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National Diet and Nutrition Survey (NDNS RP): Results from Years 1-4 (combined) for Northern Ireland (2008/09-2011/12)

Executive Summary

A survey carried out on behalf of the Food Standards Agency in Northern Ireland 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 February 2015) 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 FSA in Northern Ireland (FSA in NI) has responsibility for monitoring the diet of the population in Northern Ireland and therefore has co-funded additional recruitment for NDNS RP. Recruitment in Northern Ireland was boosted to 200 participants per year for four years (2008/09 to 2011/12), in order to achieve representative dietary health data specific for Northern Ireland. The Northern Ireland boost has been co-funded by three funding partners: the Department of Health, Social Services and Public Safety (DHSSPS); the Food Safety Promotion Board (Safefood)^{3,4} and FSA in NI.

This publication of the Northern Ireland NDNS RP Years 1 to 4 report, forms part of a series of report publications from the NDNS RP, the first of which was the UK combined data report covering Years 1 to 4 (2008/09 to 2011/12), released as an Official Statistic by PHE in May 2014.⁵ This was followed by the Scotland report for the equivalent time period, released as an Official Statistic by FSA in Scotland in September 2014.⁶ It is recognised that Northern Ireland has to catch up with its nutritional surveillance work; the combined results from Years 1 to 4 is the first time that representative data for Northern Ireland from the NDNS RP has been available.

The data will inform dietary surveillance in Northern Ireland; measure against the performance indicators published in the Obesity Prevention Strategy; assist in evaluating existing policies; and set future, evidence-based policy direction.

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.⁷ The main report presents combined results from Years 1 to 4 of the NDNS RP for the Northern Ireland sample, designed to be nationally representative. It follows the same general format as the UK report⁵ including types and quantities of foods consumed, and compares intakes of key foods and nutrients in Northern Ireland with the UK and by household income and deprivation indices. The report also includes findings from blood indices of nutritional status and salt intakes from measurement of 24-hour urinary sodium excretion. It also includes information on Body Mass Index (BMI), blood pressure, blood cholesterol levels and the socio-demographic characteristics of the participants.

The Health Survey for Northern Ireland 2012/13⁸ showed that 62% of adults measured in Northern Ireland are either overweight (37%) or obese (25%). The need for a strong evidence base which provides information on the dietary health and nutritional status of the Northern Ireland population has become particularly acute with the cross-Departmental Obesity Prevention Strategy for Northern Ireland: *A Fitter Future for All – A Framework for Preventing and Addressing Overweight and Obesity in Northern Ireland 2012-2022*.⁹ The Strategy identifies “marker foods” (fruit and vegetables;¹⁰ sugary, fizzy drinks and squashes;¹¹ confectionery;¹² chips and other fried foods;¹³ and meat products¹⁴). The purpose of the “marker foods” is to monitor those food categories which are of public health interest.

This executive summary provides background information on the survey, including sample and methodology, and presents some of the key findings from the Northern Ireland Years 1 to 4 report on food consumption, nutrient intake and nutritional status.

Headline findings

- Fruit and vegetable consumption in Northern Ireland was significantly lower than in the UK as a whole; 83% of adults, 77% of older adults and 96% of children aged 11 to 18 years in Northern Ireland did not meet the five-a-day recommendation.¹⁵
- Mean intakes of non-starch polysaccharide (NSP) were significantly lower than those in the UK as a whole and for adults were below the recommended level.
- Mean consumption of oil-rich fish was well below the recommended one portion per week and was significantly lower than in the UK as a whole.
- Mean consumption of red and processed meat for men and boys aged 11 to 18 years exceeded the current maximum recommendation for adults.
- Mean intakes of saturated fat exceeded recommendations in all age groups and were similar to or slightly higher than mean intakes in the UK as a whole.
- Mean intakes of non-milk extrinsic sugars (NMES) exceeded recommendations in all age groups except those aged 65 years and over, and were similar to or slightly lower than mean intakes in the UK as a whole.
- Mean salt intakes exceeded the recommended maximum for children aged 11 to 18 years and for both males and females aged 19 to 64 years. Mean intake for adults was similar to that in England.
- For the majority of vitamins and minerals, intakes were similar to or slightly lower than the UK as a whole. As for the UK as a whole, there was evidence of low intakes for some vitamins and minerals, particularly in the 11 to 18 years age group.
- A third of adults aged 19 to 64 years in Northern Ireland had low blood levels of vitamin D, a higher proportion than in the UK as a whole.
- Adults and children in the lowest income / most deprived tertile had lower fruit and vegetable consumption than the highest income / least deprived tertile. They also had lower intakes of NSP and some vitamins and minerals.

