National Diet and Nutrition Survey (NDNS RP): Results for Years 5 to 9 (combined) of the Rolling Programme for Northern Ireland (2012/13 - 2016/17) and time trend and income analysis (Years 1 to 9; 2008/09 - 2016/17)

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

Prepared by: Beverley Bates, Robin Clifford, David Collins, Lorna Cox, Naomi Davidson, Clifton Gay, Sonja Nicholson, Marian O'Reilly, Polly Page, Caireen Roberts, Toni Steer and Gillian Swan

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MRC Elsie Widdowson Laboratory

About Food Standards Agency in Northern Ireland

Food Standards Agency in Northern Ireland (FSA in NI) is responsible for devolved matters relating to food safety, standards, nutrition and dietary health in Northern Ireland and has responsibility for monitoring the diet of the population in Northern Ireland.

Food Standards Agency in Northern Ireland
10 A-C Clarendon Road
Belfast
BT1 3BG
Tel: 028 9041 7700
www.food.gov.uk
email: infofsani@food.gov.uk

For queries relating to this document, please contact:
executive.support@food.gov.uk

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Contents

Executive summary

The National Diet and Nutrition Survey Rolling Programme (NDNS RP) is a continuous cross-sectional survey, 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. A representative sample of around 1000 people (500 adults and 500 children) take part in the NDNS RP each year.

The NDNS RP comprises an interview, a 4-day estimated diet diary, physical measurements and a blood and urine sample. Results are used by government to monitor progress toward diet and nutrition objectives of UK Health Departments and to develop policy interventions.

Fieldwork for the first 9 years of the NDNS RP was carried out between 2008/09 and 2016/17.

Food Standards Agency in Northern Ireland (FSA in NI) has responsibility for monitoring the diet of the population in Northern Ireland and has co-funded additional recruitment (i.e. boosted sample) in Years 1-4 (2008/09-2011/12) and Years 6-9 (2013/14-2016/17)[1] in order to achieve representative data for Northern Ireland and enable comparisons to be made with UK results. The Northern Ireland boost is co-funded by the Northern Ireland Steering Group which comprises three funding partners: the Department of Health (DoH); *safe*food (Food Safety Promotion Board) and FSA in NI

The foods and nutrients and urinary analyte presented in this report were selected for their nutritional and public health relevance to current dietary concerns in Northern Ireland. Results are analysed for five age groups: 1.5 to 3 years; 4 to 10 years; 11 to 18 years; 19 to 64 years and 65 years and over, split by sex in all except the youngest age group.

Key findings

Food consumption, nutrient intakes and urinary spot iodine compared with recommendations

(Years 5 to 9; 2012/13-2016/17)

- Consumption of 5 A Day fruit and vegetable portions was below the recommendation in all age/sex groups. Average consumption of fruit and vegetables for children aged 11 to 18 years in Northern Ireland was 2.5 portions per day with 94% not meeting the 5 A Day recommendation. On average adults aged 19 to 64 years consumed 3.4 portions per day and adults aged 65 years and over consumed 3.3 portions per day with around 80% not meeting the 5 A Day recommendation.
- Average consumption of oily fish was equivalent to 7-15g per week in children and 30-60g per week in adults, well below the recommended 1 portion (140g) per week.

[1] In Year 5 (2012/13) recruitment in Northern Ireland was not boosted. Therefore, data in this report is based on participants in Northern Ireland from the UK core sample together with a boosted Northern Ireland sample in Years 1-4 and Years 6-9.

- Average daily consumption of red and processed meat for men aged 19 to 64 years exceeded the current maximum recommendation for adults by 19g.[2,3]
- For all age/sex groups, average intakes of saturated fatty acids exceeded the current recommendation of no more than 11% of food energy providing 12.7-13.3% of food energy for children aged 4 years upwards and 13.3-14.0% for adults.
- Average intakes of *trans* fatty acids met the recommendation of no more than 2% of food energy in all age/sex groups.
- Intakes of free sugars[4] exceeded the recommendation of no more than 5% of total energy from free sugars in all age/sex groups. Average intake was 12.8% of total energy for children aged 1.5 to 3 years, 13.6% for those aged 4 to10 years and 15.1% for children aged 11 to 18 years. Average free sugars intake was 9.3-10.5% of total energy for adults. Overall, 95-97% of children and 84-87% of adults did not meet the recommendation.
- For AOAC fibre,[5] average intakes were 9.9g for children aged 1.5 to 3 years, 12.9g for those aged 4 to 10 years and 14.6g for children aged 11 to 18 years. Intakes of AOAC fibre were 17.3-17.6g for adults. Overall, 94-98% of the population were not meeting the recommendations.[6]
- There was evidence of low intakes for some vitamins and minerals, particularly in the 11 to 18 years age group where average intakes of vitamin A, folate, iron, calcium, magnesium, potassium, iodine, selenium and zinc were below recommendations.
- Average intakes of vitamin D were well below the recommended 10µg/day in all age/sex groups.
- Overall, the median concentration of iodine in spot urine samples for most age/sex groups was above the threshold indicating adequate iodine status for the Northern Ireland population. For girls aged 11 to 18 years, the median urinary iodine concentration did not meet the threshold although it should be noted that the number of samples in this age group is small.

Trends over time (Years 1 to 9; 2008/09-2016/17)

- There was little change in intake of fruit and vegetables over the 9-year period.
- There was little change in intake of oily fish over the 9-year period, except in the proportion of consumers aged 1.5 to 3 years which fell by 12 percentage points.
- Intake of red and processed meat showed a downward trend over time in the 11 to 18 years and 19 to 64 years age groups.
- Over the 9 years, the proportion of the population consuming sugary, fizzy drinks and squashes dropped by 34, 20 and 28 percentage points for those aged 4 to 10 years, 11

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[2] NHS. Eat Well: Meat in your diet. [Internet]. Available from: www.nhs.uk/Livewell/Goodfood/Pages/meat.aspx.
[3] The Department of Health has advised that people who eat a lot of red and processed meat a day (more than 90g cooked weight) cut down their intake to 70g.
[4] The definition of free sugars includes all added sugars in any form; all sugars naturally present in fruit and vegetable juices, purees and pastes, and similar products in which the structure has been broken down; all sugars in drinks (except for dairy-based drinks) and lactose and galactose added as ingredients. Further details of the methodology for determining free sugars in the NDNS RP are provided in appendix AA.
[5] AOAC fibre is the term used to describe fibre measured by the American Association of Analytical Chemists (AOAC) methods. AOAC fibre includes resistant starch and lignin in the estimation of total fibre as well as NSP
[6] The Scientific Advisory Committee on Nutrition (SACN) AOAC fibre recommendations: 30g/day for adults; 25g/day for older children aged 11-16 years; 20g/day for the 5-11 year age group; 15g/day for the 2-5 years age group.

to 18 years and 19 to 64 years respectively. There was a downward trend in intake over time among children who drank sugary, fizzy drinks and squashes, however the decrease was only significant for children aged 11 to 18 years.

- There was a downward trend in intake of free sugars, although average intakes exceeded the current recommendation of no more than 5% of total energy from free sugars in all age/sex groups over the 9 years. As a percentage of total energy, free sugars intake dropped by 4.5, 3.5 and 4.5 percentage points over the 9 years for boys aged 4 to 10 years, girls aged 11 to 18 years and men aged 19 to 64 years respectively.
- There were small but not significant decreases in total fat intake over the 9-year period. No trend over time was seen in saturated fatty acid intakes as a percentage of food energy, except for children aged 1.5 to 3 years where intakes fell by 1.8 percentage points over the 9 years. Adults and children showed a significant reduction in *trans* fatty acids intake as a percentage of food energy over time.[7]
- There was little change in AOAC fibre intake over time.
- There was a downward trend in intakes of most vitamins and minerals over the 9-year period for many age/sex groups.
- There was a significant decrease over time in sodium intake[8] in all age groups.

Equivalised household income[9] (Years 5 to 9; 2012/13-2016/17)

- There was evidence of greater intake of fruit and vegetables with increasing income in all age/sex groups. Higher percentages of consumers of fruit juice were also seen with increasing income.
- There was a significant decrease in the proportion of children aged 4 to 10 years consuming sugary, fizzy drinks and squashes with increasing income. For all age groups, among those who drank sugary, fizzy drinks and squashes, intakes tended to decrease with increasing household income.
- Intake of total fat as a percentage of energy tended to increase with increasing income for adults but decrease with increasing income for children. There was no consistent pattern across age/sex groups in saturated fatty acid intake with respect to income.
- For free sugars, there was no consistent pattern in intake with respect to income although intakes decreased significantly with income for children aged 4 to 10 and 11 to 18 years.
- Intakes of AOAC fibre and most vitamins and minerals tended to increase with increasing income.
- Changes in sodium intake[8] with respect to income were small and not in a consistent direction.

[7] The levels of *trans* fats produced artificially through food processing have been reduced. NDNS relies on the availability of food composition data to support estimation of nutrient intakes. This decrease in intake may reflect changes in the composition of foods that took place some time ago, rather than changes in actual nutrient intakes in the survey population over the 9-year period.
[8] Sodium intake estimates are based on the sodium content of foods consumed. They do not fully take account of salt added during cooking and exclude salt added at the table by participants.
[9] Equivalisation is a standard methodology that adjusts household income to account for different demands on resources, by considering the household size and composition.

1 Background and purpose

1.1 Introduction

The National Diet and Nutrition Survey Rolling Programme (NDNS RP) is a cross-sectional survey with 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)[10] and the UK Food Standards Agency (FSA). FSA in Northern Ireland (FSA in NI) has responsibility for monitoring the diet of the population in Northern Ireland and has co-funded additional recruitment (i.e. boosted sample) in Years 1 to 4 (2008/09-2011/12) and Years 6 to 9 (2013/14-2016/17)[11] in order to achieve representative data for Northern Ireland and enable comparisons to be made with UK results. The Northern Ireland boost is co-funded by the Northern Ireland Steering Group which comprises three funding partners: the Department of Health (DoH); *safe*food (Food Safety Promotion Board) and FSA in NI.

Years 1 to 9 (2008/09-2016/17) of the NDNS RP were carried out by a consortium comprising NatCen Social Research (NatCen) and the Medical Research Council Elsie Widdowson Laboratory (MRC EWL) with fieldwork in Northern Ireland carried out by the Northern Ireland Statistics and Research Agency (NISRA).[12, 13]

The NDNS provides the only source of nationally representative UK data on the types and quantities of foods consumed by individuals, from which estimates of nutrient intake for the population are derived.[i] Results are used by government to monitor progress toward diet and nutrition objectives of UK Health Departments and to develop policy interventions, for example

[10] From 1 April 2013, responsibility for the NDNS contract transferred from the Department of Health in England to the Department of Health's Executive Agency, Public Health England (PHE).

[11] In Year 5 (2012/13) recruitment in Northern Ireland was not boosted. Therefore, data in this report is based on participants in Northern Ireland from the UK core sample together with a boosted Northern Ireland sample in Years 1-4 and Years 6-9.

[12] The MRC Elsie Widdowson Laboratory (MRC EWL) was previously called MRC Human Nutrition Research (MRC HNR). The Unit was closed at the end of December 2018 having been the scientific lead for the NDNS RP Years 1 to 10 (2008/09 – 2017/18). For NDNS RP Years 11 to 14 (2018/19-2021/22) scientific leadership for the NDNS is provided through the NIHR BRC Diet, Anthropometry and Physical Activity Group and Nutritional Biomarker Laboratory in the MRC Epidemiology Unit at the University of Cambridge. This research theme is led by the MRC Epidemiology Unit which joined the NDNS consortium in Year 10 (2017/18).

[13] In Years 1 to 5 (2008/09-2012/13) the consortium also included the University College London Medical School (UCL).

work to monitor progress towards a healthy, balanced diet as visually depicted in the Eatwell Guide[ii] and in Northern Ireland in relation to strategy marker foods published in the obesity prevention strategy.[iii, 14] The NDNS is an important source of evidence underpinning the Scientific Advisory Committee on Nutrition's (SACN) work relating to national nutrition policy. The food consumption data are also used by the FSA to assess exposure to chemicals in food, as part of the risk assessment and communication process in response to a food emergency or to inform negotiations on setting regulatory limits for contaminants.

