

# Sustainable diets in the UK? Developing a systematic framework to assess the environmental impact, cost and nutritional quality of household food purchases

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## Supplementary material 1

### Methods for disaggregating multi-product codes

A method that permitted greenhouse gas emissions GHGE and land use calculations to take into account both the different proportions of foods coming from different commodities, and the different constituent products making up each multi-product code was devised. However, disaggregating all of these multi-product codes and taking into account every possible constituent product, was not feasible in this study, due to the minimal contribution of some of the products to the overall food purchases. We therefore took a more pragmatic approach to this exercise and prioritised the 202 codes that accounted for 95% of all purchases (by quantity).

The first step was to explore how food and drink purchases, in terms of the proportion of overall quantity purchased across the whole dataset, were distributed across the 526 codes. The purpose of this step was to identify whether a smaller subset of the multi-product codes could be disaggregated, rather than attempting to disaggregate all multi-product codes. In doing this, we identified that 95% of all purchases (by quantity) in the 2012 and 2013 LCFS dataset were accounted for by 202 of the 526 food and drink codes. Thus, disaggregating the multi-product codes in this subset of 202 codes was prioritised.

- 1) The next step was to carry out the first part of the disaggregation of the product codes by identifying the constituent products making up each multi-product code. After identifying these constituent products using a coding frame supplied by Defra, we then used market share data

(supplied by the Food Standards Agency) to identify the main sub-products in each composite code. To do this, constituent products were added to the list of products to be disaggregated for each multi-product code until at least 50% of the market share of the multi-product code was covered. For example, for 8901 – ‘complete meat-based ready meals – frozen or not frozen’ – we identified ‘meat-based pasta dishes’ as the main product at 47% market share, followed by ‘shepherd’s pie’ at 12%.

- 2) After this, we allocated each sub-product that had been identified for disaggregation to the proportions in its respective basic commodities. Various methods were used to do this, depending on product. In the first instance, if data on commodity allocation were available from a previous study of GHGE by Scarborough (1) these were used. If these were not available, we used ‘www.tesco.com’ to view the ingredient list and nutritional information panel in order to estimate the main commodities. If the data could not be obtained in this way then a recipe was used, from ‘bbcgoodfood.com’. For example, for ‘meat-based pasta dishes’, the recipe for lasagne was used from the work of Scarborough(1) and for ‘shepherd’s pie’ a recipe was used from ‘bbcgoodfood.com’.
- 3) Once each sub-product within each multi-product code had been disaggregated into its respective commodities, we calculated a weighted aggregate commodity allocation based on the market share of each product that was used for disaggregation. For example, the code 8901 – ‘complete meat-based ready meals – frozen or not frozen’ – was weighted to 79.7% for ‘meat-based pasta dishes’ and 20.3% for ‘shepherd’s pie’.

Single-product codes did not need disaggregation and thus were allocated to a single commodity. After disaggregating the multi-product codes in the subset of 202 codes that accounted for 95% of purchases, it was necessary to devise a method by which to allocate the remaining 324 codes that were not part of the disaggregation exercise. To do this, the closest match amongst those products that had been already disaggregated was used. A small number of products that did not have a suitable match were allocated to a single component, i.e. ‘fudges, toffees and caramels’ were allocated to ‘sugar’.

1. Scarborough P, Appleby PN, Mizdrak A, Briggs AD, Travis RC, Bradbury KE, et al. Dietary greenhouse gas emissions of meat-eaters, fish-eaters, vegetarians and vegans in the UK. *Climatic change*. 2014;125(2):179-92.

## Supplementary material 2

Calculation to exclude those households that purchased a lower than feasible amount of food to maintain the Basal Metabolic Rate of the members of the household.

