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Accessing healthy food:

A sentinel mapping study of healthy food retailing in Scotland

Executive Summary

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Executive Summary

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Executive Summary

Introduction

The issues underpinning food access and availability have provided one of several foci of debate in Scotland in respect of the relationships between diet and health. The key question has been 'Within Scotland, are there significant differences in the accessibility to affordable sources of healthy food?' A supplementary question then arises; 'If differences are present, are they linked to the social dimensions of affluence-deprivation and urbanism-rurality?'

The Food Standards Agency Scotland commissioned research to explore these questions and answers to them. The research was undertaken between 2005 and 2007 by the Centre for the Study of Retailing in Scotland. The project was based in The University of Edinburgh and drew on a range of expertise from specialists in retailing, nutrition, geography, marketing, statistics and geographical information systems at The University of Edinburgh, Queen Mary University, London, The University of Stirling and The University of Dundee.

Objectives

The objective of the research project was to provide an independent and systematic evaluation of access in terms of the availability and affordability of a selected range of healthy food items, thus providing information to improve understanding of any structural constraints or limitations that might make it difficult to achieve the national policy objective of improved diet.

In order to achieve this it was essential to create two foundations:

- a database of stores selling food; and
- a list of indicative healthy foods.

From these foundations it was then possible to identify key sites (sentinel survey sites) within which to investigate food access in a detailed systematic way using a survey instrument that could be of more general applicability after the conclusion of the research project.

Methods

A review of previous research identified several studies (within and outside the UK) that suggested the importance of socio-economic variables to improving diet, but few addressed specifically the issues of accessibility and affordability. A number of these studies considered the concept of 'food deserts' as areas in which there was an absence of shops selling food and the consequential problem of access to places to purchase food. Although the concept was articulated in these studies, few were able to prove the existence of such areas. The review of previous studies provided useful pointers for the current research but did not provide studies either for direct comparison with the situation in Scotland or of direct value in terms of research design.

The research design adopted for the project comprised a dual approach of mapping the location of food stores across Scotland to provide a macro-perspective on access and, in tandem, empirical survey of the availability and price of selected foods in small areas to provide a micro-perspective.

The macro-study compiled a database on 5,923 food stores and developed a geographical information system to map and analyse these data. As no single accurate and comprehensive data source exists on the number, type and location of food stores in Scotland, the database was compiled from a variety of sources. Medium and large stores, (i.e of over 3,000 sq ft,) were able to be identified separately by floorspace within the database. Change in the population of shops was monitored over the period of the project.

The micro-study involved identification of 9 survey areas, termed survey sentinels, in which detailed surveys were undertaken at all shops within the area. The survey sentinels were selected to represent different socio-economic environments, in respect of affluence-deprivation (SIMD) and urbanism-rurality (SEUR). Paired deprived and affluent sentinels were selected in urban, rural and small town environments with the addition of two Island sentinels to enable exploration of this specific environment. In each sentinel, all food shops were visited and the presence and prices of a range of healthy food products were recorded. These data were collected for a total of 466 shops across the sentinels.

The foods for which data were recorded were selected as indicators of the presence of a range of healthy foods. This list of foods, especially devised by the project team, is termed the Healthy Eating Indicator Shopping Basket (HEISB). It comprised a total of 35 items drawn from 5 major food groups.

Results

The results of the macro-study have proven the feasibility of establishing a database and associated GIS of food shops in Scotland – in effect a Food Map of Scotland. This map indicates that there is an extensive network of food shops across all the socio-economic environments in Scotland. Levels of accessibility vary considerably with an estimated 250,000 people living more than 10 km from a medium or large food shop and approximately 3 million living within 1 km of a medium or large food shop. The pattern of provision is dynamic.

The results of the micro-study indicated that the HEISB tool, as an indicator of availability of healthy foods, discriminated well amongst stores in terms of the food stocked. In the large stores and some of the medium sized general stores a full range of the 35 HEISB items was available. Small stores generally stocked around half of the HEISB. Small stores stocking a wider range were present in more remote rural areas. Across the stores surveyed, the fruit and carbohydrate groups were normally more available than the vegetable group with the protein-rich group less available in small stores and in more deprived areas. Overall the total

number of HEISB foods available per shop was weakly negatively correlated with deprivation; as deprivation increases the number of foods available falls. There are a number of stores in the deprived areas having a good range of the HEISB items. Store operation is more important than location in a deprived or affluent area in influencing availability of HEISB items.