Sample and response rates

A random sample of 2,619 addresses from 97 postcode sectors, drawn from the Postcode Address File, was issued in Northern Ireland between April 2008 and March 2012. 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.¹⁶ 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.

Response rates achieved in Northern Ireland for Years 1 to 4 combined were as follows:

Individual response	N	%
Completion of food and drink diary (3 or 4 days) ^a	982 (470 adults, 512 children)	64%
<i>Of those completing a food and drink diary:</i>		
Blood sample obtained ^b	365 (264 adults, 101 children)	56% of adults, 20% of children
24-hour urine sample obtained ^b	565 (304 adults, 261 children)	65% of adults, 63% of children

^a The majority of participants completed four days of the food and drink diary. Only 2% completed three days.

^b 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.

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.¹⁷ Details of the sampling and methods of analyses can be found in Chapter 2 and Appendix B of this report.

Current UK diet and nutrition recommendations

The NDNS RP Northern Ireland findings are compared with the UK recommendations for food and nutrient intakes. Current UK recommendations for consumption of fruit and vegetables, red and processed meat and oily fish are shown below.

Food	Recommendation
Fruit and vegetables	At least 5 portions per day for those aged 11 years and over ¹⁸
Red and processed meat ^a	Should not exceed 70g per day for adults ¹⁹
Oily fish ^b	At least 1 portion per week for all ages (140g) ²⁰

^a Red meat includes beef, lamb, pork, sausages, burgers and kebabs, offal, processed red meat and other red meat.

^b Oily fish includes anchovies, carp, trout, mackerel, herring, jack fish, pilchards, salmon (including canned), sardines, sprats, swordfish, tuna (fresh only) and whitebait

The Dietary Reference Values (DRVs) for key macronutrients are shown below. These 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.

Macronutrient	Dietary Reference Value ²¹
Total fat	Population average no more than 35% of food energy for those aged 5 years and over
Saturated fatty acids	Population average no more than 11% food energy for those aged 5 years and over
<i>Trans</i> fatty acids	Population average no more than 2% food energy
Non-milk extrinsic sugars (NMES)	Population average no more than 11% food energy for all ages
Non-starch polysaccharides (NSP)	Adult population average at least 18g per day

Population adequacy of micronutrient intake is assessed by comparing intake with the age and sex specific UK DRV for each vitamin and mineral.²¹ In addition, biochemical indices of micronutrient status are compared 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.

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.

Food consumption²² and nutrient intakes (Chapter 5)

Table 1.1 provides a summary of the consumption of selected foods for adults and children in Northern Ireland. Seventeen per cent of adults and 23% of older adults met the “5-A-Day” recommendation.^{15,18} Four per cent of boys and girls aged 11 to 18 years met the “5-A-Day” recommendation.¹⁵ Mean consumption of oily fish in all age groups was well below the recommended one portion (140g) per week.²⁰ Mean consumption of red and processed meat

for men aged 19 to 64 years and boys aged 11 to 18 years exceeded the current recommendation that, for adults, average intakes should not exceed 70g per day.¹⁹

Table 1.1 Average daily intake of selected foods, for NDNS RP Northern Ireland Years 1-4 combined

Food	NDNS age group (years)				
	1.5-3	4-10	11-18	19-64	65+
“5-A-Day” portions (portions/day) ^{a,15}	-	-	2.3	3.3	3.6
Fruit g/day ^b	89	89	53	79	110
Vegetables g/day ^c	57	68	83	149	142
Oily fish g/day ^d	1	1	1	4	10
Red and processed meat g/day ^e	39	53	72	82	69
<i>Bases (unweighted)</i>	<i>94</i>	<i>182</i>	<i>236</i>	<i>391</i>	<i>79</i>

^a To calculate “5-A-Day” portions of fruit and vegetables 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.