The NDNS programme began in 1992 as a series of cross-sectional surveys designed to be representative of the British population, each covering a different age group: pre-school children (aged 1.5 to 4.5 years);[iv] young people (aged 4 to 18 years);[v] adults (aged 19 to 64 years)[vi] and older adults (aged 65 years and over).[vii] Since 2008, the NDNS has run continuously as a rolling programme (RP) covering adults and children aged 1.5 years and over. Methods used in the NDNS are kept under review to ensure they remain the best practical methods available.

1.2 Content of this report

This report includes the following analyses:[viii,15]

- Descriptive statistics on types and quantities of food consumed including that for strategy marker foods,[iii] nutrient intake and iodine status for the Northern Ireland population for Years 5 to 9 (2012/13 to 2016/17).
- Trends over time in relation to food consumption, including that for strategy marker foods,[iii] and nutrient intakes in Northern Ireland for the first 9 years of the NDNS RP (2008/09-2016/17). In addition these trends are compared with trends for equivalent food consumption and nutrient intakes in the UK as a whole.[16]

[14] Fruit and vegetables; sugary, fizzy drinks and squashes; confectionery; chips and other fried foods; and meat products form part of the "marker foods" set out by 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*.

[15] The report does not include results of blood sample analysis as from Year 5 onwards, blood was only taken from core NI participants, not those in the boost NI sample. Numbers are therefore too small for meaningful analysis. Information about blood sampling, processing and analysis methods are detailed in the UK Years 1-9 report.

[16] Additional recruitment was undertaken in Northern Ireland (Years 6 to 10) and in Wales (Years 5 to 9) in order to achieve representative data for each country and to enable comparisons to be made with UK results.

- Analysis of food consumption, nutrient intake and iodine status by equivalised household income[17] for Years 5 to 9 (2012/13 to 2016/17). These income trends are compared with equivalent income trends for food consumption, nutrient intakes and iodine status in the UK as a whole.

Background information on the survey, including the sample and methodology is provided in chapter 2 and further details can be found in the appendices.[18]

The time trend and equivalised income analyses in this report have been conducted on a number of key foods, nutrients, and urinary iodine, selected for their nutritional and public health relevance to current dietary concerns in Northern Ireland and the UK. Plots (and tables) are provided in Excel and commentary is provided in chapters 2 to 7.

1.3 Interpreting the time trend and income analysis

In this report the time trend and equivalised income[17] analyses have been presented as plots in Excel and the following guidance is provided to aid interpretation of these plots. Appendix U provides a full explanation of the analytical approach.

- In each case the analysis has been summarised using the slope of the regression line along with the 95% confidence interval. Where there is a statistically significant trend ($p<0.05$) the quantification of the slopes have been assigned an asterisk. The slope of the regression line represents the average change per year (trend analysis) or per £10,000 (income analysis).
- A comparison between the slope of the regression line for Northern Ireland with the slope of the regression line for UK has also been provided along with the 95% confidence interval. Where there is a statistically significant difference between the NI and UK trends ($p<0.05$) the quantification of the difference of the slopes have been assigned a hat symbol.
- Where a data distribution was highly skewed it was analysed on a log scale. In these cases the geometric mean is the most appropriate average and changes are

[17] Equivalisation is a standard methodology that adjusts household income to account for different demands on resources, by considering the household size and composition.
[18] Appendices A,B and L- AA describe in detail the methodology and protocols employed in the RP. Appendices C-J include the survey materials, including participant-facing documents.

represented as ratios of geometric means (rather than differences of arithmetic means as they were for non-logged analyses). The average per year (trend analysis) or per £10,000 (income analysis) ratio of geometric means has been converted into a percent change per year or per £10,000.

- Information has been provided in appendix U of this report regarding how to calculate the average increase/reduction over the 9 years of the survey for the time trend analysis. The calculation method for variables analysed on the log scale is slightly different from that for variables that are analysed on the untransformed linear scale. Nine-year change values are presented in Excel tables U.1-U.4 and should be interpreted in conjunction with the time trend analysis Excel plots.
- Sometimes the slope for one age/sex group will be statistically significant despite other groups having larger slopes that are not significant. This is because a change over time is easier to detect in age/sex groups with larger sample sizes or with less variation between data points.
- For foods where there are a large number of non-consumers, percentage of consumers and intakes for consumers only are presented instead of population intakes. This is because the regression analysis of the population consumption is highly influenced by zero values which can be misleading.

1.4 Methodological changes during Years 1 to 9 of the NDNS RP

The data collection and analysis methods used in the first 9 years of the NDNS RP (2008/09-2016/17) were kept as consistent as possible over time. Dietary data is self-reported and was collected through a 4-day food and drink diary in all years.

1.5 Methodological considerations

The misreporting of energy intake (EI) is known to be an issue for all dietary surveys and studies.[ix,x] Previous NDNS and the current NDNS RP are unique amongst large-scale population surveys in their inclusion of doubly labelled water (DLW)[19] as an objective biomarker

[19] The doubly labelled water technique (DLW) is widely agreed to be the most accurate way of assessing energy expenditure over one to two weeks. Participants in DLW studies drink a weighed amount of water labelled with known amounts of the stable isotopes of hydrogen (^{2}H) and oxygen ($^{18}O_2$) based on their body weight. Loss of the 2 isotopes from body water is assessed by measurement of the rate of decline in concentration of the isotope in

to validate EI estimated from reported food consumption. In the NDNS RP, estimates of EI from the 4-day diary were compared with measurements of total energy expenditure (TEE) using the DLW technique in 2 separate sub-samples of survey participants. The first sub-sample was taken from Year 1 (2008/09) and Year 3 (2010/11) and the second sub-sample from Year 6
(2013/14) and Year 7 (2014/15) for the UK as a whole. The results of analysis of the most recent DLW sub-study for the UK as a whole indicated that reported EI in children aged 4 to 10 years was on average 13% lower than TEE measured by the DLW technique, 31% lower in children aged 11 to 15 years, 33% lower in adults aged 16 to 64 years and 28% lower in adults aged 65 years and over. These results are consistent with findings from the DLW sub-sample taken from Years 1 and 3 which were reported in appendix X of the UK Years 1 to 4 report.[xi]

The energy and nutrient intakes presented in this report have not been adjusted to take account of misreporting.

Appendix X provides a summary of the DLW method, the results of the UK analysis in Years 6 and 7 and an illustration of a number of considerations relevant to the interpretation of the survey findings. Appendix X of the UK Years 1 to 4 report[xi] provides the results of the UK analysis for the DLW sub-study carried out in Years 1 and 3.

1.6 Changes to UK dietary recommendations

Government advice on energy and nutrient intakes is based on recommendations from the Committee on Medical Aspects of Food and Nutrition Policy (COMA) and its successor, the Scientific Advisory Committee on Nutrition (SACN).[20] Since the start of the NDNS RP in 2008 government has revised its advice on energy intakes, red and processed meat consumption, and intakes of sugars, fibre and vitamin D, as a result of changes to recommendations from SACN. Revised advice has also been issued on consumption of fruit juice and smoothies in the context of government 5 A Day recommendations. Current UK recommendations for foods are shown in table A. Current UK recommendations for macronutrients and micronutrients are shown in Excel tables 3.4, 3.15 and 3.16.

samples of the subject's urine, collected during the study period, and measured by isotope ratio mass spectrometry. The difference between the elimination rates of the 2 isotopes reflects the rate at which CO_2 is produced from metabolism. Energy expenditure can then be estimated from the CO_2 production.

[20] The Scientific Advisory Committee on Nutrition (SACN) was established in 2000 following the disbandment of COMA in March 2000.

In 2011 SACN[xii] undertook a review of the evidence for energy requirements, and made revised recommendations for energy intake. The revised recommendations for most age/sex groups (except for infants and young children) were higher than those originally set by COMA in 1991. Government decided to cap recommendations at 10.5MJ (2500kcal)/day for males and 8.4MJ (2000kcal)/day for females to help address issues of overweight and obesity. In the same year SACN also published its review of iron and health[xiii] which included a consideration of the evidence for red and processed meat consumption and colorectal cancer risk. SACN recommended that adults with high intakes of red and processed meat (around 90g/day or more) should consider reducing their intakes towards the UK average of around 70g/day. A mean intake of 70g/day is used as the threshold for monitoring purposes.

In 2015, the definition and dietary recommendations for sugars and fibre were revised by SACN.[xiv] SACN recommended that a definition of free sugars should be adopted in the UK replacing the term non-milk extrinsic sugars (NMES) on which sugar intake recommendations had been based for the previous 25 years. SACN recommended that free sugars intake should not exceed 5% of total energy intake for adults and children over 2 years. As the definitions of free sugars[xv] and NMES are broadly similar, this effectively represented a halving of the original recommendation of 10% of total energy from NMES. The definition of dietary fibre also changed from non-starch polysaccharide (NSP) to AOAC fibre which includes starch and lignin in the estimation of total fibre as well as NSP. The new recommendation for AOAC fibre intake is 30g/day for adults, which represents an increase over the previous recommendation of 18g NSP per day (equivalent to 23-24g AOAC fibre).

In 2016 SACN published an evidence review of vitamin D and health and set a Reference Nutrient Intake (RNI) of 10µg/day for adults and children of all ages,[xvi, 21] replacing previous advice that the RNI was required only for children under 4 years and older adults aged 65 years and over. Government advice was updated to recommend that in the summer months the majority of adults and children aged 5 years and older will probably obtain sufficient vitamin D from sunshine when they are outdoors, and by following a healthy, balanced diet as shown in the Eatwell Guide. Because it is difficult to get enough vitamin D from food, everyone over the

[21] The Scientific Advisory Committee on Nutrition (SACN) vitamin D and health report published in 2016 recommended an RNI of 10µg/day for those aged 4 years and over and a safe intake of 10µg/day for those aged 1 to 4 years.

age of 5 years should consider taking a daily supplement containing 10µg vitamin D during the autumn and winter months.

People who have no or very little sunshine exposure such as those who are frail or housebound or are in an institution such as a care home so are not often outdoors, and those who usually wear clothes that cover up most of their skin when outdoors, should take a daily supplement containing 10µg of vitamin D throughout the year. People from minority ethnic groups with dark skin, such as those of African, African-Caribbean or South Asian origin, might not get enough vitamin D from sunlight, so should consider taking a vitamin D supplement throughout the year. Children aged from one to four years should be given a daily supplement containing 10µg vitamin D throughout the year. Infants from birth to one year of age should also be given a daily supplement containing 8.5-10µg vitamin D unless they are receiving at least 500ml of infant formula per day.

Over the period of the NDNS RP the 5 A Day recommendation[xvii] for fruit and vegetables has changed in relation to advice on smoothies. Before 2016 smoothies containing pureed fruit could count towards 5 A Day in addition to fruit juice. The recommendation since 2016 is that smoothies should be treated the same as fruit juice and 150ml of fruit juice or smoothies combined count as one of your 5 A Day; any additional fruit juice or smoothies above this does not count. The calculation of 5 A Day in NDNS was changed accordingly for Year 9.

Table A: Current UK recommendations

Food	Recommendation
Fruit and vegetables	At least 5 portions per day (equivalent to 400g) for those aged 11 years and over
Red and processed meat[a]	For adults, average intakes of red and processed meat should not exceed 70g per day
Oily fish[b]	At least 1 portion per week for adults and children (140g for adults)

[a] Includes beef, lamb, pork, sausages, burgers and kebabs, offal, processed red meat and other red meat

[b] Includes anchovies, carp, trout, mackerel, herring, jack fish, pilchards, salmon (including canned), sardines, sprats, swordfish and whitebait.

1.7 Published and future NDNS RP reports

This report adds to the series of NDNS RP reports that have been published since Year 1 (2008/09). These include the Years 1 to 4 combined results reports for Northern Ireland,[xviii]

UK,[xi] and Scotland[xix] and the Years 2 to 5 combined results report for Wales.[xx] From Year 5, a series of paired years results reports for the UK as a whole have been published; i.e. Years 5 and 6 (2012/13-2013/14)[xxi] and Years 7 and 8 (2014/15-2015/16).[viii] The latest report for the UK as a whole was published in January 2019 with an analysis of changes in diet and nutrient intake over time (Years 1 to 9 (2008/09-2016/17)) and by equivalised income[22] (Years 5 to 9 (2012/13-2016/17)).[xxii] The latest data for Wales is due to be published later in 2019.

