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National Diet and Nutrition Survey Rolling Programme (NDNS RP)

Results from Years 1-4 (combined) for Scotland (2008/09-2011/12)

Executive Summary

A survey carried out on behalf of the Food Standards Agency in Scotland and Public Health England

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Executive summary

Erratum note: Correction to the fruit and vegetable consumption and salt intake data

This Executive Summary has been updated in 2017 since first publication (in September 2014) to take account of corrections to fruit and vegetable consumption estimates due to an error in the calculation and to salt intake values due to bias detected in the original analytical data. Further details are provided in chapters 5 and 7.

Introduction

The National Diet and Nutrition Survey Rolling Programme (NDNS RP) is a continuous programme of fieldwork designed to assess the diet, nutrient intake and nutritional status of the general population aged 1.5 years and over living in private households in the UK. The core NDNS RP is jointly funded by Public Health England (PHE)[1] and the UK Food Standards Agency (FSA) and is carried out by a consortium of three organisations: NatCen Social Research (NatCen), MRC Human Nutrition Research (HNR) and the University College London Medical School (UCL).[2] The most recent UK report covering Years 1 to 4 (2008/9 to 2011/12) was released as an Official Statistic by PHE on 14th May 2014.[3]

FSA in Scotland (FSAS) has responsibility for monitoring the diet of the population in Scotland and has funded additional recruitment for Years 1 to 4 (2008/9 to 2011/12) in order to enable comparisons to be made with UK results.[4] Increased sample sizes were similarly funded in Wales and Northern Ireland by government bodies in those countries. Results for Northern Ireland and Wales will be published as separate reports later in 2014/15.

The NDNS RP provides high quality data on the types and quantities of foods consumed by individuals, from which estimates of average nutrient intakes for the population can be derived.[5] This report covers a range of topics including food consumption, use of dietary supplements, intakes of energy, macronutrients, vitamins, minerals, salt, and biochemical measures of nutritional status. This report includes information on Body Mass Index (BMI), blood pressure, blood cholesterol levels and the socio-demographic characteristics of the participants.

The combined results from Years 1 to 4 (2008/09 – 2011/12) is the first time representative data from NDNS RP has been available for Scotland. The results will support work by FSAS and the Scottish Government to facilitate improvements to the diet and nutritional status of children and adults in Scotland. The Scottish Government and FSAS voluntary framework for *Supporting Healthy Choices*[6] sets out the action

required to shape and better support healthier diets in Scotland. The framework is underpinned by the National Food and Drink Policy, *Recipe for Success*,[7] and the *Preventing Overweight and Obesity Route Map*.[8] The next stage of the National Food and Drink Policy, *Becoming a Good Food Nation*,[9] has just been launched and health remains a key focus.

The Scottish Dietary Goals (SDGs)[10] revised in 2013, underpin diet and health policy in Scotland and set out the key outcomes required for the Scottish population. The SDGs encompass foods (fruit and vegetables, red meat, oil rich fish) and nutrients (total fat, saturated fatty acids, *trans* fatty acids, non-milk extrinsic sugars (NMES), non-starch polysaccharides (NSP) and salt intakes). Progress towards the SDGs is monitored using a combination of surveys, but principally from secondary analysis of the Living Costs and Food Survey (LCF).[11] The sample size for the NDNS RP in Scotland is too small to analyse trends over time and there is no previous NDNS dataset in Scotland that is large enough for comparison.

In order to reduce population energy intake in Scotland as part of the *Preventing Obesity Route Map Action Plan*,[12] specific foods and drinks high in fat and/or high in sugar have been targeted for population level reduction. This report provides an overview of consumption of these categories by population age/sex groups.

Contents of this report

This report presents combined results from Years 1 to 4 of the NDNS RP for the Scotland sample, which is designed to be nationally representative. It follows the same general format as the UK report published by PHE on 14th May 2014[3] including:

- Background and Purpose (Chapter 1).
- Methodology and Response (Chapter 2).
- Socio-demographic characteristics (Chapter 3).
- Physical measurements and physical activity (Chapter 4).
- Types and quantities of foods consumed based on food groups and composite dishes as eaten (Chapter 5).
- Intakes of energy, macronutrients such as saturated fatty acids, *trans* fatty acids and sugar and alcohol; comparison of energy and nutrient intakes with SDGs[10] and UK Dietary Reference Values (DRVs).[13] Intakes of micronutrients such as iron, calcium, folate and vitamin C, including and excluding the contribution from dietary supplements; comparison of intakes with UK DRVs[13] (Chapter 5).

- Indicators of longer term status for micronutrients from blood analytes and blood lipid concentrations (Chapter 6).

- Salt intakes estimated from urinary sodium excretion (Chapter 7).

- Intakes of key foods and nutrients selected from the SDGs[10] and UK DRVs[13] in Scotland compared with the UK, presented by narrower age bands (Chapter 8).
- Comparison of intakes of key foods and nutrients by household income quintile and Scottish Index of Multiple Deprivation (SIMD) (Chapter 9).

- Statistical comparisons between Scotland and the UK for intakes of key foods and nutrients (Chapter 10).

Overview of key findings

Mean intakes of foods and nutrients

- In the Scotland population, mean saturated fatty acids, non-milk extrinsic sugars (NMES), and salt intakes were above dietary recommendations and the mean intakes of fruit and vegetables, non-starch polysaccharides (NSP; a measure of fibre) and oil-rich fish[14] were below recommendations. Overall the mean total fat and *trans* fatty acids intakes were in line with recommendations.

- Comparisons between Scotland and the UK for key foods and nutrients showed that mean intakes were similar with a few exceptions: mean consumption of vegetables was significantly lower in Scotland than the UK for nearly all age/sex groups; the mean number of "5-A-Day" fruit and vegetable portions was significantly lower in adults aged 19 to 64 years in Scotland compared with the UK (3.7 and 4.0 respectively); mean NSP intake was significantly lower in Scotland than the UK for children aged 4 to 10 years (10.5g and 11.1g respectively) and adults aged 19 to 64 years (13.0g and 13.7g respectively).

Mean intakes of vitamins and minerals

- Mean intakes of most vitamins from food sources were close to or above the Reference Nutrient Intake (RNI)[13,15] for all age/sex groups in Scotland except for vitamin D which was below the RNI for children aged 1.5 to 3 years and for adults aged 65 years and over[13,16] and folate which was below the RNI for girls aged 11 to 18 years.

- There was evidence of low intakes (below the Lower Reference Nutrient Intake (LRNI))[17] of most minerals for some age/sex groups including iron, calcium, magnesium, potassium, zinc, selenium and iodine. Iron intake was below the LRNI for 54% of girls aged 11 to 18 years and 24% of women aged 19 to 64 years.

- Mean intakes of iron, calcium, vitamin C, folate and vitamin D were compared between Scotland and the UK and no consistent differences in intakes were observed with the exception of folate intake which was significantly lower for adults in Scotland compared with the UK.

