

Final Report
UK Total Diet Study
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HallMark
Veterinary & Compliance Services

Title: Sampling for UK Total Diet Study (TDS) 2014

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Table of Contents

1. Introduction

1.1. Background

2. Sampling Design and Plan

2.1. Selection of food categories and groups

2.2. Selection of geographic locations

2.3. Selection of food Items within food categories

2.4. Allocation of food items to retailers

2.5. Selection of specific stores within a LA

2.6. Selection of specific products within each food item

2.7. Sample size

3. Sample Collection

3.1. Trained Sample Collectors

3.2. Sample Purchasing

3.3. Sample data collection

4. Deviations from the Sampling Strategy

4.1. Unavailability of samples

4.2. Regional Variations

5. Resampling

5.1. Identification of resamples

5.2. Resampling collection

References

Excel document containing all sample data

List of Tables

Table 1: Summary numbers of samples per food group

Table 2: 24 Selected LA's

Table 3: Percentage of samples collected by retailer

Sampling for UK Total Diet Study (TDS) 2014

1. Introduction

1.1 Background

The key principle of a total diet study (TDS) is that is representative of the whole diet. The aim of this 2014 TDS sampling was to collect a total of 3306 samples across 138 food categories (17 more than the 121 categories in the previous total diet study from 2006). These categories were then grouped into 28 food groups as illustrated in Table 1. Within a food group the relative proportion of a category is a reflection of levels of consumption within the UK diet. The sample numbers were established by the Food Standards Agency (FSA) and the description below refers to the sampling strategy only.

Table 1: Summary of numbers of samples per food group

Food Group No	Food Group	Target	Collected
1	Bread	120	120
2	Miscellaneous Cereals	240	240
3	Carcase meat	72	72
4	Offal	120	120
5	Meat products	288	288
6	Poultry	96	96
7	Fish	168	168
8	Oils and fats	144	144
9	Eggs	48	48
10	Sugars and preserves	168	168
11	Green vegetables	168	168
12	Potatoes	48	48
13	Other vegetables	264	264
14	Canned or jarred vegetables	120	120
15	Fresh fruit	192	192
16	Fruit products	96	96
17	Non-alcoholic Beverages	282	240
18	Milk	48	48
19	Dairy products	240	240
20	Nuts	48	48
21	Alcoholic drinks	120	120
22	Meat substitutes	24	24
23	Snacks	48	48
24	Desserts	48	48
25	Sandwiches	24	24
26	Condiments	72	72
27	Tap Water	18	18
28	Bottled water	24	24
	TOTAL	3306	3306

2. Sampling Design and Plan

2.1 Selection of food categories and groups

This was carried out by the FSA. Defra's family food 2012, a statistical publication on UK food and drink, was used to identify the amounts of different foods *purchased* in the UK¹. This information was then used to estimate the amounts of different foods *consumed* in the UK. Family food classifies foods into a hierarchical coding scheme of approximately 500 different food codes (food items). These were mapped to those categories used in the previous 2006 total diet study². New food categories were added where there was no suitable existing category.

2.2 Selection of geographic locations (n=24)

To ensure representation of the UK diet as a whole, samples were to be collected from 24 locations. The key requirement was to collect one sample from each 'food category' from every one of the 24 selected locations. Using the 'Local Authority' (LA) as a sampling unit, Hallmark partner statisticians from the Royal Veterinary College (RVC) selected LAs within 12 regions encompassing England, Wales, Scotland and Northern Ireland. Table 1 presents the LAs ordered by region. Population size data from 2012 was used to determine the number of LAs selected within a region and probability proportional to size strategy was used to select the specific LAs.

Table 2: 24 Selected LAs

Region	LA	Size	Number
East	Peterborough	186372	1
East	Cambridge	125155	2
East Midlands	Charnwood	168779	3
East Midlands	North Kesteven	109263	4
London	Ealing	340671	5
London	Wandsworth	308312	6
London	Kingston upon Thames	163906	7
North East	Sunderland	275743	8
North West	Wirral	320229	9
North West	Rossendale	68366	10
North West	Eden	52656	11
Northern Ireland	Coleraine	58993	12
Scotland	Dumfries & Galloway	150830	13
Scotland	Midlothian	84240	14
South East	New Forest	177382	15
South East	Waverley	121884	16
South East	Crawley	108302	17
South West	Cornwall	537914	18
South West	Swindon	211934	19
Wales	Torfaen / Tor-faen	91372	20
West Midlands	Birmingham	1085417	21
West Midlands	Solihull	207380	22
Yorkshire & Humber	Doncaster	302739	23
Yorkshire & Humber	Rotherham	258352	24

