A survey carried out on behalf of the
Department of Health and the
Food Standards Agency

National Diet and Nutrition Survey

Headline results from Years 1 and 2 (combined) of the Rolling Programme (2008/2009 – 2009/10)

Edited by: Beverley Bates, Alison Lennox, Chris Bates, Gillian Swan

NatCen National Centre for Social Research
UCL
MRC Human Nutrition Research

Authors' acknowledgements

We would like to thank all of those who gave up their time to be interviewed and who welcomed interviewers and nurses into their homes. We would also like to acknowledge the professionalism and commitment of interviewers and nurses who worked on the survey and who are so important to the survey's success.

We would like to thank everyone who contributed to the survey and the production of this report. In particular, we would like to thank:

- Members of the teams at Natcen: Helen Henderson, Sarah Pigott, Caireen Roberts, Lucy Lee, Valdeep Gill, Rosie Sutton and Sam Clemens; HNR: Polly Page, Toni Steer, Sonja Nicholson, Birgit Teucher, Gerda Pot and Katie Dearnley; and UCL: Jenny Mindell and Vasant Hirani.
- Stuart Bennett and colleagues at the Northern Ireland Statistics and Research Agency for organising and carrying out fieldwork in Northern Ireland.
- Operations staff at Natcen, especially Sue Duffy, Lynne Gold, Helen Selwood and Janice Morris.
- The programmers and data managers at Natcen: Steve Edwards, Claire Deverill and Olu Alaka; and at HNR: Darren Cole, Gemma Bramwell, Jonathan Last, Iain Bayes, Kerry Lambert and Alison James.
- The dietary assessment team at HNR: Celia Greenberg, Emily Fitt, Clare Whitton, Natalie Momen, Kate Edgecombe, Lindi Holmes, Dorothy Singer, Rachel Woodward, Kirsty Trigg, David Pell, Jenny Winster, Rachael Mack, Karen Binks and Tsz Ning Mak.
- Laboratory and analytical personnel at HNR: Lorna Cox, Christine Clewes, Les Bluck, Steve Austin, Peter Winship, Stephen Young, Antony Wright, Kate Guberg, Karen Chamberlain, Hanneke Mfuni, Abhilash Krishnankutty, Tabasum Makhdoomi, Debbie Harman, Michelle Lewin, Maria Pinheiro, Marilena Leventi, Carl Ruffel, Deepti Sood, Carmen Canas, Edyta Telega and Falai Baldeh.
- Ann Prentice at HNR for her scientific oversight.
- Other colleagues at HNR: Sue Bryant, Yvette Edwards, Adrian Mander, Ashley Olson and Mark Chatfield.
- Other colleagues at UCL: Maria Aresu, Laia Becares, Barbara Carter-Szatynska, Saffron Karlsen, Marilyn Roth and Emmanuel Stamatakis.

- Colleagues at Addenbrookes for carrying out blood analyses and Professor Elaine Gunter (Centre for Disease Control and Prevention, USA) for an independent review of the laboratory procedures and analyses.
- Soren Brage and colleagues at the MRC Epidemiology Unit for their physical activity expertise.
- Members of the NDNS Project Board and external advisors, in particular the late Professor Sheila Bingham, Dr Ailsa Welch, Dr Wendy Wrieden, Professor Julie Lovegrove and Professor Hilary Powers.
- The professional staff at the Department of Health in particular: Mark Bush, Mary Day, Sakhi Dodhia, Melanie Farron-Wilson, Andrew James, Verity Kirkpatrick, Sheela Reddy, Alison Tedstone and Frederick Wheeler.
- The professional staff at the Food Standards Agency: Fiona Comrie, Clifton Gay, Maria Jennings, Anne Milne, Heather Peace, Gillian Purdon and Joseph Shavila.

Notes to text and tables

1 The data used in the report have been weighted. The weighting is described in Appendix B of this report. Unweighted sample sizes are shown at the foot of each table.

2 Two different non-response weights have been used: one for non-response at the interview stage (with adult and child versions) and one for non-response to the nurse visit (again, with adult and child versions). In addition, the Smoking and Alcohol sections in Chapter 3 use a separate weight which allows 16-18 year olds to be included in analysis of adults.

3 The data were analysed in SPSS version 15 using the complex surveys module.

4 The following conventions have been used in tables:

- `-` no observations (zero value)
- `0` non-zero values of less than 0.5% and thus rounded to zero
- `[ ]` used to warn of small sample bases, if the unweighted base is less than 30.

5 Because of rounding, row or column percentages may not add exactly to 100%.

6 A percentage may be quoted in the text for a single category that aggregates two or more of the percentages shown in a table. The percentage for the single category may, because of rounding, differ by one percentage point from the sum of the percentages in the table.

7 Values for means, medians, percentiles and standard errors are shown to an appropriate number of decimal places. For reasons of space, Standard Error may sometimes be abbreviated to SE and Standard Deviation to sd.

8 'Missing values' occur for several reasons, including refusal or inability to answer a particular question; refusal to co-operate in an entire section of the survey (such as the nurse visit or a self-completion questionnaire); and cases where the question is not applicable to the participant. In general, missing values have been omitted from all tables and analyses.

9 The group to whom each table refers is stated at the upper left corner of the table.

10 The term 'significant' refers to statistical significance (at the 95% level) and is not intended to imply substantive importance.

1. Background and purpose

Beverley Bates, Sarah Pigott

1.1. Introduction

The National Diet and Nutrition Survey (NDNS) is a survey of the food consumption, nutrient intakes and nutritional status of people aged 1.5 years and older living in private households. The survey is carried out in all four countries of the United Kingdom (UK) and is designed to be representative of the UK population. This report contains results for this core UK sample.

Additional recruitment was undertaken in Scotland, Northern Ireland and Wales in order to achieve large enough samples in these countries to enable cross-country comparisons to be made.[1] These results will be reported at a later date when sufficient numbers are available for analysis.

The first four years of the NDNS rolling programme were commissioned by the UK Food Standards Agency (FSA) in 2006 with a contribution to funding from the Department of Health (DH) in England. Responsibility for nutrition policy in England and in Wales transferred from FSA to Health Departments in 2010, but remains with FSA in Scotland and Northern Ireland. Management of the NDNS contract also transferred to DH at this time; the core UK survey continues to be jointly funded by FSA and DH, with the additional recruitment in Scotland, Wales and Northern Ireland funded by organisations in those countries.

The programme (for four years of data collection from 2008 to 2011/12) is carried out by a consortium of three organisations: the National Centre for Social Research (NatCen), MRC Human Nutrition Research (HNR), based in Cambridge and the Department of Epidemiology and Public Health at the Royal Free and University College London Medical School (UCL). Fieldwork in Northern Ireland is carried out by the Northern Ireland Statistics and Research Agency (NISRA). Haematological and biochemical analyses of blood samples are carried out at HNR and Addenbrooke's Hospital NHS Trust, Cambridge.

This report presents findings from the first two years of the NDNS rolling programme, fieldwork for which was carried out between February 2008 and August 2010.[2] The two survey years have been combined to provide a larger sample size on which to base analyses. This first chapter provides an overview of the background and aims of NDNS. This is followed by information about the research designs and methodologies and response (chapter 2), socio-demographic characteristics of the sample (chapter 3) and physical measurements (chapter 4). Chapter 5 focuses on food consumption and nutrient intakes of participants and differences by age and sex. Comparisons of intakes with government recommendations (Dietary Reference Values)[3] and with findings from earlier surveys in the NDNS series are also made in chapter 5.

Results from analysis of blood samples for biochemical indices of nutritional status will be published separately.

Other elements of the first two years of the NDNS rolling programme (24-hour urine, total energy expenditure measured by doubly labelled water (DLW) and physical activity) will be included in future reports, when sufficient numbers permit meaningful analyses.

1.2. The National Diet and Nutrition Survey

DH has responsibility for surveillance of the nutrient intake and nutritional status of the general population. The nutrition remit of DH is to encourage and facilitate the eating of healthy diets in order to improve the diet and nutrition of the UK population and reduce diet-related disease. The evidence base to support this work is obtained through DH's dietary survey programme, of which the NDNS is the major component. The NDNS also provides detailed data on food consumption at the level of the individual which enables FSA to carry out food chemical exposure assessments which form an essential part of the risk assessment process.