Blood measures of nutritional status

- There was little evidence of low status (as measured by concentrations in blood) for most vitamins apart from vitamin D and riboflavin. Mean values for thiamin status as indicated by Erythrocyte Transketolase Activation Coefficient (ETKAC), vitamin C, B_{12}, retinol (vitamin A) and vitamin E fell

within the reference ranges and the proportion falling outside established thresholds of adequacy was low.

- There was evidence of low biochemical riboflavin status as indicated by Erythrocyte Glutathione Reductase Activation Coefficient (EGRAC) above the currently accepted threshold for biochemical riboflavin repletion. However there is some uncertainty as to the relevance of this threshold to health outcomes.

- There was evidence of low vitamin D status in a proportion of participants in all reported age/sex groups in Scotland, which was similar to the UK. For children aged 11 to 18 years and adults aged 19 to 64 years and 65 years and over, 26.1%, 32.5% and 29.4% respectively had a 25-hydroxyvitamin D (25-OHD) concentration below the current threshold indicating vitamin D adequacy (25nmol/L). A higher proportion of adults, older adults and boys aged 11 to 18 years in Scotland had low vitamin D status compared with the UK.

- There was evidence of iron-deficiency anaemia (as indicated by low haemoglobin concentrations) plus low iron stores (plasma ferritin) in a proportion of girls aged 11 to 18 years (3.1%), women aged 19 to 64 years (3.0%) and women aged 65 years and over (5.2%) in Scotland. These proportions were similar to those in the UK. Mean concentrations of haemoglobin and plasma ferritin were also similar in Scotland compared with the UK.

Urinary sodium analysis for estimated salt intake

- Mean salt intakes for all age groups in Scotland exceeded the recommended maximum intakes[18] except for women aged 65 years and over (by standard criteria only).[19] Mean intake in Scotland for children aged 7 to 10 years and 11 to 18 years was 5.1g per day and 7.1g per day respectively. Mean salt intake for adults aged 19 to 64 years and 65 years and over was 8.6g per day and 7.6g per day respectively. The mean salt intake for adults aged 19 to 64 years in Scotland was similar to that for adults in England (from a 2011 survey of adults),[20] and mean salt intakes for children and older adults were similar to the same age groups in the UK (from UK NDNS RP).

Diets of children and young people

- Children aged 11 to 18 years had the poorest diets; consuming the fewest portions of fruit and vegetables and the highest percentage of food energy from NMES. A substantial proportion of girls in this age group also fell below the LRNI for intakes of some vitamins and most minerals, including folate,

vitamin A, riboflavin and iron.

Dietary Inequalities

- There were some differences in food consumption, energy and nutrient intakes by equivalised household income and by Scottish Index of Multiple Deprivation (SIMD) although differences were not consistently observed for all age groups. For adults aged 19 to 64 years there was a pattern of decreased consumption of both fruit and vegetables, increased consumption of 'soft drinks, non-diet',[21] decreased NSP intake and increased percentage of energy from NMES with lower income and higher deprivation. For children aged 11 to 18 years, the pattern was similar with the exception of fruit consumption and percentage of energy from NMES which was not statistically significant.

Sample and response rates

A random sample of 5,832 addresses from 216 postcode sectors, drawn from the Postcode Address File, was issued in Scotland between April 2008 and March 2011. Where there were multiple households at an address, a single household was selected at random. For each household, either one adult (aged 19 years and over) and one child (aged 1.5 to 18 years), or one child only were randomly selected to take part.[22] Selected individuals were asked to complete a diary of food and drink consumption over four consecutive days (with the start date randomly allocated) and an interview was conducted to collect background information on dietary habits, socio-demographic status, lifestyle and physical activity (stage one). Participants who agreed to a nurse visit (stage two) were asked to provide a blood sample to assess biochemical indices of nutritional status and those who were aged four years and older were asked to provide a 24-hour urine collection to assess salt intake. Physical measurements were also collected.

In Scotland, the response rate for completion of the diary was 53% for Years 1 to 4 combined. A total of 1,695 individuals aged 1.5 years and older completed at least three days of the food and drink diary (867 adults aged 19 years and over and 828 children aged 1.5 to 18 years).[23] Fewer participants agreed to be visited by a nurse and a further percentage declined to give a blood or a 24-hour urine sample.[24] Overall in Years 1 to 4 combined, 51% of adults (440) and 27% of children (227) in Scotland who had completed a diary went on to give a blood sample. Fifty-nine per cent of adults (515) and 47% of children aged 4 to 18 years (391) who completed a diary provided a 24-hour urine sample.

The data were weighted to minimise any bias in the observed results which may be due to differences in the probability of households and individuals being selected to take part; and to attempt to reduce non-response bias.[25] Details of the sampling and methods of analyses can be found in Chapter 2 and Appendix B of this report.

Current diet and nutrition recommendations and nutritional status thresholds

The SDGs[10] relate to the current UK recommendations for food and nutrient intakes.[13] In this report, mean daily intakes of energy and macronutrients are compared with the SDGs and UK DRVs.[26] For total fat, saturated and *trans* fatty acids and NMES the recommendations are the maximum contribution these nutrients should make to the population average diet.[27] These recommendations indicate the average or the maximum contribution that these nutrients should make to the population average intakes of these nutrients. In addition, biochemical measures of blood lipids are compared with clinical thresholds to provide an indication of the proportion of the population at increased risk of vascular disease.

Population adequacy of micronutrient intake is assessed by comparing intake with the age and sex specific UK DRV for each vitamin and mineral.[13] Mean intake is compared with the Reference Nutrient Intake (RNI)[15] and an estimate is made of the proportion with intake below the Lower Reference Nutrient Intake (LRNI).[13,17] The RNI and LRNI for each vitamin and mineral are given in Tables 5.14 and 5.32 of this report. In addition, Tables 6.1-6.5 of this report present comparisons of biochemical indices of micronutrient status with threshold values, where they have been set, to give an estimate of the proportion of the population at greater risk of deficiency due to depleted body stores or tissue concentrations.

Salt intake has been estimated from urinary sodium excretion. Table 1.7 (see section on salt intake) presents the RNIs for sodium, set in 1991 by the Committee on Medical Aspects of Food and Nutrition Policy (COMA) Panel on Dietary Reference Values[13] for the different NDNS age groups covered in the report. The table also shows the corresponding recommended maximum salt intake per day for adults, which was set by COMA[28] and endorsed by the Scientific Advisory Committee on Nutrition (SACN) in its report on Salt and Health (2003) and the recommended maximum intakes set by SACN (2003) for children.[29]

Physical measures

Table 1.1 provides a summary of the key physical measures for adults and children in Scotland compared with the UK for NDNS RP Years 1 to 4 combined (2008/9 to 2011/12). Measurements were similar to the UK NDNS RP. Measures are also broadly similar to the equivalent Scottish Health Survey data from 2010/11[30] for mean BMI, childhood obesity, raised waist circumference and hypertension.