Table 1.2 provides a summary of the reported total energy intake for adults and children in Northern Ireland. Mean energy intakes were below the Estimated Average Requirement (EAR)²³ for adults and children aged 11 years and over. However it should be borne in mind that the UK doubly labelled water (DLW) sub-study showed evidence of under-reporting of energy intakes in these age groups; see Appendix X of the main report for more details. ‘Cereals and cereal products’ was the largest contributor to energy intake in all age groups. ‘Meat and meat products’ and ‘milk and milk products’ were the other major contributors with ‘milk and milk products’ making a larger contribution in younger children.

Table 1.2 Average daily total energy intake for NDNS RP Northern Ireland Years 1-4 combined

Total energy	NDNS age groups (years)					
	1.5-3 Sex- combined	4-10 Sex- combined	11-18 Sex- combined	19-64 Men Women		65+ Sex- combined
MJ	4.78	6.44	7.40	8.86	6.65	7.21
kcal	1132	1529	1758	2108	1581	1713
<i>Bases (unweighted)</i>	94	182	236	145	246	79

Table 1.3 provides a summary of the intakes of selected macronutrients for adults and children in Northern Ireland.

- Mean intake of total fat met the DRV (no more than 35% food energy) in all age/sex groups except for men aged 19 to 64 years (36.5%). 'Mean intake of saturated fat exceeded the DRV (no more than 11% food energy) in all age/sex groups, whilst mean intake of trans fatty acids met the DRV (no more than 2% food energy). Milk and milk products, cereals and cereal products' and 'meat and meat products' were the main contributors to intake; milk made a larger contribution for younger children.
- Mean NMES intake exceeded the DRV (no more than 11% food energy) for all age/sex groups except those aged 65 years and over. For children, the main source of NMES was 'non-alcoholic beverages' (soft drinks and 'fruit juice' – soft drinks provided 32% of NMES intake in the 11 to 18 years age group with a further 8% from fruit juice). 'Cereals and cereal products' (mainly cakes, biscuits and breakfast cereals) and 'sugar, preserves and confectionery' (mainly confectionery) were the other major contributors in children. For adults aged 19 to 64 years, 'sugar, preserves and confectionery' (including table sugar), 'non-alcoholic beverages' (soft drinks and 'fruit juice') and 'cereals and cereal products' (mainly cakes and 'biscuits') made similar contributions to intake. For older adults, 'cereals and cereal products' was the largest contributor, mainly from cakes and 'biscuits'. 'Sugar, preserves and confectionery' was also a major contributor in this age group (mainly from table sugar).

- Mean intake of non-starch polysaccharide (NSP) for adults aged 19 to 64 years and 65 years and over was below the DRV set for adults of at least 18g per day. 'Cereals and cereal products' and 'vegetables and potatoes' were the main sources of NSP.

Table 1.3 Average daily intake of selected macronutrients, for NDNS RP Northern Ireland Years 1-4 combined

Macronutrient	NDNS age group (years)				
	1.5-3	4-10	11-18	19-64	65+
Total fat % food energy	34.3	33.9	34.1	35.6	34.7
Saturated fatty acids % food energy	14.8	13.6	12.5	13.1	13.9
<i>Trans</i> fatty acids % food energy ^a	0.6	0.6	0.6	0.7	0.8
NMES % food energy	12.2	14.6	14.3	12.1	10.5
NSP g	7.8	9.9	11.3	12.9	13.3
<i>Bases (unweighted)</i>	<i>94</i>	<i>182</i>	<i>236</i>	<i>391</i>	<i>79</i>

^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).

Fifty per cent of men and 41% of women aged 19 to 64 years reported consuming alcohol over the four-day diary period. On average, men in this age group who consumed alcohol during the four-day diary period obtained 10.7% of energy intake from alcohol while women in this age group obtained 6.9%.

Table 1.4 provides a summary of the intakes of selected micronutrients for adults and children in Northern Ireland. Mean intake is compared with the Reference Nutrient Intake (RNI)²⁴ and an estimate is made of the proportion with intake below the Lower Reference Nutrient Intake (LRNI).²⁵

- Mean daily intakes of most vitamins from food sources were close to or above the RNI for all age and sex groups. For girls aged 11 to 18 years, 19%, 21% and 7% had intakes below the LRNI for vitamin A, riboflavin and folate respectively. Twelve per cent of women aged 19 to 64 years had intakes of riboflavin from food sources below the LRNI.

