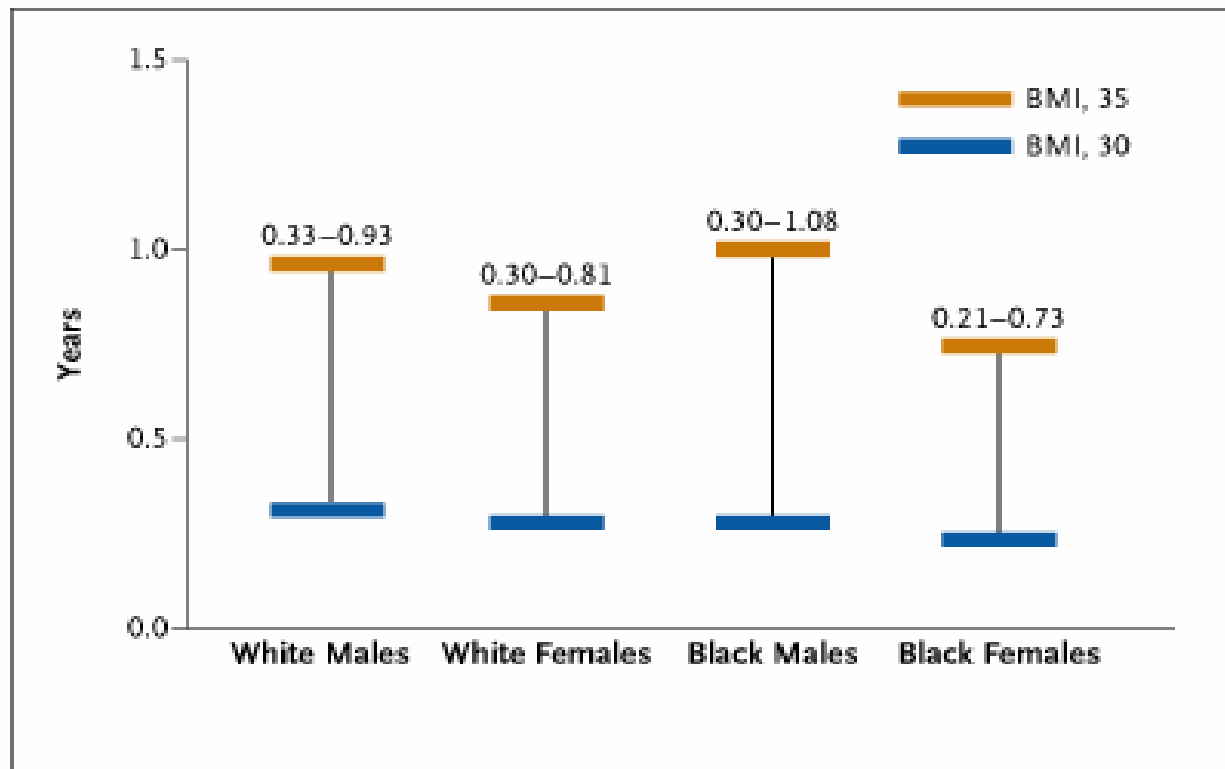
(*BMI ≥ 30 , or ~ 30 lbs overweight for 5' 4" person)





Katmarzyk (2002) The Canadian Obesity Epidemic 1985-1998. *CMAJ* 166(8)





From: Olshansky et al (2005) A potential decline in life expectancy in the United States *NEJM* 352;11

Obesity and SES

- Higher rates of obesity are found in those with the lowest incomes and the least education
- The relationship of obesity with income is viewed in some quarters as an apparent paradox
- However this is partly explained by the relatively low cost of high fat, high sugar foods which are in turn associated with higher individual energy intakes and lower consumption of fruits and vegetables

Obesity & SES

- It has also been discovered that dietary patterns and obesity rates vary spatially
- Living in a low income or deprived area is independently associated with the prevalence of obesity and a poor diet
- Such associations have been consistently reported in the UK, Netherlands, Sweden, Australia, USA and Canada

Environment matters?

- It has been suggested that individually focused interventions to improve diet and reduce obesity have met with limited success
- Individual social and psychological factors do not adequately explain the rise in overall obesity prevalence
- Only partially explains the unequal social distribution of obesity
- Speculation that this may be due to a process of ‘deprivation amplification’ whereby exposure to poor quality neighbourhood food environments amplifies these individual risk factors

The modern food environment?



Can a city make you fat?

Can a city make you fat?

Jan. 27, 2006

MEGAN OGILVIE

SPECIAL TO THE TORONTO STAR

During a one-hour walk...of a small section of New York City... Rundle points out different environmental features that may influence obesity.