The LCFS details the household composition by the following categories:

- Male children < 2
- Male children 2 to < 5
- Male children 5 to < 16
- Male children 16 to < 18
- Male adults < 45
- Male adults 45 to < 60
- Male adults 60 to < 65
- Male adults 65 to < 70
- Male adults 70 and over
- Female children < 2
- Female children 2 to < 5
- Female children 5 to < 16
- Female children 16 to < 18
- Female adults < 45
- Female adults 45 to < 60

- Female adults 60 to < 65
- Female adults 65 to < 70
- Female adults 70 and over

There are a range of BMR calculations, we used the estimates derived by Henry (2005)<sup>1</sup>, that used both weight and height measures.

Henry (2005)<sup>1</sup> weight and height prediction equation:

$$BMR = \text{weight coefficient} * \text{weight (kg)} + \text{height coefficient} * \text{height (m)} + \text{constant}$$

In order to generate estimates we required height and reference values for each gender/age category. For this we used a combination of: WHO growth standards<sup>2</sup>; UK 1990 reference for children and adolescents<sup>3</sup>; and Health Survey for England 2009<sup>4</sup>. The following table contains the full details. Those households where food purchases per person suggested a lower than feasible energy intake to maintain BMR were excluded.

## Table

Group	Height & weight reference	Weight (kg)	Height (m)	BMR reference	Weight coefficient	Height coefficient	Constant	BMR (kcal/day)	BMR (kcal/14 days)
Male children < 2	WHO growth standards: male age 1 <sup>2</sup>	9.6	0.76	Male: < 3	28.2	859	-371	552.56	7735.84
Male children 2 to < 5	WHO growth standards: male age 2 <sup>2</sup>	12.2	0.87	Male: < 3	28.2	859	-371	720.37	10085.18
Male children 5 to < 16	UK 1990 reference for children and adolescents: male age 5 <sup>3</sup>	18.6	1.1	Male: 3 - 10	15.1	313	306	931.16	13036.24
Male children 16 to < 18	UK 1990 reference for children and adolescents: male age 13 <sup>2</sup>	60.2	1.73	Male: 10 - 18	15.6	266	299	1698.3	23776.2
Male adults < 45	Health Survey for England 2009: male age 35-44 <sup>4</sup>	69.7	1.76	Male: 30 - 60	11.4	541	-137	1609.74	22536.36
Male adults 45 to < 60	Health Survey for England 2009: male age 45-54 <sup>4</sup>	68.8	1.75	Male: 30 - 60	11.4	541	-137	1594.07	22316.98
Male adults 60 to < 65	Health Survey for England 2009: male age 55-64 <sup>3</sup>	68.3	1.74	Male: > 60	11.4	541	-256	1463.96	20495.44
Male adults 65 to < 70	Health Survey for England 2009: male age 65-74 <sup>4</sup>	67	1.73	Male: > 60	11.4	541	-256	1443.73	20212.22
Male adults 70 and over	Health Survey for England 2009: male age 75+ <sup>4</sup>	65.1	1.7	Male: > 60	11.4	541	-256	1405.84	19681.76
Female children < 2	WHO growth standards: female age 1 <sup>2</sup>	9	0.74	Female: < 3	30.4	703	-287	506.82	7095.48
Female children 2 to < 5	WHO growth standards: female age 2 <sup>2</sup>	11.5	0.86	Female: < 3	30.4	703	-287	667.18	9340.52
Female children 5 to < 16	UK 1990 reference for children and adolescents: female age 5 <sup>3</sup>	18.2	1.09	Female: 3 - 10	15.9	210	349	867.28	12141.92
Female children 16 to < 18	UK 1990 reference for children and adolescents: female age 16 <sup>3</sup>	55.3	1.63	Female: 10 - 18	9.4	249	462	1387.69	19427.66
Female adults < 45	Health Survey for England 2009: female age 35-44 <sup>4</sup>	59.9	1.63	Female: 30 - 60	8.18	502	-11.6	1296.642	18152.988
Female adults 45 to < 60	Health Survey for England 2009: female age 45-54 <sup>4</sup>	59	1.62	Female: 30 - 60	8.18	502	-11.6	1284.26	17979.64
Female adults 60 to < 65	Health Survey for England 2009: female age 55-64 <sup>4</sup>	58	1.61	Female: > 60	8.52	421	10.7	1182.67	16557.38
Female adults 65 to < 70	Health Survey for England 2009: female age 65-74 <sup>4</sup>	57.2	1.59	Female: > 60	8.52	421	10.7	1167.434	16344.076