Table 1.1 Physical measures: NDNS RP Scotland Years 1-4 combined compared with NDNS RP UK Years 1-4 combined

	NDNS RP Scotland (2008/9 to 2011/12)	NDNS RP UK (2008/9 to 2011/12)[3]
Mean BMI (kg/m^2) [a]		
Men (19 years and over)	27.7	27.6
Women (19 years and over)	27.8	27.4
Adult obesity (% obese)[a]		
Men (19 years and over)	27%	26%
Women (19 years and over)	29%	29%
Childhood obesity (% obese) [b]		
Boys (2 to 18 years)	19%	17%
Girls (2 to 18 years)	16%	19%
Proportion with raised waist circumference		
Men (19 years and over)	34%	37%
Women (19 years and over)	50%	46%
Proportion with hypertension		
Men (19 years and over)	34%	32%
Women (19 years and over)	31%	28%
Proportion of adults aged 19-64 years with raised cholesterol		
5.2 and 6.4mmol/litre	36.1%	34.8%
6.4 and 7.8mmol/litre	8.5%	11.1%
above 7.8mmol/l	1.4%	1.8%
Physical Activity		
Median time spent in moderate or vigorous physical activities		
Men (16 years and over)	1.2 hrs per day	1.0 hrs per day
Women (16 years and over)	0.5 hrs per day	0.5 hrs per day
ActiGraph median counts per minute (CPM)		
Boys (4 to 15 years)	552 CPM	534 CPM
Girls (4 to 15 years)	468 CPM	452 CPM
Bases (unweighted)		
Men BMI	*329*	*1324*
Men waist measurement	*263*	*1058*
Boys BMI	*380*	*1540*
Men hypertension	*205*	*814*

Adults raised cholesterol	*327*	*1349*
Men physical activity	*312*	*1253*
Boys physical activity	*94*	*451*
Women BMI	*484*	*1854*
Women waist measurement	*370*	*1455*
Girls BMI	*374*	*1512*
Women hypertension	*298*	*1155*
Women physical activity	*439*	*1688*
Girls physical activity	*118*	*486*

[a] An adult was classified as: underweight if BMI was less than 18.5kg/m^2; normal weight if BMI was from 18.5 to less than 25kg/m^2; overweight if BMI was from 25 to less than 30kg/m^2; obese, excluding morbidly obese, if BMI was from 30 to less than 40kg/m^2; morbidly obese if BMI was 40kg/m^2 or more; overweight, including obese if BMI was 25kg/m 2 or more; and as obese if BMI was 30kg/m2 or more.
[b] A child was classified as obese if BMI was >95th centile for sex and age.

Key findings

Erratum note: correction to fruit and vegetable consumption data

Consumption figures in this section have been corrected for an error in the estimation of fruit, vegetables and fruit juice and the calculation of "5-A-Day" portions. Fruit and vegetable components of some food groups (soft drinks, confectionery, biscuits, cakes, sugar, preserves and sweet spreads, savoury snacks and ice cream) were included in the estimates when they should have been excluded. This has now been corrected and the corrected values are slightly lower than the original published values. Further details are provided in chapter 5.

A summary of the intakes of selected foods and macronutrients in Scotland and a comparison with the UK are provided in Tables 1.2 and 1.3.

Table 1.2 Average daily intake of selected foods, for NDNS RP Scotland Years 1-4 combined compared with NDNS RP UK Years 1-4 combined, by age

	NDNS RP survey years and age group (years)									
	Scotland Years 1-4 combined					UK Years 1-4 combined				
Source	1.5-3	4-10	11-18	19-64	65+	1.5-3	4-10	11-18	19-64	65+
"5-A-Day" portions (portions/day)[a]	-	-	2.6	3.7	4.3	-	-	2.7	4.0**	4.5
Fruit g/day[b]	119	104	60	90	130	105	106	58	97	130
Vegetables g/day[c]	65	78	100	160	172	72*	97**	112*	182**	186
Oil rich fish g/day[d]	1	2	2	6	9	1	2	2	8	13*
Red and processed meat g/day[e]	31	48	59	72	63	30	45	60	71	63
Bases (unweighted)	*125*	*307*	*396*	*650*	*217*	*604*	*1277*	*1497*	*2697*	*753*

* p<0.05 and ** p<0.01 denotes a statistical difference between UK RP1-4 and Scotland RP Y1-4 (reference group) of equivalent age group.

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[a] To calculate "5-A-Day" portions see Chapter 5 and Appendix A. Children under 11 years have not been included as the 80g portion is only appropriate for older children and adults.
[b] Average daily consumption (mean in grams) of fruit including contribution from composite dishes, also includes fruit from smoothies.
[c] Average daily consumption (mean in grams) of vegetables (not including potatoes) including contribution from composite dishes.
[d] Oil rich fish, referred to in the main report as 'oily fish' includes anchovies, carp, trout, mackerel, herring, jack fish, pilchards, salmon (including canned), sardines, sprats, swordfish, tuna (fresh only) and whitebait.
[e] Red and processed meat referred to in the main report as 'total red meat' includes beef, lamb, pork, sausages, burgers and kebabs, offal, processed red meat and other red meat.

Fruit and vegetables (see Table 1.2[31])

- Mean consumption of "5-A-Day" fruit and vegetable portions was significantly lower in Scotland compared with the UK for men aged 19 to 64 years (3.6 compared with 4.0 portions) and women aged 19 to 64 years (3.7 compared with 4.0 portions). In Scotland, 24% of adults aged 19 to 64 years (22% of men and 25% of women) met the "5-A-Day" recommendation[32] compared to 28% of adults aged 19 to 64 years in the UK (28% of both men and women), however these differences only reached significance when males and females were combined.

- In Scotland, mean consumption of fruit and vegetables for children aged 11 to 18 years was 2.6 portions per day. Ten per cent of boys and 7% of girls in this age group met the "5-A-Day" recommendation. Mean consumption of fruit and vegetables for adults aged 65 years and over was 4.3 portions per day. Thirty-five per cent of this age group met the "5-A-Day" recommendation.[32]

- When fruit and vegetables were considered separately from each other, fruit consumption was similar between Scotland and the UK for all age/sex groups. Vegetable consumption however, was significantly lower in Scotland in all age/sex groups with the exception of girls aged 11 to 18 years and men aged 65 years and over where the consumption was still lower but the difference did not reach statistical significance.

- Mean fruit and vegetable consumption for those aged 11 to 18 and 19 to 64 years showed a clear pattern when split both by equivalised income and by SIMD. Mean fruit and vegetable consumption expressed in grams and as "5-A-Day" portions was significantly lower in quintile 1 (lowest income and the most deprived) than in quintile 5 (highest income and the least deprived). Adults aged 19 to 64 years showed a pattern of increasing fruit and vegetable intake by income and SIMD quintiles from quintile 1 (lowest/most deprived) to quintile 5 (highest/least deprived).

Oil rich fish[14] (see Table 1.2)

- Consumption of oil rich fish[14] was below the recommendation of one portion (140g) per week[10] in all age groups. For example, mean consumption in adults aged 19 to 64 years was estimated to be 45g per week and for adults aged 65 years and over mean consumption was estimated to be 66g per week.

- Mean oil rich fish[14] consumption was similar in Scotland and the UK for all age groups except for adults aged 65 years and over where mean consumption was 9g per day in Scotland, significantly lower than the mean consumption of 13g per day in the UK.