- For vitamin D, RNIs are set only for those aged up to four years and those aged 65 years and over and there are no LRNIs. Mean intakes from food sources were well below the RNI in both these age groups: 25% for children aged 1.5 to 3 years and 36% for adults aged 65 years and over.²⁶
- Mean intakes of most minerals from food sources were below the RNI for some age/sex groups, in particular children aged 11 to 18 years. Substantial proportions of this age group, especially girls, had intakes of minerals (for example iron, magnesium and potassium) below the LRNI. Mean intakes of all minerals were close to or above the RNI for children aged under 11 years and few children in this age group had intakes below the LRNI.
- Twenty-four per cent of adults aged 19 to 64 years (17% of men, 31% of women) and 40% of adults aged 65 years and over reported taking at least one dietary supplement during the four-day diary recording period.

Table 1.4 Average daily intake as a percentage of the Reference Nutrient Intake (RNI) from food sources only and proportion of participants with average daily intakes below the Lower Reference Nutrient Intake (LRNI) for selected micronutrients, for NDNS RP Northern Ireland Years 1-4

Micronutrients ^a	NDNS RP survey years and age groups (years)							
	Boys		Total	Men	Girls		Total	Women
	4-10	11-18	boys	19-64	4-10	11-18	girls	19-64
Vitamin A								
Mean % RNI	129	104	115	136	113	86	98	133
% with intake below the LRNI	2	8	5	11	9	19	15	6
Riboflavin								
Mean % RNI	181	140	158	134	157	115	134	122
% with intake below the LRNI	1	8	5	4	2	21	13	12
Folate								
Mean % RNI	156	115	133	132	141	91	113	105
% with intake below the LRNI	1	2	1	3	0	7	4	5
Iron								
Mean % RNI	115	93	103	127	103	56	77	73
% with intake below the LRNI	1	7	4	3	6	50	31	27
Calcium								
Mean % RNI	167	93	126	122	155	85	116	102
% with intake below the LRNI	1	7	4	5	2	16	10	9
Magnesium								
Mean % RNI	120	77	96	89	116	62	86	78
% with intake below the LRNI	2	26	15	23	5	63	37	14
Potassium								
Mean % RNI	148	77	109	83	143	63	99	69
% with intake below the LRNI	0	12	7	13	2	36	21	24
Selenium								
Mean % RNI	126	77	99	62	121	65	90	65
% with intake below the LRNI	1	27	15	40	3	52	30	60
Zinc								
Mean % RNI	95	90	92	98	90	82	86	103
% with intake below the LRNI	8	10	9	5	8	23	16	6
Bases (unweighted)	94	120	214	145	88	116	204	246

^a The % of RNI for vitamin D has not been included in this table, as RNI's for vitamin D have only been set for those aged 1.5-3 years and 65 years and over.

Detailed age breakdown for young people and adults (Chapter 8)

Results for key foods and nutrients are presented for Northern Ireland for four age groups, subdivided by sex: 11 to 15 years, 16 to 24 years, 25 to 49 years and 50 to 64 years. These age groups differ from the age/sex groups used elsewhere in the report and are referred to as “age sub-groups”.

- Mean daily intake of saturated fat as a percentage of food energy exceeded the DRV for all age sub-groups.
- Mean intake of NMES as a percentage of food energy exceeded the DRV in all age sub-groups, except males and females aged 50 to 64 years.
- Females aged 11 to 15 years had mean intakes below the RNI²⁴ for iron and calcium (59% and 86% respectively). Females aged 16 to 24 years had mean intakes below the RNI²⁴ for iron, calcium and folate (55%, 89% and 84% respectively), and females aged 25 to 49 years had mean intakes below the RNI²⁴ for iron only (61% of the RNI).
- For females, 44%, 51% and 36% of those aged 11 to 15 years, 16 to 24 years and 25 to 49 years respectively had iron intakes below the LRNI. For females, 16%, 12%, 9% and 9% of those aged 11 to 15 years, 16 to 24 years, 25 to 49 years and 50 to 64 years had calcium intakes below the LRNI and 14% of females aged 16 to 24 years had intakes below the LRNI²⁵ for folate.
- The number of portions of fruit and vegetables consumed per day and the proportion of participants meeting the “5-A-Day” recommendation¹⁸ increased with age but overall was lower for all age/sex sub-groups in Northern Ireland compared with the UK.
- Overall, mean consumption of Northern Ireland “marker foods”, other than fruit and vegetables, (sugar, fizzy drinks and squashes;¹¹ confectionery;¹² chips and other fried foods;¹³ and meat products¹⁴) tended to be higher in Northern Ireland compared to the UK.