There was a considerable range of price for the HEISB items across the stores and the sentinel areas surveyed. The total HEISB median price varied substantially by store type from £37.48 in large stores, £40.30 in medium sized stores, to £47.83 in small stores. Although in the survey of availability it was seen that many small general food stores, in many cases in rural areas, had a relatively high percentage availability of indicator foods, it is apparent that this comes at a relatively high price. Across the 9 sentinel areas the total HEISB median price ranged from £52.75 to £42.34. The 3 sentinels with the highest price for the HEISB all have a significant deprived element: rural deprived £52.75, the Island sentinel £49.18 that contains notably deprived areas, and, small town deprived £47.25. There is a tendency for prices to be lower in areas with a low level of social and economic deprivation. The study has not proved a conclusive link between deprivation and price of HEISB, but when the pairs of Rural, Island and Small Town sentinels are considered the more deprived sentinel in each case has a higher price for the HEISB.

Conclusions

The project has shown the values of combining macro and micro level study to address the question 'Within Scotland, are there significant differences in the accessibility to affordable sources of healthy food?' In general, using the specific methodology designed for this research there is no evidence to support a view of the presence of urban 'food deserts'. Accessibility to a range of healthy food as indicated by the presence of key items depends more on the presence of medium and large stores than being in a deprived or affluent area. The contrast in HEISB availability between small general stores and the medium and large stores is very clear.

The price of items in the HEISB varied considerably across stores and across the survey areas. There is a tendency for prices to be lower in larger shops and in areas with a low level of social and economic deprivation.

The survey instrument proved useful in establishing what foods were available and at what cost in different socio-economic environments in terms of the overall basket and of individual items. It was shown to have a sufficient degree of sensitivity to indicate where there are specific issues in terms of availability and price of specific products.

The research has generated recommendations concerning future research which include:

a) considering ways to encourage small general food shops to increase the range of healthy foods;

b) to consider updating the database on food retail provision within Scotland; and

c) to consider extending the analysis in the report to other sentinel sites. This will allow the changes in the availability and price of healthy food to be followed and effective policy to be delivered and monitored.

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1. Introduction

The issue of food access and availability has been one of several foci of debate in Scotland in respect of concerns over the relationships between diet and health. There has been discussion surrounding the concept of 'food desserts' in which access to food is constrained due to the absence of food retail outlets. This discussion linked to others about food quality, healthy diets and social inclusion has raised questions about the ability of consumers, and particular groups such as the elderly or infirm, to acquire healthy food items as part of their diet. The policy objective of improving the health of the Scottish population is dependent, in part, on there being an accessible provision of affordable healthy food options.

Despite the interest in the topic there are a limited number of studies on availability and access to healthy food items. The aim of this project was to provide an objective and systematic evaluation of food access in terms of the availability and affordability of a carefully selected range of healthy items, thus providing information to improve our understanding of any structural constraints or limitations that might make it difficult to achieve the policy objectives of better diet.

In order to do this it was essential to create two key foundations:

- a database of stores selling food: and
- an indicative list of healthy foods.

From this foundation it was then possible to identify key sites within which to investigate food access in a detailed systematic way.

No reliable and comprehensive database on Scottish food retail provision existed prior to this research project. The changing nature of the retail sector requires a regular and sustained effort to maintain accurate information on food retail provision. The creation of this database involved amalgamation of data from a wide variety of sources and interrogating this within a Geographical Information System that provided a sound locational framework for analysis.

To provide an indicative list of healthy foods a survey instrument was developed that allowed the researchers to measure the availability and affordability of a range of healthy items in each of the selected sites, and relate this to geographical location and deprivation. While survey instruments were available in other research projects they lacked the regional specificity required in this study, and included a range of both healthy and less healthy products. This research focused specifically on the provision of a range of healthy items hence the need to develop a specific healthy basket termed the healthy eating indicator shopping basket (HEISB).

The information collected using HEISB in surveys of specific locations, termed sentinel sites, was linked to the database allowing production of an accurate profile of retail provision across each of the sentinel sites. This provided a current picture of retailing provision in Scotland and the availability and price of healthy food in the survey sites.

The specific objectives of the research were to:

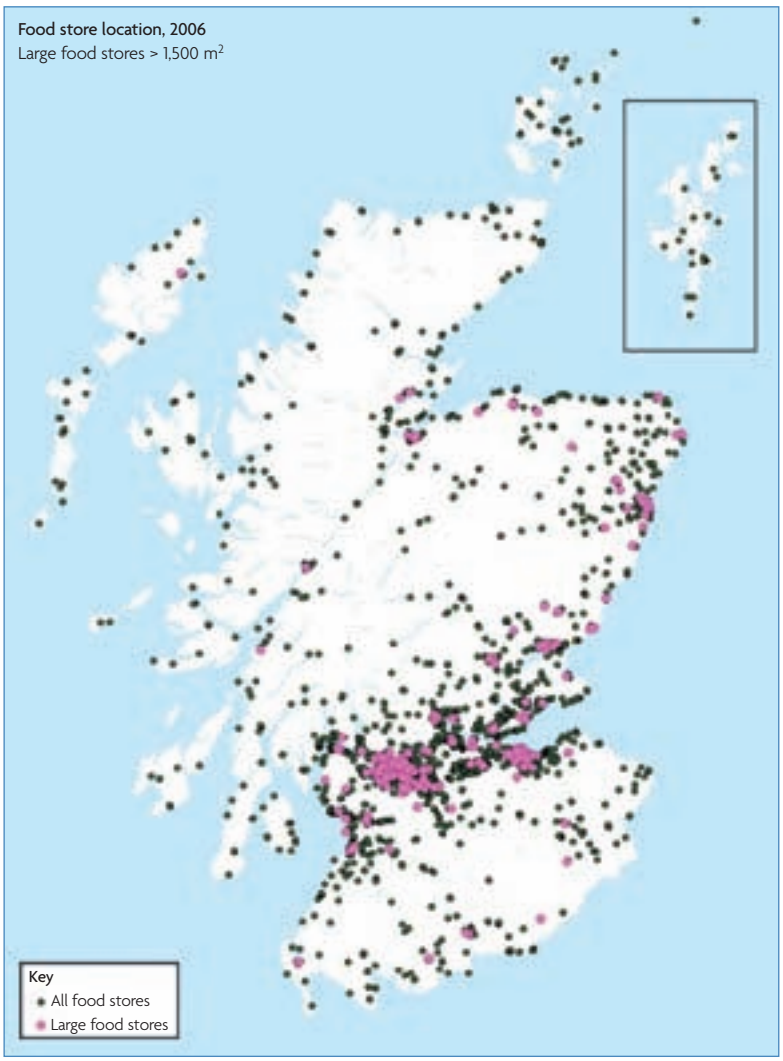
1. construct a Geographic Information System (GIS) of food retailing provision across Scotland;
2. to identify suitable sites (research sentinels) for detailed research taking into account differences in affluence and deprivation and in settlement structure;
3. to produce a toolkit, including the development of a 'healthy basket' survey instrument, to assess the availability of and access to healthy food;
4. to survey food retail provision at sentinel sites;
5. to map the provision of food retailing in Scotland; and
6. to undertake analysis in particular with regards to the urban-rural and affluent-deprived axes to establish if availability and access were related to these axes.

The project was sponsored and funded by Food Standards Agency Scotland and undertaken between 2005 and 2007 based in the Centre for the Study of Retailing in Scotland, at The University of Edinburgh. Professor A Anderson acted as consultant to the project.

2. Summary of main results

2.1 National map of food retailing

The location of food stores from the constructed database of 5923 stores is shown in the figure below. Numbers of food stores are in decline although, because of the absence of sound statistics, the scale of this decrease is not known. No accurate figures on the number of food stores in Scotland over recent years are available. Although the density of stores across Scotland varies considerably, it would appear from the figure below that all inhabited parts have access to a store. Analysis of the data shows that approximately 250,000 people live more than 10 km from a large or medium sized food store and approximately 3 million live within 1 km of a large or medium sized store.



2.2 The HEISB survey instrument

The HEISB list comprised 35 items divided into 5 food groups with a different number of items in each group and an additional ready meal:	
Fruit and vegetables	17
Carbohydrate rich	9
Protein rich	4
Dairy	3
Fatty/oily foods	1
Ready meal	1

The list, shown in Table 1 was compiled to include items to indicate the likely presence of healthy foods within a store. The items were selected by reference to nutritional factors, convenience, non-premium pricing and potential for local sourcing. As the foods were deemed as indicators, for some items close substitutes were allowed, for example in pack size, etc.