In the past, the NDNS programme comprised a series of cross-sectional surveys, each covering a different age group: pre-school children (aged 1.5 to 4.5 years);[4] young people (aged four to 18 years);[5] adults (aged 19 to 64 years);[6] and older adults (aged 65 and over).[7] The programme was set up in 1992 following the 1986/87 Dietary and Nutritional Survey of British Adults,[8] the first survey of this type in Britain. The first survey of the NDNS programme was carried out in 1992/93, and since then there has been a survey about every three years, with the most recent, of adults aged 19 to 64 years, carried out in 2000/01. Each was conducted as a stand-alone survey. Following a review of the dietary survey programme in 2003, FSA's Board agreed in principle that future surveys should be carried out on a rolling basis in order to strengthen the ability to track changes in diet and nutrition over time. The new rolling programme format of continuous fieldwork provides a more responsive framework for dietary surveys, giving more ability to identify emerging policy issues, responding more rapidly to changing data needs and giving better opportunities to identify and analyse trends. This will enable DH to develop, implement and monitor effective policies to improve the nation's diet and nutritional status and will also support FSA's risk assessment for food chemicals.

Prior to the launch of mainstage fieldwork in 2008, a comparison study of two different dietary assessment methods (randomly allocated to sampled addresses) was carried out in 2007. Over 1,100 adults and children took part with around half participating in interviewer-administered 24-hour dietary recalls (repeated on four non-consecutive days) and the others keeping a four-day estimated (un-weighed) food diary on consecutive days. The NDNS Project Board considered the findings and decided that the four-day estimated diary (hereafter referred to as the "four-day food diary") should be used for the rolling programme.[9,10]

The specific aims of the NDNS rolling programme are to:

- provide quantitative data on the food and nutrient intakes, sources of nutrients and nutritional status of the UK population aged 1.5 years and above;
- provide information on trends in food consumption, nutrient intake and nutritional status in different age groups;
- describe the characteristics of individuals with intakes of specific nutrients above or below the national average;
- produce a database of food consumption which will be used to calculate intakes of natural toxicants, contaminants, additives and other food chemicals;
- measure blood and urine indices that provide evidence of nutritional status or dietary biomarkers, and to relate these to dietary, physiological and socio-demographic data;
- provide height, weight and other anthropometric measurements and examine their relationship to socio-demographic, dietary, biochemical and health data;
- monitor the diet of the population to establish the extent to which it is adequately nutritious and varied;
- monitor the extent to which the diets of population sub-groups vary from expert recommendations;
- assess total energy expenditure and physical activity levels and patterns in the study population; and
- provide information on oral health status in relation to diet and nutritional status.

The rolling programme will provide the detailed food consumption data essential to support risk assessments for food chemicals and will also benefit a wide range of Government activities related to diet and health. It is key to monitoring progress on diet and nutrition objectives of UK Health Departments, for example those set out in the Healthy Lives Healthy People White Paper in England.[11]

As mentioned in section 1.1, this report includes combined results from Year 1 of NDNS (fieldwork carried out between February 2008 and June 2009) and

Year 2 (fieldwork carried out between April 2009 and August 2010). An earlier report on Year 1 of the survey was published on FSA's website in February 2009.[12] It is important to note that comparisons cannot be made between the results contained in this report and those included in the previous Year 1 report due to the different rules in Years 1 and 2 for selecting diary days. In Year 1, both weekend days were included for each participant whereas Year 2 was designed so that for both years combined, all days of the week would be more evenly represented. Hence, any observed differences between the two reports may be attributable to the different representation of days in Years 1 and 2.

---

[1] Boosted samples in Scotland and Northern Ireland were included from Year 1. A boosted sample in Wales was included from Year 2 (starting April 2009).

[2] Fieldwork for year 1 began in April 2008 and was completed in June 2009. It was preceded by a short run-in period from February to March 2009 to test procedures. Data from the run-in are included in the results. Fieldwork for year 2 ran from April 2009 to August 2010.

[3] Department of Health (1991). Dietary Reference Values for food Energy and Nutrients in the United Kingdom. (Report on Health and Social Subjects, No. 41). London: HMSO

[4] Gregory JR, Collins DL, Davies PSW, Hughes JM, Clarke PC. National Diet and Nutrition Survey: children aged 1 ½ to 4 ½ years. Volume 1: Report of the diet and nutrition survey London: HMSO, 1995.
Hinds K, Gregory JR. National Diet and Nutrition Survey: children aged 1½ to 4½ years. Volume 2: Report of dental survey. London: HMSO, 1995.

[5] Gregory JR, Lowe S, Bates CJ, Prentice A, Jackson LV, Smithers G, Wenlock R, Farron H. National Diet and Nutrition Survey: young people aged 4 to 18 years. Volume 1: Report of the diet and nutrition survey. London: TSO, 2000.
Walker A, Gregory J, Bradnock G, Nunn J, & White D. National Diet and Nutrition Survey: young people aged 4 to 18 years. Volume 2: Report of the oral health survey. London: TSO, 2000.

[6] Henderson L, Gregory J, Swan G. National Diet and Nutrition Survey: adults aged 19 to 64 years. Volume 1: Types and quantities of food consumed. London: TSO, 2002.
Henderson L, Gregory J, Irving K, Swan G. National Diet and Nutrition Survey: adults aged 19 to 64 years. Volume 2: Energy, protein, carbohydrate, fat and alcohol intake. London: TSO, 2002.
Henderson L, Irving K, Gregory J, Bates CJ, Prentice A, Perks J, Swan G, Farron M. National Diet and Nutrition Survey: adults aged 19 to 64 years. Volume 3: Vitamin and mineral intake and urinary analytes. London: TSO, 2003.
Rustin D, Hoare J, Henderson L, Gregory J, Bates CJ, Prentice A, Birch M. National Diet and Nutrition Survey: adults aged 19 to 64 years. Volume 4: Nutritional status (anthropometry and blood analytes), blood pressure and physical activity. London: TSO, 2004
Hoare J, Henderson L, Bates CJ, Prentice A, Birch M, Swan G, Farron M. National Diet and Nutrition Survey: adults aged 19 to 64 years. Volume 5: Summary report. London: TSO, 2004.

[7] Finch S, Doyle W, Lowe C, Bates CJ, Prentice A, Smithers G, Clarke PC. National Diet and Nutrition Survey: people aged 65 years and over. Volume 1: Report of the diet and nutrition survey. London: TSO, 1998.
Steele JG, Sheiham A, Marcenes W, Walls AWG. National Diet and Nutrition Survey: people aged 65 years and over. Volume 2: Report of the oral health survey. London: TSO, 1998.

[8] Gregory J, Foster K, Tyler H, Wiseman H. The Dietary and Nutritional Survey of British Adults. London: HMSO, 1990.

[9] Following considerable discussion of the dietary assessment method to use for the rolling programme, it was decided to conduct a study to compare the two possible methods that might be adopted, a repeat 24-hour recall method and an estimated or unweighed diary. The results of the comparison study showed equivalent response rates, comparable experiences for interviewers and participants, similar energy and nutrient intakes and similar extent of misreporting by the two dietary assessment methods compared. However, there were a number of considerations that leaned towards the dietary diary for the survey on an ongoing basis, not least continuity with past NDNS surveys and flexibility with a wide range of age groups.

[10] Stephen A, Teucher B, Bluck L, Cole D, Fitt E, Mander A, Woodward R, Wright A, Bates B, Roberts C, Mackenzie H, Deverill C, Mindell J. National Diet and Nutrition Survey Rolling Programme, Comparison Study, Part 1. A comparison of results by dietary assessment method: repeat 24-hour recall and four-day estimated (unweighed) diet diary. Unpublished. 2008.

[11] Department of Health Healthy Lives, healthy People: Our strategy for public health in England White paper [Online] Available http://www.dh.gov.uk/en/Publicationsandstatistics/Publications/PublicationsPolicyAndGuidance/DH_121941 (accessed 01/02/2011)

[12] [Online]. Available: http://www.food.gov.uk/science/dietarysurveys/ndnsdocuments/ndns0809year1 (Accessed 30/01/2011)

2 Methodology and response

Beverley Bates and Valdeep Gill

2.1 Overview of methodology

This chapter provides an overview of Year 2 methodology. Information about Year 1 methodology can be found in chapter 2 of the Year 1 report, published on FSA's website.[1]

In order to meet the aims of the survey (see section 1.2) a sample of people representative of the UK population aged 1.5 years and over was required. This sample was drawn from the Postcode Address File (PAF),[2] a list of all the addresses in the UK. In order to improve cost effectiveness the addresses were clustered into Primary Sampling Units (PSUs), small geographical areas, based on postcode sectors, randomly selected from across the UK. A list of addresses was randomly selected from each PSU.