Female adults 70 and over	Health Survey for England 2009: female age 75+ <sup>4</sup>	54.3	1.55	Female: > 60	8.52	421	10.7	1125.886	15762.404
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<sup>1</sup> Henry CJ. Basal metabolic rate studies in humans: measurement and development of new equations, 2005, Public Health Nutr 8, 1133-1152.

<sup>2</sup> World Health Organization (2006) WHO Child Growth Standards: Methods and development: Length/height-for-age, weight-for-age, weight-for-length, weight-for-height and body mass index-for-age. Geneva, Switzerland: World Health Organization

<sup>3</sup> Freeman. JV et al. Cross sectional stature and weight reference curves for the UK, 1990. Arch Dis Child 1995;73:1724

<sup>4</sup> National Health Service (NHS) Information Centre (2010) Health Survey for England - 2009 trend tables. The NHS Information Centre for health and social care.

TABLE S1: COMPONENTS OF THE DIET QUALITY INDEX AND SCORING SYSTEM

FOODS	SCORING	RATIONALE
<b>Fruit and Vegetables</b>		
A sliding score from 0 to 10 was used to score intake. Fruit/ vegetable juice was adjusted by a 150ml = 80g factor. As mean intakes of fruit/vegetable juice and baked beans were less than one portion per day, no further adjustment was made.	Weight divided by 400g x 10	≥400g / day WHO/FAO expert consultation on diet, nutrition and prevention of chronic diseases. <sup>1</sup>
Minimum Score = 0; Maximum Score = 10		
<b>Fish</b>		
<b>Addition of scores from Oily and White Fish</b>	Sliding scale from 0 to 10, with any scores between 10 and 15 (see below) adjusted to 10	Eat at least two 140g portions of cooked fish per week, of which one should be oily <sup>2</sup>
Minimum Score = 0; Maximum Score = 10		
<b>Oily Fish</b>	Weight divided by 280g x 10	
A sliding score from 0 to 10 was used to score intake	Minimum Score = 0; Maximum Score = 10	
<b>White Fish</b>		
A sliding score from 0 to 5 was used to score intake	Weight divided by 140g x 5	
Minimum Score = 0; Maximum Score = 5		
<b>Meat and Meat Products</b>		
<b>Addition of Scores from Red Meat and Processed Meat</b>	Score out of 10	People who eat red meat to consume less than 500g (cooked red meat) a week, very little if any to be processed. <sup>3</sup>
<b>Total Red and Processed Meat</b>		≤71.4g / day = 5
A score of 0 or 5 was used to score intake		>71.4g / day = 0
<b>Processed Meat</b>		0g / day = 5
A score of 0 or 5 was used to score intake		>0g / day = 0
Minimum Score = 0; Maximum Score = 10		

NUTRIENTS	SCORING	RATIONALE
<b>Fat</b>		
A score of 0 or 10 was used to score intake	≤35% food energy = 10 >35% food energy = 0	Scottish Dietary Goal 2013 <sup>4</sup> and DRV ≤35% food energy. <sup>5</sup>
<b>Saturated Fat</b>		
A score of 0 or 10 was used to score intake	≤11% food energy = 10 >11% food energy = 0	Scottish Dietary Goal 2013 <sup>4</sup> and DRV ≤11% food energy. <sup>5</sup>
<b>Intrinsic and Milk Sugars and Starch</b>		
A score of 0 or 10 was used to score intake	≥39% food energy = 10 <39% food energy = 0	DRV ≥39% food energy. <sup>5</sup>
<b>NME Sugars</b>		
A score of 0 or 10 was used to score intake	≤11% food energy = 10 >11% food energy = 0	DRV ≤11% food energy. <sup>5</sup>
<b>NSP</b>		
A sliding score from 0 to 10 was used to score intake	Weight divided by 18g x 10	DRV 18g per day. <sup>5</sup>
Minimum Score = 0; Maximum Score = 10		
<b>Alcohol</b>		
A score of 0 or 5 was used to score intake	≤5% total energy = 5 >5% total energy = 0	≤5% energy. <sup>5</sup>