Table 1: Products in the HEISB

Product Name	Product Description	Target size
Apples	Fresh loose eating apples – green or red (not cooking apples)	per kg
Bananas	Fresh loose medium sized	per kg
Grapes (white)	Fresh un-seeded loose	per kg
Oranges	Fresh loose	per kg
Orange Juice	Pure UHT orange juice	1 lt
Pineapple	Tinned pineapple in own juice	220 g tin
Frozen berries	Frozen raspberries or frozen berry mixture	454 g
Onions	Medium sized brown onions loose	per kg
Carrots	General purpose loose carrots	per kg
Broccoli	Loose unprepared broccoli	per kg
Lettuce	Round variety	single loose
Peppers	Common red capsicums	per kg
Tomatoes	Loose standard medium-sized tomatoes.	per kg
Cucumber		single loose
Sweetcorn	Low salt and low sugar tinned sweetcorn	198 g tin
Baked Beans	Ordinary baked beans tinned in tomato sauce.	420 g tin
Peas	Frozen garden peas or petit pois	907 g
Potatoes	White loose general purpose	per kg
Weetabix	Weetabix wheat cereal only (has a known healthier sodium level).	24 pack
Porridge oats	Plain dry, unsweetened, unflavoured oats	1 kg
Bread rolls	Brown bread rolls 100% wholemeal flour	6-pack
Bread loaf	Medium sliced 100% wholemeal flour pre-sliced bread loaf	800 g
Pasta	Dry 100% durum wheat flour spaghetti	500 g
White rice	Long grain normal cook white rice	500 g
Brown rice	Normal cook brown rice	500 g
Oven chips	Oven chips, < 5% fat by cooked weight	907 g
Chicken	Fresh chicken breasts, no skin, no bone	2-pack
Beef	Fresh beef mince lean, ideally < 7% fat.	500 g
Salmon	Fresh salmon fillets	2-pack
Haddock	Fresh haddock fish	2-pack
Ready meal	Birds Eye Lasagne	400 g
Semi-skimmed milk	Semi-skimmed milk	1 lt
Skimmed milk	Skimmed milk	1 lt
Yoghurt	Low fat fruit yoghurt	125 g
Spread	Low fat spread. Made from PUFA maximum fat content 41%	500 g

2.3 Survey sites and retail provision

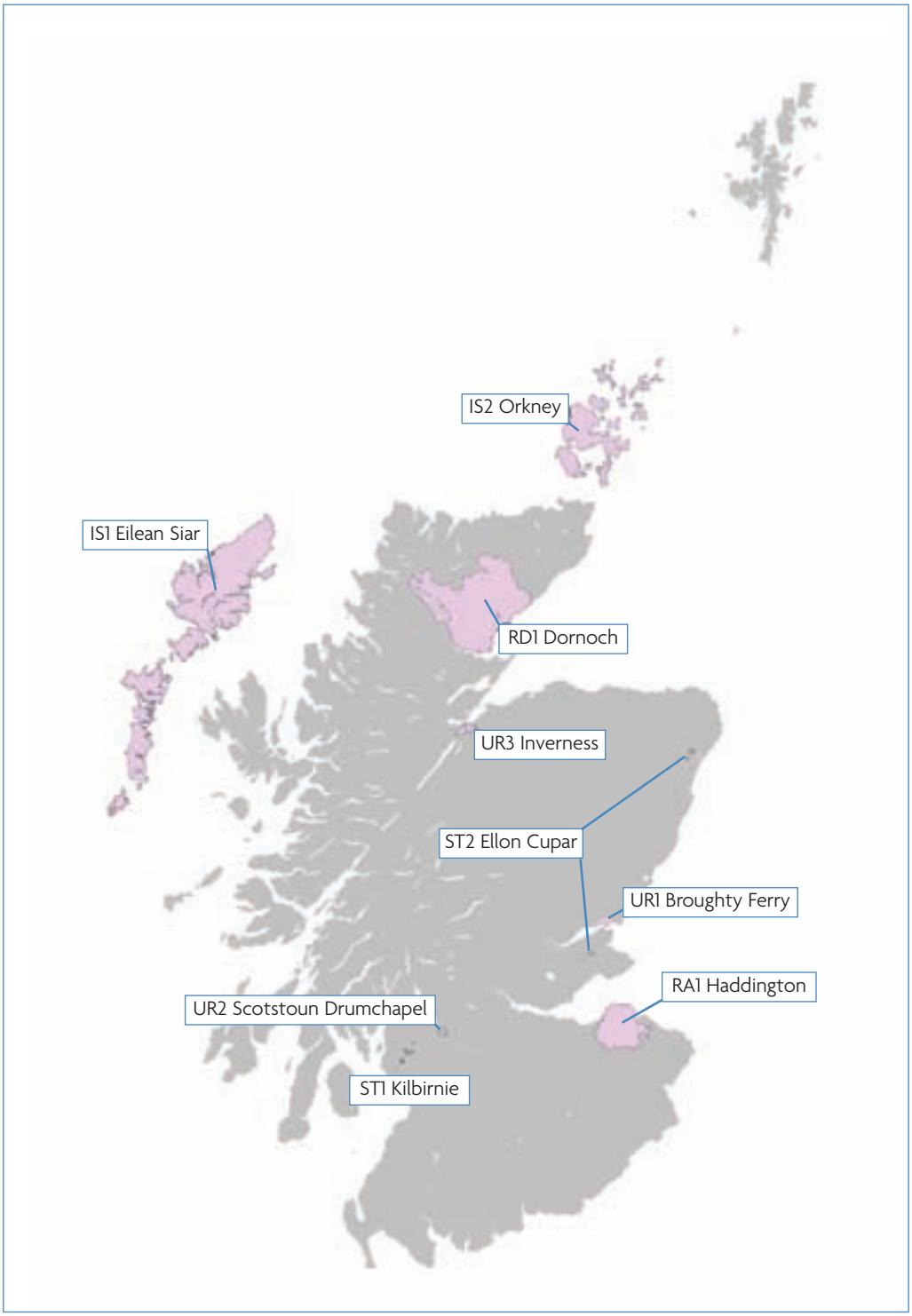
Nine survey areas were selected as research sentinels. Table 2 lists the nine sentinels, their character on the two axes of urban-rural (SEUR) and affluent-deprived (SIMD), and the number of general and specialist food shops surveyed within each sentinel.