Information describing the purpose of the survey was posted to all selected addresses. This was followed by a face-to-face visit by an interviewer to each address to recruit participants in the eligible age range(s). As in Year 1, the survey aimed to collect data from a UK representative sample of 1000 people per year, 500 adults (aged 19 years and over) and 500 children (aged 1.5 to 18 years). In order to achieve (as far as possible) equal numbers of adults and children in the sample, at some addresses only children were selected to take part (see section 2.2.2). In addition extra addresses were selected in Wales, Scotland and Northern Ireland to boost the sample size in these countries and enable comparisons to be made between the UK countries.[3]

At each address, the interviewer enumerated the number of households and, in cases where there were two or more, randomly selected one for NDNS. From each selected household an interviewer randomly selected up to one adult and one child to take part in the survey. These are known as *participants*. The first stage of the survey comprised a face-to-face Computer Assisted Personal Interview (CAPI) with each participant (or in the case of a

young child, their parent or guardian[4]), completion of a four-day food diary by the participant (outside the interviewer visits) and measurements of height and weight. The interviewer also collected information on shopping and food preparation practices and facilities in the household by additionally interviewing the *Main Food Provider* (MFP)[5] of the household where this was not a selected participant. The MFP was the person who was best placed to answer questions about food purchased and prepared for the participant(s). The interview also identified the *Household Reference Person* (HRP)[6] in each household and asked questions about housing tenure, as well as his or her employment, to determine the socio-economic classification of the household.[7]

Participants who took part in the CAPI interview and completed a food diary for at least three days were classified as '*fully productive'* and were invited to take part in the second stage of the survey. This involved a visit from a nurse to take physical measurements, a blood sample and a 24-hour urine collection.

2.2 Sample design

2.2.1 Selecting addresses

The sample was drawn from the (smaller users) PAF. A core UK sample of 3240 addresses was selected from 120 PSUs. Twenty seven addresses were randomly selected in each selected PSU. At each address, the interviewer established the number of households and, in cases where there were two or more, selected one household at random.

2.2.2 Selecting participants

The 27 addresses were randomly allocated to one of two groups to determine whether an adult (aged 19 years or over) and a child (aged 1.5 to 18 years), or a child only, were selected for interview. At nine of the selected addresses the interviewer selected one adult and, where present, one child for inclusion in the survey. The remaining 18 addresses were for a "child boost" and the

interviewer only carried out interviews in households with children. In households containing more than one eligible person (adult and/or child), interviewers selected the participant(s) using a random selection procedure.

Further details on sampling can be found in Appendix B.

2.3 Ethical approval

Ethical approval for the study was obtained from the Oxfordshire A Research Ethics Committee. The letters of approval for the original submission and subsequent substantial amendments, together with approved documents, were sent to all Local Research Ethics Committees (LRECs) covering areas where fieldwork was being conducted. Research governance[8] approval was sought for all participating NHS laboratories and obtained where required by the Research and Development (R&D) Committee.

2.4 Fieldwork

Fieldwork was issued monthly to interviewers and nurses in the following waves:

	Interviewers (Stage 1)	*Nurses (Stage 2)*
Quarter 1	April-June 2009	July-September 2009
Quarter 2	July-September 2009	October-December 2009
Quarter 3	October-December 2009	January-March 2010
Quarter 4	January-March 2010	April-June 2010

Stage 1 fieldwork commenced on the first weekday of the month, and interviewers were given six weeks in which to complete their assignment. Stage 2 fieldwork for a particular month started six weeks after the interviewer deadline (for example, interviewers completed April assignments by mid-May 2009 and nurse visits to these participants started in July 2009). Nurses had up to seven weeks to complete their work.

2.5 Overview of survey components and fieldwork procedures

There were two main stages to the survey:

Stage 1: Interviewer visit:	Four-day food diary
	Detailed background interview
	Interview with MFP
	Height and weight measurements
	Physical activity self-completion questionnaire or ActiGraph
Stage 2: Nurse visit:	Blood sample
	24-hour urine collection
	Physical measurements
	Blood pressure
	Collection of information about prescribed medicines

2.5.1 Stage 1: the interviewer visits

A letter and leaflet describing the purpose of the survey was sent to all sampled addresses before the fieldwork start date. A few days later, interviewers visited the addresses to determine whether the address was private, residential and occupied. They then carried out the selection process and, for children aged under 16 years, sought both the child's and their parent's consent to interview.

Interviewers carried out three main visits to households who agreed to participate:

- **Visit 1:** Four-day food diary explained to the participant and left with them to complete; interviewer-administered CAPI; height and weight measurements; and self-completion booklets in which to record the smoking and drinking habits of children and young people. Participants aged 16 years and above were asked to complete a self-completion questionnaire designed to collect information about physical activity

(the Recent Physical Activity Questionnaire (RPAQ)).[9] Children aged four to 15 years were asked whether they would be willing to wear a physical activity monitor (an ActiGraph) for seven consecutive days (the monitor was explained and left with those who agreed to wear it).

- **Visit 2:** The diary check up visit, where the interviewer reviewed the completion of the four-day food diary so far and filled in any missing information with the participant.
- **Visit 3:** Review and collection of four-day food diary, RPAQ self-completion and ActiGraph and further CAPI questionnaire administration.

At the end of the third main interviewer visit, interviewers gave each participant completing at least three food diary recording days a token of appreciation (£30 in high street vouchers).[10] Interviewers then introduced the second stage of the survey, asking for permission for the nurse to visit.

Further details about information collected during the interviewer stage (and the fieldwork documents used) can be found in Appendices C to F.

2.5.1.1 Computer Assisted Personal Interview (CAPI) programme

CAPI interviewing involves the interviewer reading questions from a laptop screen and entering the participants' responses into designated fields. The CAPI questionnaire had three main elements: household composition/ structure interview, MFP interview and individual interview. The individual questionnaire, asked of each selected participant had two parts: Part I, which was asked at the first main interviewer visit; and Part II, which was asked at the third main visit after the interviewer collected the food diary.

The content of the CAPI questionnaires is shown in Appendix D.

2.5.1.2 Collection of dietary data: the four-day food diary

Based on the day of the first individual CAPI interview, the interviewer's laptop program selected four consecutive days as the food diary recording period.

Participants were provided with a diary and asked to keep a record of everything they ate and drank over these four days, both in and outside the home. Interviewers carried out a food diary check visit with participants on the second or third day of recording either in person or over the telephone, with the aim of improving recording for the remaining days and also providing encouragement to participants to continue recording. Interviewers then returned to collect the diary and check the remaining days no later than three days after the final day of recording.

As participants were not expected to weigh their food and drink, portion sizes were estimated using household measures (e.g. two thick slices of bread, four tablespoons of peas) or using weights from labels (e.g. 420g tin of baked beans, 330ml can of lemonade). Those aged 16 years and over were also able to describe their portion size using photographs of 10 frequently consumed foods reproduced in the diary.

A parent was asked to keep the food diary on behalf of participants aged 11 years and younger, with the child contributing information where possible and with help from other carers.

Appendix A provides full details of the dietary data collection and processing protocols.

2.5.1.3 Selection of food diary start day

In Year 1 of NDNS the food diary recording period (four consecutive days) always started on a Thursday, Friday or Saturday and included both weekend days (Saturday and Sunday). This meant that weekend days were over-represented and Wednesdays were never represented.

To redress the over-representation of weekend days and non-representation of Wednesdays the food diary recording period was changed in Year 2 so that weekend days were under-sampled and Wednesdays were over-sampled. The Year 2 diary recording period could start on *any* day and did not necessarily include any weekend days.

Further information about the food diary can be found in section 5.1.

2.5.2 Stage 2: the nurse visits

Stage 2 of the survey was carried out by a qualified nurse and took place within two to four months of the final interviewer visit. All individuals completing three or four food diary days were eligible for a nurse visit.

At the end of Stage 1, interviewers provided participants with information leaflets giving details of the nurse visit. Nurses could provide these again if necessary. The nurse asked questions about prescribed medications before taking, with agreement, a number of physical measurements.

2.5.2.1 Measurements taken by the nurse

A summary of the information collected during the nurse stage is provided below. Some of the information collected by nurses was limited to particular age groups.

Measurement or procedure	**Participant**
Details of prescribed medications	All ages
Blood pressure	Aged four years and over
Infant length measurement	Aged 18 to 23 months
Waist and hip circumferences	Aged 11 years and over
Demi-span	Aged 65 years and over and those aged 16 to 64 years where height could not be measured
Mid Upper Arm Circumference (MUAC)	Aged two to 15 years
24-hour urine collection	Aged four years and over fully out of nappies
Non-fasting blood sampling	Aged 1.5 to three years and diabetics not willing to fast
Fasting blood sampling	Aged four years and over

The nurse fieldwork documents are provided in Appendices G and H. Measurement protocols are in Appendix I.