<sup>1</sup> **World Health Organisation** (2003). *Diet, nutrition and the prevention of chronic diseases. Joint WHO/FAO Expert Consultation*. WHO Technical Report Series no. 916. Geneva, WHO.

<sup>2</sup> **Scientific Advisory Committee on Nutrition (SACN)**. (2004). *Advice on fish consumption: benefits & risks*. Retrieved 19 March 2014, from [http://www.sacn.gov.uk/pdfs/fics\\_sacn\\_advice\\_fish.pdf](http://www.sacn.gov.uk/pdfs/fics_sacn_advice_fish.pdf).

<sup>3</sup> **World Cancer Research Fund / American Institute for Cancer Research** (2007). *Food, nutrition, physical activity and the prevention of cancer: a global perspective*. Washington, D.C., American Institute for Cancer Research.

<sup>4</sup> **Scottish Government.** (2013). *Revised Dietary Goals for Scotland*. Retrieved 5 December 2013, from <http://www.scotland.gov.uk/Topics/Health/Healthy-Living/Food-Health/DietaryGoalsScot>

<sup>5</sup> **Department of Health** (1991). *Dietary Reference Values for Food Energy and Nutrients for the United Kingdom. Report of the Panel on Dietary Reference Values of the Committee on Medical Aspects of Food Policy (COMA) Department of Health Report on Health and Social Subjects 41*. London, HMSO

## Table S2 Coding Frame for Diet Quality Index

The following coding frame is for each of the 3 food components of the DQI score. The factor is used to multiply the daily intake in order to compare with dietary guidelines.

### 1. Fruit and Vegetables including fruit (and vegetable) juice and baked beans

Defra Code	Description	Factor
16201	Cabbages, fresh	1
16301	Brussels sprouts, fresh	1
16401	Cauliflower, fresh	1
16701	Lettuce & leafy salads	1
16702	Prepared lettuce salads	1
16801	Peas, fresh	1
16901	Beans, fresh	1
17101	Other fresh green vegetables	1
17201	Carrots, fresh	1
17301	Turnips & swede, fresh	1
17401	Other root vegetable, fresh	1
17501	Onions, leeks, shallots, fresh	1
17601	Cucumbers, fresh	1
17701	Mushrooms, fresh	1
17801	Tomatoes, fresh	1
18301	Stewpack, stirfry pack, pack of mixed vegetables	1
18302	Stem vegetables	1
18303	Marrow, courgettes, aubergine, pumpkin and other fresh vegetables	1
18304	Fresh herbs	1
18401	Tomatoes, canned or bottled	1
18501	Peas, canned	1
18802	Baked beans in sauce	1
18803	Other canned beans & pulses	1
19101	Other canned vegetables	1
19201	Dried pulses other than air-dried	6.19
19501	Air-dried vegetables	14.39
19602	Tomato puree and vegetable purees	5.2
19603	Vegetable juices e.g. tomato juice, carrot juice	0.533
20301	Peas, frozen	1
20401	Beans, frozen	1
20601	Ready meals & other vegetable products - frozen or not frozen	0.4
20604	All vegetable takeaway products	0.4
20801	Other frozen vegetables	1
21001	Fresh oranges	1
21401	Other fresh citrus fruits	1
21701	Fresh apples	1
21801	Fresh pears	1
22101	Fresh stone fruit	1
22201	Fresh grapes	1
22701	Other fresh soft fruit	1
22801	Fresh bananas	1
22901	Fresh melon	1
23101	Other fresh fruit	1
23301	Tinned peaches, pears & pineapples	0.6
23601	All other tinned or bottled fruit	0.52
24001	Dried fruit	3.71
24101	Frozen strawberries, apple slices, peach halves, oranges and other frozen fruits	1
24801	Pure fruit juices	0.533
29601	Pizzas - frozen and not frozen	0.16
29602	Takeaway pizza	0.16
31801	Soups - canned or cartons	0.3