In addition, a supplementary folate report including blood folate results for the UK as a whole and separately for Northern Ireland, Scotland and Wales was published in 2017.[xxiii] The NDNS also includes a series of urinary sodium surveys for the assessment of population salt intake, with fieldwork in Northern Ireland in 2015,[xxiv] England in 2011[xxv] and 2014,[xxvi] and Scotland in 2014.[xxvii]

Data for Years 1 to 9 are deposited at the UK Data Service.[xxviii]

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

2 Characteristics and representativeness of the NDNS RP sample in Northern Ireland (Years 5 to 9 combined; 2012/13-2016/17)

2.1 Introduction

This chapter includes information about response rates for Years 5 to 9 (combined) in Northern Ireland.[xviii,23] The Northern Ireland sample was boosted in Years 6 to 9 (to a target of 100 adults and 100 children per year)[24] so for these years, the sample comprises core and Northern Ireland boost cases. For Year 5, the sample comprises core cases only.

A description is also provided of the socio-demographic characteristics of the NDNS RP sample; representativeness to the Northern Ireland population is shown via mid-year population estimates. Also shown are anthropometric measurements, using data collected during the interviewer and nurse visits. Information regarding weighting the survey data is also discussed in this chapter.

2.2 Response rates

2.2.1 Household level response

Overall for Years 5 to 9 (combined), of the 2,796 addresses[25] issued to interviewers, 42% were eligible for household selection. Ineligible addresses include vacant or derelict properties and institutions. Addresses that were selected for the child boost and were screened out because they did not contain any children in the eligible age range were also included in the ineligible category.

Household selection was carried out at 94% of eligible addresses. The remaining 6% of addresses refused before the household selection could be carried out. See appendix B for more information on sample design and selection.

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[23] Equivalent information for the first 4 years of the NDNS RP is provided in the Northern Ireland Years 1 to 4 report.
[24] The Northern Ireland sample was also boosted in Years 1 to 4.
[25] The issued addresses included Northern Ireland boost cases in Years 6 to 9 as well as core cases in all years.

(Table 2.1)

2.2.2 Individual level response

The overall response rate for fully productive individuals (i.e. those completing the diet diary for 3 or 4 days) was 55% in Year 5, 60% in Year 6, 52% in Year 7, 53% in Year 8 and 46% in Year 9, giving a sample size of 836 fully productive individuals.[26] Analyses in this report (including response rates for subsequent stages/components of the survey) are based on these 836 individuals.

Participants in Years 6 to 9 aged 4 years and over[27] were asked to provide a spot urine sample. 84% of these participants provided a spot urine sample (86% of adults, 82% of children).

61% of all fully productive participants were visited by a nurse.[28] Physical measurements including waist and hip circumference, mid-upper arm circumference (MUAC) and blood pressure were taken from almost all participants (adults and children) who had a nurse visit.[29]

(Table 2.2)

2.3 Characteristics of the NDNS RP sample

2.3.1 Sex

In the unweighted NDNS RP sample in Northern Ireland, 38.1% of adults aged 19 years and over were men and 61.9% were women, while for children (aged 1.5 to 18 years) 51.4% were boys and 48.6% were girls. The sample was weighted to reflect the distribution of males and females in the population of Northern Ireland.[xxix]

After weighting, 48.4% of the adult sample were male and 51.6% were female; 51.3% of the child sample were boys and 48.7% were girls.

(Table 2.3)

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[26] Of the 836 fully productive individuals, 822 (98%) completed 4 dietary days and 14 (2%) completed 3 days.
[27] Participants also had to be fully out of nappies to be eligible for the 24-hour urine sampling element.
[28] The remainder of fully productive respondents either refused to progress to stage 2 or, in a small number of cases, could not be visited during the nurse fieldwork period.
[29] Participants in the core sample (but not the country boot sample) were asked to provide a blood sample.

2.3.2 Age

In the overall unweighted NDNS RP sample in Northern Ireland, 48.1% were adults aged 19 and over (38.9% aged 19 to 64 years and 9.2% aged 65 years and over) and the remaining 51.9% were children and young people aged 1.5 to 18 years.

The sample was weighted to bring the age profile of the sample in line with the age profile of men and women in the population of Northern Ireland. Once weighted, 76.7% of the sample were adults (60.8% aged 19-64 years and 15.9% aged 65 years and over) and 23.3% were children and young people.

(Table 2.4)

All text and tables in the remainder of this chapter use weighted data to present a representative sex and age profile of the Northern Ireland population.

2.3.3 Ethnicity

In terms of ethnicity, 99.2% of the overall sample (adults and children) were White British, 0.5% were Asian/Asian British, 0.1% Black/Black British, 0.1% Mixed and 0.1% other ethnicity. This is in line with the latest available Census data from 2011.[xxx]

(Table 2.5)

2.3.4 National Statistics Socio-Economic Classification (NS-SEC)[xxxi]

Participants were assigned a socio-economic classification based on the current or most recent job of the Household Reference Person (HRP) for their household.[30,31]

Amongst the adult sample, the HRP was most likely to be in lower managerial and professional occupations (19.3%), semi-routine occupations (17.1%) or routine occupations (14.4%). A further 3.6% of the adult sample were in a household where the HRP had never worked. A similar pattern was seen across the child sample. These findings are in line with the latest available Census data from 2011.[xxx]

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[30] The 'Household Reference Person' (HRP) was defined as the householder (a person in whose name the property is owned or rented) with the highest income. If there was more than one householder and they had equal income, then the eldest was selected as the HRP.

[31] Some households contained both an adult and a child participant. Such households and their HRP will be represented in both the adult and child figures.

(Table 2.6)

2.4 Anthropometric measures

2.4.1 Introduction

A number of anthropometic measures were taken as part of the study to to provide contextual information on body weight and abdominal obesity. Detailed descriptions of the measurement protocols used in the NDNS RP are available in appendix L but a brief description is provided within each section below. Note that the text includes results for sex-combined (i.e. all adults or all children) but the tables show males and females separately.

Height and weight measurements, from which body mass index (BMI) was calculated, were taken during Stage 1 (the interviewer visit). Height and weight were measured using a portable stadiometer, measuring to the nearest 0.1 cm (and if between two mm, rounded to the nearest even mm) and weighing scales, measuring to the nearest 0.1kg. BMI = weight (kg) / height squared (m^2)) was calculated by the interviewer's Computer Assisted Personal Interview (CAPI) programme. For participants whose height could not be measured, estimated height based on demispan[32,xxxii] was used to calculate BMI.[33]

For children aged 1.5 to 2 years, the interviewer measured length instead of height and this measurement was used in place of height when calculating BMI for these youngest children.[34]

Waist and hip circumference[35] was measured for all participants aged 11 years and over who agreed during Stage 2 (the nurse visit). These measurements allow the

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[32] Demispan is defined as the distance between the mid-point of the sternal notch and the finger roots with the arm outstretched laterally. Using BMI based on demispan equivalent height is recommended where no measured height is available, and has been suggested as a preferred measure of BMI in older people.
[33] The demispan equivalent height was calculated using regression equations derived by Bassey: (Bassey EJ. *Demispan as a measure of skeletal size*. Annals of Human Biology 1986; 13: 499-502.) Females: Height (cm) = (1.35x demispan in cm) + 60.1. Males: Height in (cm) = (1.40x demispan in cm) + 57.8.
[34] These data are not shown but are included in the archived data.
[35] All fieldworkers were trained to carefully observe the standard measurement protocols. Each measurement was taken twice. Where the discrepancy between the measurements was at or above a given value (height ≥ 0.5cm, weight ≥ 0.2kg, waist and hip circumferences ≥ 3cm), a third measurement was taken. The mean of the two closest measurements was used. If only one measurement was available, it was excluded from the analysis.

calculation of waist:hip ratio, which provide an indication of abdominal obesity. Waist and hip circumferences were measured using an insertion tape measure.

2.4.2 Obesity in adults

Table 2.7a shows mean BMI and BMI status, in adults, by age group and sex. BMI status has been categorised using the classifications set by both the World Health Organization (WHO)[xxxiii] and National Institute for Health and Clinical Excellence (NICE).[xxxiv] The classifications are shown in table 2A below:

Table 2A: BMI

classification BMI (kg/m2)	**Description**
Less than 18.5	Underweight
18.5 to less than 25	Normal
25 to less than 30	Overweight, not obese
30 or more	Obese, including morbidly
40 or more	obese Morbidly obese

An adult was classified as having abdominal obesity if their waist circumference was raised (greater than 102cm for men and greater than 88cm for women), or if their waist: hip ratio (WHR) was raised (greater than 0.95 for men and greater than 0.85 for women).

Mean BMI for adults was 27.8. Among adults, 34.6% were overweight, 65.1% were overweight, including obese and 3.5% were morbidly obsese. Whilst mean BMI was similar for men and women (27.6 and 27.9 respectively), men (39.2%) were more likely to be overweight than women (30.2%) and in line with that were also more likely to be overweight including obese than women (69.1% of men were overweight, obese or morbidly obese compared with 61.3%.of women). However, a greater proportion of women were morbidly obese than men (5.2% compared with 1.7% respectively).

Mean waist circumference in adults was 98.3cm and 54.8% of adults had a raised waist circumference. Mean waist circumference was higher in men than in women (mean waist circumference was 102.5cm in men and 94.5cm in women). However, a significantly greater proportion of women had a raised waist circumference than men (58.8% of women, compared with 50.5% of men).

Waist circumference increased with age. For both men and women, mean waist circumference and the proportion with a raised waist circumference was higher amongst older adults (aged 65 years and over) than those aged 19 to 64 years.

Mean waist:hip ratio for adults was 0.9 (1.0 amongst men and 0.9 amongst women).

(Table 2.7a)

2.4.3 Obesity in children

New UK WHO growth charts for children from birth to 4 years were introduced for all new births in England, Wales and Northern Ireland from May 2009 and in Scotland from January 2010.[xxxv] These are based on WHO Growth Standards from data in infants who were exclusively or predominantly breastfed.[xxxvi,36]

Growth standards for the youngest children (aged under 4 years) are based on breastfed babies, who tend to have a different pattern of growth compared with formula-fed infants, whereas growth standards for older children are based on the growth of UK children regardless of feeding (UK 1990 reference values). Differences between the youngest and oldest children should be viewed with caution due to the use of different growth standards.

For clinical purposes, the charts define overweight as above the 91st centile but on or below the 98th centile for BMI and obesity as above the 98th centile. However, this report uses the 85th and 95th centiles to define overweight and obesity, as is standard UK government practice for population monitoring.[xxxvii]

Overall, 15.4% of children were overweight and a further 20.7% were obese. A greater proportion of girls were overweight than boys (17.6% and 12.9% respectively).

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[36] The new UK-WHO 0-4 years growth charts were introduced in the UK because they represent an international standard of growth for healthy infants and young children. Breastfed infants exhibit a healthier pattern of growth. The new charts were constructed using the WHO Growth Standards for infants aged 2 weeks to 4 years, which used data from healthy children from around the world with no known health or environmental constraints to growth. WHO found that infants worldwide have very similar patterns of linear growth, whatever their ethnic origin. The new charts provide a description of optimal growth, describing the ideal patterns of growth for all UK children, whatever their ethnic origin and however they are fed in infancy. The WHO data is combined with birth data for gestations 23 to 42 weeks from the UK1990 growth reference, as the WHO dataset did not include preterm infants. The UK1990 reference is still to be used for children aged 4 years and over.

However, there was no difference in the proportion who were obese by sex (20.4% of boys were classed as obese, compared to 20.0% of girls). There was no clear pattern of BMI among children by age.

(Table 2.7b)

3 Food consumption and nutrient intakes (Years 5-9 combined; 2012/13-2016/17)

3.1 Introduction

The results presented in this chapter derive from the Northern Ireland sample for Years 5 to 9 combined of the NDNS RP. Analysis is based on Northern Ireland core cases from the UK sample and Northern Ireland boost cases combined, providing an overall Northern Ireland sample of 836 individuals aged 1.5 years and over (see chapter 2, section 2.2).

Results in this chapter are presented for both sexes combined for the age groups: 1.5 to 3 years, 4 to 10 years, 11 to 18 years, 19 to 64 years and 65 years and over. Results are also subdivided by sex for all age groups, except for children aged 1.5 to 3 years as intakes in this age group do not tend to vary by sex, and adults aged 65 years and over because of small numbers. The purpose of this chapter is to describe how the diets of different age groups in the population compare with recommendations. Caution should be taken when interpreting results where the cell sizes are below 50.