2.5.2.2 Blood sampling

After providing the physical measurements, participants were asked whether they were willing to give a small blood sample by venepuncture after an overnight fast (those aged 1.5 to three years and diabetics not willing to fast were asked whether they were willing to provide a non-fasting blood sample). The nurse obtained written consent from the participants aged 16 years and older before the sample was taken. For children aged 1.5 to 15 years, written consent of a parent or guardian was required and nurses additionally obtained the assent of the child where possible. For those aged 10 years or younger, blood was taken by a paediatric phlebotomist who accompanied the nurse on the visit. Nurses also sought written agreement to store part of the blood sample for additional analyses at a future date. Participants who provided a blood sample were given £15 in high street vouchers as a token of appreciation for agreeing to this part of the study.

2.5.2.3 24-hour urine sampling

Nurses also sought agreement from adult participants, and child participants aged four years and over who were fully out of nappies (and their parent or guardian), to provide a 24-hour urine collection. If participants agreed, they were asked to take three para-aminobenzoic acid (PABA) tablets evenly throughout the waking hours of the day on which the urine collection was made.[11] Written consent was sought for the taking of PABA tablets, laboratory analysis of the 24-hour urine sample and storage of any remaining urine for future analyses. Participants who provided a 24-hour urine sample were given £10 in high street vouchers as a token of appreciation for taking part in this element of the study.

2.5.3 Feedback to participants and GPs

Participants who completed three or four food diary recording days were asked whether they would like to be sent feedback on the analysis of their

diary and how this compared to recommendations. The feedback also included general information on sources of healthy eating advice. Further information about the dietary feedback can be found in Appendix A and an example of the dietary feedback is provided in Appendix J.

Each participant was also given a 'Measurement Record Card' on which the interviewer and nurse recorded the person's height, weight, body mass index (BMI) (if aged 16 years and over), blood pressure (if aged four years and over) and other age-dependent anthropometric measurements (waist and hip circumferences (ages 11 years and older); mid upper arm circumference (MUAC) (aged two to 15 years); demispan measurement (aged 65 years and over) and infant length (aged 18 to 23 months). Participants who provided a blood sample were additionally asked whether they wished to be sent results of the blood sample analyses most related to their health. Participants were asked if they wanted details of these analyses, their BMI and their blood pressure readings to be sent to their GP. If they did, written consent was obtained from the individual (or from the parent in the case of a child). See Appendix J for an example of feedback to GPs.

2.6 Fieldwork quality control

2.6.1 Project specific training for interviewers and nurses

Fieldwork in England, Scotland and Wales was carried out by NatCen's panel of interviewers and nurses. In Northern Ireland, fieldwork was carried out by interviewers and nurses working for NISRA.

All interviewers and nurses working on NDNS were briefed and trained before undertaking an assignment and were monitored during their assignment. Fieldworkers were also issued with comprehensive written instructions covering survey procedures and measurement protocols.

2.6.2 Training for interviewers

All new-to-NDNS interviewers attended a two-day training course where they were fully briefed on the protocols and administration of the survey. Interviewers who had previously worked in Year 1 of NDNS attended a one-day refresher briefing.

The full and refresher briefing sessions covered background and content, doorstep approach, questionnaire administration (including practice sessions), placement and collection of self-completions and ActiGraphs, and the placement, checking and collection of the four-day food diaries. Interviewers at the two-day briefings were also trained in taking height and weight measurements.

After the briefing, "early work" checks were carried out on the first two or three food diaries returned by each interviewer with timely feedback provided on any areas of concern. All interviewers working on a second or subsequent assignment received feedback on the diaries from their previous assignment. Further, any interviewer who had more than three months gap between assignments completed their own two-day diary which was reviewed and comments fed back.

2.6.3 Training for nurses

Nurse briefings lasted one and a half days and covered equipment training, blood sampling and 24-hour urine training and questionnaire administration (including practice sessions). Most nurses who worked on NDNS were very experienced in taking all the physical measurements collected on the study. Any newer nurses also attended a general NatCen nurse training session which covered standard protocols for all physical measurements.

2.7 Key methodological changes between Years 1 and 2

A number of methodological changes were introduced in Year 2 of NDNS. These are summarised below:

- The FSA asked the NDNS Consortium to set up a Physical Activity Working Group (PAWG) with the aim of deciding how physical activity data should be collected from Year 2 of NDNS onwards.[12] The PAWG consisted of representatives from the Consortium, FSA, and physical activity experts from the MRC Epidemiology Unit.

  Based on recommendations of the PAWG, the use of the physical activity monitor (the 'ActiGraph') was extended from children aged four to10 years in Year 1 to four to 15 years in Year 2 onwards. Those aged 16 years and older were asked to complete a physical activity self-completion questionnaire. There was no change from Year 1 for those aged four to 10 years who continued to be asked to wear an ActiGraph.

- In Year 1, the nurse visit followed as soon as possible after the interviewer visits were completed. In Year 2, a longer gap was introduced with the aim of improving nurse stage response rates. The nurse visit took place between two to four months after the interviewer visits to the household had been completed.

- The DLW sub-study takes place in alternate fieldwork years (i.e. Years 1 and 3) so there was no DLW sub-study in Year 2 of NDNS.

- In Year 1, the dietary recording period included both weekend days (Saturday and Sunday). In Year 2, the diary recording period started on any weekday or weekend day and did not necessarily include any weekend days (see section 2.5.1.3 for more information).

2.8 Response rates

Response rates presented in this section are for Years 1 and 2 combined.[13]

2.8.1 Household level response

Overall for Year 1 and Year 2 combined, of the 6750 addresses issued to interviewers, 46% were eligible for household selection and 54% were

ineligible. Ineligible addresses include vacant or derelict properties/institutions. Child boost addresses that were screened out were also included in the ineligible category, which explains the higher than average proportion of ineligible addresses.

Household selection was carried out at 90% of eligible addresses. The remaining 10% of addresses refused before the household selection could be carried out. Of those selected households, 64% were productive – i.e. at least one selected participant completed three or four dietary recording days.

(Table 2.1)

2.8.2 Individual level response

The overall response rate for fully productive individuals (i.e. those completing three or four dietary recording days) was 55%, giving a sample size of 2126 fully productive individuals.[14] Analyses in this report (including response rates for subsequent stages/components of the survey) are based on these 2126 individuals.

Valid height and weight measurements were obtained for almost all fully productive participants (height 95%; weight 94%).

Seventy six percent of all fully productive participants were visited by a nurse.[15]

Nurses obtained a blood pressure measurement from 74% of fully productive adults (75% of men and 74% of women) and children aged four years and over (71% of boys and 77% of girls). Waist and hip circumference measurements were obtained from three quarters of participants aged 11 years and over. Nurses measured the MUAC of 74% of children aged two to 15 years.

Fifty per cent of adults completing at least three diary days and 27% of children completing at least three diary days provided a blood sample. Younger children (and their parent(s)) were more reluctant to give a blood

sample than older children: 19% of those aged 1.5 to 10 years provided a blood sample compared with 39% of those aged 11 to 18 years.

Fifty nine per cent of participants aged four years and over and who completed at least three diary days provided a 24-hour urine collection for analysis. **(Table 2.2)**

2.9 Weighting the survey data

It is necessary to apply weighting factors to the data collected in NDNS for two reasons: to remove any bias in the observed results which may be due to differences in the probability of households and individuals being selected to take part; and to attempt to reduce non-response bias.

The survey was designed so that no more than one adult and one child were selected from any one household to take part. This meant that adults living in households with one or more other adults and children in households with one or more other child were less likely to be selected than were adults or children in single adult/child households.

In addition, the multi-stage design means there were a number of stages in the survey where it was possible for participants to drop out. If the people who refused to participate at a particular stage were systematically different from those who took part then the sample would be biased.

Weighting factors were used to correct for both these cases. There were two stages to the weighting scheme: the first was to generate a set of design weights to correct the unequal selection probabilities; and the second was to create a set of weights to adjust for non-response. The final weights were a product of the selection weights and the non-response weights. Full detail of the NDNS weighting scheme is provided in Appendix B.

[1] [Online]. Available: http://www.food.gov.uk/science/dietarysurveys/ndnsdocuments/ndns0809year1 (accessed 30/01/11)

[2] The sample was drawn from the 'small users' sub-file of the Postcode Address File (PAF) is a computer list, prepared by the Post Office, of all the addresses (delivery points) which receive fewer than 25 articles of mail a day.

[3] These results will be published at a later date when sufficient numbers are available for analysis.

[4] A guardian is defined as a person with legal responsibility for the child.

[5] The Main Food Provider (MFP) is the person in the household with the main responsibility for shopping and preparing food. If these tasks are shared equally between two people, for example if one person does all the shopping and another person does all the cooking, then either resident could be classified as the MFP.

[6] 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.