Intake by equivalised income or by Northern Ireland Multiple Deprivation Measure (Chapter 9)

Households were grouped into tertiles, ranked by equivalised income²⁷ and separately by Northern Ireland Multiple Deprivation Measure (NIMDM).²⁸ Statistical comparisons were undertaken for intakes of key foods and nutrients by tertiles of equivalised income or NIMDM within each sex-combined age group. Tertile 3 (the highest income or lowest deprivation) was used as the reference category.

- There were some differences observed in food consumption, energy and nutrient intakes by equivalised household income and NIMDM tertiles, particularly for fruit and vegetable consumption. Differences were clearest between the lowest and highest tertiles but were not seen in all age groups.
- Overall, there were no clear differences by equivalised household income or NIMDM for energy intake or macronutrients. The exception was NSP intake which was lower in the lowest income/most deprived tertiles in all age groups.
- Mean intake of micronutrients tended to be lower in the lower equivalised income tertiles and the most deprived NIMDM tertiles compared with the least deprived tertiles. The differences reached statistical significance in some age groups for iron, vitamin C, vitamin D and folate.
- Mean fruit and vegetable consumption expressed in grams and as “5-A-Day” portions¹⁸ was lower in the lowest income/most deprived tertiles than the highest income/least deprived tertiles when split by equivalised income and by NIMDM, with some age groups showing a pattern of increasing intake from the lowest income/most deprived tertile to the highest income/least deprived tertile. However, mean consumption in all tertiles was below the recommendation of “5-A-Day”.¹⁸
- No consistent pattern for total meat, red meat, total fish or oily fish consumption was observed across the age groups.

- With the exception of confectionery,¹² consumption of the Northern Ireland 'marker foods' (sugary, fizzy drinks and squashes,¹¹ chips and fried foods¹³ and meat products¹⁴) tended to be higher in the lower income/most deprived tertiles.

Comparisons between Northern Ireland and the UK for intakes of key foods and nutrients (Chapter 10)

Statistical comparisons were undertaken for intakes of key foods and nutrients between the Northern Ireland sample and the whole of the UK sample of the NDNS RP Years 1 to 4 combined.²⁹ Results are presented by standard age groups; 1.5 to 3 years, 4 to 10 years, 11 to 18 years, 19 to 64 years and 65 years and over and are also subdivided by sex (except for children aged 1.5 to 3 years and adults aged 65 years and over, where numbers are insufficient to subdivide by sex).

- In two age groups (men aged 19 to 64 years and girls aged 4 to 10 years) mean intake of total fat as a % of food energy was significantly higher in Northern Ireland compared with the UK. Mean saturated fat intake as a % of food energy was also higher in adults aged 19 to 64 years in Northern Ireland (13.1%) compared with the UK (12.6%).
- There was no consistent pattern of differences in NMES intakes between Northern Ireland and the UK across the age groups.
- Mean intake of NSP was lower in all age/sex groups in Northern Ireland compared with the UK. Mean intakes were statistically significantly lower for boys and girls aged 4 to 10 years and men aged 19 to 64 years in Northern Ireland compared with the UK.
- Mean iron intake was below the RNI in females aged 11 to 18 and 19 to 64 years in both Northern Ireland and the UK. In girls aged 4 to 10 years and women aged 19 to 64 years mean iron intake was significantly lower in Northern Ireland compared with the UK.
- Mean intake of folate was significantly lower in girls aged 4 to 18 years and in men and women aged 19 to 64 years in Northern Ireland compared with the UK.