[For example] A farmer's market in Union Square that sells fresh greens and organic meats three days a week...may encourage people to make healthy food choices.

None of this is, like, rocket science," laughs Rundle. "None of this is, like, some grand esoteric formula. A lot of it has a 'that-kind-of-makes-sense' quality to it. But nobody has looked at these (kinds of) data and nobody has analyzed these (kinds of) data to see if it's true."

Food environments: local grocery stores and fast-food outlets

- **Environmental influences on diet involve numerous settings such as home, work, school and neighbourhood**
- **In this presentation I want to focus on neighbourhood influences on diet; other issues are important**
- **Specifically two hypothesized pathways**
 - **Access to foods for home preparation and consumption**
 - **Access to out-of home ready-made foods ('fast-food')**

Evidence for an environmental effect of grocery stores in the UK

- Long, though limited, history of work in this field
- Earlier work suggested that food was more expensive and less readily available in poorer areas – areas often termed ‘food deserts’
- Studies were often small, unsystematic and sometimes misinterpreted (see Cummins & Macintyre, 2002)
- Classic example is Mooney (1990)

Mooney (1990)

	<i>No of shops</i>	'Healthy' Basket A		'Unhealthy' Basket B		<i>Difference (%)</i>
		<i>Cost</i>	<i>SD</i>	<i>Cost</i>	<i>SD</i>	
Entire District	9	£11.51	91p	£9.72	118p	18**
Deprived Area	5	£11.13	43p	£9.23	40p	21***
Affluent Area	4	£11.98	111p	£10.32	150p	17*

p<0.01, *p<0.001

(Source: Mooney 1990 *Journal of Human Nutrition & Dietetics*, p.114)

Glasgow Urban Foodscape Study

- With this in mind, as a graduate student, I conducted a systematic observational study of food price and availability in Glasgow neighbourhoods
- Price and availability of 57 items surveyed in 325 grocery stores across Glasgow (see Cummins & Macintyre, 2002, *Urban Studies* for details)
- Won't go into detail here but....the findings suggested that food was either no different in price or in a few cases slightly cheaper in poorer areas compared to richer areas
- Also, overall larger numbers of food stores in poorer areas.

Policy context in the UK

‘Improvements in the local food retail economy can provide employment for local residents, a pathway in to new skills and training opportunities, reduce crime and improve health by providing a range of quality goods at affordable prices....we have to tackle social exclusion and make it easier for people living in poor neighbourhoods to make healthy lifestyle choices’

Department of Health (1999) Improving shopping access for people living in deprived neighbourhoods. Policy Action Team 13.

Policy context in the UK

'In the UK, average consumption [of fruit & vegetables] is only about three portions a day, and a fifth of children eat no fruit in a week. Information is important, but the food choices people can make are shaped by the availability and affordability of food locally'

Department of Health (2000)

The NHS Plan: A Plan for Investment, A Plan for Reform



This is not **TESCO** ...so go get your groceries somewhere else ...support local business

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- Workers worldwide
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This website is supported by organisations concerned about the market-distorting power of the major supermarkets, the information is intended for educational and public awareness purposes. The organisations supporting it do so in their individual capacities and only in relation to their own particular areas of expertise, and are not responsible for materials produced and actions taken by other organisations

Home

Welcome to Tescopoly

Tesco now controls 30% of the grocery market in the UK. In 2005, the supermarket chain announced over £2 billion in profits. Growing evidence indicates that Tesco's success is partly based on trading practices that are having serious consequences for suppliers, farmers, overseas workers, local shops and the environment.



Urgent call to action: our best chance yet to restrain the power and growth of Tesco!

On 9 March the Office of Fair Trading proposed a new Competition Commission investigation into the big four supermarkets. This proposal is a direct response to a demand from Friends of the Earth, the Association of Convenience Stores, the National Federation of Women's Institutes and FARM which was supported by Tescopoly and many other organizations and individuals - **showing that campaigners can stand up against the mighty Tesco and win!!**

The OFT is holding a short consultation on its proposal that the Competition Commission start a new supermarkets inquiry - it is asking for comments by **Thursday 6 April**. [Click here](#) to download suggested points to include in a response to the OFT consultation.

Please send any comments to the addresses below:

chris.jenkins@oft.qsi.gov.uk

marie-louise.coster@oft.qsi.gov.uk

or write to Supermarkets Team, Markets and Policy Initiatives Division 4, Office of Fair Trading, Fleetbank House, 2-6 Salisbury Square, London EC4Y 8JX

Or you can **PRESS FOR CHANGE** with Friends of the Earth and email the OFT to tell them that you support their proposal to refer the four biggest UK supermarkets to the Competition Commission.