3.2 Foods consumed

Consumption for standard NDNS food groups is presented in tables 3.1a-3.2c. In these tables, all ingredients in composite dishes (e.g. homemade dishes and manufactured products) are assigned to a food group based on the main components of the dish. Details of the NDNS food groups can be found in appendix R. No commentary is provided on these tables.

This section reports consumption of fruit and vegetables; sugary, fizzy drinks and squashes; confectionery; chips and other fried foods; and meat products, i.e. the “marker foods” set out by 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*.[iii] These are presented in table 3.3. This section also reports on consumption of fruit juice, 5 A DAY fruit and vegetable portions, meat and fish; these are presented in table 3.3a. Consumption of fruit, vegetables, meat and fish is based on disaggregated data. Consumption figures using disaggregated data include only the contribution of relevant ingredients from

composite dishes (both homemade dishes and manufactured products), but exclude the other components of those dishes.

Consumption of sugary, fizzy drinks and squashes, confectionery, chips and other fried foods, and meat products is based on the NDNS food groups that can be found in appendix R.[37,38,39,40,41] Results are provided for the total Northern Ireland sample, including non-consumers.

- Mean daily total fruit and vegetable consumption based on disaggregated data was 136g for children aged 1.5 to 3 years, 153g for children aged 4 to 10 years and 151g for children aged 11 to 18 years. For adults, those aged 19 to 64 years and those aged 65 years and over consumed, on average, 236g per day.
- Among children, mean daily consumption of sugary, fizzy drinks and squashes was lowest in boys aged 4 to 10 years (74g) and highest in boys aged 11 to 18 years (256g). Mean consumption in adults was 104g for those aged 19 to 64 years and 26g for those aged 65 years and over.
- Among children, mean daily consumption of confectionery ranged from 14g for children aged 1.5 to 3 years to 24g for children aged 11 to 18 years. Mean consumption in adults was 14g for those aged 19 to 64 years and 5g for those aged 65 years and over.
- Mean consumption of chips and other fried foods ranged from 16g for children aged 1.5 to 3 years to 49g for children aged 11 to 18 years. For those aged 11 to 18 years, mean daily consumption was higher for boys than girls (54g and 44g respectively). For adults aged 19 to 64 years, mean daily consumption was higher for men than women (61g and 37g respectively).

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[37] Sugary, fizzy drinks and squashes – NDNS food group 57 (soft drinks not diet) 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.
[38] Confectionery – NDNS food groups 43 (sugar confectionery) and 44 (chocolate confectionery). A full definition is provided in appendix R.
[39] 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.
[40] 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.
[41] All composite dishes in the NDNS Nutrient Databank (NDB) have been disaggregated into their constituent ingredients so they can be reported separately. Details on the NDNS NDB and the methodology for the disaggregation of composite dishes is provided in appendix A.

- Across all age/sex groups, mean daily consumption of meat products ranged from 26g for adults aged 65 years and over to 58g for boys aged 11 to 18 years.
- Mean consumption of fruit juice[42] was highest in boys aged 11 to 18 years (72g) and lowest in women aged 19 to 64 years (21g).
- Consumption of 5 A Day fruit and vegetable portions was below the recommendation[xvii] in all age and sex groups. Children aged 11 to 18 years consumed 2.5 portions per day on average and the proportion meeting 5 A Day was 6%. On average, adults aged 19 to 64 years and adults aged 65 years and over consumed 3.4 portions and 3.3 portions per day respectively. Twenty per cent of those aged 19 to 64 years and 19% of those aged 65 years and over met the 5 A Day recommendation.
- Mean consumption of red and processed meat for women aged 19 to 64 years (57g) met the current recommendation that adult average intakes should not exceed 70g per day. However, mean consumption for men aged 19 to 64 years (89g) exceeded the recommendation.[i,43]
- Mean consumption of oily fish in all age groups was well below the recommended one portion (140g) per week. Consumption was equivalent to 7-15 grams per week in children, 30 grams per week in adults aged 19 to 64 years and 60 grams per week. in adults aged 65 years and over.

(**Tables 3.3 and 3.3a)**

3.3 Energy and macronutrients

Mean daily intakes of energy and key macronutrients are presented in table 3.5 and 3.14 and compared with the UK Dietary Reference Values (DRVs).[xii,xiv,xxxviii] DRVs for key macronutrients are shown in table 3.4. Where relevant, DRVs are referred to as 'recommendations' in the rest of this section. The recommendations for macronutrients generally indicate the maximum contribution the nutrient should make to energy intake at the population level or, in the case of AOAC fibre, represent the recommended population average intake.

The percentage contribution of food groups to energy and macronutrient intake are presented in tables 3.6-3.13. No commentary is provided on these tables.

[42] This includes the fruit juice component of smoothies but not smoothie fruit.
[43] The Department of Health has advised that people who eat a lot of red and processed meat a day (more than 90g cooked weight) cut down to 70g.

- Mean daily intakes for total energy were 4.57 MJ (1083 kcal) for children aged 1.5 to 3 years, 6.11 MJ (1451 kcal) for children aged 4 to 10 years, 7.10 MJ (1686 kcal) for children aged 11 to 18 years, 8.96 MJ (2130 kcal) for men aged 19 to 64 years, 6.66 MJ (1584 kcal) for women aged 19 to 64 years and 6.68 MJ (1586 kcal) for adults aged 65 years and over.
- Mean intake of total fat met the recommendation (no more than 35% food energy) in all age/sex groups, except men and women aged 19 to 64 years for whom mean intake just exceeded the recommendation at 35.4% and 35.1% of food energy respectively.
- Mean intake of saturated fatty acids exceeded the recommendation (no more than 11% of food energy) in all age/sex groups, providing 13.3% of food energy for children aged 4 to 10 years, 12.7% for children aged 11 to 18 years and 13.3% for adults aged 19 to 64 years and 14.0% for adults aged 65 years and over.
- Mean intake of *trans* fatty acids provided 0.5-0.6% of food energy across the age/sex groups, and thus all groups met the recommendation (no more than 2% food energy).
- In all age groups, mean intake of free sugars[44] exceeded the recommendation of providing no more than 5% of daily total energy intake for those aged 2 years and over. In children, boys aged 11 to 18 years had the highest free sugars intake as a percentage of total energy (15.9% of total energy); whilst children aged 1.5 to 3 years had the lowest intake (12.8%).[45] In adults, mean intake of free sugars as a percentage of total energy intake was 10.5% and 9.3% respectively for adults aged 19 to 64 years and adults aged 65 years and over.
- The percentage meeting the recommendation of no more than 5% of daily total energy intake from free sugars was 4% for children aged 1.5 to 3 years, 5% of children aged 4 to 10 years and 3% of children 11 to 18 years. In adults, 13% of those aged 19 to 64 years and 16% of those aged 65 years and over met the recommendation.

[44] The definition of free sugars includes all added sugars in any form; all sugars naturally present in fruit and vegetable juices, purees and pastes, and similar products in which the structure has been broken down; all sugars in drinks (except for dairy-based drinks) and lactose and galactose added as ingredients. Further details of the methodology for determining free sugars in the NDNS RP are provided in appendix AA.
[45] The recommendation that free sugars provides no more than 5% of daily total energy intake applies to those aged 2 years and over.

- In all age groups, the mean intake of AOAC fibre[46] was below the recommendations.[47] For children aged 1.5 to 3 years, 4 to 10 years and 11 to 18 years, mean intakes were 9.9g, 12.9g and 14.6g respectively. For adults aged 19 to 64 years and 65 years and over, mean intakes were 17.6g and 17.3g respectively.
- The percentage of children meeting the AOAC fibre recommendation was 6% of those aged 1.5 to 3 years, 4% of those aged 4 to 10 years and 2% of those 11 to 18 years. For both adults aged 19 to 64 years and adults aged 65 years and over, 4% met the recommendation.
- 48% of adults aged 19 to 64 years and 31% of adults aged 65 years and over reported consuming alcohol during the four-day recording period. On average, adults aged 19 to 64 years who consumed alcohol during the 4-day recording period obtained 7.5% of total energy intake from alcohol.

(**Tables 3.5 and 3.14**)

3.4 Vitamins and minerals

Mean intake (presented in tables 3.17 and 3.17a) is compared with the Reference Nutrient Intake (RNI)[48] and an estimate is made of the proportion with intakes below the Lower Reference Nutrient Intake (LRNI).[49] Published UK RNIs and LRNIs**Error! Bookmark not defined.**xxxviii are shown in tables 3.15 and 3.16.

The percentage contribution of food groups to micronutrient intake are presented in tables 3.18-3.29. No commentary is provided on these tables.

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[46] AOAC fibre is the term used to describe fibre measured by the American Association of Analytical Chemists (AOAC) methods. AOAC fibre includes resistant starch and lignin in the estimation of total fibre as well as non-starch polysaccharides.
[47] SACN AOAC fibre recommendations: 30g/day for adults; 25g/day for older children aged 11-16 years; 20g/day for the 5-11 year age group; 15g/day for the 2-5 year age group.
[48] The RNI for a vitamin or mineral is the amount of the nutrient that is sufficient for 97.5% 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 more likely that some of the group will have an intake below their requirement.
[49] 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. An intake below the LRNI is only considered a problem if sustained over a period of time. As diet is recorded for only four days in the NDNS RP, estimated intake values may not represent intakes over the longer term for micronutrients that are not widely distributed in foods such as vitamin A. It should also be noted that DRVs for some micronutrients such as magnesium, potassium, selenium and zinc are based on very limited data so caution should be used when assessing adequacy of intake using the LRNI.

- Mean daily intakes of vitamin A from food sources were close to or above the RNI for all age/sex groups with the exception of children aged 11 to 18 years (86% of the RNI). Eleven percent of children aged 4 to 10 years, 16% of children aged 11 to 18 years and 13% of adults aged 19 to 64 years had intakes below the LRNI for vitamin A.
- Mean daily intakes of riboflavin from food sources were above the RNI for all age/sex groups. Children aged 11 to 18 years and women aged 19 to 64 years had intakes below the LRNI for riboflavin (17% and 13% respectively).
- Mean daily intakes of folate from food sources were close to or above the RNI for all age/sex groups with the exception of girls aged 11 to 18 years (83% of the RNI). Eleven percent of boys and 13% of girls aged 11 to 18 years had intakes from food sources below the LRNI. The inclusion of reported dietary supplements had little impact on the percentages with intakes below the LRNI. For women of childbearing age (16 to 49 years), mean daily intake of folate from food sources was close to the RNI with 8% of this group having an intake below the LRNI. Again, the inclusion of dietary supplements had no impact on the proportion with intakes below the LRNI.
- For vitamin D, mean intakes from food sources were well below the RNI in all age/sex groups ranging from 20% of the RNI for children aged 1.5 to 3 years and children aged 11 to 18 years to 27% and 34% of the RNI for adults aged 19 to 64 years and 65 years and over respectively. There are no LRNIs set for vitamin D.

(Tables 3.17 and 3.17a)

For children aged 1.5 to 3 years and 4 to 10 years, mean intakes of most minerals were close to or above the RNI and few children had intakes below the LRNI. For children aged 1.5 to 3 years, mean iron intake was 89% of the RNI and 13% had intakes below the LRNI for zinc. For children aged 4 to 10 years mean intake of zinc was 88% of the RNI. However, for children aged 11 to 18 years, mean intakes fell below the RNI for each of the minerals reported and a substantial proportion of children aged 11 to 18 years had intakes below the LRNI, including 57% of girls 11 to 18 years below the LRNI for iron.

For women aged 19 to 64 years, mean intakes were below the RNI for iron (70% of the RNI), magnesium (84% of the RNI), potassium (71% of the RNI) and selenium (66% of the RNI). Thirty four percent of women aged 19 to 64 years had iron intakes below the LRNI. A substantial proportion of men aged 19 to 64 years had intakes below the LRNI for selenium

(24%). For adults aged 65 years and over, 20%, 21% and 66% had intakes below the LRNI for magnesium, potassium and selenium respectively.

It should also be noted that DRVs for some micronutrients such as magnesium, potassium, selenium and zinc are based on very limited data so caution should be used when assessing adequacy of intake using the LRNI.