32001	Soups - from takeaway	0.3
32201	Meals on wheels - items not specified	0.2
100103	Vegetable or fruit based curry	0.4
100104	Dhal & Dhal dishes	0.4
100106	Other Indian dishes	0.4
100108	Indian buffet or shared meal or unspecified Indian meal	0.2
100201	Chinese or Thai meat or fish based dishes excluding curry	0.2
100202	Chop suey and fu vung dishes	0.2
100203	Chinese or Thai vegetable based main course dishes	0.4
100204	Chinese or Thai curry	0.2
100206	Other Chinese or Thai dishes	0.2
100207	Chinese or Thai buffet, shared meal or unspecified meal	0.2
100301	All other ethnic meals	0.2
110601	Meat and vegetable stews, casseroles or hotpots	0.2
110602	Chicken or turkey stews, casseroles or hotpots	0.2
110603	Meat lasagne, cannelloni, moussaka and other meat-based oven baked dishes	0.2
130201	Pizza - cheese & tomato, vegetable; incl. Pizza, type not specified	0.4
130202	Pizza - meat, fish or poultry	0.16
150101	Lettuce & cress	1
150102	Other green vegetables e.g. spinach, cabbage, sprouts	1
150201	Peppers - raw/cooked	1
150202	Courgettes, marrow, aubergine, pumpkin, plantain, cucumbers	1
150203	Peas & sweetcorn	1
150204	Baked Beans and other beans (not green beans) & pulses	1
150205	Tomato - fresh, raw	1
150206	Tomato - cooked or processed	1
150301	Carrots	1
150302	Onions - raw or cooked incl. 'onions' type not specified	1
150303	Onions - fried	1
150304	Other root vegetables/ tubers e.g. turnip, parsnip, radish, beetroot	1
150401	Mushrooms - raw or cooked	1
150501	Mixed vegetables and 'veg' type not specified.	1
150502	Other vegetables, e.g. artichoke, asparagus	1
150503	Vegetables in batter or breadcrumbs and deep fried e.g. onion rings	0.4
150504	Onion and other vegetable bhais & pakora	0.4
150601	Veggie burger, bean burger, veggie sausage, nut roast	0.4
150602	Vegetable lasagne, veg cannelloni, veg moussaka and other oven baked vegetable based dishes	0.4
150603	Stuffed vegetables (e.g. stuffed pepper) and vegetable based starter	0.4
150604	Vegetable based stews & casseroles and veg-based pies	0.4
160101	Mixed salad, main course - without dressing	1
160102	Mixed salad, side dish, without dressing; incl. 'salad' type not specified	1
160103	Green salad - without dressing	1
160201	Vegetable/ fruit and nut salad - with dressing	0.4
160301	Meat salad e.g. beef, lamb salads	0.2
160302	Chicken or turkey salad	0.2
160303	Fish salad e.g. tuna, salmon salads	0.2
160401	Cheese salad including ploughmans	0.2
160402	Egg salad	0.2
160501	Other salads e.g. Greek, Florida, Russian	0.2
160601	Salad buffet or buffet meal where items not specified	0.2
170105	Noodles with meat, vegetables etc.	0.2
180102	Vegetable-based soups	0.3
180104	Soups, other; incl. SOUP NOT SPECIFIED	0.3
200101	All citrus fruit, fresh e.g. orange, grapefruit	1
200102	Banana, fresh	1
200103	Apples, fresh	1
200104	Pears, fresh	1
200105	Stone fruit, fresh e.g. apricot, plum, peach, cherry, avocado	1
200106	Grapes, fresh	1
200107	Soft fruit/berries, fresh e.g. strawberries, blackberries	1