LATEST NEWS AND ACTIONS:

Shoppers back rules to protect British farmers: New figures show that four out of five adults want new rules put in place to protect farmers in their dealings with the big supermarkets, and that nearly two thirds think that British farmers are not being paid enough for the food they produce. The NOP poll released today by Friends of the Earth marks the fourth anniversary of the Supermarket Code of Practice. The Code was introduced in 2002 to ensure that supermarkets treat their suppliers fairly - but is widely believed to have failed. Read full [press release](#).

OFT calls for investigation into supermarket power - Friends of the Earth have welcomed the proposal from the Office of FairTrading (OFT) to refer supermarkets to the Competition Commission for a new inquiry and called for the Commission to be thorough but swift in its

- nef
- Green Link
- THE SMALL AND FAMILY FARMER ALLIANCE
- Friends of the Earth
- GMB LONDON
- NGH
- WAR ON WANT
- Label Behind


Subsequent UK observational studies..


- White et al (2004) Newcastle Food Access Study. Most comprehensive of it's type
- Pearson et al (2005) Smaller study in Barnsley, Dibsdall (2003)
- No independent effect of food retailing on diet and fruit and vegetable consumption found in both studies
- No clear evidence of 'food retail deserts' in Newcastle though problems *do* exist for a minority of residents
- Dibsdall's respondents have reported that physical proximity to shops was not an issue

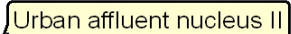
From local to national studies

- Despite these well designed and executed studies, they are still 'local' in nature and mainly undertaken in urban settings leading to problems of generalisability
- To try and rectify this colleagues and I are currently involved in a larger national study of food price and availability in Scotland
- Two stages:
 - National 'GIS' of food retailing using secondary data
 - Eight local case studies across Scotland in different area types (very remote and rural to highly urbanised)

Legend

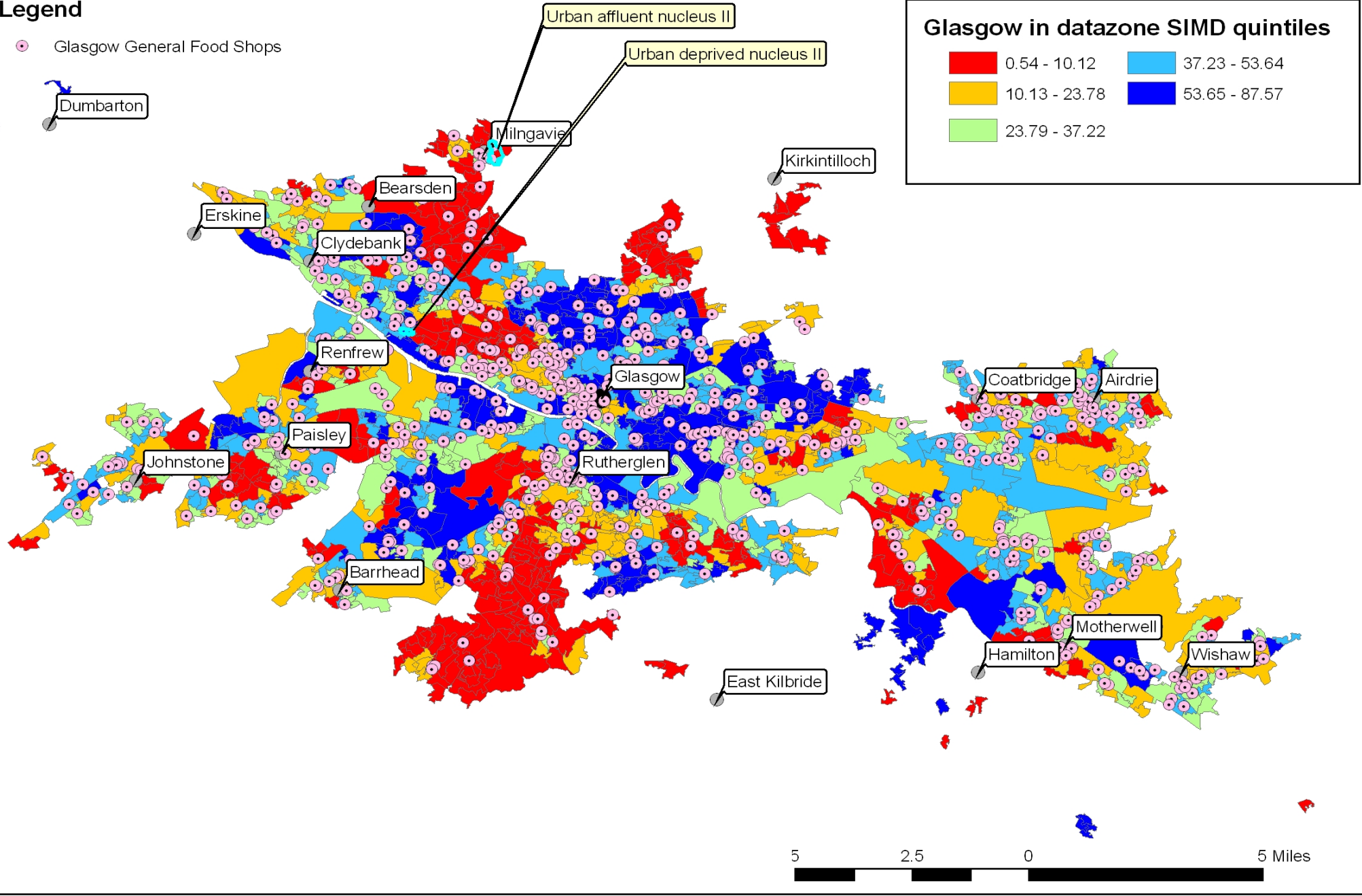
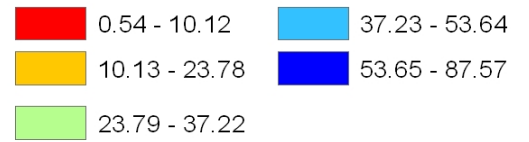
 Glasgow General Food Shops