(**Table 3.17**)

4 Urinary iodine concentration (Years 6 to 9; 2013/14-2016/17)

4.1 Introduction

Lack of dietary iodine can lead to goitre (enlargement of the thyroid), hypothyroidism and impairment of mental function including retardation in infants and children. On a worldwide basis, iodine deficiency is the single most important preventable cause of brain damage.[xxxix] Indicators to assess and monitor the iodine status of a population have been defined by the World Health Organization (WHO 2007);[xxxix] these state that in children and adults, median urinary iodine concentrations of between 100µg/L and 199µg/L and fewer than 20% of the population below 50µg/L define a population which has no iodine deficiency.[50] The WHO guidelines suggest that the normal range for pregnant and lactating women should reflect their additional need and the risk that these needs may not be met if population levels are too low.[xxxix] Therefore, this group should have a median urinary iodine concentration of between 150µg/L and 249µg/L to reflect a population with no deficiency. A spot urine sample was introduced in Year 6 (2013/14) of the NDNS RP for measurement of urinary iodine concentration. The median and other descriptive statistics for urinary iodine concentration are presented for males, females and sexes combined for the following age groups: children aged 4 to 10 years, children aged 11 to 18 years, adults aged 19 to 64 years, adults aged 65 years and over, and women of childbearing age (16 to 49 years). The following commentary is supported by accompanying Excel tables providing data for Years 6 to 9 (combined) (2013/14-2016/17). However the limited number of participants in each age/sex group should be borne in mind when interpreting the Excel tables and the commentary in section 4.2; the WHO guidelines referred to above are based on a sample of 30 individuals (e.g. schoolchildren) in each of 30 clusters, which is a total of 900 spot urine samples for each age group.

[50] Spot samples only allow for population level iodine concentration rather than individual iodine concentrations to be obtained.

4.2 Urinary iodine concentrations

During the period covered by Years 6 to 9 of the NDNS RP,[51] spot urine samples were provided by a total of 127 children aged 4 to 10 years, 162 children age 11 to 18 years, 267 adults aged 19 to 64 years and 63 adults aged 65 years and over in Northern Ireland. With the exception of girls aged 11 to 18 years, urinary iodine concentrations met the WHO criteria for adequate iodine status in all age/sex groups (i.e. median urinary iodine concentration within 100-199µg/L and fewer than 20% of samples below 50µg/L). Median spot iodine concentration for girls aged 11 to 18 years was 89µg/L with 16% of this group below 50µg/L (n=78).

In the NDNS RP, pregnant and lactating women are excluded from the survey. Instead, results are presented for women of childbearing age, thus providing more information which may help to characterise the iodine status of this group.[52] The median urinary iodine for the 138 women of childbearing age (16 to 49 years) in Years 6 to 9 (combined) was 103µg/L with 18% of the population below 50µg/L. While these values met the WHO criterion for adequate intake for the general population, they did not meet the criteria for iodine sufficiency in pregnant and lactating women (i.e. median urinary iodine concentration within 150-249µg/L).

(**Tables 4.1 and 4.2a-b)**

[51] Spot urine samles were not collected in Year 5.
[52] Sampling of pregnant women can be difficult because the number of pregnant women present in householdbased surveys may be small. Assessing the median value in women of reproductive age or among adolescent girls is more feasible in a population-based survey, and may be helpful in interpreting the median population value.

5 Time trend analysis (Years 1 to 9; 2008/09-2016/17) for selected foods and nutrients

5.1 Introduction

The results presented in this chapter derive from the Northern Ireland sample for Years 1 to 9 combined of the NDNS RP. Analysis is based both on Northern Ireland core and boost cases providing an overall sample of 1818 individuals aged 1.5 years and over.

This chapter presents time trend analyses for selected key foods and nutrients over the 9-year period. The foods and nutrients were selected for their nutritional and public health relevance to current dietary concerns in the UK and include the "marker foods" set out by the cross-Departmental obesity prevention strategy for Northern Ireland: fruit and vegetables; sugary, fizzy drinks and squashes; confectionery; chips and other fried foods; and meat products.[iii]

The time trend analysis uses a linear regression model, which splits each survey year into quarters to more fully characterise the trends over time and to provide an estimate of the average per year change over the 9-year period. The slope of the regression line represents the average year-by-year change for Northern Ireland. This line is compared to the corresponding time trend for the UK in a plot in Excel. The plot also provides confidence intervals for the 2 slopes and their difference. Refer to chapter 1 (section 1.3) for a guide to interpretation of the time trend analysis plots. To calculate the 9-year change refer to appendix U, which provides instructions on how to scale up and explains that the calculations for variables that are analysed on the log scale are different from those for variables analysed on the linear scale. Nine-year change values for Northern Ireland are presented in Excel tables U.1-U.4 and values for the difference between Northern Ireland and UK are in Excel tables U.1a-U.4a and should be interpreted in conjunction with the time trend analysis Excel plots.

Because of the achieved sample size in Northern Ireland, commentary is in most cases limited to sex-combined age groups although plots are also included for males and females separately.

Many of the trends identified by the analysis were small in magnitude and some were not statistically significant. This chapter describes trends in key foods and nutrients in Northern Ireland taking account of statistical significance and whether the change is nutritionally meaningful. The text describes upward or downward trends and the overall size of any observed changes in intakes for Northern Ireland. The 95% confidence intervals for the size of changes are set out in brackets in the text.[53] When the interval does not contain zero, this indicates a statistical difference at the 5% level. The text also describes trends for Northern Ireland which are different to those observed in the UK as a whole where these differences are statistically significant.Therefore unless stated otherwise, trends for Northern Ireland and the UK can be assumed to be similar.

The plots provide an indication of mean food and nutrient intakes across the 9-year period, however they are not intended to provide or describe the group mean values for each year. Group mean values are described for Years 5 to 9 (combined) in chapter 3. No reference is made in those cases where a regression line cannot be fitted. This occurred either when most of the data are zero, when there was a clear non-linear relationship or when the number of participants was less than 30. Furthermore, confidence in the regression estimates are diminished when the number of participants is close to 30 or when the number of participants within one of the early or late calendar years for an age/sex group is less than 3 (e.g. men 65 years and over). In those cases, only limited commentary is provided.

Trends in arithmetic mean are reported as ‘change per year’ where the data were normally distributed and could be analysed without transformation. Where the data were skewed and needed to be log-transformed before analysis, the trends in geometric mean are reported as ‘percentage change per year’ (see section 1.3 of chapter 1 for more detail).

[53] The 95% Confidence Intervals (CIs) presented in the plots relate to the magnitude and direction of change i.e. negative CIs for a downward trend. In the text, downward trends are expressed as a **decrease** and so the CIs quoted represent the magnitude of the decrease not the direction of change.

5.2 Foods

5.2.1 Population intake

For total fruit and vegetable consumption, 5 A Day fruit and vegetable portions, total meat, and red and processed meat consumption the proportion of non-consumers over the 4-day period was low. Therefore, the trends in population intakes, including non-consumers, are presented.

Fruit and Vegetables. There was little change observed over the 9-year period for total fruit and vegetable intake in all age/sex groups and changes were not in a consistent direction. The largest change over time was for men aged 19 to 64 years with an average yearly increase in total fruit and vegetable intake of 4g/day, although this was not significant. The majority of this increase was attributable to an average yearly increase in fruit intake.

5 A DAY. The number of 5 A Day portions consumed are presented for the age/sex groups for which there is a government recommendation,[xvii] that is for 11 to 18 years, 19 to 64 years and 65 years and over. Changes over the 9-year period were very small or close to zero for these age/sex groups for average number of 5 A Day portions consumed. Changes in the proportion meeting the 5 A Day recommendation were also very small. As noted in chapter 3 of this report, all age/sex groups had a mean fruit and vegetable intake below the 5 A Day recommendation.

Total meat. Little change was observed in the intake of total meat over the 9-year period.

Total red and processed meat. For all age/sex groups, with the exception of children aged 1.5 to 3 years, there was a downward trend over the 9-year period in intake of red and processed meat, although this was not always statistically significant. The largest significant yearly reduction was seen in boys aged 11 to 18 years (3g/day, CI: 0, 5). Chapter 3 of this report shows that men aged 19 to 64 years had a mean total red and processed meat intake above the recommended 70g per day.[54]

(**Tables 5.1, 5.12, 5.13, 5.16 and 5.17)**

[54] The Department of Health has advised that people who eat a lot of red and processed meat a day (more than 90g cooked weight) cut down to 70g.

5.2.2 Percentage of consumers and intake by consumers only

For fruit juice, confectionery, chips and other fried foods, meat products, white meat, fish (and oily fish) and sugary, fizzy drinks and squashes, trends are presented for percentage of consumers and intakes for consumers only. Trends for population intakes are not presented because the proportion of non-consumers over the 4 days of diary recording was high, or was high in some age/sex groups. Their inclusion could cause the regression analysis of population intakes to be misleading (see section 1.3 of chapter 1).

Fruit juice.[55] There was little change observed in the percentage consuming fruit juice over the 4-day diary period in most age/sex groups over the 9-year period. Intakes of fruit juice (consumers only) decreased over time in all age/sex groups with the exception of children aged 1.5 to 3 years. This was only statistically significant for children aged 4 to 10 years, with an average yearly reduction of 5g/day (CI 0, 9).

Confectionery. There was a significant 3 percentage point (CI 0, 5) increase per year in the percentage of consumers of confectionery over four days for boys aged 11 to 18 years. This was significantly different from boys of the same age in the UK as a whole (who showed a non-significant decrease). The data for intake of confectionery (consumers only) were skewed and so were log-transformed before analysis. The trends in geometric mean are reported as an average percentage change per year. For children who consumed confectionery, there was a 6% and 5% decrease in intake per year for children aged 1.5 to 3 years and girls aged 11 to 18 years respectively but these were not statistically significant. For the other age/sex groups, changes in intake for consumers were small.

Chips and other fried foods. Little change was observed over the 9 years in terms of the percentage consuming chips and other fried foods. The data for intake of chips and other fried foods (consumers only) were skewed and so were log-transformed before analysis. The trends in geometric mean are reported as an average percentage change per year. For children aged 4 to 10 years and 11 to 18 years (consumers only), intake of chips and other fried foods decreased significantly over the 9 years by 4% (CI 2, 6) and 3% (CI 0, 5) per year respectively.

[55] This includes the fruit juice component of smoothies but not smoothie fruit.

Meat products. There was little change in all age/sex groups in terms of the percentage consuming meat products over the 9-year period. The data for intake of meat products (consumers only) were skewed and so were log-transformed before analysis. The trends in geometric mean are reported as an average percentage change per year. Intakes of meat products (consumers only) decreased in all age groups although this was not always statistically significant. The largest change was seen in men aged 19 to 64 years with an average yearly reduction of 7% (CI 3, 10) and this was significantly different from the UK as a whole (where men of this age showed a non-significant increase).

White meat. Little change was observed over the 9 years in terms of the percentage consuming white meat or in the intake of white meat by consumers.

Total fish. In adults aged 65 years and over there was a statistically significant 3 percentage point (CI 0, 6) decrease per year in the percentage of consumers of fish, and there was a 2 percentage point (CI 0, 4) reduction in the proportion of women aged 19 to 64 years consuming fish. There was little change in other age/sex groups over the 9-year period and the small differences seen were not in a consistent direction. Changes over time in fish intake by consumers were very small or close to zero for all age/sex groups.

Oily fish. There was a statistically significant 1 percentage point (CI 0, 2) decrease per year in the percentage of consumers of oily fish for children aged 1.5 to 3 years. Changes in other groups were generally small or close to zero and did not reach statistical significance. For consumers of oily fish, changes in intake were small over the 9 years.

Sugary, fizzy drinks and squashes – children. There was a downward trend in the percentage of children consuming sugary, fizzy drinks and squashes, although this was not significant for children aged 1.5 to 3 years. In children aged 4 to 10 years and 11 to 18 years there was an average yearly reduction in the percentage consuming sugary, fizzy drinks and squashes over the diary period of 4 (CI 2, 6) and 2 (CI 0, 4) percentage points respectively. This is equivalent to a reduction of 34 and 20 percentage points over the 9 years. Data for intake of sugary, fizzy drinks and squashes (consumers only) were skewed and were log-transformed before analysis. The trends in geometric mean are reported as an average percentage change per year. Intakes of sugary, fizzy drinks and squashes among children

(consumers only) decreased over the 9-year period, although this was only significant for children aged 11 to 18 years (4% per year, CI; 0, 8).