200108	Melon, fresh	1
200109	Pineapple, fresh	1
200110	Fresh fruit salad, without cream/ice cream	1
200111	Other fresh fruit (kiwi, passion) & 'fruit', type not specified	1
200112	Free school fruit	1
200201	Dried fruit e.g. sultanas, raisins	3.71
200301	Tinned, stewed/baked or processed fruit - without cream/ice cream	1
230207	Vegetarian based sandwich on white bread or roll	0.4
230208	Vegetarian based sandwich on brown bread or roll	0.4
230209	Vegetarian based sandwich bread not specified	0.4
240102	Meat-based sauce e.g. Bolognese, chilli con carne	0.2
240104	Tomato-based sauce containing vegetables, incl. ratatouille	0.4
240203	Coleslaw	0.4
240301	Fruit filling e.g. peaches for pancakes	1
240302	Vegetable filling	0.4
240701	Unspecified meal e.g. 'meal', 'school meal' or 'meal at work'	0.2
260204	PURE fruit juices	0.533
260205	Vegetable juices e.g. tomato juice, carrot juice	0.533
290205	Fruit and other pies/pastries	0.5

## 2. Fish – White and Oily Fish

White Fish (to calculate per week)

Defra Code	Description	Factor
10201	White fish, fresh or chilled	6.58
10202	White fish, frozen	6.58
11401	White fish, dried or salted or smoked	6.762
11702	Shellfish, fresh or chilled	7
11703	Shellfish, frozen	7
11801	Takeaway fish	3.85
12001	Other tinned or bottled fish	5.67
12103	Ready meals & other fish products - frozen or not frozen	2.45
12304	Takeaway fish products	3.5
12305	Takeaway fish based meals	3.5
100101	Meat or fish based curry with sauce	1.75
100102	Meat or fish based curry without sauce	1.75
100201	Chinese or Thai meat or fish based dishes excluding curry	1.75
120101	White fish - grilled, steamed, baked or boiled - no sauce	7
120102	White fish - fried (incl. in batter/breadcrumbs) - no sauce	3.85
120301	Shellfish - without sauce / dressing e.g. prawns, shrimps, oysters, crab	7
120501	Other fish products and unspecified 'fish' e.g. squid, sushi, crabsticks	7
120601	Fish, processed, in breadcrumbs (fish fingers, fish cakes, scampi) - without sauce/dressing	3.5
120602	Fish burgers (in bun)	1.575
120603	Fish based pie or other dish e.g. paella, kedgeree, tuna pasta bake	2.45
130202	Pizza - meat, fish or poultry	0.175
160303	Fish salad e.g. tuna, salmon salads	0.7
230110	Fish based sandwich on white bread or roll	2.31
230111	Fish based sandwich on brown bread or roll	2.31
230112	Fish based sandwich bread not specified	2.31
240103	Fish or seafood based sauce	3.43
240304	Fish-based filling e.g. tuna mayonnaise	4.55

Oily Fish (to calculate per week)

Defra Code	Description	Factor
10601	Herrings & other blue fish, fresh or chilled	6.195
10602	Herrings & other blue fish, frozen	6.195
10701	Salmon, fresh or chilled	6.58
10702	Salmon, frozen	6.58
10801	Blue fish, dried or salted or smoked	4.956
11901	Tinned salmon	7
12001	Other tinned or bottled fish	1.33
12103	Ready meals & other fish products - frozen or not frozen	1.05
120201	Trout, tuna and salmon only - fresh - without sauce/dressing	7
120202	Other fatty fish without sauce/dressing e.g. herring, mackerel, sardines	7
120401	Kippers and other smoked fish e.g. smoked salmon	7
120603	Fish based pie or other dish e.g. paella, kedgeree, tuna pasta bake	1.05
160303	Fish salad e.g. tuna, salmon salads	0.7