 Dumbarton

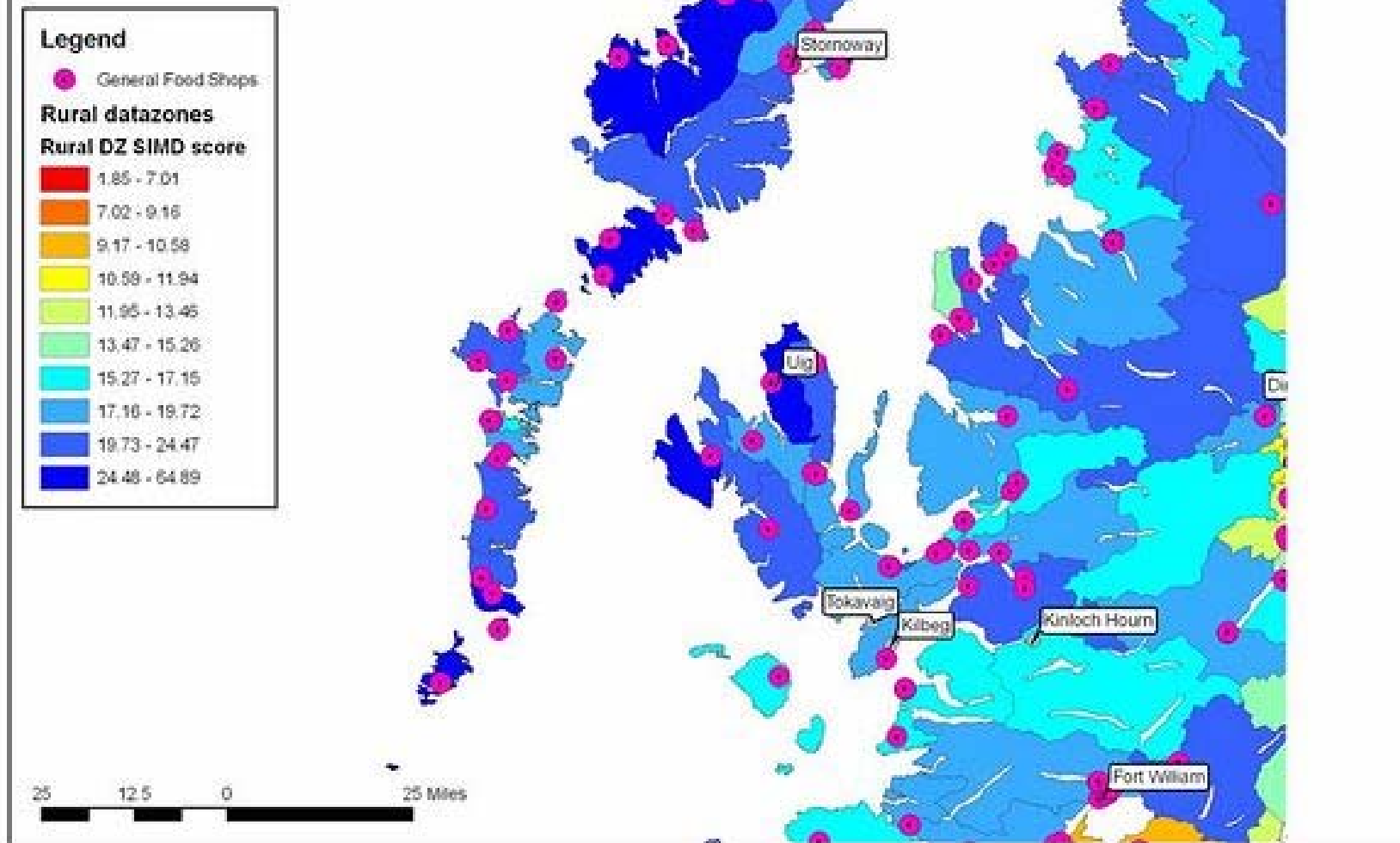
 Urban affluent nucleus II

 Urban deprived nucleus II

Glasgow in datazone SIMD quintiles



Harris, Lewis and Skye - Rural sentinel potential

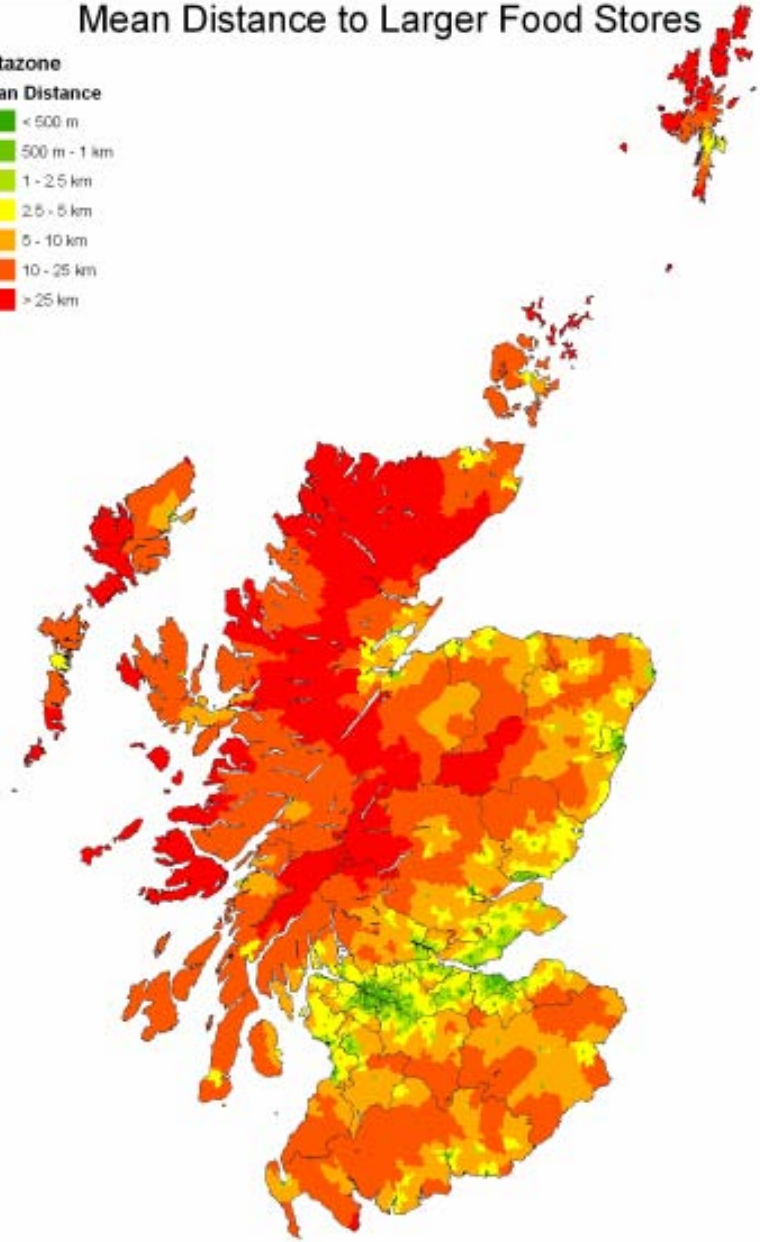


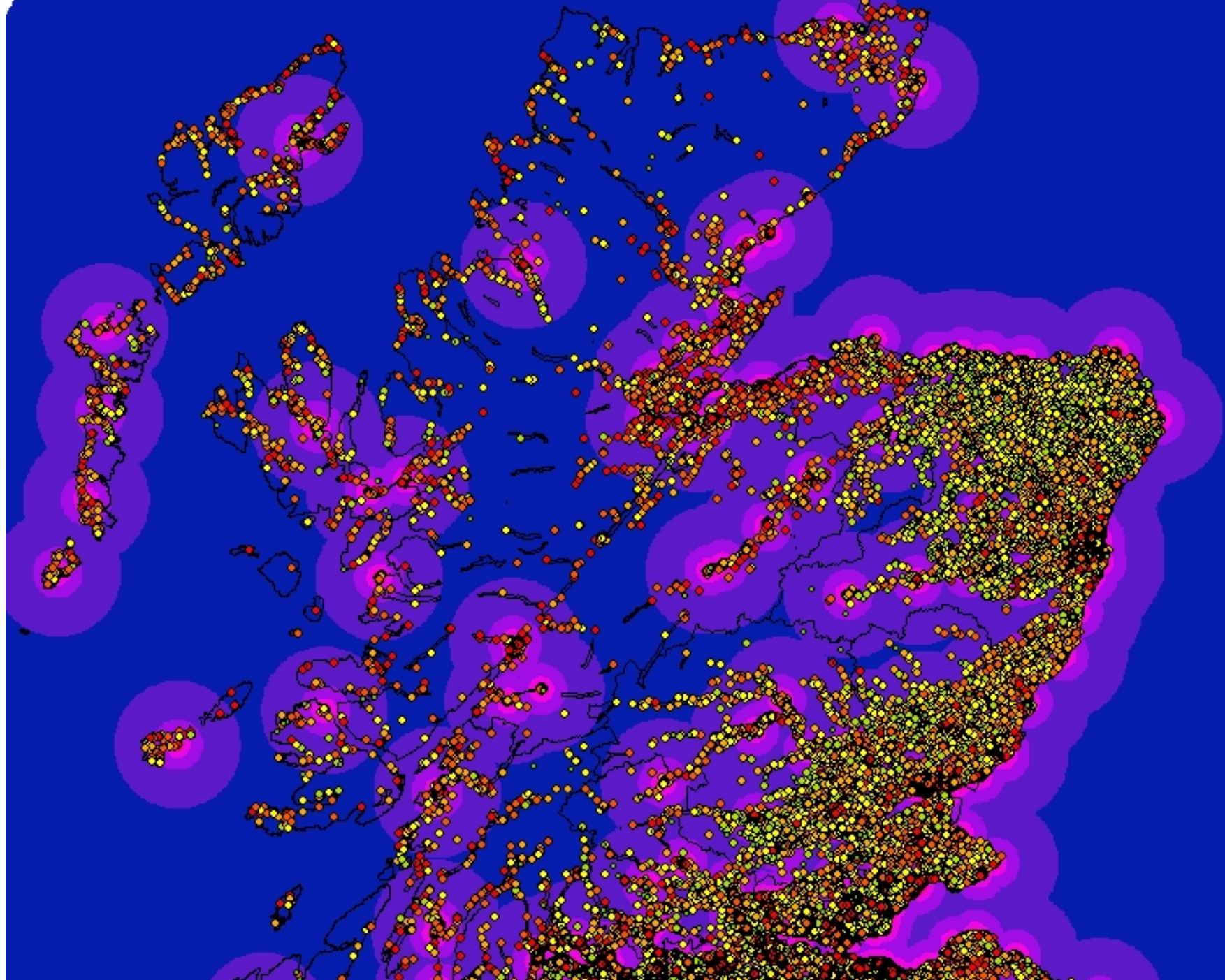
Mean Distance to Larger Food Stores

Datazone

Mean Distance

- < 500 m
- 500 m - 1 km
- 1 - 2.5 km
- 2.5 - 5 km
- 5 - 10 km
- 10 - 25 km
- > 25 km





BUT...only observational evidence

- **Most UK studies have simply investigated the association of number of stores and the price and availability of food within them with area deprivation**
- **Recent evidence is equivocal (at present but our new Scottish study may shed further light on this...)**
- **Studies of linking grocery stores and diet/obesity remain rare**
- **Evidence has been purely observational; causality cannot be determined therefore....**
- **Studies are open to criticism as it may be, for example, that lower availability of certain foods are due to low demand rather than a simple failure to stock**

A tale of two (UK) cities

- **In light of the current UK policy context two recent studies have evaluated the effects on diet or opening a large food supermarket in a deprived urban neighbourhood**
- **Studies are the first of their kind**
- **Leeds Food Deserts Study (Wrigley, Clarke, Guy et al)**
- **Glasgow Superstore Study (Cummins, Petticrew, Sparks et al)**

Leeds Food Deserts Study (1)