Sugary, fizzy drinks and squashes – adults. Adults aged 19 to 64 years showed an average reduction in the percentage consuming sugary, fizzy drinks and squashes over the diary period of 3 percentage points per year (CI 2, 5) (equivalent to a reduction of 28 percentage points over the 9 years). This is significantly larger than the decrease seen for this age group in the UK as a whole (1 percentage point per year). Men in Northern Ireland aged 19 to 64 years who drank sugary, fizzy drinks and squashes had an average reduction in intake of 5% per year, although this was not statistically significant.

(**Tables 5.2- 5.9, 5.14, 5.15 and 5.18-5.23)**

5.3 Energy and macronutrients

To put the trends for energy and macronutrients over time into nutritional context, reference is made to population dietary intake in terms of Dietary Reference Values (DRVs).[xii,xiv,xxxviii] Where relevant, DRVs are presented in the individual plots and are referred to as 'recommendations' in the rest of this section. The recommendations for macronutrients generally indicate the maximum contribution the nutrient should make to energy intake at the population level or, in the case of AOAC fibre, represent the recommended population average intake.

Total energy. There was an average decrease in total energy intakes for all age/sex groups over the 9-year period, although this was not always statistically significant. The same pattern was seen for food energy intake (i.e. excluding energy from alcohol) for all age/sex groups.

Protein. For men aged 19 to 64 years, protein as a percentage of food energy increased by 0.3 percentage points per year (CI 0.1, 0.6) and this was significantly larger than the increase seen in this group in the UK as a whole (0.1 percentage points). In the other age/sex groups, changes over time were small or close to zero.

Total fat. Small non- statistically significant decreases in total fat intake as a percentage of food energy were observed across most age groups over time. Chapter 3 shows that mean intake in all age/sex groups met or was close to meeting the recommendation of no more than 35% food energy from total fat.

Saturated fatty acids. Over the 9-year period, changes in saturated fatty acids intake as a percentage of food energy were very small or close to zero across most age groups. For children aged 1.5 to 3 years there was a statistically significant average reduction per year of 0.2 percentage points (CI 0.0, 0.4), equivalent to a reduction of 1.8 percentage points over the 9 years. Assuming straight-line trends over time, the regression line indicates that mean saturated fatty acids intake exceeded the recommendation of no more than 11% food energy throughout the 9-year period, in all age/sex groups.

***Trans* fatty acids**. There was a statistically significant average reduction per year in *trans* fatty acids intake as a percentage of food energy in all age groups.[56] Assuming straight-line trends over time, the regression line indicates that mean intake in all age/sex groups met the recommendation of no more than 2% food energy from *trans* fatty acids throughout the 9-year period.

Total carbohydrate. For intake of carbohydrate as a percentage of food energy, the changes over time were small or close to zero.

Free sugars.[57] There was an average decrease in free sugars intake as a percentage of total energy for all age/sex groups over the 9-year period, although this was not always statistically significant. The largest reductions in free sugars intake as a percentage of total energy were seen in boys aged 4 to 10 years and men aged 19 to 64 years (both 0.5 percentage points per year, CI: 0.2, 0.8) and girls aged 11 to 18 (0.4 percentage points, CI: 0.1, 0.7), This is equivalent to a reduction of 4.5 for boys and men and 3.5 percentage points for girls over the 9 years. For men aged 19 to 64 years, the decrease in intake was significantly larger than the decrease seen in this group in the UK as a whole (which was 0.3 percentage points). Assuming

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[56] The downward trend in intake may reflect changes in the composition of foods rather than changes in actual nutrient intakes in the survey population over the 9-year period. The NDNS Nutrient Databank (NDB) provides food composition data to support the estimation of nutrient intakes in the NDNS RP. Each survey year is analysed using a different version of the NDB which is updated so that it best reflects the nutrient content of foods in that year. Updates aim to capture new food products to reflect foods available at the time of fieldwork data collection and to reflect reformulation of products (such as reductions in fat, sugar or salt content). It is important to note that changes in the NDB are partly driven by the availability of new analytical data. New analytical data for *trans* fatty acids in processed foods was incorporated into the NDB in Year 3 (2010/11) although the levels of *trans* fatty acids in these foods had already been reduced prior to this.

[57] The definition of free sugars includes all added sugars in any form; all sugars naturally present in fruit and vegetable juices, purees and pastes, and similar products in which the structure has been broken down; all sugars in drinks (except for dairy-based drinks) and lactose and galactose added as ingredients. Further details of the methodology for determining free sugars in the NDNS RP are provided in appendix AA.

straight-line trends over time, the regression line indicates that mean free sugars intake exceeded the current recommendation of no more than 5% total energy throughout the 9-year period, in all age/sex groups.[58]

AOAC fibre.[59] There was an average yearly reduction in AOAC fibre intakes in boys aged 11 to 18 years of 0.4g/day (CI 0.1, 0.6). Changes in AOAC fibre intake over the 9-year period for all other age/sex groups were small or close to zero and not in a consistent direction. Chapter 3 shows that mean AOAC fibre intake in all age/sex groups was below current recommendations.[60]

Alcohol. There was little change over time in the percentage consuming alcohol for all age groups from 11 years upwards. For adults who consumed alcohol changes in intake over time were small.

(**Tables 5.24 and 5.26-5.34)**

5.4 Micronutrients

To put trends in micronutrient intake over time into context, reference is made to population dietary intakes in terms of DRVs[xxxviii] and includes commentary on the Reference Nutrient Intake (RNI)[61] and an estimate of the proportion with intakes below the Lower Reference Nutrient Intake (LRNI).[62] All micronutrient intakes discussed in this chapter and associated Excel tables exclude contribution from supplements.

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[58] The recommendation that free sugars provides no more than 5% of daily total energy intake applies to those aged 2 years and over.
[59] AOAC fibre is the term used to describe fibre measured by the American Association of Analytical Chemists (AOAC) methods. AOAC fibre includes resistant starch and lignin in the estimation of total fibre as well as non-starch polysaccharides.
[60] SACN AOAC fibre recommendations: 30g/day for adults; 25g/day for older children aged 11-16 years; 20g/day for the 5-11 year age group; 15g/day for the 2-5 year age group.
[61] The RNI for a vitamin or mineral is the amount of the nutrient that is sufficient for 97.5% 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 more likely that some of the group will have an intake below their requirement.
[62] 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. An intake below the LRNI is only considered a problem if sustained over a period of time. As diet is recorded for only four days in the NDNS RP, estimated intake values may not represent intakes over the longer term for micronutrients that are not widely distributed in foods such as vitamin A. It should also be noted that DRVs for some micronutrients such as magnesium, potassium, selenium and zinc are based on very limited data so caution should be used when assessing adequacy of intake using the LRNI.

Vitamin A

- The data for vitamin A intake were skewed and so were log-transformed before analysis. The trends in geometric mean are reported as an average percentage change per year.
- There was an average decrease in vitamin A intake for all age/sex groups over the 9-year period, although this was not always statistically significant. Children aged 4 to 10 years and adults aged 19 to 64 years had an average yearly reduction of 3% (CI 2, 5 and 1, 5 respectively).
- Chapter 3 shows that mean intake of vitamin A was above the RNI in all age/sex groups with the exception of children aged 11 to 18 years.
- For all age groups where it was possible to estimate trends, there was an increase in the proportion with vitamin A intake below the LRNI of 1 percentage point per year although this was only significant for children aged 4 to 10 years (CI 0, 2).

Riboflavin

- A significant average yearly reduction in riboflavin intake was seen in children aged 1.5 to 3 years (0.04mg/day, CI: 0.01, 0.06). Smaller and non-significant decreases in intakes were seen in other age groups.
- Chapter 3 shows that mean intake of riboflavin was above the RNI in all age/sex groups.
- There was a statistically significant 2 percentage point increase per year in the proportion of boys aged 11 to 18 years (CI 1, 4) with riboflavin intake below the LRNI, significantly different from this group in the UK as a whole (who showed no trend).

Folate

- A downward trend in folate intake over time was observed for all age groups. The largest yearly reductions were seen in children aged 4 to 10 years (4µg/day, CI: 1, 6), children aged 11 to 18 years (6µg/day, CI: 3, 10) and adults aged 65 years and over (6µg/day, CI: 1, 11).
- Chapter 3 shows that mean intake of folate was above the RNI in all age/sex groups with the exception of children aged 11 to 18 years.
- There was a statistically significant 2 percentage point increase per year in the proportion of children aged 11 to 18 years (CI 1, 3) with folate intake below the LRNI,

and this was significantly larger than the increase seen for this age group in the UK as a whole (1 percentage point).

Vitamin D

- The data for vitamin D intake were skewed and so were log-transformed before analysis. The trends in geometric mean are reported as an average percentage change per year.
- For children aged 1.5 to 3 years and 4 to 10 years, vitamin D intake increased over the 9 years and this was statistically significant for children aged 1.5 to 3 years (4% per year, CI; 0, 9). For adults, the data suggested a small, non-significant decrease in intake over time.
- Assuming straight-line trends over time, the regression line indicates that mean intakes of vitamin D were below the RNI throughout the 9-year period, in all age/sex groups.

Iron

- An average yearly reduction in iron intake was seen in all age groups except chidren aged 1.5 to 3 years. A significant yearly decrease of 0.2mg/day was seen in children aged 11 to 18 years (CI 0.1, 0.3) and adults aged 65 years and over (CI 0.0, 0.4).
- There was an increase in the proportion of children aged 11 to 18 years and adults aged 19 to 64 years with iron intakes below the LRNI but these were not statistically significant.
- Assuming straight-line trends over time, the regression line indicates that some age/sex groups had mean intakes of iron below the RNI and substantial proportions with intakes below the LRNI throughout the 9-year period, in particular girls aged 11 to 18 years and women aged 19 to 64 years.

Calcium

- A significant average yearly reduction in calcium intake of 21mg/day (CI 5, 36) and 14mg/day (CI 1, 26) was observed in children aged 1.5 to 3 years and 11 to 18 years respectively. Adults aged 65 years and over had a significant average yearly reduction in calcium intake of 18mg/day (CI 2, 34).
- Assuming straight-line trends over time, the regression line indicates that mean intake of calcium was above the RNI throughout the 9-year period, in all age groups with the exception of children aged 11 to 18 years.

- There was an increase in the proportion of children aged 11 to 18 years and adults aged 65 years and over with calcium intakes below the LRNI but these were not statistically significant.

Sodium

- There was a significant average yearly reduction in sodium intake in all age groups: the smallest change was seen in children aged 4 to 10 years (39mg/day, CI 20, 58) with the largest in adults aged 65 years and over (76mg/day, CI 35, 117). These sodium intake estimates are based on the sodium content of foods consumed. They do not fully take account of salt added during cooking and exclude salt added at the table by participants.[63]

Iodine

- A downward trend in iodine intake over time was observed for most age groups although it was not statistically significant in all age groups. Children aged 1.5 to 3 years and 11 to 18 years had a significant average yearly reduction in iodine intake of 4µg/day (CI 1, 7) and 3µg/day (CI 0, 6) respectively. Adults aged 65 years and over had a significant average yearly reduction in iodine intake of 4µg/day (CI 0, 8). There was a significant average year-by-year increase in the proportion with iodine intake below the LRNI of 2 percentage points for children aged 11 to 18 years (CI 0, 3). Chapter 3 shows that there was evidence of low intakes of iodine for children aged 11 to 18 years.

Magnesium

- There was little change in magnesium intake over the 9 years.
- Chapter 3 shows that mean intake of magnesium was below the RNI for older children and adults.
- There was a statistically significant 1 percentage point decrease per year in the proportion of adults aged 19 to 64 years (CI 0, 2) with magnesium intake below the LRNI, significantly different from the UK as a whole for this age group (who showed no trend).

[63] A nominal 0.01g of salt is added to homemade recipes where salt has been specified by the participant as an ingredient.

Potassium

- A downward trend in potassium intake over time was observed for all age groups, except for adults 19 to 64 years. A significant yearly decrease of 32mg/day was seen in girls aged 4 to 10 years (CI 4, 60).
- Assuming straight-line trends over time, the regression line indicates that mean potassium intakes were below the RNI throughout the 9-year period, for children aged 11 to 18 years, adults aged 19 to 64 years and adults aged 65 years and over.
- There was little change in the proportions with potassium intakes below the LRNI.