- Mean consumption of fruit and vegetables was lower in all age/sex groups in Northern Ireland compared with the UK. All age groups in Northern Ireland where the “5-A-Day” criteria can be applied had a statistically significantly lower mean consumption of portions of fruit and vegetables compared to the UK.
- Mean red meat consumption was higher in Northern Ireland compared with the UK in all age/sex groups whereas mean oily fish consumption was lower in all age/sex groups in Northern Ireland compared with the UK.
- For comparisons between the Northern Ireland sample of the NDNS RP and the Irish National Adult Nutrition Survey (NANS)^{30,31} mean energy intake, dietary fibre, iron, calcium, vitamin C and folate intake was higher in NANS compared with the NDNS RP. A similar picture was also observed for mean fruit and vegetable consumption. However, the methodological differences of the surveys should be kept in mind when comparing these two different surveys.

24-hour urine analyses: Sodium excretion and estimated Salt intake³²

Erratum note: The results in this section were excluded from the original report published in February 2015. The results published here have been corrected to take account of analytical bias in sodium concentrations and are in line with data republished in the UK year 1-4 report in February 2017 and the urinary sodium surveys of adults in England and Scotland (2014)^{33,34} and Northern Ireland (2015).³⁵

Salt intake has been estimated from urinary sodium excretion. Table 1.5 presents the recommended maximum salt intake per day for adults, which was set by COMA³⁶ 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.³⁷

In Northern Ireland, for those aged 11 to 18 years and adults aged 19 to 64 years, mean estimated salt intake was higher than the maximum recommended intake.

Mean estimated salt intake was 6.7g/day for children aged 11 to 18 years and 8.6g/day for adults aged 19 to 64 years; 9.7g/day for men aged 19 to 64 years and 7.5g/day for women aged 19 to 64 years. The mean estimated salt intake for children aged 11 to 18 years was 12% greater than the SACN recommendation of a population average of no more than 6g/day, whilst the mean estimated salt intake for adults aged 19 to 64 years was 43% greater than the SACN recommendation.

Since this report was originally published new data have been published for salt intakes for adults in England (2014)³³ and Northern Ireland (2015).³⁵ This report has not been updated to reflect these new results.

Table 1.5 Average estimated salt intake (g/day), for NDNS RP Northern Ireland Years 1-4 combined compared with NDNS RP UK Years 1-4 combined, by age^a					
NDNS age/sex group^b	Recommended maximum salt intake (g/day)^{36,37,c,d}	Northern Ireland Years 1-4 combined^e (g/day)	Northern Ireland Years 1-4 combined^e % difference of sample mean from population recommendation	UK Years 1-4 combined^{e,f} and England 2011 survey^{e,g} (g/day)	UK Years 1-4 combined^{e,f} and England 2011 survey^{e,g} % difference of sample mean from population recommendation
11 to 18 years	6	6.7 (n=60)	12 (n=60)	7.0 ^f (n=377)	16 ^f (n=377)
19 to 64 years	6	8.6 (n=170)	43 (n=170)	8.5 ^g (n=547)	49 ^g (n=547)
19 to 64 years males	6	9.7 (n=67)	61 (n=67)	9.8 ^g (n=250)	63 ^g (n=250)
19 to 64 years females	6	7.5 (n=103)	26 (n=103)	7.2 ^g (n=297)	20 ^g (n=297)

^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 RP⁵ 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 2011.³⁸

Biochemical indices of nutritional status (Chapter 6)

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

- There was evidence of low vitamin D status in all age/sex groups in Northern Ireland. For children aged 11 to 18 years; 29.5% had a 25-OHD concentration below 25nmol/L (the current threshold indicating vitamin D adequacy) at the time of venepuncture. For adults, 34.3% of those aged 19 to 64 years and 18.7% of those aged 65 years and over had a 25-OHD concentration below 25nmol/L at the time of venepuncture. For adults aged 19 to 64 years and children aged 11 to 18 years the proportion with low vitamin D status was higher in Northern Ireland than in the UK as a whole. Low vitamin D status has implications for bone health, including increasing the risk of rickets and osteomalacia.
- There was evidence of iron-deficiency anaemia (as indicated by low haemoglobin concentrations) and low iron stores (plasma ferritin) in 4.2% of adult women in Northern Ireland, a similar proportion to UK as a whole.
- A substantial proportion of participants aged four years and over had riboflavin status values, based on raised EGRAC, indicating biochemical depletion. However, there is uncertainty about the functional consequences of a raised EGRAC. Therefore, in addition to using this threshold, changes in the riboflavin status of the UK population will also be monitored by reviewing the EGRAC values at the 75th and 90th percentiles in successive years (see Table 6.2).