### 3. Red and Processed Meat

#### Processed Red Meat

Defra Code	Description	Factor
5502	Bacon and ham joints, uncooked	0.69104
5505	Bacon and ham rashers, uncooked	0.65825
5801	Cooked ham & bacon	1
6201	Corned beef/ corned meat (canned or sliced)	1
6601	Other cooked meat	0.954007
7102	Other canned meat and canned meat products	0.532811
7901	Sausages (uncooked) - pork	0.78
8001	Sausages (uncooked) - beef	0.779
8302	Meat pies	0.271562
8303	Sausage rolls	0.28
8401	Meat pies, pasties and puddings	0.27445
8501	Burgers	0.73
8902	Other convenience meat products	0.240481
9301	Pâté	1
9302	Delicatessen type sausages: cooked or cured	1
9403	Meat pastes and spreads	1
9501	Takeaway meat pies & pasties	0.266316
9502	Burger & bun e.g. hamburger	0.485
9503	Kebabs	0.5
9504	Sausages & saveloys	1
9506	Miscellaneous meats	0.649653
110106	Bacon	1
110107	Gammon or ham	1
110301	Small or single burgers	0.39
110302	Large or double burgers	0.58
110401	Kebabs - all types including chicken	0.5
110402	Plain sausages e.g. beef, pork	1
110403	Other sausages	1
110404	Hot dogs and sausage sandwiches	0.1769
110501	Meat pies (pastry topped) and pasties	0.16
110502	Meat pies (potato topped e.g. shepherd's pie)	0.1963
110503	Sausage roll (pastry)	0.28
110701	All pates	0.5
110801	Other meat products or dishes	0.2592
130202	Pizza - meat, fish or poultry	0.0337
160301	Meat salad e.g. beef, lamb salads	0.314
230101	Meat based sandwich on white bread or roll	0.242
230102	Meat based sandwich on brown bread or roll	0.242
230103	Meat based sandwich bread not specified	0.242
230107	Bacon and egg based sandwich on white bread or roll including Bacon and Egg McMuffin	0.25
230108	Bacon and egg based sandwich on brown bread or roll	0.25
230109	Bacon and egg based sandwich bread not specified	0.25

#### Red and Processed Red Meat

Defra Code	Description	Factor
3102	Beef: joints (including sides) on the bone	0.561
3103	Beef: joints (boned)	0.632697
3104	Beef steak (less expensive)	0.636751
3105	Beef steak (more expensive)	0.728463
3106	Beef, minced	0.82
3107	All other beef and veal	0.62
3601	Mutton	0.617767
3602	Lamb joints	0.589275