[7] Questions were asked to ascertain whether the HRP was in paid work at the time of the interview and, if not, whether they had ever had a paid job. If the HRP had ever worked, there were further questions about their current or most recent job in order to classify HRPs into the National Statistics Socio-economic Classification (NS-SEC) groupings.

[8] The Research Governance Framework is intended to define the broad principles of good research practice, and to ensure that health and social care research is conducted to high scientific and ethical standards.

[9] Based on the Recent Physical Activity Questionnaire developed by the MRC Epidemiology Unit, Cambridge.

[10] Children who had worn an ActiGraph were given a promissory note stating that their £10 token of appreciation would be sent from the office within four weeks of interview.

[11] PABA tablets were given to assess completeness of the urine collections.

[12] For the NDNS rolling programme, questionnaires were developed with the aim of assessing the physical activity of participants aged 11 years and over in sufficient detail to enable estimation of energy expenditure. These questionnaires were based on existing documents where suitable, with new questions developed where required to provide additional detail which was considered missing. Separate questionnaires were prepared for children aged 11 to 15 years and participants aged 16 years and over. The questions were asked as part of the CAPI interview and took 20 minutes, on average, to administer. Subsequent detailed analysis of NDNS Comparison Study questionnaire data showed that it was not possible to produce 'energy in / energy out' data at an individual level so the PWAG accepted that NDNS should instead aim to produce expenditure estimates provided in three to five categories of expenditure level. This enabled the introduction of a revised, shorter questionnaire (based on the RPAQ) for participants aged 16 years and over. This shorter questionnaire should allow the categorisation of individuals into those three to five categories of physical activity.

[13] Response rates for the individual years (1 and 2) were very similar.

[14] A further 75 individuals completed one or two diary days or refused before or during the CAPI interview. Of the 2126 fully productive individuals, 2092 (98%) completed four dietary days and 34 (2%) completed three days.

[15] 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.

3. Socio-demographic characteristics of the NDNS sample

Valdeep Gill

This chapter describes the socio-demographic characteristics of the NDNS sample for Years 1 and 2 combined, using data collected during the CAPI interviews and additionally from self-completion questionnaires in the case of Smoking and Drinking analysis.

3.1. Sex

Forty three per cent of adult participants in the NDNS unweighted sample were men and 57% were women. There was a slightly smaller proportion of girls than boys aged 1.5 to 18 years (boys 52%, girls 48%) in the unweighted sample. The sample was weighted to reflect the distribution of males and females in the general population within the UK.[1] **(Table 3.1)**

3.2. Age

Among adults, 78% of the unweighted sample were aged 19 to 64 years and 22% were aged 65 years and over. Among children in the unweighted sample, 20% were aged 1.5 to three years, 39% were aged four to 10 years and 41% were aged 11 to 18 years. The sample was weighted to bring the proportions broadly in line with the age profile of the UK general population.[1]

(Tables 3.2 and 3.3)

All text and tables in the remainder of the report use weighted data.

3.3. National Statistics Socio-economic Classification (NS-SEC), housing tenure, education and qualifications

Each participant's household was assigned a socio-economic classification based on the employment of the Household Reference Person (HRP) for that household (see section 2.1 for HRP definition).

In terms of the HRP's current or most recent job, the proportion of participants' households[2] classified to the main NS-SEC occupational groupings were broadly in line with those reported in the General Lifestyle Survey, 2008 (GLF 2008)[3, 4]. **(Table 3.4)**

More than two-thirds of participants (70% adults, 65% children) lived in owner-occupied accommodation and around one-fifth (17% adults, 22% children) lived in social housing and one-tenth (13% adults, 12% children) lived in privately rented accommodation. These proportions are broadly in line with those found in the general Great Britain population.[4] **(Table 3.4)**

Participants aged 16 years and over were asked the age at which they had left full-time education. Overall half reported that they had left school by the age of 16 years but the proportion having done so was much higher amongst older adults (three quarters of those aged 65 years and over had left school by the age of 16 years).

If participants had finished full-time education, they were asked the *highest* qualification (if any) they had achieved. Twenty two per cent of those aged 16 years or older had a degree and 22% had no qualifications. The proportion of participants with no qualifications was higher among older adults. Eight per cent of those aged 19 to 34 years had obtained no qualifications compared with 53% of those aged 65 years and over. **(Table 3.5)**

3.4. Vegetarian and vegan diets

Two per cent of both adults and children reported that they were vegetarian; and less than 1% of participants reported following a vegan diet.[5]

(Table 3.6)

3.5. Smoking

Of those aged 16 years and over, 26% of men and 19% of women reported that they were current smokers. These proportions are similar to those reported in the GLF 2008[6] (where 22% of men and 21% of women were categorised as current smokers) and slightly lower for women than in Northern

Ireland's Continuous Household Survey of 2009/10[7] (where 24% of men and 24% of women reported being current smokers).

(Table 3.7)

Those who reported that they were current smokers were asked how many cigarettes they smoked on an average week and weekend day. Seven per cent of men and 3% of women were classed as heavy smokers (i.e. they smoked 20 or more cigarettes per day). Again, these proportions are similar to those reported in GLF 2008 (where 7% of men and 5% of women were classed as heavy smokers).[6] **(Table 3.8)**

A higher proportion of younger boys (aged eight to 12 years) than girls of the same age had ever smoked a cigarette. However, amongst older children, this was reversed with 26% of girls aged 13 to 15 years compared with 22% of boys of the same age reporting having ever smoked a cigarette.

(Table 3.9)

3.6. Alcohol consumption

3.6.1. Drinking behaviour amongst adults aged 16 years and older

The recommended sensible drinking guidelines for England are that men should not regularly drink more than three to four units of alcohol per day, and women should not regularly drink more than two to three units of alcohol per day.[8] Similar guidance exists for the other UK countries. Men who regularly drink more than eight units a day (or 50 units a week) and women who regularly drink more than six units a day (or 35 units a week) are considered to be at particular risk of harm.[9]

Alcohol consumption is reported in terms of units of alcohol; one unit of alcohol is 10ml by volume of pure alcohol. Daily consumption is calculated by recording the amounts drunk using the day in the past week when the participant drank most.[10]

The majority of adults (73% of men, 59% of women) had drunk alcohol in the last week, including 28% of men and 16% of women who had drunk more than twice the recommended levels on one of these days. **(Table 3.10)** On average among those who drank in the last week, men consumed 8.5 units on the day they drank most in the last week, and women consumed 5.4 units. **(Table 3.11)**

Alcohol consumption levels amongst NDNS adults are very similar to those reported in GLF 2008.[4,11]

3.6.2. Drinking behaviour amongst children aged 8 to 15 years

In 2009, the Department for Health published guidance written by the Chief Medical Officer on the consumption of alcohol amongst children and young people.[12] The guidance makes clear that an alcohol-free childhood is the healthiest option. The guidance also recommends that parents should try to ensure that their children do not drink, at least up to the age of 15 years. Furthermore, young people aged 15 to 17 years should never exceed recommended adult daily limits and, on days when they drink, consumption should be below such levels.

The proportion of children who reported ever having had a proper alcoholic drink (not just a taste) increased with age, from 12% of boys and 8% of girls aged eight to 10 years to 49% of boys and 57% of girls aged 13 to 15 years.[13] These proportions are broadly in line with Health Survey for England (HSE) 2009[14,15] results.[16] **(Table 3.12)**

Four per cent of boys aged 13 to 15 years and 6% of girls of the same age reported usually drinking once a week or more. **(Table 3.13)**

---

[1] Office for National Statistics. *Mid 2009 Population Estimates*. Available: http://www.statistics.gov.uk/statbase/Product.asp?vlnk=15106 (accessed 17/01/2011).

[2] 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.

[3] The General Lifestyle Survey (GLF) formerly known as the General Household Survey (GHS) is a multi-purpose continuous survey which collects information on a range of topics from people living in private households in Great Britain.

[4] Ali R et al. General Lifestyle Survey 2008. Overview Report, 2008. Available: http://www.statistics.gov.uk/StatBase/Product.asp?vlnk=5756 (accessed 17/01/2011).

[5] Self-reported assessment via question in the CAPI interview.

[6] Robinson S, Bugler C. General Lifestyle Survey 2008. Smoking and drinking among adults, 2008. Available: http://www.statistics.gov.uk/downloads/theme_compendia/GLF08/GLFSmoking&DrinkingAmongAdults2008.pdf (accessed 17/01/2011).

[7] http://www.csu.nisra.gov.uk/Prevalence_of_cigarete_smoking_by_sex_Trend.xls (accessed 17/01/2011).

[8] http://www.dh.gov.uk/en/Publichealth/Healthimprovement/Alcoholmisuse/DH_085385 (accessed 13/12/2010).