- There is little evidence of low status for other micronutrients where normal ranges or thresholds for low status have been set. Mean values for vitamin C, B₁₂, thiamin as indicated by ETKAC, retinol and vitamin E fell within the normal range.
- In adults aged 19 to 64 years and 65 years and over, 35.4% and 16.9% respectively had a serum total cholesterol between 5.2 and 6.4mmol/L, indicating a marginally increased risk of cardiovascular disease. The proportion of adults aged 19 years and over with a serum total cholesterol between 6.5 and 7.8mmol/L indicating moderately elevated cardiovascular risk was 7.6% for those aged 19 to 64 years and 22.9% for those aged 65 years and over, with a further 1.0% of those aged 19 to 64 years having a serum total cholesterol greater than 7.8mmol/L, indicating severe risk.

Methodological issues

An overview of the purpose, documents, methodologies, procedures for data collection and quality control are provided in the main report along with supporting technical appendices. These include a consideration of the methodological issues and limitations which include self reported measures of food intake, time between diet and nutritional status assessment and days of the week in the food diary. This should be borne in mind while interpreting these findings (see Chapter 5 and Appendix X of the main report for more detail).

Future reports

A urinary sodium survey of adults aged 19 to 64 years in Northern Ireland³⁵ in 2015 and urinary sodium surveys of adults aged 19 to 64 years in Scotland³⁴ and in England³³ in 2014 as part of the NDNS RP were published in 2016. A direct comparison of estimated salt intakes between Northern Ireland and England are available in the 2015 Northern Ireland sodium survey report published in 2016.³⁵

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.

A further round of additional recruitment in Northern Ireland is taking place over four years from 2013/14 to 2016/17. This will allow an analysis of changes in the Northern Ireland diet and nutrition over time.

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 HNR.

³ FSA in NI, DHSSPS and SafeFood have funded boosts in Years 1 to 4 and Years 6 to 9.

⁴ Increased sample sizes were similarly funded in Scotland and Wales by government bodies in those countries. Results for Scotland have been published: (<http://www.food.gov.uk/scotland/researchscot/scotlandresearch/ScotlandProjectList/n10036>) and a separate report containing results for Wales will be published in 2015.

⁵ 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).

⁶ National Diet and Nutrition Survey Rolling Programme (NDNS RP): results from Years 1- 4 (combined) for Scotland (2008/09-2011/12) <http://www.food.gov.uk/sites/default/files/ndns-scotland-full-report.pdf> (accessed 15/10/14).

⁷ Ashwell M, Barlow S, Gibson S, Harris C (2006) National Diet and Nutrition Surveys: the British experience. *Public Health Nutrition* 9(4) 523-530.

⁸ http://www.northernireland.gov.uk/news-dhssps-200314-health-survey-northern?WT.mc_id=rss-news (accessed 11/12/14).

⁹ <http://www.northernireland.gov.uk/index/media-centre/news-departments/news-dhssps-march-2013-archive/news-dhssps-november-2010-archive/news-dhssps-151110-fitter-futures-key.htm> (accessed 23/09/14).

¹⁰ Total fruit and vegetables – Total disaggregated fruit and vegetables (excluding fruit juice). A full definition is provided in Appendix R of the main report.

¹¹ Sugary, fizzy drinks and squashes – All types including squashes and cordials, carbonates. Not 100% fruit juice. Not mineral water (please note that this food group is referred to as 'Soft drinks, not low calorie' in Appendix R). A full definition is provided in Appendix R of the main report.

¹² Confectionery – NDNS food groups 43 (sugar confectionery) and 44 (chocolate confectionery). A full definition is provided in Appendix R of the main report.

¹³ Chips and other fried foods – NDNS food groups 38A (chips purchased retail or takeaway. Includes oven and microwave chips), 38C (other purchased potato products fried or baked) and 38D (homemade chips/fried and roast potatoes). A full definition is provided in Appendix R of the main report.