3603	Lamb chops	0.549128
3604	All other lamb	0.714897
4101	Pork joints	0.570298
4102	Pork chops – uncooked	0.588
4103	Pork fillets and steak	0.65
4104	All other pork – uncooked	0.625934
4603	Ox liver	0.91
4604	Lambs liver	0.78
4605	Pigs liver	0.88
4607	All other liver	0.884907
5101	All offals other than liver	0.56119
5502	Bacon and ham joints, uncooked	0.69104
5505	Bacon and ham rashers, uncooked	0.65825
5801	Cooked ham & bacon	1
6201	Corned beef/ corned meat (canned or sliced)	1
6601	Other cooked meat	0.954007
7102	Other canned meat and canned meat products	0.532811
7801	Other meat (rabbit, venison, etc) – uncooked	0.594
7901	Sausages (uncooked) - pork	0.78
8001	Sausages (uncooked) - beef	0.779
8302	Meat pies	0.271562
8303	Sausage rolls	0.28
8401	Meat pies, pasties and puddings	0.27445
8501	Burgers	0.73
8901	COMPLETE meat-based ready meals	0.144783
8902	Other convenience meat products	0.240481
9301	Pâté	1
9302	Delicatessen type sausages: cooked or cured	1
9403	Meat pastes and spreads	1
9501	Takeaway meat pies & pasties	0.266316
9502	Burger & bun e.g. hamburger	0.485
9503	Kebabs	0.5
9504	Sausages & savelovs	1
9505	MEAT- based meals incl. Indian & Chinese takeaways	0.208303
9506	Miscellaneous meats	0.649653
100101	Meat or fish based curry with sauce	0.0928
100102	Meat or fish based curry without sauce	0.5
100201	Chinese or Thai meat or fish based dishes excluding curry	0.17
100202	Chop Suey and Fu Yung dishes	0.09
110101	Steak - without sauce e.g. braised, sirloin	1
110102	Roast meat with sauce or gravv	0.64
110103	Pork chops with sauce or gravv	0.81
110104	Lamb chops with sauce or gravv	0.67
110105	Spare ribs	1
110106	Bacon	1
110107	Gammon or ham	1
110108	All offal including liver, kidney, tongue	1
110204	Game with sauce or gravv	0.71
110301	Small or single burgers	0.39
110302	Large or double burgers	0.58
110401	Kebabs - all types including chicken	0.5
110402	Plain sausages e.g. beef, pork	1
110403	Other sausages	1
110404	Hot dogs and sausage sandwiches	0.1769
110501	Meat pies (pastry topped) and pasties	0.16
110502	Meat pies (potato topped e.g. shepherd's pie)	0.1963
110503	Sausage roll (pastry)	0.28
110601	Meat and vegetable stews, casseroles or hotpots	0.0529
110603	Meat lasagne, cannelloni, Moussaka and other meat-based oven baked dishes	0.2041
110701	All pates	0.5
110801	Other meat products or dishes	0.2592
130202	Pizza - meat, fish or poultry	0.0337

160301	Meat salad e.g. beef, lamb salads	0.314
170105	Noodles with meat, vegetables etc.	0.2
230101	Meat based sandwich on white bread or roll	0.242
230102	Meat based sandwich on brown bread or roll	0.242
230103	Meat based sandwich bread not specified	0.242
230107	Bacon and egg based sandwich on white bread or roll including Bacon and Egg McMuffin	0.25
230108	Bacon and egg based sandwich on brown bread or roll	0.25
230109	Bacon and egg based sandwich bread not specified	0.25
240102	Meat-based sauce e.g. Bolognese, chilli con carne	0.3366



TABLE S3: LIST OF VARIABLES IN THE FINAL DATASET

Variable	Description
Case number	Household case number
URN	Unique reference number given when 2012, 2013 and 2014 datasets were combined
Survey Year	Year of survey – 2012 or 2013 or 2014
MEMHH	Number of people in the household
Sum of Quantity	The total quantity (weight in g ) of all food and drink purchased during the data collection period, at the household level.
Sum of GHG	The total quantity of greenhouse gas emissions (Kg CO <sub>2</sub> e)for the food and drink purchased, at the household level. Calculated as per the method described.
Sum of LU	The total quantity of land use (ha) for the food and drink purchased, at the household level. Calculated as per the method described.
Total expenditure	The total expenditure (£) on food and drink purchased, at the household level.
Quantity per HH member	The quantity (weight in g) of food and drink per household member, calculated by dividing the total quantity by the numbers of people in the household.
GHG per HH member	The total quantity of GHG emissions (Kg CO <sub>2</sub> e) per household member, calculated by dividing the total quantity by the numbers of people in the household.
LU per HH member	The total quantity of land use (ha) per household member, calculated by dividing the total quantity by the numbers of people in the household.
Expenditure per HH member	The expenditure (£) on food and drink purchased per household member, calculated by dividing the total expenditure by the numbers of people in the household.
DQI total score	The Diet Quality Index calculated as per the method described.
DQI % score	The DQI adjusted to a 0-100 percentage score
Household min KCAL for BMR	The minimum number of Kcal that would be required to sustain basal metabolic rate for all household members, taking into account sex and age. Calculated as per the method described.