[9] Department of Health et al (2007), cited above. Drinking at this level has been described in surveys, including the HSE, as 'binge drinking'. 'Binge drinking' is also used to define a pattern of drinking a large quantity of alcohol in a short period of time with the aim of getting drunk. In practice, this may involve considerably more than twice the recommended daily limits. To avoid confusion, the term 'binge drinking' is not used in this report.

[10] Adults (i.e. those aged 16 and older) who drank bottled or canned beer, lager, stout or cider were asked in detail about what they drank, and this information was used to estimate the amount in pints (one pint is equivalent to 0.568 litres). Adults were also asked to quantify the amount of wine drunk in terms of large (250ml), standard (175ml) and small (125ml) glasses, and were also given the option of specifying the quantity of wine drunk in bottles or fractions of a bottle; a bottle was treated as the equivalent of six small (125ml) glasses. Adults who drank spirits were asked to quantify how much they drunk in single measures (25 ml).

[11] Comparable data is not available for Northern Ireland.

[12] Chief Medical Officer, *Guidance on the Consumption of Alcohol by Children and Young People, 2009.* Available: http://www.dh.gov.uk/en/Publicationsandstatistics/Publications/PublicationsPolicyAndGuidance/DH_110258 (accessed 17/01/2011).

[13] Children are likely to under-report their alcohol consumption (frequency and amount drunk) in home-based surveys because they may be worried about parents seeing their answers. This should be borne in mind when interpreting the findings presented in this section.

[14] Health Survey for England - 2009: Health and lifestyles. Available at: http://www.ic.nhs.uk/statistics-and-data-collections/health-and-lifestyles-related-surveys/health-survey-for-england (accessed 17/01/2011).

[15] Note that results are not directly comparable with HSE (2009) as age groupings differ in the two surveys.

[16] Comparable data is not available for Scotland, Wales and Northern Ireland.

4 Physical measurements

Maria Aresu, Vasant Hirani and Jennifer Mindell

4.1 Introduction

This chapter presents physical measurements taken during Stage 1 (the interviewer visit): height and weight, from which body mass index (BMI) was calculated and Stage 2 (the nurse visit): waist and hip circumferences; and blood pressure. Comparisons are made, where possible, with data on physical measurements from the most recent health surveys in England and Scotland.[1, 2, 3] Data presented are for Years 1 and 2 combined.

Detailed descriptions of the measurement protocols used on NDNS are available in Appendix I but a brief description is provided within each section below.

Other physical measurements taken during the nurse visit (mid upper arm circumference (MUAC) and demi-span) are not reported in this chapter but will be included in the archived data (see Appendix Q for more detail).

4.2 Anthropometry

4.2.1 Measurements

Height and weight were measured at the first interviewer visit, 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 (m^2)) was calculated by the interviewer's CAPI program. For children aged 1.5 to two years, the interviewer measured length instead of height. Length has been used in place of height when calculating BMI for these youngest children. The nurse measured waist and hip circumferences in those aged 11 years and over using a tape measure.[4]

4.2.2 Obesity

4.2.2.1 Adults

Table 4.1a shows mean BMI and BMI status, in adults, by age group and sex (according to the World Health Organisation (WHO)[5] and National Institute for Health and Clinical Excellence (NICE) classification[6] as shown in Table 4A below):

Table 4A: BMI classification

BMI (kg/m^2)	Description
Less than18.5	Underweight
18.5 to less than 25	Normal
25 to less than 30	Overweight
30 or more	Obese
40 or more	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 was higher in older adults (aged 65 years and over) than those aged 19 to 64 years but there were no significant differences in mean BMI by sex. A higher percentage of men (43%) than women (30%) were overweight, or were overweight including obese (71% in men and 58% in women).

Men had a higher mean waist circumference and mean WHR than women. Mean waist circumference and mean WHR were both significantly higher in those aged 65 years and over in men and women. For example, mean WHR was 0.92 for men aged 19 to 64 years and 0.98 for men aged 65 years and over. For women, mean WHR was 0.82 for those aged 19 to 64 years and 0.87 for those aged 65 years and over.

The proportion of adults who had a raised waist circumference or raised WHR was significantly higher in older adults (aged 65 years and over) than in younger adults (aged 19 to 64 years), but there were no significant differences

between the sexes in the prevalence of raised waist circumference nor raised WHR. **(Table 4.1a)**

4.2.2.2 Children

New UK World Health Organisation (WHO) growth charts for birth to four years were introduced for all new births in England, Wales and Northern Ireland from May 2009 and in Scotland from January 2010. These are based on WHO Growth Standards from data in infants who were exclusively or predominantly breastfed.[7, 8] For clinical purposes, the charts define overweight as above the 91st 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.[9]

Similar proportions of boys and girls were overweight (both 15%); overweight, including obese (33% and 34%, respectively); and obese (18% and 19%, respectively). Prevalence of overweight and overweight including obesity was greater in younger children (aged two to three years) than older children (aged four to 10 years and 11 to 18 years). The prevalence of overweight and obese combined did not differ by sex. It should be noted that the youngest children were compared with growth standards based on breastfed babies, who tend to have a different pattern of growth compared to formula-fed infants, whereas older children were compared with UK 1990 reference values based on the growth of UK children.

(Table 4.1b)

4.2.2.3 Comparisons with other surveys

Comparisons of results for adults participating in NDNS with adults measured recently in England and Scotland[10] showed that mean BMI was broadly similar between NDNS, Scottish Health Survey 2009 (SHeS 2009)[1] and Health Survey for England 2009 (HSE 2009)[2] for both sexes.

The proportion of overweight adults was also very similar in the three surveys. In men it was 43% in NDNS, 41% in SHeS 2009[1] and 44% in HSE 2009[2] and in women 30%, 34% and 33% respectively in the three surveys. The proportion of obese was also very similar in NDNS and SHeS 2009[1] but lower in HSE 2009;[2] in men it was 28% in NDNS, 27% in SHeS 2009[1] and 22% in HSE 2009[2] and in women 27%, 28% and 24% respectively in the three surveys.

Mean waist circumference was higher in men in NDNS (98.6cm) than in HSE 2009[2] (96.4cm) and SHeS 2008/09[1,11] (96.5cm). Raised waist circumference in men was more prevalent in NDNS (40%) than in HSE 2009[2] (32%) or SHeS 2008/09 (33%). There were no differences among women in the three surveys in mean or raised waist circumference.

Comparisons could only be made between NDNS and SHeS 2008/09[1] for WHR, because these analyses were not available in HSE 2009[2]. There were no differences in mean WHR between the two surveys, for either sex. In men, raised WHR was higher in NDNS (42%) compared with SHeS 2008/09[1] (34%). However, in women raised WHR was higher in SHeS 2008/09[1] (41%) than in NDNS (37%).

When comparing children's anthropometric results for NDNS with the other surveys, analyses in the NDNS were not entirely comparable with HSE, SHeS or Welsh Health Survey (WHS)[12] due to the different cut-offs being used for children aged two to three years in the different surveys and due to comparisons being limited to children aged two to 15 years because HSE, SHeS and WHS define participants aged 16 years and over as adults.

A similar proportion of boys and girls were overweight in all three surveys. A higher proportion of girls were overweight including obese in the NDNS (34%) and WHS[12] (33%) than in SHeS 2009[1] (27%) and HSE 2009[2] (28%) and also a higher proportion were obese in NDNS (19%) and WHS[12] (18%) than in SHeS 2009[1] (14%) and HSE 2009[2] (15%). There were no differences in

prevalence of overweight including obese or obese between NDNS and the three other surveys (SHeS 2009,[1] HSE 2009[2] and WHS[12]) among boys.

4.3 Blood pressure

4.3.1 Measurement of blood pressure

Blood pressure was measured in a sitting position using an automated, validated machine, the Omron HEM907, after a five minute rest. Results presented in this chapter are based on the mean of the second and third readings, taken at one minute intervals, in participants with valid readings, who had not eaten, drank alcohol, exercised, or smoked in the preceding 30 minutes. Full details of protocols are available in Appendix I.

Hypertension was defined as a systolic blood pressure of 140mmHg or above, or diastolic blood pressure of 90mmHg or above, or taking medication specifically to reduce blood pressure.

4.3.2 Results

Mean systolic blood pressure was significantly higher in men (129.6mmHg) than women (124.7mmHg) and significantly higher in older adults aged 65 years and over than in younger adults aged 19 to 64 years. The difference with age was greater in women (138.6mmHg in those aged 65 years and over, 119.7mmHg in those aged 19 to 64 years) than in men (136.2mmHg and 128.0mmHg respectively). Mean diastolic blood pressure, however, varied neither by age group nor by sex.