Table 2: Sentinel sites

Sentinel ID	Median SEUR	Median SIMD	General food shops	Specialist food shops
IS1	Remote rural	7	44	16
IS2	Remote rural	4	30	12
RA1	Accessible rural	3	28	34
RD1	Remote rural	6	15	4
ST1	Accessible small town	7	20	12
ST2	Accessible small town	2	14	10
UR1	Large urban	2	19	16
UR2	Large urban	9	91	18
UR3	Other urban	4	49	19

Small general food stores dominate (57%) the sentinel sites but the survey covers a range of retail provision including specialist stores (30.3%), medium sized stores (6.2%) and large general stores (2.8%) along with stores where food, although present, was not the primary business (3.2%). Geographical location of the stores varies across the sentinel sites with no large general stores in three of the sentinels, freezer centres limited to urban areas and specialist greengrocers only found in small towns or accessible rural area.

National Distribution of Sentinels



2.4 The survey procedure

In each of the research sentinel areas each shop was surveyed for the presence and price of HEISB items. In total data from 466 shops were collected. Data were subjected to checking and validation procedures. The data from the survey were linked to a geographical information system that contains the location of the shops.

2.5 HEISB availability

The HEISB tool as an indicator of availability of healthy foods discriminates well between stores in terms of the food stocked. In the large stores and some of the medium sized general stores a full range of HEISB items was available. Small stores generally stock around half of the HEISB.

The fruit and carbohydrate groups were normally more available than the vegetable group with the protein-rich group less available in small, specialist and secondary food stores, and more deprived areas.

Overall the total number of foods available (out of 35) per shop was weakly negatively correlated with deprivation; as deprivation increases the number of foods available falls. As deprivation increases relative availability of vegetables gets worse but fruit tends to be relatively more available in the most deprived areas. In terms of the balance of the HEISB the most deprived data zones have greater relative availability of fruit, carbohydrates and dairy products with the most affluent areas better for all other food categories except protein-rich items.

Of all the items in the HEISB, carbohydrates had the best overall relative availability in the sentinels with the exception of rural and small town affluent locations. Fruit had good relative availability in all sites with the exception of rural affluent, small town affluent and urban deprived settings. In contrast vegetables showed poorer relative availability in seven of the nine settings including all urban areas, small town affluent, island mixed/deprived and rural affluent. Dairy products were more available in urban compared to rural and island settings. Lower availability in this context does not mean the items were not available but that fewer shops had the items.

Whilst 31 small general food stores stocked 5 or fewer HEISB products, a good range of healthy food, defined as at least 50% of items in each of the 5 product groups, could be found in 61 out of 268 small general food stores. These small stores stocking a wide range were present in more remote rural areas. Whilst a small general store in a remote rural area typically offers a general range of healthy food, a small general store in a large urban area often does not. The sentinel data showed that Orkney (IS2) has over 50% more high HEISB stores than Scotstoun (UR2) although it has about a quarter the population. Healthier food is present in the large urban areas but in a smaller proportion of shops compared with remote rural areas. There are fewer shops selling a poor range of HEISB items in more remote areas, whereas there is a network of shops in urban areas which stock a poor range of HEISB items, as noted in the urban deprived sentinel.

The HEISB is a useful tool to discriminate access to healthy foods in different areas, and access across particular food groups. These differences reflect the retail provision in the sentinels, and a complex pattern with respect to urban and rural communities.

2.6 HEISB price variation

Within the sentinel sites there is no evidence of urban 'food deserts' based on price. The two affluent small town sentinel sites were the cheapest places to purchase the total HEISB basket with rural deprived and island mixed/deprived the two most expensive. Compared to other stores the large general food stores yielded the lowest price for the total basket of food items, £37.48, compared to small general stores £47.83.