Red and processed meat[33] (see Table 1.2)

- Mean daily consumption of red and processed meat[33] for men aged 19 to 64 years and 65 years and over was 92g and 77g respectively, whilst women aged 19 to 64 years and 65 years and over consumed 54g and 53g respectively. The recommendation in Scotland is that average intake of red and processed meat should be pegged at around 70g per day and the average intake of the very highest consumers of red and processed meat (90g per person per day) should not increase.

- Mean consumption of red and processed meat[33] was higher in Scotland compared with the UK in boys aged 4 to 10 years (53g compared with 48g) and men aged 19 to 64 years (92g compared with 86g), whilst consumption was similar in Scotland and the UK for girls aged 4 to 18 years and in women aged 19 years and over.

- No consistent differences by equivalised household income quintiles and SIMD quintiles were observed in any age group for red and processed meat[33] consumption.

Energy intake

- Mean reported total energy intake was 4.88 MJ (1156 kcal) for children aged 1.5 to 3 years and 6.50 MJ (1542 kcal) for children aged 4 to 10 years. For children aged 11 to 18 years, mean total energy intake was 7.44 MJ (1768 kcal).

- For adults, mean reported total energy intake was 8.96 MJ (2132 kcal) for men aged 19 to 64 years, 6.56 MJ (1559 kcal) for women aged 19 to 64 years, 8.15 MJ (1937 kcal) for men aged 65 years and over and 6.04 MJ (1435 kcal) for women aged 65 years and over.

- The main types of food contributing to energy intake were 'cereals and cereal products', 'milk and milk products' (for younger children), and 'meat and meat products' (for older children and adults).

- Mean reported energy intake was significantly lower in Scotland compared with the UK for women aged 19 to 64 years (1559 kcals compared with 1613 kcals) and women aged 65 years and over (1435 kcals compared with 1510 kcals).

- No consistent difference was observed for mean reported intakes of total or food energy between income or SIMD quintiles.

Alcohol intake

- On average, adults aged 19 to 64 years who consumed alcohol during the four-day recording period obtained 9.1% of energy intake from alcohol and older adult consumers obtained 5.7%.

- Male consumers aged 19 to 64 years in Scotland had a higher mean intake of alcohol compared with the UK (38.3g and 29.2g respectively) but this was not significantly different. Female consumers aged 19 to 64 years in Scotland had a similar mean intake compared with the UK (18.2g and 19.2g respectively).

- Males aged 16 to 24 years (including non-consumers) in Scotland had a higher percentage of total energy from alcohol than in the UK (6.9% versus 3.0%). This was not tested for statistical significance.

Protein intake (grams and % food energy)

- Mean protein intakes were well above the RNIs in all age/sex groups and provided 14.5-15.2% of food energy for children and 17.0-17.2% for adults, which was similar to UK values.

- For adults 19 to 64 years, mean protein intake, expressed as a percentage of food energy and total energy, tended to increase from the lowest equivalised income quintile (1) through to the highest (5). This pattern was not observed in adults aged 19 to 64 years when split by SIMD quintiles.

Total fat intake (grams and % food energy (see Table 1.3))

- Mean percentage food energy from total fat met the recommendation of no more than 35% food energy in all age/sex groups except for men aged 19 to 64 years and 65 years and over, for whom, on average, total fat provided 35.1% and 36.2% of food energy.

- The main types of food contributing to total fat intake were 'milk and milk products' (mainly for younger children), 'cereals and cereal products', and 'meat and meat products'.

- Mean daily intakes of total fat were generally similar in Scotland to the UK, and where there were differences, none were statistically significant.

- Overall no consistent difference was observed for mean total fat intakes between income or SIMD quintiles, either when expressed as a percentage of food energy intake or in terms of absolute intake.

Saturated fatty acids intake (grams and % food energy (see Table 1.3))

- Mean intake of saturated fatty acids was higher than the recommendation of no more than 11% food energy for all age/sex groups, and provided 13.4% for children aged 4 to 10 years, 12.8% for children aged 11 to 18 years, 12.9% for adults aged 19 to 64 years and 13.9% of food energy for adults aged 65 years and over. Mean intakes were similar to the UK.

- 'Milk and milk products', 'cereals and cereal products', and 'meat and meat products' made similar contributions to saturated fatty acids intakes in adults and older children while in younger children 'milk and milk products' was the largest contributor.

- Overall, no consistent difference was observed in mean saturated fatty acids intakes expressed as a percentage of food energy between income or SIMD quintiles in children or adults.

Trans fatty acids intake (grams and % food energy (see Table 1.3))

- Mean intakes of *trans* fatty acids provided 0.6-0.8% of food energy for all age/sex groups, and thus met the recommendation in Scotland (average intakes to remain below 1% food energy). Mean intakes in Scotland were very similar to those in the UK.

- Overall, no consistent difference was observed in mean intakes of *trans* fatty acids as a percentage of food energy or in terms of absolute intakes between income or SIMD quintiles.

Non-milk extrinsic sugars (NMES) intake (grams and % food energy (see Table 1.3))

- Mean intake of NMES was higher than the recommendation of less than 11% of food energy in all age groups, ranging from 15.4% for children aged 11 to 18 years to 11.5% for adults aged 65 years and over.

- For children, the main sources of NMES intake were non-alcoholic beverages (soft drinks and fruit juice), particularly for those aged 11 to 18 years (contributing 46%), and 'cereals and cereal products' (contributing 20%). For adults aged 19 to 64 years and 65 years and over, the main sources of NMES intake were 'sugar, preserves and confectionery' (contributing 26% and 31% respectively), 'cereals and cereal products' (contributing 22% and 31% respectively), and, in addition, for adults aged 19 to 64 years, non-alcoholic beverages (contributing 26%).

- Mean intakes of NMES as a percentage of food energy were similar in Scotland and the UK.

- No consistent difference was observed in mean intake of NMES as a percentage of food energy or in terms of absolute intake in children aged 4 to 10 years and 11 to 18 years when split either by income or by SIMD. In adults aged 19 to 64 years, NMES intake as a percentage of food energy was significantly higher in the lowest income and the most deprived quintile (13.5% and 13.0% food energy respectively) compared with the highest income and the least deprived quintile (10.6% and 11.0% food energy respectively).

Non-starch polysaccharides (NSP) intake (grams (see Table 1.3))

- Mean intakes for adults did not meet the recommendation in Scotland which is set at a population average intake of 18g per day. Mean intake of NSP was 8.3g per day for children aged 1.5 to 3 years, 10.5g per day for children aged 4 to 10 years, 11.5g per day for children aged 11 to 18 years, and 13.0g per day for adults.

- 'Cereals and cereal products' was the main source of NSP in all age groups, providing about 40% of total intake.

- Mean NSP intakes tended to be lower in all age/sex groups in Scotland compared with the UK. Mean NSP intake was significantly lower in boys aged 4 to 10 years (10.8g per day compared with 11.5g per day) in Scotland compared with the UK. Mean NSP intake was also significantly lower in girls aged 4 to 10 years, women aged 19 to 64 years and women aged 65 years and over in Scotland compared with the UK (10.2g per day, 12.1g per day and 11.7g per day compared with 10.7g per day, 12.8g per day and 13.1g per day respectively).