Hypertension was significantly more common in older men and women than in younger adults. Among adults aged 19 to 64 years, 6% were on treatment for hypertension (i.e. controlled or uncontrolled hypertension), compared with 39% of older adults (40% of men and 38% of women aged 65 years and over). Untreated high blood pressure was twice as common in older adults (25% of men and 23% of women aged 65 years and over, compared with 14% of men and 10% of women aged 19 to 64 years).

(Table 4.2)

4.3.3 Comparisons with other surveys[3]

Mean systolic and diastolic blood pressure among participants in NDNS were very similar to the data from Scotland (SHeS 2008/09)[1, 11] and England (HSE 2009).[2] For example, mean systolic blood pressure in men was 129.6mmHg in NDNS, 130.3mmHg in SHeS 2008/09[1,11] and 129.9mmHg in HSE 2009[2]; in women it was 124.7mmHg in NDNS, 125.5mmHg in SHeS 2009[1] and 123.5mmHg in HSE 2009.[2] Mean diastolic blood pressure in men was 74.2mmHg in NDNS, 73.8 mmHg in SHeS 2008/09[1,11] and 73.7mmHg in HSE 2009;[2] the equivalent figures for women in the same age groups were 73.5mmHg in NDNS, 73.9mmHg in SHeS 2008/09[1,11] and 72.1mmHg in HSE 2009.[2]

Twenty-nine per cent of men in NDNS, 32% of men in HSE 2009[2] and 35% of men in SHeS 2008/09[1,11] had survey-defined hypertension (raised blood pressure and/or on medication for hypertension). In women, prevalence was 28% in NDNS, 27% in HSE 2009[2] and 30% in SHeS 2008/09.[1,11]

References and endnotes

[1] Bromley C, Given L, Ormston R. (eds.) *The Scottish Health Survey 2009.* Edinburgh: Scottish Executive, 2010.

[2] Craig R, Hirani V. (eds). *Health Survey for England 2009.* Leeds: Information Centre, 2010

[3] Comparisons of NDNS with health surveys in Wales and Northern Ireland could not be made due to the data not being comparable or available. The Welsh Health Survey uses self-report, not measured weight and height for adults. The most recent Northern Ireland survey (carried out in 2005/06) did not include a measurement module.

[4] 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.

[5] *World Health Organisation body mass index (BMI) classification*. [On-line] www.who.int/bmi/index.jsp?introPage=intro_3.html (accessed 05/10/2010).

[6] National Institute of Health and Clinical Excellence. *Obesity: the prevention, identification, assessment and management of overweight and obesity in adults and children.* [On-line] www.nice.org.uk/guidance/index.jsp?action=download&o=38295. page 221 (accessed 05/10/2010).

[7] Royal College of Paediatrics and Child Health / World Health Organisation. *The UK_WHO Growth Charts: Early Years.* London: RCPCH, 2009. www.rcpch.ac.uk/Research/UK-WHO-Growth-Charts (accessed 05/10/2010).

[8] 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 two weeks to four 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 four years and over.

[9] Cole T, Freeman JV, Preece MA. *Body mass index reference curves for the UK, 1990.* Arch Dis Child 1995; 73: 25-29.

[10] The age at which a participant is defined as an adult is slightly different between the surveys: in the NDNS participants aged 19 years and over are classed as adults whereas for HSE and SHeS, those aged 16 years and over are defined as adults. In the results, 'younger' means from that minimum age up to 64 years.

[11] Data collected by nurses (e.g. waist circumference, WHR and blood pressure) on the Scottish Health Surveys (SHeS) were reported for the first time in the SHeS 2009 report. The reported results were based on combined 2008 and 2009 data, to allow sufficient numbers for analysis.

[12] Walters L, Kingdon A, Roberts C (eds.). *Welsh Health Survey 2009.*Welsh Assembly Government 2010. [On-line] new.wales.gov.uk/topics/statistics/theme/health/health-survey/results/?lang=en (accessed 25/01/2010)

5. Dietary intakes

Caireen Roberts, Gerda Pot, Sonja Nicholson, Celia Prynne and Alison Lennox

5.1 Introduction

The results presented in this chapter derive from the first and second years combined of the NDNS rolling programme collected between February 2008 and March 2010, with a core UK sample of 2126 individuals aged 1.5 years and over. The results supersede those reported for the first year of the NDNS rolling programme and are the combined results of Years 1 and 2. Year 1 results were based on rather small numbers and the addition of a second year increases the validity of the data. The results for the increased numbers from both Years 1 and 2 combined show similar results to those reported for Year 1 in terms of foods, food groups and nutrients, and the statements made in the report of Year 1 are supported and reinforced by the larger numbers presented in this report. Because of small numbers in each year, no comparisons have been made between individual years of the survey. Results are presented for both sexes combined for the age groups: 1.5 to three years, four to 10 years, 11 to 18 years, 19 to 64 years and 65 years and over. For those aged 65 years and over, numbers are still relatively small and this should be taken in to account when reviewing the data for this age group. Results are also subdivided by sex for all age groups, except for children aged 1.5 to three years as these do not vary by sex and are traditionally reported in NDNS for both sexes combined. Comparisons with results from previous surveys have been included to provide context. However there are methodological differences between the previous surveys and the current rolling programme so these comparisons should be interpreted with caution. Unless stated otherwise, all Dietary Reference Values (DRVs) discussed in Chapter 5 are those presented in the 1991 COMA report on Dietary Reference Values for Food Energy and Nutrients for the United Kingdom.[1]

Results are based on dietary assessment using a four-day food diary and represent a daily average of the days assessed. In Year 1 the study design was to have each participant record both weekend days, in an effort to capture both weekday and weekend consumption for each person. Previous surveys of four days had been

converted to seven day equivalents based on the ratio of weekend days to weekdays but it was decided not to carry out this conversion for the rolling programme and to report the four days collected. In Year 2, the design was changed to one where all days of the week would be equally represented. In order to compensate for Year 1's design, Year 2 was designed to over-represent week days and under-represent weekend days (see section 2.5.1.3 for more detail). Therefore, all days of the week are more equally represented in the Year 1 and 2 combined data, although there remains a slightly higher proportion of weekend days than week days.

It was thought that the oversampling of weekend days in Year 1 could have led to a bias in reported food consumption and nutrient intake, since it has been shown that there is day-to-day variation in intake of some foods and nutrients. For example, alcoholic beverages and takeaway foods are consumed more frequently on Fridays and Saturdays, whilst Sunday is often associated with higher consumption of meat and vegetables, most probably due to Sunday lunch. Alcohol intake for Years 1 and 2 combined was indeed lower than in Year 1 of the NDNS rolling programme.

Mis-reporting of food consumption, generally under-reporting, is known to be a problem in NDNS as in all dietary surveys. Biased low estimates of intake can result from respondents mis-reporting their actual intake or modifying their diet during the recording period. There is also a lot of day-to-day variation in diet and this can make it hard to capture habitual diet over a relatively short assessment period. The level of underreporting needs to be borne in mind when interpreting findings from this survey. The doubly labelled water technique has been used to measure total energy expenditure in a sub-sample of NDNS participants to assess the level of underreporting of energy intake. Results will be published in a future report. Evidence suggests that some foods and nutrients may be underreported to a greater extent than others, and some may be over-reported, but there is no information available on the level to which different foods and nutrients are misreported in the survey.

5.1.1 Comparisons with previous surveys

Comparisons with previous surveys have been included to provide context. In comparing the data from Years 1 and 2 with previous NDNS surveys, the differences

in duration of dietary assessment must also be taken into account. Dietary assessment over a four-day period will provide similar mean intakes to assessment over a seven-day period, but the variation will be different as will the percentage of consumers, especially for foods that are consumed infrequently. Moreover, estimates of proportions of individuals above or below a certain cut-off value, such as the Lower Reference Nutrient Intake (LRNI) or dietary recommendations for saturated fat or non-milk extrinsic sugars (NMES), will be affected by assessments of different durations.

In order to enable comparisons of the current survey data with previous NDNS survey reports representing seven days duration, specifically the NDNS survey of adults 19 to 64 years conducted in 2000/01 [2] and the survey of young people aged 4 to 18 years conducted in 1997,[3] these have been recalculated for four days of assessment. The results of this recalculation are provided in Appendix K, along with further details of the background and methods used to derive the four-day values from the previous surveys. Dietary assessment in the NDNS survey of people aged 65 years and over conducted in 1994/95 [4] was by a four-day weighed diary and thus needed no recalculating. Only adults aged 65 years and over living in private households (free-living) from the 1994/95 survey are included in the comparison figures.

Any comparisons between intakes in this and previous surveys should be made using the recalculated intakes and not the seven-day data from the published reports because incorrect conclusions may be drawn if the original published data are used for comparisons, especially data on the proportions of individuals above or below cut-off values or the percentage consumers of a food group.