The total basket price rises with deprivation with an important caveat that prices are lowest in the most deprived areas. The affluent sentinels are associated with lower prices in all but two of the HEISB items. The low prices in the most deprived areas is significant because sourcing all HEISB items from shops located in these areas, in which large and medium sized stores were well represented, gave the cheapest total basket. In terms of individual food items in the HEISB frozen peas, brown rice and spaghetti show the greatest price variability; semi-skimmed milk, oven chips, salmon and beef mince the least. Less common items such as frozen berries and grapes have larger ranges but lower relative variability.

Table 3 shows the median price of the items in HEISB in general stores. Although in the survey of availability it was seen that the small general food store, in many cases, had a relatively high percentage of availability it is apparent that this comes at a relatively high price.

Table 3: Median price (pence) of food items in HEISB by size of general food store

Food items	General Food Stores		
	Small	Medium	Large
FRUIT			
Orange juice	85	44	38
Bananas	149	89	85
Pineapple	53	40	35
Apples	135	107	98
Oranges	29	20	19
White grapes	311	237	199
Frozen berries	241	247	241
VEGETABLES			
Baked beans	49	19	15
Frozen peas	178	99	92
Carrots	87	59	52
Tomatoes	178	119	109
Onions	79	65	51
Round lettuce	58	41	42
Broccoli	212	159	138
Cucumber	79	75	75
Red pepper	369	425	425
Sweetcorn	52	52	47
CARBOHYDRATES			
Weetabix	170	128	133
Oats	169	89	57
Spaghetti	69	23	22
White rice	75	45	38
Brown rice	92	95	53
Brown rolls	120	75	75
Wholemeal bread	99	52	48
Oven chips	129	123	100
Potatoes	50	52	41
MEALS			
Birds eye lasagne	189	230	228
PROTEIN			
Lean beef mince	269	269	193
Haddock fillets	249	246	266
Chicken breasts	180	180	234
Salmon fillets	279	289	284
DAIRY			
Semi-skimmed milk	75	58	56
Low fat spread	124	93	88
Low fat yoghurt	31	28	16
Skimmed milk	70	58	55
HEISB TOTAL	**4782**	**4027**	**3747**

In considering the prices for the sentinels, for the total basket and for most items the lowest prices are recorded in the affluent small town sentinels with these sentinels having the lowest price for 25 of the 35 individual food items. Of the remaining 10 items not having the lowest price in small town affluent, 8 have their lowest prices in urban affluent sentinels.

Table 4 shows the price of the complete HEISB across the sentinels. The total basket price in the 2 small town affuluent sentinels was £42.30 and £42.38. The 3 sentinels with the highest price for the HEISB all have a significant deprived element, rural deprived £52.75 and the Island sentinel £49.18 that contains notably deprived areas and small town deprived £47.25.

Table 4: Median price (pence) of food items in HEISB by sentinel

Sentinel ID	UR2	UR1	UR3	ST1	ST2	RD1	RA1	IS2	IS1
Sentinel	Urban	Urban	Urban	Small	Small	Rural	Rural	Island	Island
Environment	D	A	M	town D	town A	D	A	M	M/D
HEISB TOTAL	**4387**	**4360**	**4511**	**4725**	**4234***	**5275**	**4668**	**4341**	**4918**

D=deprived; M=mixed; A=affluent; * price average across two locations

Although the study has not proved a conclusive link between deprivation and price of HEISB, when Rural, Island and Small Town sentinels are considered the more deprived sentinel in each case has higher price for HEISB. For the Urban sentinels there is little difference in price between affluent and deprived.

2.7 HEISB Quality ratings and store opening hours

Quality ratings on fresh fruit and vegetables are better for large general food stores. Small general stores and deprived sentinels had the greatest proportion of items rated as poor quality.

Food stores were open longest in urban mixed areas whereas stores in island mixed/deprived had the shortest opening hours. Opening hours were positively correlated with deprivation and amount of the HEISB stocked.

3. Discussion

3.1 Scottish food retail Geographical Information System

The compilation and update of the database of all food retail outlets in Scotland has highlighted the range of food retail formats from small general stores through to large general stores across the country. The detailed maps of the sentinel sites highlight the high level of local variation in food retail provision.

3.2 General accessibility to food retail stores

The research points to a high degree of variation in number and type of retail stores across the sentinels. More deprived areas have a greater density of general food stores, particularly smaller stores, than the more affluent sentinels.

From this we conclude that within the sentinels there were no major issues of accessibility to a food store. The presence of 'food deserts', that has been the subject of debate in the media and popular press, is not supported from the evidence of this project. Inevitably within any area there are specific issues that arise for some individual consumers such as the elderly and infirm, for example, the need to visit more than one store to obtain all of the healthy basket items, or different levels of provision for certain categories or individual items. Alternative sources of food provision, for example travelling shops and internet order and home delivery may be one solution to ameliorate some of the local issues.