Selenium

- A significant average yearly reduction in selenium intake of 1µg/day (CI 0, 1) was observed in children aged 11 to 18 years while a significant average yearly increase of 1µg/day (CI 0, 1) was seen in men aged 19 to 64 years (CI 0, 2).
- Assuming straight-line trends over time, the regression line indicates that mean selenium intake was below the RNI throughout the 9-year period for children aged 11 to 18 years, adults aged 19 to 64 years and adults aged 65 years and over.
- There was an increase in the proportion of adults aged 65 years and over with selenium intakes below the LRNI but this was not statistically significant.

Zinc

- For children aged 4 to 10 years and boys aged 11 to 18 years, there was a significant average yearly reduction in zinc intake of 0.1mg/day (CI 0.0, 0.1) and 0.2mg/day (CI 0.0, 0.3) respectively.
- Chapter 3 shows that mean intake of zinc was below the RNI for children aged 4 to 10 and 11 to 18 years.
- There was an increase in the proportion of children aged 11 to 18 years and adults with zinc intakes below the LRNI but these were not statistically significant.

(**Tables 5.35-5.56)**

6 Equivalised income (Years 5-9; 2012/13-2016/17) for selected foods and nutrients

6.1 Introduction

The results presented in this chapter derive from the Northern Ireland sample for Years 5 to 9 combined of the NDNS RP. Northern Ireland core cases from the UK sample and Northern Ireland boost cases provide an overall Northern Ireland sample of 836 individuals aged 1.5 years and over (see chapter 2, section 2.2). The 763 individuals who provided income data are included in this analysis.

This chapter presents key findings for food consumption and nutrient intakes by equivalised household income[64] for selected key foods and nutrients for Years 5 to 9 (2012/13-2016/17) combined. The foods and nutrients were selected for their nutritional and public health relevance to current dietary concerns in the UK and include the "marker foods" set out by the cross-Departmental obesity prevention strategy for Northern Ireland: fruit and vegetables; sugary, fizzy drinks and squashes; confectionery; chips and other fried foods; and meat products.[iii]

For the equivalised income analysis the average change in each outcome per £10,000 increase in equivalised household income was estimated (via the slope) from a linear regression model. This line is compared to the corresponding income trend for the UK in a plot in Excel. The plot also provides confidence intervals for the two slopes and their difference. Refer to chapter 1
(section 1.3) for a guide to interpretation of the income analysis plots.

Because of the achieved sample size in Northern Ireland, commentary is in most cases limited to sex-combined age groups although plots are also included for males and females separately.

Many of the trends identified by the analysis were small in magnitude and did not always reach statistical significance. This chapter describes trends in key foods and nutrients in Northern Ireland taking account of statistical significance and whether the change is nutritionally

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

meaningful. The text describes upward or downward trends and the overall size of any observed changes in intakes for Northern Ireland. The 95% confidence intervals for the size of changes are set out in brackets in the text.[65] When the interval does not contain zero, this indicates a statistical difference at the 5% level. The text also describes trends for Northern Ireland which are different to those observed in the UK as a whole where these differences are statistically significant.Therefore unless otherwise stated, trends for Northern Ireland and the UK can be assumed to be similar. The text in this report does not describe the actual group mean for each income decile.[66]

Commentary is provided except in those cases where a regression line cannot be fitted. This occurred either when most of the data are zero, when there was a clear non-linear relationship or when the number of participants was less than 30. Furthermore, confidence in the regression estimates are diminished when the number of participants is close to 30. In those cases, only limited commentary is provided.

Trends in arithmetic mean are reported as ‘change per £10,000’ where the data were normally distributed and could be analysed without transformation. Where the data were skewed and needed to be log-transformed before analysis, the trends in geometric mean are reported as ‘percentage change per £10,000’ (see section 1.3 of chapter 1 for more detail).

There is evidence that the equivalised income data are positively skewed but a log transformation of these data resulted in a negative skew. Therefore no transformation was applied to the income data prior to the regression analysis, but the influence of high income responses was investigated to ensure the regression slope was not unduly affected by them.

[65] The 95% Confidence Intervals (CIs) presented in the plots relate to the magnitude and direction of change i.e. negative CIs for a downward trend. In the text, downward trends are expressed as a **decrease** and so the CIs quoted represent the magnitude of the decrease not the direction of change.
[66] Income deciles were created where particpants were subset into 10 equally sized groups based on their equivalised income.

6.2 Foods

6.2.1 Population intake

For total fruit and vegetable consumption, 5 A Day fruit and vegetable portions, total meat, and red and processed meat consumption, the proportion of non-consumers over the 4-day period was low. Therefore, the trends in population intakes, including non-consumers, are presented.

Fruit and Vegetables. There was an increase in total fruit and vegetable intake with increasing equivalised income for all age/sex groups, and this was statistically significant in al age groups except children aged 1.5 to 3 years. The largest increase was seen in adults aged 65 years and over who consumed, on average, 56g/day (CI 28, 84) more fruit and vegetables for every £10,000 increase in equivalised income. This was significantly greater than the increase seen in adults of that age in the UK as a whole (who showed a significant increase of 15g/day) and was mainly attributable to an increase in fruit intake of 39 g/day (CI 19, 60).

5 A DAY. The number of 5 A Day portions consumed are presented for the age groups for which there is a government recommendation,[xvii] that is for 11 to 18 years, 19 to 64 years and 65 years and over. With increasing household income, the number of 5 A Day portions consumed increased significantly for all age groups. The largest increase was seen in adults aged 65 years and over with 0.8 portions (approximately 64g of fruit and vegetables) (CI 0.4, 1.1) for every £10,000 increase in equivalised income. This was significantly greater than the increase seen in adults of that age in the UK as a whole (who showed a significant increase of 0.2 portions). For the age/sex groups where it was possible to estimate trends, the proportion meeting the 5 A Day recommendation increased significantly for adults aged 19 to 64 years with increasing household income (5 percentage points, CI 2, 8 for every £10,000 increase in equivalised income).

Total meat. There was no consistent pattern across the age/sex groups in terms of change in intake of total meat with respect to income and the observed changes were small.

Total red and processed meat. For children aged 1.5 to 3 years intake of red and processed meat decreased, on average, by 4g/day (CI 0, 7) for every £10,000 increase in equivalised income. This decrease was significantly greater than the UK as a whole for this age group (who

showed no trend). For the other age/sex groups the changes were smaller and not in a consistent direction.

(**Tables 6.1, 6.12, 6.13, 6.16 and 6.17)**

6.2.2 Percentage of consumers and intake by consumers only

For fruit juice, confectionery, chips and other fried foods, meat products, white meat, fish (and oily fish) and sugary, fizzy drinks and squashes, trends are presented for percentage of consumers and intakes for consumers only. Trends for population intakes are not presented because the proportion of non-consumers over the 4 days of diary recording was high in some age/sex groups. Their inclusion can cause the regression analysis of population intakes to be misleading (see chapter 1, section 1.3).

Fruit juice.[67] For almost all age/sex groups, the percentage consuming fruit juice over the diary period increased with increasing household income, although this was not always statistically significant. The largest significant increase was seen in adults aged 65 years and over of 16 percentage points (CI 9, 23) for every £10,000 increase in equivalised income, followed by adults 19 to 64 years and children 1.5 to 3 years of 8 percentage points (CI 8, 9 and CI 4, 12 respectively). For fruit juice consumers, changes in fruit juice intake were small and/or not significant and there was no consistent pattern in the direction of change with respect to income across the age groups.

Confectionery. There was no consistent pattern across the age/sex groups with respect to income in the percentage consuming confectionery over the diary period. For every £10,000 increase in equivalised income there was a statistically significant 5 percentage point (CI 3, 7) increase in the percentage of consumers of confectionery for adults aged 19 to 64 years. This was significantly greater than the UK as a whole for this age group (who showed a non-significant increase). The percentage of consumers aged 4 to 10 and 11 to 18 years decreased with increasing income although this was not statistically significant. The data for intake of confectionery (consumers only) were skewed and so were log-transformed before analysis. The trends in geometric mean are reported as an average percentage change per year. For most age/sex groups, changes in intake for consumers of confectionery were small. For

[67] This includes the fruit juice component of smoothies but not smoothie fruit.

children aged 4 to 10 years who consumed confectionery, there was a statistically significant decrease in intake of 15% (CI 7, 23) for every £10,000 increase in equivalised income. This was significantly different from the UK as a whole for this age group (who showed a non-significant increase).

Chips and other fried foods. There was no consistent pattern across the age/sex groups with respect to income in the percentage consuming chips and other fried foods. For every £10,000 increase in equivalised income there was a statistically significant 4 percentage point (CI 2, 6) increase in the percentage of consumers of chips and other fried foods over four days for children aged 1.5 to 3 years. This was significantly different from this group in the UK as a whole (who showed a significant decrease of 3 percentage points). For children aged 4 to 10 years and adults aged 19 to 64 years there was a statistically significant reduction of 4 percentage points (CI 0, 7 and 1, 7 respectively) in the percentage of consumers of chips and other fried foods for every £10,000 increase in equivalised income. The data for intake of chips and other fried foods (consumers only) were skewed and so were log-transformed before analysis. The trends in geometric mean are reported as an average percentage change per year. For children aged 4 to 10 years and adults aged 19 to 64 years who consumed chips and other fried food, intake decreased significantly by 10% (CI 5, 14) and 8% (CI 2, 14) respectively for every £10,000 increase in equivalised income. These were significantly greater than the UK as a whole for both age groups (who showed significant decreases of 5% and 2% respectively).

Meat products. Small non-statistically significant decreases in the percentage consuming meat products over the diary period were observed across most age groups over time with increasing income . The data for intake of meat products (consumers only) were skewed and so were log-transformed before analysis. The trends in geometric mean are reported as an average percentage change per year. For those who consumed meat products, intakes decreased in all age groups although this was not always statistically significant. The largest changes were seen in children aged 1.5 to 3 years and adults aged 19 to 64 years with decrease of 12% (CI 5, 20) and 9% (CI 4, 13) respectively for every £10,000 increase in equivalised income.

White meat. There was no consistent pattern across the age/sex groups with respect to income in the percentage consuming total white meat or the intake for consumers and the changes were small.

Total fish. The changes were generally small in the percentage consuming fish with respect to household income, the exception was seen in girls aged 4 to 10 years with an increase of 6 percentage points (CI 0, 11) for every £10,000 increase in equivalised income. In some age groups, intake of total fish (consumers only) showed an increase with increasing income but the changes were small.

Oily fish. The percentage consuming oily fish increased significantly for adults aged 19 to 64 years with increasing household income. For every £10,000 increase in equivalised income the percentage of consumers rose by 6 percentage points (CI 5, 8). This was significantly greater than the increase in the percentage of consumers of that age in the UK as a whole (who showed a significant increase of 4 percentage points).

Sugary, fizzy drinks and squashes. For every £10,000 increase in equivalised income, the percentage consuming sugary, fizzy drinks and squashes over the diary period decreased for children aged 1.5 to 3 years and 4 to 10 years, although this was only significant for the 4 to 10 age group (5 percentage points, CI 0, 10). There were downward trends in the quantities of sugary, fizzy drinks and squashes being drunk by consumers for all age/sex groups with increasing income although these trends were not significant in any age groups.

(Tables 6.2-6.9, 6.14, 6.15 and 6.18-6.23)

6.3 Energy and macronutrients

In this section, reference is made to population dietary intake in terms of DRVs.[xii,xiv,xxxviii] Where relevant, DRVs are presented in the individual plots and are referred to as 'recommendations' in the rest of this section. The recommendations for macronutrients generally indicate the maximum contribution the nutrient should make to energy intake at the population level or, in the case of AOAC fibre, represent the recommended population average intake.

Total energy. There was an upward trend in total energy intake with increasing household income in most age/sex groups but this generally did not reach statistical significance. The largest change was seen in women aged 19 to 64 years where total energy intake increased, on average, by 0.23MJ/day (55kcal) (CI 0.10, 0.37) for every £10,000 increase in equivalised

income. The same pattern was seen for food energy intake (i.e. excluding energy from alcohol) for all age/sex groups.

Protein. For children aged 4 to 10 and 11 to 18 years, protein intake as a percentage of food energy increased significantly by 0.6 percentage points (CI 0.3, 0.9) and 0.4 percentage points (CI 0.1, 0.6) respectively for every £10,000 increase in equivalised income. These were significantly greater than the UK as a whole (where both age groups showed a non-significant increase).