- A before/after study in Seacroft, a deprived area of Leeds (Wrigley et al, 2003)
- Evaluated what happened when existing grocery provision was demolished and new provision constructed
- Increase of between 0.01 and 0.47 portions of fruit and vegetables per day for those who switched to using the new store after it opened
- Increases were greatest (0.47 portions per day) in the groups that had the lowest intakes of fruit and vegetables at baseline

Leeds Food Deserts Study (2)

- Also an increase in walking trips associated with grocery shopping (greater physical activity)
- Increases in consumption remained after controlling for individual socio-demographic factors
- So, at face value, an interesting and apparently successful strategy for improving food consumption patterns in deprived areas
- **HOWEVER** this was an *uncontrolled* study, which is important as the next study shows

Glasgow Superstore Study

- Two year study which ran from September 2001 to December 2002 in two neighbourhoods in Glasgow City, Scotland, UK
- Designed as a exploratory pilot study of a 'naturally occurring' experiment in a food retail deficit area
- Full results in Cummins et al (2005) *Journal of Epidemiology & Community Health* and Cummins et al (in press) *Environment & Planning A*

Study Design

- Project had three elements
- A 'before and after' postal survey of a representative sample of residents in two areas using a quasi-experimental controlled design
- Focus-group study of a selection of local residents
- Survey of retailing at 6 month intervals
- Only reporting results from the postal survey here

What are the study sites like...?

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 [fries], fags [tobacco] and booze means that life expectancy is actually falling in one of the most deprived parts of the UK

David Smith

Sunday March 14, 2004

[The Observer](#)







Sample selection

- Random sample of households, stratified by area, drawn from the postcode address file and supplied by CACI Ltd.
- Total of 3975 postal questionnaires were administered pre-intervention during October 2001
- Respondents followed-up after a 12 month interval

Data available

- **Outcomes measured were:**
 - **Fruit consumption (portions per day)**
 - **Vegetable consumption (portions per day)**
 - **Fruit & Vegetable consumption (portions per day)**

 - **Self-rated health (excellent, good, fair, poor)**
 - **GHQ-12 (measure of psychological well-being)**
- **Other data: sex, age, education, economic activity**

Results – dietary change within sites

	Control		Intervention	
Outcome	Baseline	Change	Baseline	Change
Fruits	2.11	+0.12 (p=0.19)	1.97	+0.09 (p=0.35)
Vegetables	2.16	+0.25 (p=0.01)	2.06	+0.15 (p=0.14)
Fruits & Vegetables	4.16	+0.25 (p=0.003)	3.92	+0.29 (p=0.07)

Dietary change – multivariate appraisal

	Intervention Effect	Std Error	T	P-value	95% CI
Fruits	+0.03	0.140	0.19	0.846	-0.25 to 0.30
Vegetables*	-0.11	0.168	-0.66	0.597	-0.44 to 0.22
Fruits & Vegetables*	-0.10	0.249	-0.40	0.692	-0.59 to 0.40
* Quadratic term					

Summary – diet outcomes

- **Inconclusive evidence for an intervention effect for diet and general health in main sample**
- **Marginal improvement or substantial negative change – statistically inconclusive**
- **For ‘switchers’ there is an indication of some intervention effect for dietary outcomes – not statistically significant**
- **Important that changes in the intervention site were similar to Leeds Study; but after allowing for change in the comparison site the intervention ‘effect’ disappears**

Evidence for an environmental effect of fast-food outlets in the UK

- Evidence base is very sparsely populated
- What studies do exist are limited by being 'ecological' in design
- Useful for hypothesis generation though!
- Three ecological studies in the UK
 - two national (England & Scotland)
 - one local (Glasgow)

Fast-food chains and area deprivation in the UK

- We initially undertook a simple national study investigating whether MacDonald's Restaurants were located in poorer neighbourhoods in the UK (see Cummins et al; 2005, *AJPM*)
- Statistically significant positive correlation with quintile of area deprivation
- Linear trend with of greater numbers of outlets in increasingly poorer areas indicating evidence for a 'dose-response' effect

But...

- We followed this up with an in depth look at Glasgow only this time including independent outlets in addition to global chains (see Macintyre et al; 2005, *IJBNPA*)
- This study composed of 1301 outlets in the city
- We found a confused picture, no clear pattern with area deprivation

Quintile	Restaurants		Fast food chains		Cafés		Takeaways		All outlets	
	OR	95%CI	OR	95%CI	OR	95%CI	OR	95%CI	OR	95%CI
1 Affluent	0.77	0.45–1.33	0.49	0.12–2.10	0.61	0.35–1.06	0.49	0.29–0.81	0.52	0.32–0.84
2 (reference)	1.00		1.00		1.00		1.00		1.00	
3 Middling	0.45	0.24–0.82	0.83	0.25–2.78	0.90	0.53–1.52	1.23	0.76–1.98	0.89	0.56–1.42
4	0.21	0.10–0.43	0.00	0.00-0.00	0.40	0.22–0.73	0.71	0.43–1.16	0.50	0.31–0.80
5 Deprived	0.18	0.09–0.40	0.66	0.18–2.38	0.77	0.46–1.32	0.78	0.48–1.27	0.61	0.38–0.98
Overall sig.		0.00		0.89		0.03		0.01		0.01

Substitution or concentration?