2.3 Selection of food Items within food categories

The selection of the 24 individual foods within a food category was based on the percentage contribution of the food items to that category (generally where a food category is made up of more than one or several food items). Where a food category was made up of only one food item (e.g. the 'white sliced bread' category is made up of the 'White, standard, sliced' food item) or only a couple of food items where one dominates, brand market share information, where available, was used to select products within a category. The only exception to this was tap water of which there were only 18 samples collected. Tap water was collected from each sample collectors home. Some sample collectors were responsible for obtaining samples from two or more LAs, hence there were not 24 tap water samples. When obtaining samples of tap water collectors followed a protocol as defined by the laboratory, using supplied laboratory grade Nalgene bottles.

2.4 Allocation of food items to retailers

For each of the 24 locations, 7 'purchasing points' were identified. The purchasing points were the big 4 major retailers (as defined by Mintel 2013 Leading Grocers (Figure 1)); 1.Tesco, 2.Asda, 3.Sainsburys, and 4.Morrisons. Then the other national supermarkets; 5.Marks & Spencer, Co-op and Waitrose and discount supermarkets 6.Aldi, Lidl, Iceland. This made up 6 purchasing points with an additional 7th purchasing point 'other retailers and businesses'. The 7th purchasing point was a miscellaneous group titled 'high street' including any business not belonging to any of the 6 previous purchasing points, where any of the selected food items were available to be directly purchased by the public. These included convenience stores, delicatessens, take away outlets, coffee shops and restaurants.

Tesco (UK)	27%
Asda	15%
Sainsbury	14%
Wm Morrison	10%
The Co-operative Food	5%
Waitrose	4%
Marks & Spencer	4%
Aldi	3%
Lidl	2%
Spar	2%
Iceland Foods	2%
Musgrave	2%
Premier	1%
Costcutter	1%
Nisa Retail	1%

Figure 1: Mintel 2013 LEADING GROCERS: SHARES OF ALL GROCERS' SALES, 2012³

2.5 Selection of specific stores within a LA

Within a LA, sample collectors had the freedom to decide the specific store branch to be visited for each of the 6 retailer purchasing points. Sample collectors had to visit only 1 store per LA. For the 7th purchasing point sample collectors sought a convenient 'high street' location within the LA and could also include businesses as they found them 'along the road' in the local authority.

On each weeks 'shopping list' each of the 7 purchasing points were randomly selected as 1st choice, 2nd choice 3rd choice and so on. The sample collector was instructed to obtain all samples allocated to their location from the 1st choice retailer, followed by the 2nd choice retailer when a product was not available from the 1st choice, and the 3rd choice retailer and when a product was not available from the 2nd choice retailers. The selection of retailers as 1st, 2nd, 3rd, 4th, 5th, 6th or 7th choice was carried out randomly but sequentially (i.e. in a random sequence). Probability proportional to market share was used to allocate the first purchasing point for each of the 24 locations so that a food item was not always purchased from the same retailer. Table 3 shows the percentage of samples collected by retailer. Adjustments were made during the collection period to ensure proportional representation of each retailer in accordance with market share.

Table 3: Percentage of samples collected by retailer

		Percentage
1	Tesco	26.17%
2	ASDA	14.46%
3	Sainsbury's	15.63%
4	Morrison's	9.58%
5	Other: M&S, Co-op, Waitrose	14.03%
6	Discount: Aldi, Lidl, Iceland	8.77%
7	High Street	11.37%
Total		100.00%

2.6 Selection of specific products within each food item

Unless sample collectors were required to purchase a specific brand (in those food categories where brand market share data was used); for each food item to be purchased, collectors were expected to use their own judgement as to which specific product to purchase, in an attempt to mimic the likely behaviour of the "typical" consumer.

2.7 Sample size

As determined by laboratory The Food an Environment Research Agency (FERA) the sample size agreed for each individual sample was **100g**. As a TDS sample is prepared as if for consumption before being pooled into a group for analysis only a small amount of each food item from each location was required.

3. Sample Collection

3.1 Trained Sample Collectors

An individual sample collector was allocated to one or more of the 24 locations. The collectors were selected for locations based on their proximity to a selected local authority. The sample collectors then received training specifically tailored to the requirements of this TDS study including:

- How to follow the retail sequence
- Following purchasing instructions
- Numbering of the samples

Packing and maintaining the appropriate temperatures of the different food items
Ethics and adherence to the requirements of the TDS

Samples were collected weekly in each of the 24 locations over a 14 week period from April – July 2014. This strategy was designed to accommodate the laboratory requirements for smaller consignment of perishable products and allow a methodical collection. Breaks were taken in sampling at suitable points to assess progress and ensure availability of all collectors simultaneously.