- In children aged 11 to 18 years and adults aged 19 to 64 years, NSP intake was significantly lower in the lowest income and the most deprived quintile compared with the highest income and the least deprived quintile.

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Table 1.3 Average daily intake of selected macronutrients, for NDNS RP Scotland Years 1-4 combined compared with NDNS RP UK Years 1-4 combined, by age

	NDNS RP survey years and age group (years)									
	Scotland Years 1-4 combined					UK Years 1-4 combined				
Macronutrient	1.5-3	4-10	11-18	19-64	65+	1.5-3	4-10	11-18	19-64	65+
Total fat % food energy	34.4	33.8	34.0	35.0	35.2	34.0	33.4	34.0	34.6	35.4
Saturated fatty acids % food energy	14.9	13.4	12.8	12.9	13.9	14.7	13.2	12.5	12.6	13.8
Trans fatty acids % food energy[a]	0.7	0.6	0.6	0.7	0.8	0.6	0.6	0.6	0.7*	0.7
NMES % food energy	12.0	14.8	15.4	12.0	11.5	11.9	14.7	15.6	12.1	11.5
NSP g	8.3	10.5	11.5	13.0	13.0	8.2	11.1**	11.8	13.7**	13.9
Bases (unweighted)	*125*	*307*	*396*	*650*	*217*	*604*	*1277*	*1497*	*2697*	*753*

* p<0.05 and ** p<0.01 denotes a statistical difference between UK RP1-4 and Scotland RP Y1-4 (reference group) of equivalent age group.

[a] Due to rounding some values appear the same in the tables, however, the values are different once they are presented to further decimal places (see Chapter 10 Table 10.1c).

Indicator foods and drinks high in fat and sugar

- There were no consistent differences between Scotland and the UK for consumption of 'biscuits', 'buns, cakes and pastries', 'confectionery' and 'soft drinks, non-diet'.[21] A summary of key results is shown in Table 1.4. Mean consumption of 'biscuits' was significantly lower in Scotland (13g per day) compared with the UK (17g per day) in children aged 11 to 18 years, but was significantly higher in Scotland (18g per day) compared with the UK (13g per day) in adults aged 65 years and over.

- Mean 'confectionery' consumption was significantly higher in Scotland compared to the UK in children aged 1.5 to 3 years (12g per day compared with 9g per day) and 4 to 10 years (21g per day compared with 18g per day).

- Mean consumption of 'soft drinks, non-diet'[21] tended to be higher in Scotland compared with the UK for children aged 4 to 18 years and adults aged 19 to 64 years but reached statistical significance only in boys aged 11 to 18 years.

- No clear patterns were found for equivalised income and SIMD for indicator foods and drinks high in fat and sugar with the exception of mean consumption of 'soft drinks, non-diet',[21] where consumption in adults aged 19 to 64 years was significantly higher in the lowest compared with the highest income quintile. Mean consumption decreased from quintile 1 to quintile 5 for equivalised income but not for SIMD.

Table 1.4 Average daily intake of indicator foods and drinks high in fat and sugar for NDNS RP Scotland Years 1-4 combined compared with NDNS RP UK Years 1-4 combined, by age

Food group (mean in g)	NDNS RP survey years and age group (years)									
	Scotland Years 1-4 combined					UK Years 1-4 combined				
	1.5-3	4-10	11-18	19-64	65+	1.5-3	4-10	11-18	19-64	65+
Biscuits[a]	11	16	13	14	18	12	17	17**	13	13**
Buns, cakes and pastries[b]	11	17	15	14	24	8	21	16	16	23
Confectionery[c]	12	21	19	12	8	9*	18*	19	11	5
Soft drinks, non-diet[d]	61	132	292	144	40	63	127	260	135	52
Bases (unweighted)	*125*	*307*	*396*	*650*	*217*	*604*	*1277*	*1497*	*2697*	*753*

* p<0.05 and ** p<0.01 denotes a statistical difference between UK RP1-4 and Scotland RP Y1-4 (reference group) of equivalent age group.
[a] All types of sweet and savoury biscuits, purchased and homemade. Includes cereal bars and flapjacks.
[b] All types, purchased and homemade.
[c] All types of sugar and chocolate confectionery.
[d] All types, including squashes and cordials, carbonates. Not 100% fruit juice. Not mineral water. This food group is referred to as 'Soft drinks, not low calorie' in Appendix R.

Key findings on intakes of iron, calcium, vitamin C, folate and vitamin D

A summary of key results can be found in Tables 1.5 and 1.6.

Iron

- Fifty-four per cent of girls aged 11 to 18 years and 24% of women aged 19 to 64 years had an iron intake below the LRNI.
- No significant differences for iron intakes were observed when comparing Scotland with the UK except in women aged 65 years and over.
- Mean iron intake was significantly lower in the lowest quintile compared with the highest for both income and SIMD in children aged 11 to 18 years and adults aged 19 to 64 years.

Calcium

- For girls, 18% of those aged 11 to 18 years had intakes of calcium below the LRNI.
- No clear pattern of differences for calcium intakes were observed when comparing Scotland with the UK.
- There was a higher proportion of adults aged 19 to 64 years with intakes below the LRNI in the lowest income quintile compared with the highest quintile.

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Vitamin C

- Mean daily intake of vitamin C from food sources were well above the RNI for all age/sex groups. The proportion of individuals with intakes below the LRNI was 2% or less.

- No significant differences for vitamin C intakes were observed when comparing Scotland with the UK except for adults aged 19 to 64 years where mean intake was significantly lower in Scotland (76.6mg) compared with the UK (82.9mg).

- Mean vitamin C intake was above the RNI in all income and deprivation quintiles and for all age groups. In all age groups where statistical analysis could be carried out, mean intake was significantly lower in the lowest income and deprivation quintile compared to the highest.

Folate

- Mean intake of folate was below the RNI for girls aged 11 to 18 years (88% of the RNI) but was above the RNI in all other age/sex groups. Ten per cent of girls aged 11 to 18 years had folate intakes below the LRNI.

- The mean folate intake for adults (males and females combined) in Scotland was significantly lower than for the UK.

- Children aged 11 to 18 years and adults aged 19 to 64 years had lower mean folate intakes in the lowest income and most deprived SIMD quintile compared to the highest income and least deprived SIMD quintile.

Vitamin D

- Mean intake of vitamin D was below the RNI for children aged 1.5 to 3 years (26% of the RNI) and for adults aged 65 years and over (32% of the RNI).[16]

- Inclusion of intakes from dietary supplements brought the mean intake up to 30% of the RNI for children aged 1.5 to 3 years and 47% for adults aged 65 years and over.[16]

- Mean dietary intakes of vitamin D in Scotland were very similar to those in the UK for all age groups.

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Intakes of other vitamins and minerals

- Intakes below the Lower Reference Nutrient Intake (LRNI)[17] for vitamin A were found in 12% of children aged 11 to 18 years. However the infrequent consumption of vitamin A-rich foods means that a longer recording period is ideally needed to assess the customary vitamin A intake of an individual. A high proportion (23%) of girls aged 11 to 18 years also had riboflavin intakes below the LRNI.