3.3 Healthy food availability by retail outlet

The analysis reveals the highest stocking levels of the 35 items in the HEISB in the large general stores (e.g. supermarkets or superstores). The contrast between the small general stores and the medium and large stores is very clear. Only large, and some medium sized general stores regularly stocked the entire HEISB (median of 100% and 91.4% of HEISB items respectively), with a lower level of availability of HEISB in the small general stores (median 50% of HEISB items stocked). However, in areas where the small general store provides the main component of the store network the availability of the HEISB items is determined by the remoteness of the sentinel, i.e. small general stores have a higher level of HEISB provision in remoter areas. This survey does not provide clear evidence to support the findings of earlier work by Clark *et al*[1] in their study of the Western Isles which highlighted the very limited availability of food items, particularly fresh fruit and vegetables.

More deprived urban areas have higher densities of small general stores. There is a relationship between the store size and availability of the HEISB, but there are variations depending on the location of the store. An important conclusion on availability to 'healthy food' in Scotland is that the level of availability relates both to the access to

[1] Clark GM, MacLellan M, McKie L, and Skerratt S. Food Availability and Food Choice in Remote and Rural Areas. 1995. Edinburgh, Health Education Board Scotland.

medium and large supermarkets and to the level of provision within small general stores. For example as the access to medium/large supermarkets declines i.e. with increasing remoteness, the level of provision within small general stores increases. Food shops in rural areas are more dispersed geographically, and distance may prevent or reduce the likelihood of regular supermarket shopping. This may lead to a wider range of foods, including healthier foods being sold and stocked by smaller shops.

3.4 Healthy food availability by sentinel

Whilst there is variability of availability within all the sentinels, nonetheless there are shops selling all items in each case and if consumers are willing to visit more than one shop then availability could be considered to be good. In relating these differences to the urban-rural and affluent-deprived dimensions the differences in availability do not clearly relate to these dimensions with an acceptable level of statistical significance. Nonetheless there is a tendency for the more deprived urban areas to have a higher network density of small stores that, individually, have lower levels of availability of HEISB.

3.5 Healthy food price

There are many difficulties in drawing conclusions about price differentials given the frequency prices change due to product availability and promotion. Nonetheless the magnitude of the price differences recorded is such as to indicate that there are real and substantial differences in prices being recorded in the survey.

Once again, the large general stores have an impact on availability and affordability. The large general stores record the lowest median cost for the total basket. While this is perhaps not surprising, given the buying power and price competitiveness of the large general stores, some of the specialist stores recorded lowest prices on specific items (they inevitably had a limited range of HEISB items according to their specialist focus). While many small general stores had high availability this comes at a relatively high price. The range of store types is an important consideration in examining price variation and in considering the impact on affordability.

While the study has not proved a conclusive link between deprivation and price of HEISB, when Rural, Island and Small Town sentinels are considered the more deprived sentinel in each case has a higher price for HEISB. For the Urban sentinels there is little difference in price between affluent and deprived.

3.6 Promotional activity

The prices recorded in the survey reflect promotional activity which ultimately influences the final price paid by the consumer. The use of promotions was more prevalent in the urban deprived and island mixed/deprived sentinels with less evidence in affluent areas.

3.7 Food quality

The survey design also allowed a broad indication of quality to be assessed in respect of the fruit and vegetable components of HEISB. In general quality was good. There was a tendency for the highest quality offerings to be associated with the larger stores and specialists with small general stores showing the most cases of lower quality items. These were relatively crude quality measures but it does raise some issues about the variation in product quality between store types.

3.8 Local and national maps

Where detailed survey work has been undertaken we get a much better picture of the reality of access to healthy food. In some cases, for example Orkney and the Western Isles there is a better level of access than might be inferred from looking at nationally compiled data alone, whilst in other areas, for example Broughty Ferry, the level of access is worse than would be assumed from national maps.

Overall the population has high levels of access to healthy food as indicated by the retail provision of the constituents of the HEISB, with 87% living within 5 kms of a large or medium sized store that is likely to sell a wide range of healthy food items.

Broad media statements regarding the existence of food desserts, or suggestions that availability of healthy food is a contributory factor in poor diet find little support in this study. In this respect we can confirm and concur with the findings for other small scale studies in Scotland and England.

4. Challenges

The project has established a contemporary database of food retailing in Scotland and mapped the retail provision in Scotland and has also provided the basis on which to build and maintain an up to date record of what is happening across the country.

The survey instrument allowed us to distinguish between different sites both in terms of the overall basket and in individual items with respect to what was available and what it cost. As a research instrument it has a sufficient degree of sensitivity to indicate where there are specific issues in terms of availability and price of certain products. What it cannot do is explain why that may be the case beyond considering the possible impact of rurality and deprivation. The recording of promotional activity and quality measures provides additional information that might help to explain some of the findings. These might be further developed and enhanced in refining the research tool.