¹⁴ Meat products (including sausages, burgers, meat/chicken pies) – NDNS food groups 29 (burgers - not chicken burgers), 30 (sausages), 31 (meat pies - including chicken pies) and 26A (manufactured coated chicken products). A full definition is provided in Appendix R of the main report.

¹⁵ In the first publication of this report (in February 2015), “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 February 2015.

¹⁶ 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.

¹⁷ 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.

¹⁸ Department of Health 5 A DAY programme [online]
<http://www.nhs.uk/Livewell/5ADAY/Pages/5ADAYhome.aspx> (accessed 22/10/14).

¹⁹ Scientific Advisory Committee on Nutrition. Iron and Health. London: TSO, 2010. This recommendation applies to adults only. The recommendation is that adults with relatively high intakes of red and processed meat (of 90g or more per day) should consider reducing their intakes.

²⁰ Scientific Advisory Committee on Nutrition. Advice on fish consumption: benefits and risks. London: TSO, 2004.

²¹ 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.

²² Results for food consumption include vegetables, fruit, meat and fish after disaggregation (i.e. including the contribution from composite dishes, both homemade dishes and manufactured products, containing these ingredients but excluding other components of these dishes).

²³ Scientific Advisory Committee on Nutrition. Dietary Recommendations for Energy:[Online]. Available http://www.sacn.gov.uk/pdfs/sacn_dietary_reference_values_for_energy.pdf (2011) (accessed 03/03/14).

²⁴ 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.

²⁵ 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.

²⁶ For vitamin D, RNIs are only set for those aged up to four years and those aged 65 years and over.

²⁷ Equivalisation is a standard methodology that adjusts household income to account for different demands on resources, by considering the household size and composition.

²⁸ The Northern Ireland Multiple Deprivation Measure (NIMDM) 2010 comprises seven domains of deprivation, each developed to measure a distinct form or type of deprivation; income, employment, health, education, proximity to services, living environment and crime. Although the term deprivation is often synonymous with monetary poverty it is important to note that only the Income Deprivation Domain is intended to measure poverty in this sense. The remaining six domains focus on other types of deprivation, such as the lack of adequate education or poor health. The domains can be interpreted individually or combined to assess deprivation in more than one domain. http://www.nisra.gov.uk/deprivation/archive/Updateof2005Measures/NIMDM_2010_Report.pdf.

²⁹ The Northern Ireland sample includes core and boost participants. The UK sample also includes the core and boost participants from Northern Ireland. In the UK data, the Northern Ireland cases were weighted down to represent the proportion of participants that the Northern Ireland core participants represent in the UK NDNS RP survey population.

³⁰ The Irish National Adult Nutrition Survey, (2011) was carried out by the Irish Universities Nutrition Alliance. This survey investigated habitual food and beverage consumption, lifestyle, health indicators and attitudes to food and health in a representative sample (n=1500) of adults aged 18 years and over in the Republic of Ireland during 2008-2010. A sample of 1500 adults (men 740, women 760) aged between 18 and 90 years from across the Republic of Ireland took part in the National Adult Nutrition Survey (NANS). Individuals were selected for participation from the Data Ireland (An Post) database of free-living adults in Ireland. Each individual who was selected was contacted by mail and followed up shortly afterwards with a visit from a researcher. Eligible persons (adults aged 18 years and over, excluding women who were pregnant or breast-feeding) were invited to participate and a consent form was signed.

³¹ In Chapter 10 of the main report headline comparisons have been made with the Northern Ireland sample of the NDNS RP and the most recent Irish National Adult Nutrition Survey (NANS) (2011) and observed differences only are reported.

³² 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.

³³ 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 27/06/16).

³⁴ 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 27/06/16).

³⁵ National Diet and Nutrition Survey: Assessment of dietary sodium - Adults (19 to 64 years) in Northern Ireland 2015; <https://www.food.gov.uk/northern-ireland/nutritionni/national-diet-and-nutrition-survey-assessment-of-dietary-sodium>. Published 2016 (accessed 06/10/16).

³⁶ Department of Health. Report on Health and Social Subjects: 46. Nutritional Aspects of Cardiovascular disease. HMSO (London, 1994).

³⁷ 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).

³⁸ 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 (accessed 15/09/14).