- Mean intakes of most minerals including magnesium, potassium and selenium fell below the RNI for those aged 11 to 18 years and 19 to 64 years, particularly in girls and women.

- Intakes below the LRNI[17] in girls aged 11 to 18 years ranged from 22% for iodine up to 58% for magnesium.

Table 1.5 Average daily intake of selected micronutrients from food sources only, for NDNS RP Scotland Years 1-4 combined compared with NDNS RP UK Years 1-4 combined, by age

	NDNS RP survey years and age group (years)									
	Scotland Years 1-4 combined					UK Years 1-4 combined				
Micronutrients	1.5-3	4-10	11-18	19-64	65+	1.5-3	4-10	11-18	19-64	65+
Iron mg	6.5	8.5	9.5	10.5	9.9	6.3	8.7	9.6	10.7	10.2
Calcium mg	763	829	803	797	765	773	803	782	807	852**
Vitamin C mg	66.7	86.4	72.7	76.6	79.4	67.5	85.9	78.9	82.9*	83.7
Folate µg	146	191	202	245	235	150	195	210	258*	265**
Vitamin D µg	1.8	2.0	2.1	2.7	3.2	1.9	2.0	2.1	2.8	3.3
Bases (unweighted)	*125*	*307*	*396*	*650*	*217*	*604*	*1277*	*1497*	*2697*	*753*

* p<0.05 and ** p<0.01 denotes a statistical difference between UK RP1-4 and Scotland RP Y1-4 (reference group) of equivalent age group.

Table 1.6 Proportion of participants with average daily intakes of micronutrients from food sources only below the Lower Reference Nutrient Intake (LRNI), for NDNS RP Scotland Years 1-4 combined compared with NDNS RP UK Years 1-4 combined, females, by age

	NDNS RP survey years and age groups (years)									
	Scotland Years 1-4 combined					NDNS RP UK Years 1-4 combined				
	Girls		Total	Women		Girls		Total	Women	
Micronutrients	4-10	11-18	girls	19-64	65+	4-10	11-18	girls	19-64	65+
Iron	1	54	31	24	1	1	46	26	23	2
Calcium	0	18	10	8	10	3	19	12	8	4*
Vitamin C	0	1	1	1	1	0	1	1	1	1
Folate	0	10	6	4	5	0	8	4	4	1
Bases (unweighted)	*144*	*197*	*341*	*377*	*137*	*612*	*753*	*1365*	*1571*	*436*

* p<0.05 and ** p<0.01 denotes a statistical difference between UK RP1-4 and Scotland RP Y1-4 (reference group) of equivalent age group.

Use of dietary supplements

- Seventeen per cent of men and 20% of women aged 19 to 64 years, and 37% of men and 36% of women aged 65 years and over reported taking at least one dietary supplement during the four-day recording period.

- In general, supplement takers had higher intakes of vitamins and minerals from food sources only (i.e. excluding supplements) than those who did not take supplements during the four-day diary period. In general, the percentage of individuals with intakes below the LRNI from food sources only (i.e. excluding supplements) was lower or the same in the supplement takers compared to the non-supplement takers for all age/sex groups.

Estimated Salt intake[34] (see Table 1.7)

Erratum note: The results in this section have been corrected to take account of bias in sodium concentrations originally published in September 2014. This correction has resulted in slightly higher estimates of salt intake than originally published although the overall conclusions are unchanged.

Salt intake has been estimated from urinary sodium excretion. Table 1.7 presents the recommended maximum salt intake per day for adults, which was set by COMA[288] and endorsed by the Scientific Advisory Committee on Nutrition (SACN) in its report on Salt and Health (2003) and the recommended maximum intakes set by SACN (2003) for children.[299]

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- For all age/sex groups, except for women aged 65 years and over, the estimated mean salt intake was higher than the recommendation for their age group (when completeness was determined using the standard criteria).[18,19]

- For children aged 11 to 18 years the estimated mean salt intake was 7.1g per day.

- For adults aged 19 to 64 years it was 8.6g per day and for adults aged 65 years and over it was 7.6g per day.

- The results from this survey (based on data collected between 2008 and 2012) suggests a lower mean salt intake for adults aged 19 to 64 years than the 2009 Scotland Urinary Survey, although this difference has not been statistically tested.[35]

Since this report was originally published new data have been published for salt intakes for adults in England (2014)[36] and Scotland (2014).[37] This report has not been updated to reflect these new results.

Table 1.7 Average estimated salt intake (g/day), for NDNS RP Scotland Years 1-4 combined compared with NDNS RP UK Years 1-4 combined, by age[a]

NDNS age group[b]	RNI mmol sodium per day[13,c]	Recommended maximum salt intake[288,299,344] (g/day)[c,d]	Scotland Years 1-4 combined[e]	UK Years 1-4 combined[e,f] and England 2011 survey[e,g]
7 to 10 years	50	5	5.1 (n=53)	5.3[e] (n=186)
11 to 18 years	70	6	7.1 (n=80)	7.0[e] (n=377)
19 to 64 years	70	6	8.6 (n=255)	8.5[f] (n=547)
19 to 64 years males	70	6	9.9 (n=119)	9.8[f] (n=250)
19 to 64 years females	70	6	7.4 (n=136)	7.2[f] (n=297)
65 years and over	70	6	7.6 (n=74)	7.6[e] (n=270)

[a] complete by standard criteria only.
[b] Results are not presented for children aged 4 to 6 years as base numbers are below 50.
[c] 1g salt contains 17.1mmol sodium.
[d] These are the maximum daily dietary targets.
[e] Counts are provided in brackets.
[f] The UK report for years 1 to 4 of the NDNS RP[3] reported urinary sodium results from participants aged 4 to 18 years and 65 years and over only.
[g] The most recent published data for adults in England comes from a 24-hour urinary sodium survey carried out in 2011.[20]

Biochemical indices of nutritional status (see Tables 1.8 and 1.9)

- This section reports on the results of blood samples taken during the NDNS RP, which provide an assessment of the availability of nutrients to the body (after absorption) for use in metabolic processes.

- People obtain vitamin D from two sources: endogenous synthesis when their skin is exposed to ultra violet B (UVB) radiation and from their diet. There was evidence of low vitamin D status in a proportion of participants in all age/sex groups in both Scotland and the UK. Low vitamin D status has implications for bone health (increased risk of rickets and osteomalacia).

- In Scotland, a higher proportion of adults, older adults and boys aged 11 to 18 years had a 25-hydroxyvitamin D (25-OHD) concentration below 25nmol/L (the current threshold indicating vitamin D adequacy) than in the UK.

- The proportion of children in Scotland who had a concentration of 25-OHD below the lower threshold for vitamin D adequacy was 9.2% for children aged 4 to 10 years and 26.1% for those aged 11 to 18 years. For adults this was 32.5% for those aged 19 to 64 years and 29.4% for those aged 65 years and over.