3.2 Sample Purchasing

Sample collectors were provided with an electronic ‘shopping list’ for their weekly shop. This contained all the information the sample collector required as detailed below.

Retailer sequence specific to that week and location

Required food items

Purchasing instructions

Packing and temperature requirements

Dispatch instructions

This was designed to allow a degree of consumer behaviour whilst [shopping] and maintain principles of the TDS. An example of a sample collectors [shopping list] can be seen in Figure 2.

Collectors Name: Gay Lombard			Week No: 11			Location: 19 Swindon					
Retailer Sequence: 1-ASDA;2-Sainsburys;3-Morrisons;4-Discount(Aldi, Lidl, Iceland);4-High street;5-Tesco; Other(M&S, Coop, Waitrose)											
Storage Requirements Key:											
Ambient			Ambient/Chilled			Chilled			Freeze		
Group name	Category name	Sample number	Food item	Further Detail on Description	Advise for the selection of a specific product within the retailer	Minimum Required	Storage Temp Requirements	Type of Packaging	Special Packaging Requirements	Deliver Sample To	
Desserts	Desserts (unfrozen)	24-136-19	Other milks and dairy desserts - not frozen	i.e. mousses or milk pods or smooth&creamy dessert made with melted milk chocolate. Any brand	Select product requested across available brands without a defined rule or criteria, simply purchasing what you think a "typical shopper" would buy	100g	Freeze	Coolbox& ice-pads		Hub	
Desserts	Desserts (frozen but not ice cream)	24-137-19	Ice lollies; sorbet; frozen mousse; frozen yoghurt	Ice lollies, sorbet, frozen mousse, frozen yoghurt, frozen cheesecakes, frozen tarts NOT ice cream	Select product requested across available brands without a defined rule or criteria, simply purchasing what you think a "typical shopper" would buy	100g	Freeze	Coolbox& ice-pads	USE LOTS OF ICE PACKS AND TRY TO POST AS SOON AFTER PACKING AS POSSIBLE	Hub	
Snacks	Potato crisps and potato based snacks	23-134-19	Crisps and potato snacks	Potato crisps made from slices (e.g. walkers crisps) and Snacks formed from potatoes e.g. pringles, hula hoops, quavers	Select product requested across available brands without a defined rule or criteria, simply purchasing what you think a "typical shopper" would buy	100g	Ambient	Cardboard box		Hub	
Snacks	Other snacks (not potato based)	23-135-19	Cereal snacks	E.g. products such as twiglets, mini cheddars, popadoms, prawn crackers. Not potato based	Select product requested across available brands without a defined rule or criteria, simply purchasing what you think a "typical shopper" would buy	100g	Ambient	Cardboard box		Hub	
Green vegetables	Peas	11-66-19	Peas; frozen	Frozen, NOT fresh peas	Select product requested across available brands without a defined rule or criteria, simply purchasing what you think a "typical shopper" would buy	100g	Freeze	Coolbox& ice-pads	USE LOTS OF ICE PACKS AND TRY TO POST TO LAB AS SOON AFTER PACKING AS POSSIBLE	Laboratory	
Green vegetables	Green beans	11-67-19	Fresh beans	Green beans NOT frozen	Select product requested across available brands without a defined rule or criteria, simply purchasing what you think a "typical shopper" would buy	100g	Chilled	Coolbox& ice-pads	USE LOTS OF ICE PACKS AND TRY TO POST TO LAB AS SOON AFTER PACKING AS POSSIBLE	Laboratory	

Figure 2: TDS 2014 [shopping list] Week 11 Swindon (19)

3.3 Sample data collection

Each sample collector was required to complete an input form that corresponded to their shopping list. It captured all of the sample information required by the FSA, from each food item, as listed below.

- Unique sample number
- Food group, food category
- Purchase location & collector name
- Product description
- Brand name, manufacturer, retailer & type of retailer
- Weight or volume of sample and number of units
- Country of origin
- Date and time of purchase
- Durability & batch code

This was completed as part of their weekly sample collection and then emailed back to the project team. Some fields on the form were prepopulated so as to limit collector input error and save time. Figure 3 shows a section of an input form, the fields in brown are prepopulated with predetermined sample data i.e. sample number and food group name.