- This difference between the two studies raises the question that...
- Are global chains, like McDonald's, are more likely to be concentrated in poorer neighbourhoods (a 'concentration' effect)
- Or are sores MacDonaldis simply substituted by a competing chain in more affluent areas (a 'substitution' effect) with the effect that all chains would be evenly spread across all types of neighbourhoods.

Four biggest fast-food chains and area deprivation (under review)

England & Scotland

Mean	95% CI (lower-upper)	N
0.0169	0.0108-0.0231	188
0.0328	0.0267-0.0389	357
0.0441	0.0380-0.0503	474
0.0647	0.0586-0.0708	671
0.0761	0.0700-0.0822	845
0.0469		2535

F=58.339, p=0.000

To summarise UK studies...

- For the neighbourhood grocery retail environment little observational evidence found for an association with diet..
- For neighbourhood grocery retail environment conflicting experimental evidence; though the study with the more robust study design found no evidence of an effect
- For neighbourhood fast-food environment some evidence that fast-food outlets locate in poor areas, but perhaps only global chains.
- For neighbourhood fast-food environment evidence for a 'concentration' rather than 'substitution' effect





The experience of other countries – grocery store environment

- In a general review (Cummins & Macintyre, 2006) there appears to be plenty of observational evidence for a contextual effect of the local food environment
- However, closer inspection reveals that most evidence for a contextual effect emanates from the US and Canada; evidence outside of North America is equivocal at best (UK, Australia, Netherlands, Sweden, Ireland)
- In the US black and low-income neighbourhoods have poorer access to food; fewer supermarkets and greater numbers of small stores

The experience of other countries – grocery store environment

- These smaller stores charge higher prices for food
- Grocery stores in black neighbourhoods are also less likely to stock healthier foods and have a lesser allocation of shelf space
- Dose-response relationships found; increasing food stores associated with increasing consumption of fruit and vegetables
- BUT evidence not replicated elsewhere; most US studies do not investigate direct associations with diet or obesity outcomes

Systematic review

- This finding partially confirmed by an ongoing systematic review of the food price and availability 'food deserts' literature published prior to December 2003 (Beaulac et al)
- Majority of included studies suggested that 'food-deserts' exist in the US (10/19) but fewer positive findings in the UK (1/5) and Canada (1/2)
- Interesting temporal variation in positive studies; greater evidence in more recent US studies – partly reflecting improved methods but possibly a real and increasing spatial polarisation in the US?

The experience of other countries – fast food environment

- Less evidence with which to draw conclusions here
- Limited to cross-sectional ecological and isolated multi-level studies; some GIS approaches
- Majority positively relate store density to deprivation measures for chains but not independent outlets
- BUT some do directly investigate associations with obesity
- Conflicting evidence in all countries

Does local environment matter?

- Yes...and no?
- Yes in North America
- Perhaps not elsewhere..?
- Spatial order of cities varies by nation for many reasons eg, historical planning reasons, residential segregation along different social axes in different nations, differing rates and flight to the suburbs, densities of land use etc

National environments may thus matter more...

- In our review we hypothesize that national environments may matter as much, if not more, than local environments
- Some support from other literatures eg income inequality (US vs other developed nations), self-rated health and mortality (US vs Sweden)
- Migrants studies demonstrate that national cultures matter
- Interesting to look to see if their experience becomes spatially patterned over time and magnified by local context

Scale matters - local response, national change

- Local responses may not reduce geographical inequalities in obesity in countries outside of North America
- Scale matters; policy needs to focus on macro-level change as well as micro-scale responses
- Levers for policy may be different in different countries; context may matter more for obesity in the US
- Environmental experimental and intervention evidence that directly investigates diet-related outcomes of what and what does not work is desperately needed

Does 'context' matter?

- **What sort of context? (schools, peer groups, home, work, local, national)**
- **Local/national cultural context (do local, spatially defined, eating cultures exist)**
- **Can across the board built environment interventions ever work? Will they only give population level improvements?**
- **Potential of multi-scale approaches?**
- **What can community organisations do?**