- There was evidence of iron-deficiency anaemia (as indicated by low haemoglobin concentrations) plus low iron stores (plasma ferritin) in a proportion of older girls aged 11 to 18 years (3.1%), women aged 19 to 64 years (3.0%) and women aged 65 years and over (5.2%) in Scotland. These figures are similar to those for the UK.

- A substantial proportion of participants aged four years and over had riboflavin status values (as indicated by EGRAC) in the range currently regarded as indicating biochemical depletion in adults; however, there is uncertainty about whether this is associated with functional consequences (see Chapter 6 for more detail). Percentages of Scotland participants affected were 54.2% of children aged 4 to 10 years (72.4% for the UK), 65.8% of boys aged 11 to 18 years (78.2% for the UK), 84.7% of girls aged 11 to 18 years (similar to the UK, which was 87.8%), 76.9% of adults 19 to 64 years (69.3% for the UK) and 64.4% of adults 65 years and over (47.5% for UK).

- There was little evidence of low status for other micronutrients where normal ranges or thresholds of adequacy have been set. Mean values for thiamin status (as indicated by ETKAC), vitamin C, B_{12}, retinol (vitamin A) and vitamin E fell within the reference range and the proportion falling outside established thresholds indicating low status, where these have been set, was low.

Table 1.8 Key biochemical indices of nutritional status for NDNS RP Scotland Years 1-4 combined compared with NDNS RP UK Years 1-4 combined, by age

Blood analyte	NDNS RP survey years and age groups (years)							
	Scotland Years 1-4 combined				UK Years 1-4 combined			
	4-10	11-18	19-64	65+	4-10	11-18	19-64	65+
Plasma 25-hydroxyvitamin D (nmol/L) % males and females combined below 25nmol/L[a]	9.2	26.1	32.5	29.4	13.9	22.0	22.8	21.0
Plasma vitamin C (µmol/L) % males and females combined below 11µmol/L[b]	0.0	2.9	3.2	2.7	0.0	1.4	2.2	4.0
Bases (unweighted)								
Plasma 25-hydroxyvitamin D (nmol/L)	*58*	*137*	*319*	*100*	*237*	*523*	*1321*	*338*
Plasma vitamin C (µmol/L)	*57*	*129*	*305*	*93*	*230*	*501*	*1241*	*323*

[a] Department of Health (1998) Nutrition and Bone Health with Particular Reference to Calcium and Vitamin D. Report on Health and Social Subjects no. 49. London: The Stationery office.
[b] Sauberlich HE. Vitamin C status: methods and findings. Annals of the New York Academy of Sciences, 1971; 24: 444 –454.

Table 1.9 Key biochemical indices of nutritional status for NDNS RP Scotland Years 1-4 combined compared with NDNS RP UK Years 1-4 combined, females, by age

Haemoglobin (g/L) and plasma ferritin (µg/L)	NDNS RP survey years and age groups (years)[a]					
	Scotland Years 1-4 combined			UK Years 1-4 combined		
	11-18	19-64	65+	11-18	19-64	65+
% below threshold both for haemoglobin[b,c] and plasma ferritin[c,d]	3.1	3.0	5.2	4.9	4.7	3.1
Bases (unweighted)	*62*	*179*	*66*	*236*	*741*	*191*

[a] Due to small cell sizes, participant's results by age group have only been reported where there were sufficient numbers in Scotland.
[b] Haemoglobin: 11y males <115g/L, 11y females <115g/L, 12-14y males <120g/L, 12-14y females <120g/L, 15y+ males <130g/L, 15y+ females (non-pregnant) <120g/L.
[c] Scientific Advisory Committee on Nutrition (SACN). Iron and Health. London: TSO, 2010. www.sacn.gov.uk/pdfs/sacn_iron_and_health_report_web.pdf (accessed 18.09.14).
[d] Ferritin: 5y+ males <15mg/L, 5y+ females <15mg/L.

Methodological issues

Misreporting of food consumption

Dietary surveys are reliant on self-reported measures of food intake. Previous NDNS and the current NDNS RP are unique amongst large-scale population surveys in their inclusion of doubly labelled water (DLW) as an objective biomarker to validate energy intake (EI) estimated from reported food consumption. There is evidence of mis-reporting of food consumption from the UK NDNS RP survey as in all dietary surveys. A sub-study comparing self-reported EI estimates (from the four-day diary) with an objective measure of total energy expenditure (TEE) using the DLW technique found that reported EI in those aged 16 years and over was about 34% lower than TEE on average (see Chapter 5 and Appendix X for more detail). This should be borne in mind when interpreting the findings.

Diet and nutritional status

Results based on assessment of food and drink consumption over the four-day diary period provides information about dietary intake over a relatively short period. Analysis of blood samples generally provides an indication of the nutritional status of the population over a longer period. Nutritional status indices provide an assessment of availability of nutrients to the body (after absorption) for use in metabolic processes.

It is not possible to make direct comparisons between the dietary data and biochemical results presented in the report due to the elapsed time between the diary recording period and the collection of blood and urine (a gap of at least eight weeks in Year 2 onwards) and also because many of the biochemical indicators generally reflect longer term body stores of a nutrient rather than recent intake.

Days of the week

Weekend days were oversampled in Year 1 and, while weekend days were under-sampled in Year 2 to redress this, there still remains a slight over-representation of weekend days in the Years 1 to 4 combined data.[38] As eating habits vary on different days of the week for some age groups, this could lead to a bias in the reporting of some foods and drinks.

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Future reports

A urinary sodium survey of adults aged 19 to 64 years in Scotland[37] and in England[36] which commenced in 2014 as part of the NDNS RP were published in 2016. A direct comparison of estimated salt intakes between Scotland and England are available in the 2014 Scotland sodium survey report published in 2016.[37]

The UK, Scotland, Northern Ireland and Wales results for blood folate status were originally published in March 2015, but the thresholds published by the WHO which were used in that report were set using blood folate data based on different laboratory assays from those used to analyse NDNS samples. Measurements of blood folate are specific to the assay method and the laboratory used; therefore thresholds need to be appropriate to the assay method or to have been adjusted for the assay method used. Consequently, the report on folate status in the UK, Scotland and Northern Ireland as determined in Years 1 to 4 and in Wales in Years 2 to 5 of the NDNS RP will be republished in 2017.

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[1] Responsibility for nutrition policy in England and Wales transferred from FSA to Health Departments in 2010. Management of NDNS also transferred to the Department of Health in England at that time. From 1 April 2013, responsibility for the survey transferred to the Department of Health's Executive Agency, Public Health England (PHE).

[2] For Year 6 onwards, the consortium comprises NatCen and MRC HNR.

[3] National Diet and Nutrition Survey: results from Years 1 to 4 (combined) of the rolling programme for 2008 and 2009 to 2011 and 2012 https://www.gov.uk/government/publications/national-diet-and-nutrition-survey-results-from-years-1-to-4-combined-of-the-rolling-programme-for-2008-and-2009-to-2011-and-2012 (accessed 15/09/14).

[4] A boosted sample in Scotland was included from Year 1.