Sample number	Sample date	Sample Time	Region	Geographic location number	Geographic Location name	Collector name	Group number	Group name	Category number	Category name	Food item	Brand name	Product description
24-136-19	10/06/2014	10:39	South West	19	Swindon	Gay Lombard or 4	24	Desserts	136	Desserts (unfrozen)	Other milks and dairy desserts	Asda Chosen By You	40% Less Fat Chocolate Mousse
24-137-19	10/06/2014	10:39	South West	19	Swindon	Gay Lombard or 4	24	Desserts	137	Desserts (frozen but	Ice lollies, sorbet, frozen mou	Nestle	Fab Strawberry
23-134-19	10/06/2014	10:39	South West	19	Swindon	Gay Lombard or 4	23	Snacks	134	Potato crisps and po	Crisps and potato snacks	Asda Chosen By You	Hand Cooked Sour Cream & Cheddar
23-135-19	10/06/2014	10:39	South West	19	Swindon	Gay Lombard or 4	23	Snacks	135	Other snacks (not po	Cereal snacks	Jacobs	Baked Mini Cheddars 7 BBQ
11-66-19	10/06/2014	10:39	South West	19	Swindon	Gay Lombard or 4	11	Green vegetables	66	Peas	Peas; frozen	Asda Smart Price	Peas
11-67-19	10/06/2014	10:39	South West	19	Swindon	Gay Lombard or 4	11	Green vegetables	67	Green beans	Fresh beans	Asda	Green Beans
1-1-19	10/06/2014	10:39	South West	19	Swindon	Gay Lombard or 4	1	Bread	1	White sliced bread	White; standard; sliced	Weight Watchers	Thick sliced White
1-2-19	10/06/2014	10:39	South West	19	Swindon	Gay Lombard or 4	1	Bread	2	White unsliced brea	White; standard; unsliced	Asda Chosen By You	400G White Tin
1-3-19	10/06/2014	10:39	South West	19	Swindon	Gay Lombard or 4	1	Bread	3	Brown bread	Brown; sliced and unsliced	Warburtons	Premium Brown Medium Slic
1-4-19	10/06/2014	10:39	South West	19	Swindon	Gay Lombard or 4	1	Bread	4	Wholemeal and gran	Wholemeal and granary bread	Hovis	Hovis Wholemeal Medium
1-5-19	10/06/2014	10:39	South West	19	Swindon	Gay Lombard or 4	1	Bread	5	Other bread	Other breads	Asda Smart Price	6 Crumpets

Figure 3: Example section of a TDS 2014 [Input Form] completed Week 11 Swindon (19)

4. Deviations from the Sampling Strategy

4.1 Unavailability of samples

The availability of up to 7 'purchasing points' for the sample collector to obtain the samples from ensured that rarely were samples unobtainable. On the few occasions where they were, the sample collector was given additional guidance as to possible purchasing locations within their LA and would try and purchase again when they were collecting the following week.

4.2 Regional Variations

There were instances where due to regional variations certain brands were not available to collectors in their locations. In the category brown & wholemeal bread the brand 'Roberts Bakery' is not sold in London and was unavailable to the collector in London Ealing (5) location. In this instance the collector was requested to purchase a different brand and the unavailable sample swapped to a location where it would be available.

5. Resampling

5.1 Identification of un-assayable samples

Following the collection of all 3306 samples at the end of July 2014 the process of checking the data for all samples collected was jointly undertaken by Hallmark and the FSA. As a result of these checks any deviation from purchasing instructions or mistakes made in product selection were identified and these un-assayable samples were resampled. Resampling also included a number of samples that had perished during the sampling process or in storage at [the laboratory].

5.2 Resampling collection

To date 83 products have been resampled. Where possible these samples were collected by the original trained collector. Hallmark provided the sample collectors with a resampling [shopping list] for each location. Sample collector's [shopping lists] included a retail sequence in order to maintain proportional representation of each retailer in accordance with market share. The sample collector was required to visit the first retailer and collect all the products if available and if they weren't available products from the second retailer etc. Collectors were encouraged as before to research their purchasing points particularly with regard to items to only to be collected from the high street and or takeaway outlets.

References

1. Family Food 2012, Department for Environment, Food and Rural Affairs Family food:
https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/265245/familyfood-2012statsnotice-12dec13.pdf
2. 2006 Total Diet Study: Rose, M. , Baxter, M. , Brereton, N. and Baskaran, C.(2010) 'Dietary exposure to metals and other elements in the 2006 UK Total Diet Study and some trends over the last 30 years', Food Additives & Contaminants: Part A
3. Mintel 2013 Leading Grocers: Shares Of All Grocers' Sales, 2012