Total fat. For children, total fat intake as a percentage of food energy decreased with increasing income. This was statistically significant for children aged 4 to 10 years (0.6 percentage points, CI 0.0, 1.1) and girls aged 11 to 18 years (0.8 percentage points, CI 0.2, 1.4). In both age groups, this was significantly different from the UK as a whole (who showed a non-significant decrease and increase respectively). The regression line for both these age groups indicates those children in higher income groups were more likely to meet the recommendation of no more than 35% of food energy. For adults, total fat intake as a percentage of food energy increased with increasing income, although the changes were not statistically significant.

Saturated fatty acids. Mean saturated fatty acids intake exceeded the recommendation of no more than 11% food energy across the range of equivalised income for all age/sex groups, as indicated by the regression line. There was no consistent pattern across the age groups with respect to income in saturated fatty acids intake as a percentage of food energy. For every £10,000 increase in equivalised income, saturated fatty acids intake as a percentage of food energy decreased, on average, by 0.5 percentage points (CI 0.1, 0.9) for girls aged 11 to 18 years. This was significantly different from the same group in the UK as a whole (who showed a significant increase of 0.1 percentage points).

***Trans* fatty acids**. Mean *trans* fatty acids intake as a percentage of food energy was well within the recommendation of no more than 2% food energy across the range of equivalised income for all age/sex groups, as indicated by the regression line. For every £10,000 increase in equivalised income, *trans* fatty acids intake as a percentage of food energy increased, on average, for most age/sex groups, although this was not always statistically significant.

Carbohydrate. For carbohydrate intake as a percentage of food energy, the changes with respect to income were small and not in a consistent direction.

Free sugars.[68] Mean free sugars intake exceeded the recommendation of no more than 5% total energy across the range of equivalised income for all age groups,[68] as indicated by the regression line. For every £10,000 increase in equivalised income, free sugars intake decreased for children aged 4 to 10 and 11 to 18 years by 0.7 percentage points (CI 0.2, 1.2) and 0.8 percentage points (CI 0.2, 1.4) respectively. In both age groups, this was significantly different from the UK as a whole (which showed no trend and a non-significant decrease respectively).

AOAC fibre.[69] For all age groups, AOAC fibre intake increased with increasing equivalised income. The increase was significant in children 4 to 10 years and adults 19 to 64 years: for every £10,000 increase in equivalised income, AOAC fibre increased by 0.5g/day (CI 0.1, 0.8) and 0.4g/day (CI 0.1, 0.8) respectively in these age groups.

Alcohol. There was an increase in the percentage of consumers of alcohol with increasing income, although this was only statistically significant for adults aged 19 to 64 years (5 percentage points, CI 1, 8). For consumers in this age group, alcohol intake as a percentage of total energy decreased with increasing income but this was not statistically significant.

(**Tables 6.24 and 6.26-6.34)**

6.4 Micronutrients

For micronutrients, analysis has been carried out for intake and the proportion with intakes below the LRNI.[70] All micronutrient intakes discussed in this chapter and associated Excel

[68] The recommendation that free sugars provides no more than 5% of daily total energy intake applies to those aged 2 years and over.
[69] SACN AOAC fibre recommendations: 30g/day for adults; 25g/day for older children aged 11-16 years; 20g/day for the 5-11 year age group; 15g/day for the 2-5 year age group.
[70] 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. An intake below the LRNI is only considered a problem if sustained over a period of time. As diet is recorded for only four days in the NDNS RP, estimated intake values may not represent intakes over the longer term for micronutrients that are not widely distributed in foods such as vitamin A. It should also be noted that DRVs for some micronutrients such as magnesium, potassium, selenium and zinc are based on very limited data so caution should be used when assessing adequacy of intake using the LRNI.

tables exclude contribution from supplements. Reference is made to population intake compared with the RNI.[71] However, for the proportion with intakes below the LRNI there are very few age/sex groups where a regression line can be fitted (either due to most of the data being zero or there being a clear non-linear relationship). Therefore, no commentary is provided on this analysis in this section. For those age/sex groups where a regression line cannot be fitted, plots showing proportions per income decile are presented to aid the readers interpretation of the relationship. The relationship between the proportion with intakes below LRNI and equivalised income can be investigated further using the archived datasets.

Vitamin A. Data for vitamin A intakes were skewed and so needed to be log-transformed before analysis. The trends in geometric mean are reported as an average percentage change per £10,000 increase. For all age groups except adults aged 65 years and over, vitamin A intake increased with increasing equivalised income. This was statistically significant for children aged 4 to 10 years and adults aged 19 to 64 years: for every £10,000 increase in equivalised income, intake increased by 10% (CI 5, 16) and 5% (CI 1, 9) respectively. The regression line indicates that, for both age groups, those in higher income groups were more likely to have vitamin A intakes that met the RNI.

Riboflavin. Intake of riboflavin increased with increasing income for all age/sex groups except men aged 19 to 64 years, although these changes were small and not always statistically significant. For children aged 1.5 to 3 years and 4 to 10 years, riboflavin intake increased significantly by 0.07mg/day (CI 0.01, 0.14) and 0.12mg/day (CI 0.03, 0.20) respectively for every £10,000 increase in equivalised income. Women aged 19 to 64 years also had an increase in riboflavin intake of 0.07mg/day (CI 0.03, 0.11) for every £10,000 increase in equivalised income and this was significantly greater than the increase seen in women of this age in the UK as a whole (who showed a significant increase of 0.03mg/day).

Folate. For most age/sex groups where it was possible to estimate trends, folate intake increased, on average, with increasing income, although this was not always statistically

[71] The RNI for a vitamin or mineral is the amount of the nutrient that is sufficient for 97.5% 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 more likely that some of the group will have an intake below their requirement.

significant. For every £10,000 increase in equivalised income, intake increased by 9µg/day (CI 0, 17) for children aged 1.5 to 3 years and 15µg/day (CI 6, 24) for children aged 4 to 10 years. The increase for children aged 4 to 10 years was significantly greater than the increase seen in children of this age in the UK as a whole (a significant increase of 6µg/day). For women aged 19 to 64 years, folate intake increased by 12µg/day (CI 6, 18) for every £10,000 increase in equivalised income. This was significantly greater than the increase seen in women of this age in the UK as a whole (who showed a significant increase of 6µg/day).

Vitamin D. Data for vitamin D intakes were skewed and so needed to be log-transformed before analysis. The trends in geometric mean are reported as an average percentage change per £10,000 increase. Assuming straight-line trends, the regression line indicates that mean vitamin D intakes were below the RNI across the range of equivalised income for all age groups. For all age groups, with the exception of children aged 11 to 18 years, vitamin D intake increased with increasing income, although this was not always statistically significant. The largest change was in adults aged 65 years and over where intake increased by 28% (CI 1, 63) for every £10,000 increase in equivalised income.

Iron. For all age groups, iron intake increased, on average, with increasing income, although the trend was not statistically significant in all groups. The largest increase was seen in women aged 19 to 64 years (0.4mg/day, CI 0.1, 0.6) Assuming straight-line trends, the regression line indicates that, for women this age, those in higher income groups were more likely to have iron intakes that met the RNI.

Calcium. For all age groups calcium intake increased, on average, with increasing income, although this was not always statistically significant. The largest increases for every £10,000 increase in equivalised income were seen for younger children aged 1.5 to 3 years (38mg/day, CI 11, 64) and 4 to 10 years (63mg/day, CI 20, 105). These were significantly greater than the increases seen in children of the same age in the UK as a whole. In the UK there was a non-significant increase for children aged 1.5 to 3 years and a significant increase of 16mg/day for those 4 to 10 years).

Sodium. Changes in sodium intake with increasing household income were small across the age/sex groups and not in a consistent direction. For girls aged 11 to 18 years, sodium intake decreased on average by 73mg/day (CI 2, 144) while for women aged 19 to 64 years sodium

intake increased on average by 72mg/day (CI 35, 110) for every £10,000 increase in equivalised income. These sodium intake estimates are based on the sodium content of foods consumed. They do not fully take account of salt added during cooking and exclude salt added at the table by participants.[72]

Iodine. For every £10,000 increase in equivalised income, iodine intake increased by 10µg/day (CI 1, 19) for children aged 1.5 to 3 years and 12µg/day (CI 5, 20) for children aged 4 to 10 years. Both of these increases were significantly larger than the same age groups in the UK as a whole (who showed a non-significant increase and a significant increase of 3µg/day respectively). For women aged 19 to 64 years iodine intake increased by 8µg/day (CI 3,13) for every £10,000 increase in equivalised income. For the other age groups, changes in intake with increasing income were small.

Magnesium. For all age groups magnesium intake increased, on average, with increasing income. This was statistically significant for children aged 1.5 to 3 years and 4 to 10 years: for every £10,000 increase in equivalised income, intake increased by 6mg/day (CI 1, 10) and 8mg/day (CI 3, 12) respectively.

Potassium. For every £10,000 increase in equivalised income, potassium intake increased by 179mg/day (CI 14, 344) for adults aged 65 years and over and by 128mg/day (CI 64,191) for women aged 19 to 64 years. For the other age groups, changes in intake with increasing income were small.

Selenium. For all age groups, with the exception of children aged 1.5 to 3 years, selenium intake increased with increasing income. For children aged 4 to 10 years and 11 to 18 years and adults aged 19 to 64 years, intake increased by 2µg/day (CI 0, 3) for every £10,000 increase in equivalised income.

Zinc. For all age groups zinc intake increased, on average, with increasing income. This was statistically significant for children aged 4 to 10 years and 11 to 18 years: for every £10,000

[72] A nominal 0.01g of salt is added to homemade recipes where salt has been specified by the participant as an ingredient.

increase in equivalised income, intake increased for both by 0.3mg/day (CI 0.1, 0.5 and 0.0, 0.5 respectively).

(**Tables 6.35-6.56)**

7 Equivalised income (Years 6-9; 2013/14-2016/17) for urinary iodine concentration (spot urine)

7.1 Introduction

This chapter presents key findings for spot urinary iodine concentrations by equivalised household income[73] for Years 6 to 9 combined of the NDNS RP. The nutritional significance of this analyte is outlined in chapter 4.

For the equivalised income analysis the average change in each outcome per £10,000 increase in equivalised household income was estimated (via the slope) from a linear regression model. This line is compared to the corresponding income trend for the UK in a plot in Excel. The plot also provides confidence intervals for the two slopes and their difference. Refer to chapter 1 (section 1.3) for a guide to interpretation of the income analysis plots.

Commentary describes trends in Northern Ireland taking account of statistical significance and whether the change is nutritionally meaningful. The text describes upward or downward trends and the overall size of any observed changes in status for Northern Ireland. The 95% confidence intervals for the size of changes are set out in brackets in the text.[74] When the interval does not contain zero, this indicates a statistical difference at the 5% level. Commentary also describes where trends in Northern Ireland are different from the UK as a whole.

Data for urinary iodine concentrations were skewed and needed to be log-transformed before analysis. The trends in geometric mean are reported as 'percentage change per £10,000' (see section 1.3 of chapter 1 for more detail).

[73] Equivalisation is a standard methodology that adjusts household income to account for different demands on resources, by considering the household size and composition.
[74] The 95% Confidence Intervals (CIs) presented in the plots relate to the magnitude and direction of change i.e. negative CIs for a downward trend. In the text, downward trends are expressed as a **decrease** and so the CIs quoted represent the magnitude of the decrease not the direction of change.

There is evidence that the equivalised income data are positively skewed but a log transformation of these data resulted in a negative skew. Therefore no transformation was applied to the income data prior to the regression analysis, but the influence of high income responses was investigated to ensure the regression slope was not unduly affected by them.

7.2 Urinary iodine concentrations

Any spot urine concentration depends on many factors, including hydration status of the participant at the time the urine was passed as well as recent iodine intake. Spot urinary iodine concentrations do not represent the iodine status of individuals, but the median of a large number of spot urine concentrations indicates the iodine sufficiency or otherwise of a population and when population spot urine iodine concentration data are combined (as for the regression analysis) they can indicate population trends.

For adults aged 19 years and over and children aged 11 to 18 years in Northern Ireland no consistent or statistically significant trends in spot urine iodine concentration with equivalised income[75] were seen, and no differences from the UK data were observed.

In spot urine samples from children aged 4 to 10 years in Northern Ireland (71 boys, 47 girls) a statistically significant increase in iodine concentration with increasing equivalised income (boys 19% per additional £10,000, CI 4, 37; girls 17% per additional £10,000, CI 5, 31) was seen. No increase was observed in this age group in the UK as a whole.

(Table 7.1)

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

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