[5] Ashwell M, Barlow S, Gibson S, Harris C (2006) National Diet and Nutrition Surveys: the British experience. Public Health Nutrition 9(4) 523-530.

[6] Supporting Healthy Choices: A Framework for Voluntary Action. http://www.scotland.gov.uk/Publications/2014/06/8253 (accessed 15/09/14).
[7] http://www.scotland.gov.uk/Publications/2009/06/25133322/0 (accessed 15/09/14).
[8] http://www.scotland.gov.uk/Publications/2010/02/17140721/0 (accessed 15/09/14).
[9] http://www.scotland.gov.uk/Publications/2014/06/1195 (accessed 15/09/14).

[10] Scottish Dietary Goals (SDGs) were originally set in 1996 and revised in 2013. The SDGs describe the diet that will improve and support the health of the Scottish population and are used to assist with policy development to reduce the burden of obesity and diet-related disease in Scotland. Revised Dietary Goals for Scotland. Scottish Government, May 2013; http://www.scotland.gov.uk/Resource/0042/00421385.pdf (accessed 15/09/14).

[11].http://www.foodstandards.gov.scot/monitoring-progress-towards-scottish-dietary-goals-2001-2012-report-1

[12] http://www.scotland.gov.uk/Publications/2011/03/17104457/2 (accessed 15/09/14).

[13] Report on Health and Social Subjects 41 *Dietary Reference Values (DRVs) for Food Energy and Nutrients for the UK*, Report of the Panel on DRVs of the Committee on Medical Aspects

of Food Policy (COMA) 1991. The Stationery Office. London.

[14] Oil rich fish, referred to in the main report as 'oily fish' includes anchovies, carp, trout, mackerel, herring, jack fish, pilchards, salmon (including canned), sardines, sprats, swordfish, tuna (fresh only) and whitebait.

[15] The RNI for a vitamin or mineral is the amount of the nutrient that is sufficient for about 97% of people in the group. If the average intake of the group is at the RNI, then the risk of deficiency in the group is judged to be very small. However, if the average intake is lower than the RNI then it is possible that some of the group will have an intake below their requirement.

[16] For vitamin D, RNIs are only set for those aged up to four years and those aged 65 years and over.

[17] The adequacy of vitamin or mineral intake can be expressed as the proportion of individuals with intakes below the LRNI. The LRNI for a vitamin or mineral is set at the level of intake considered likely to be sufficient to meet the needs of only 2.5% of the population.

[18] The SACN recommendation for maximum daily salt is no more than 3g/day for children aged 4 to 6 years, no more than 5g/day for children 7 to 10 years and no more than 6g/day for those aged 11 years and over

[19] Standard Criteria 'complete by PABA': where the participant has reported taking three PABA tablets and the amount of PABA recovered in the urine collection is consistent with completeness. Standard criteria 'complete by claim': where the participant has reported taking less than three PABA tablets and reported (i.e. claimed) collection of all urine passed during 23 to 25 hours.

[20] National Diet and Nutrition Survey - Assessment of dietary sodium in adults (aged 19 to 64 years) in England, 2011 report. https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/127916/Sodium-Survey-England-2011_Text_to-DH_FINAL1.pdf.pdf (accessed 15/09/14).

[21] See Appendix R of this report for a full definition (please note that this food group is referred to as 'Soft drinks, not low calorie' in Appendix R).

[22] In some core sample households (where up to one adult and one child could be selected), it was possible to end up with an adult participant only, either because the selected child was not able/did not wish to take part or because there was no resident child eligible for selection.

[23] The majority of participants completed four days of the food and drink diary. Only 2% completed three days.

[24] All individuals visited by a nurse were asked if they were willing to provide a blood sample and, if aged four years and older (and fully out of nappies), a 24-hour urine sample.

[25] Non-response bias occurs if those who respond to the survey (or elements of the survey) differ from those who do not respond. Data were weighted to reduce such bias.

[26] The Scottish Dietary Goals for macronutrients are generally the same as the UK Dietary Reference Values with the exception of *trans* fatty acids. The SDG for *trans* fatty acids is for mean intakes to remain below 1% of food energy intake whereas the DRV is for mean intakes not to exceed 2% of food energy intake.

[27] For total fat and saturated fatty acids, this recommendation applies to adults and children from the age of five years.

[28] Department of Health. Report on Health and Social Subjects: 46. Nutritional Aspects of Cardiovascular disease. HMSO (London, 1994).

[29] Scientific Advisory Committee on Nutrition (2003). Salt and Health. The Stationery Office. http://www.sacn.gov.uk/pdfs/sacn_salt_final.pdf (accessed 15/09/14).

[30] Bromley C, et al. (2011) The Scottish Health Survey 2010. Volume 1 :Main Report. The Scottish Government. http://scotland.gov.uk/Resource/Doc/358842/0121284.pdf (accessed 08/08/14).

[31] In the first publication of this report (in September 2014), "5-A-Day" portions were incorrectly calculated. Fruit and vegetable components of food groups that should have been excluded (see Appendix A of this report) were mistakenly included. These were: soft drinks, confectionery, biscuits, cakes, sugar, preserves (including jam) and sweet spreads, savoury snacks and ice cream. The results presented in this chapter have been updated to correctly exclude all of the food groups that should be excluded as part of the "5-A-Day" calculations. Therefore the values for Years 1 to 4 (combined) will be lower than those presented in the first publication of this report in September 2014.

[32] Department of Health 5 A DAY programme http://www.nhs.uk/Livewell/5ADAY/Pages/5ADAYhome.aspx (accessed 15/09/14).

[33] Red and processed meat referred to in the main report as 'total red meat' includes beef, lamb, pork, sausages, burgers and kebabs, offal, processed red meat and other red meat.

[34] Dietary salt intake can only be accurately assessed by measuring sodium excretion in urine. The predominant source of sodium in the diet is "common salt" (sodium chloride). It is not possible to obtain accurate estimates of dietary intake of sodium from food intake information, mainly because of the difficulty with accurately assessing the amount of salt added to food in cooking or at the table. Estimates of sodium intake can be obtained by measuring urinary sodium excretion, assuming the body is in balance for sodium.

[35] A survey of 24 hour urinary sodium excretion in a representative sample of the Scottish population as a measure of salt intake, April 2011; http://www.food.gov.uk/scotland/researchscot/scotlandresearch/ScotlandProjectList/s14047/#.U-SgkLFwbIU (accessed 15/09/14).

[36] National Diet and Nutrition Survey (NDNS): Assessment of dietary sodium for adults (19 to 64 years) in England, 2014 report; https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/509399/Sodium_study_2014_England_Text_final.pdf Published 2016 (accessed 15/02/17).

[37] National Diet and Nutrition Survey (NDNS): Assessment of dietary sodium for adults (19 to 64 years) in Scotland, 2014 report; http://www.foodstandards.gov.scot/sites/default/files/Monitoring%20the%20Scottish%20Diet-%20Sodium%20Survey%202014%20SCOTLAND_FINAL%20PDF.pdf Published 2016 (accessed 15/02/17).

[38] This may be explained by the survey design allowing some flexibilitty in the diary start date to help maintain response rates.