The selection of suitable sites was challenging. The procedure as described used a systematic approach based on SEUR and SIMD to identify and then select sentinel areas that represented a cross section of the Scottish population but ensured that deprived areas and rural and remote resident populations were represented. Clearly any boundaries that are imposed do not necessarily equate with the shopping experiences of all the resident population but it does provide a clear picture of food availability in the sentinel bounded area. What it has shown is that in terms of these sentinels the relationships between food access and rurality, and food access and deprivation are complex. The nature of the retail provision and store type located in the area appears to be a bigger influence on availability than levels of deprivation and rurality.

Food availability does not appear to be problematic, at least in the context of this HEISB basket of items, there are variations in terms of food categories and individual items but a systematic pattern is difficult to discern. For example fruit is more widely available than vegetables but not as widespread as healthy carbohydrate options. It is important to consider what is being used as an indicator of healthy food. It should be remembered that the items included in the HEISB were all deemed healthy.

When price differences are accounted for the picture is complicated further. The most deprived areas show the cheapest baskets and have a large number of promotions, but again there is no clear relationship between deprivation and food price, or rurality and food price. There is a price gradient from low price to high price as deprivation increases but for the most deprived areas price falls to below that of the most affluent.

The presence of differences in food retail provision reflects the availability and price of food across the surveyed sites. Policy relating to food access needs to consider these differences. Rather than rely on broad measures of deprivation or rurality to explain and address these differences, it is important to recognise that retailers and many consumers are extremely adept in adjusting to the local environment, although some consumers such as the elderly and infirm or disabled, and those without transport, will be less able to adjust. Of course while we can comment on what is available and how this provision relates to the variables we have studied we cannot say if consumers will buy these healthier options, but at least most have the option to do so.

The detailed examination of retail provision and food availability suggests that there is a relationship between the type of retail provision and what healthy food is available. Whilst questions have been raised in the media about the role of the retail sector in improving diet, this research suggests that the policy within individual stores is a key determinant in both availability and price of healthy food and as such is a key lever for the promotion of healthy eating.

5. Conclusions

In summary, the conclusions to be drawn from the study are:

Key Conclusions	
1.	The HEISB instrument and survey implementation have been proven to be suitable to be used for study of food access in specific areas and is of a form that is able to provide data to monitor change in food availability;
2.	The HEISB instrument can be used to discriminate between shops providing low, medium and high levels of healthy food;
3.	Nationally available data do not provide an accurate picture of the current pattern of food retail provision in local areas;
4.	If an accurate national picture is to be maintained then there is a need for a regularly updated database of information on the network of food shops and other provision across Scotland;
5.	The accessibility to healthy food is determined both by the network of stores in an area and by the stocking policy of those stores;
6.	There is a consistent high level of availability in both large and medium general stores;
7.	Availability in small general food stores depends on the remoteness of the area. There is a higher level of HEISB provision, in small general stores, in more remote areas than in urban areas;
8.	Across small general food stores in less remote areas, availability varies considerably by food group, such that population groups that depend on the small food stores for food provisioning will have more limited access to healthy foods than if they utilised the larger stores in their area;
9.	The price of healthy foods as shown by HEISB is lower in large and medium sized stores than in small stores. Thus the retail structure of an area is an important factor in influencing price of healthy food;
10.	There is a tendency for prices to be lower in areas with a low level of social and economic deprivation;
11.	The associations between access to and the price of healthy food and rural-urban and deprived-affluent areas are complex and whilst the research has not proven conclusively that a link exists there are indications that a range of healthy food is less consistently accessible in urban deprived areas than elsewhere and also the price is higher in some types of deprived areas, not necessarily the most deprived; and
12.	The questions raised are sufficient to warrant further research that focuses specifically on these types of environment and the consumers resident in them.

6. Recommendations

Following from the conclusions above the authors recommended that:

1. Consideration be given to ways to encourage small general food shops to increase their ranges of healthy foods.
2. The survey of availability and price of healthy food, using HEISB, is extended from this pilot study to:
    a. A resurvey of the existing sentinels to assess if provision is improving or deteriorating;
    b. Additional sentinels be added to the existing database to enhance its coverage; and
    c. A programme of rolling surveys is instituted to assess the changing levels of availability and price of healthy food in Scotland.
3. Further analysis be conducted on the current data and on new data as it is acquired.
4. More detailed research, related to the costs of provision by retailers, should be undertaken on the substantial price differentials of healthy food.
5. Consideration should be given to how best to generate a regularly updated accurate spatially referenced database of food retail outlets in Scotland.

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