It should be noted that the NDNS survey of children aged 1.5 to 4.5 years conducted in 1992/93 [5] has not been recalculated for this report. Data for the current survey include children aged 1.5 to three years; however no comparisons have been made between the new data for this age group and the previous survey.

When comparing changes across different age groups it should be borne in mind that the previous surveys were carried out at different times. As mentioned earlier in

the section, the NDNS survey of people aged 65 years and over was conducted in 1994/95,[4] the survey of young people aged 4 to 18 years conducted in 1997 [3] and NDNS survey of adults 19 to 64 years conducted in 2000/01.[2] Therefore, some changes may appear to be larger in people aged 65 years and over simply due to the greater time lag since the last survey.

5.2 Foods consumed

Comparison of mean consumption data and the percentage of consumers of each food group from the current and previous surveys indicated changes in consumption of some foods. Since the earlier NDNS surveys, the availability and marketing of some foods have changed, and may account for some of the observed differences seen over time. The commentary in this section refers to mean intakes for the total population (i.e. including non-consumers) and the percentage of consumers over four days.

(**Tables 5.1a-5.2c, K1, K2**)

5.2.1 Cereals and cereal products

For most age groups, the highest mean consumption was of pasta, rice and other miscellaneous cereals, which included pizza. The exception was those aged 65 years and over, for whom the highest consumption was of white bread. Average consumption of pasta, rice and other miscellaneous cereals was higher than seen in previous surveys, including in those aged 65 years and over. White bread remained the major type of bread consumed in all age groups, but average consumption was reduced from previous surveys. Consumption of brown, granary and wheatgerm bread, which includes 50:50 breads (bread made from a mixture of white and whole grain flour), was higher in children aged four to 10 years than seen in the previous survey. For adults aged 65 years and over, wholemeal bread consumption had gone down since the previous survey. For children aged four to 18 years there was a fall in the average consumption of other (non-high fibre) breakfast cereals. For children aged 11 to 18 years there was also a fall in the consumption of high fibre breakfast cereals whilst for children aged four to 10 years consumption had risen, meaning there was little change in total breakfast cereal consumption in children aged four to 10 years, but a decrease in children aged 11 to 18 years. A higher percentage of

four to 10 year olds were consuming high fibre breakfast cereals than seen in the previous survey. There was also an increase in the percentage of consumers of high fibre breakfast cereals in those aged 65 years and over.

5.2.2 Milk and milk products

Semi-skimmed milk was the most commonly consumed type of milk for all age groups except those aged 1.5 to three years for whom whole milk was the most commonly consumed type of milk. There was an increase in the percentage of consumers of semi-skimmed milk compared with previous surveys and a reduction in the percentage of consumers of whole milk. The largest shift in percentage of consumers was seen in adults aged 65 years and over where 68% were consuming semi-skimmed milk in the current survey compared with 45% in the previous NDNS of this age group. The corresponding percentages for whole milk consumption were 25% and 58% respectively. This difference is partly due to the previous NDNS survey of people aged 65 years and over being less recent than other previous NDNS. There was a 14 year gap between the last survey of participants aged 65 years and over[4] and the current survey, compared with an eight year gap since the last survey of adults aged 19 to 64 years.[2] In 2008 a new type of milk was introduced containing 1% fat; this was consumed by 1-2% of participants aged four years and above. Milk consumption overall had fallen for all those aged 11 years and over compared with previous surveys, the largest decrease being seen in adults aged 19 to 64 years.

There was little change in consumption of cheese or other milk products, except for a rise in consumption of yoghurt, fromage frais and dairy desserts in adults aged 65 years and over.

5.2.3 Fat spreads

For all age groups, reduced fat spread had the highest consumption, although adults aged 65 years and over still had higher consumption of butter than other age groups. The proportion of participants consuming reduced fat not polyunsaturated spread was higher compared with previous surveys for all age groups while the proportion consuming reduced fat polyunsaturated spread was lower. It should be noted that

many margarines have been reformulated in recent years to reduce the fat content and are now classified as reduced fat spreads.

5.2.4 Meat and meat products

Total consumption of meat and meat products, which includes non-meat components of composite and recipe dishes, had increased by nearly a third in all age groups compared with previous surveys. The higher meat consumption seen between the rolling programme and previous NDNS is due to increases in the consumption of beef, veal and dishes, and chicken, turkey and dishes. Adults aged 19 to 64 years had the highest mean consumption of meat and meat products compared with other age groups, and mean consumption had risen from 154g per day to 194g per day since the previous survey. For all age groups, chicken, turkey and dishes, and beef, veal and dishes had the highest mean consumption.

For most age groups, chicken, turkey and dishes had the highest percentage of consumers: 55% for children aged 1.5 to three years, 62-69% for children aged four to 18 years and 66% for adults aged 19 to 64 years. This was followed by bacon and ham, ranging from 45% for those aged 1.5 to three years to 60% for those aged 11 to 18 years. For adults aged 65 years and over the reverse was seen, with bacon and ham having the highest percentage of consumers (59%) followed by chicken, turkey and dishes (52%). The only consistent shifts in percentage consumers across all age groups were for chicken, turkey and dishes, where a higher percentage were consuming these types of meat in the current survey compared with previous surveys, and for liver and liver dishes and for meat pies and pastries where the percentage of consumers had gone down since the previous surveys.
Results for disaggregated total meat consumption, excluding non-meat components of meat dishes and products, are presented in table 5.3 and discussed in section 5.3.2.

5.2.5 Fish and fish dishes

Adults aged 65 years and over had the highest mean consumption of fish and fish dishes compared with other age groups; mean consumption had risen from 33g per day to 48g per day in this age group since the previous survey. Mean consumption

had increased from 15g to 20g per day (36% increase) in children aged four to 10 years and from 31g to 36g per day (15% increase) in adults aged 19 to 64 years, but there was no change for children aged 11 to 18 years. Results for disaggregated total fish consumption, excluding non-fish components of fish products and dishes, are presented in table 5.3 and discussed in section 5.3.3.

5.2.6 Fruit and vegetables

This section refers to fruit and vegetables consumed as discrete items, but excludes those consumed as part of composite dishes such as in meat and fish dishes. Fruit and vegetable consumption, including that from composite dishes, are presented and discussed in section 5.3.1, including “five-a-day” portions.

In the current survey, average consumption of fruit was highest in children aged 1.5 to three years (102g per day) compared with that for children aged four to 10 years (96g per day) and 11 to 18 years (62g per day). Mean consumption of fruit was higher in all age groups compared with previous surveys, except for adults aged 19 to 64 years. For all age groups the percentage of consumers of fruit was higher in the current survey than in previous surveys.

Compared with previous surveys, consumption of vegetables (excluding potatoes) was higher for children aged four to 10 years and adults aged 65 years and over and slightly higher for women aged 19 to 64 years. The percentage of consumers of salad and other raw vegetables was higher than in previous surveys in all age groups, whereas there was little change in the percentage of consumers of cooked vegetables including vegetable dishes.

Total consumption of fruit and vegetables, excluding composite dishes, was higher than in previous surveys for children aged four to 10 years, boys aged 11 to 18 years, and adults aged 65 years and over.

Mean consumption of chips and fried or roasted potatoes was lower than in the previous survey for children aged four to 18 years, whilst in adults aged 65 years and over consumption was higher than in previous surveys.

5.2.7 Sugar, confectionery and snacks

Compared with previous surveys, average consumption of sugar and chocolate confectionery was reduced from 30g to 18g per day (39% decrease) for children aged four to 10 years and from 31g to 20g per day (35% decrease) for children aged 11 to 18 years; a lower percentage of children in both age groups were consuming these foods.

The consumption of sugar, preserves and sweet spreads, which includes table sugar, was reduced for all age groups, most noticeably in adults aged 65 years and over, where intakes were reduced from 22g per day to 13g per day.

There was little change in the consumption of crisps and savoury snacks except in children aged four to 10 years where intakes were lower than in the previous survey.

5.2.8 Non-alcoholic beverages

Fruit juice consumption was higher compared with previous surveys in all groups, except in women aged 19 to 64 years where there was little change. The percentage of consumers of fruit juice was higher in all age groups in the current survey, ranging from 37% for those aged 65 years and over to 61% for those aged four to 10 years, compared to a range of 26% for those 65 years and over to 43% for those aged four to 10 years in previous surveys. For children aged four to 10 years, compared with the previous survey average consumption of low calorie soft drinks had fallen from 210g to 186g per day (11% decrease) and, for not low calorie soft drinks, had fallen from 234g to 134g per day (43% decrease).There was a small drop in consumption of not low calorie soft drinks in older boys and a small increase in consumption of low calorie soft drinks in girls aged 11 to 18 years. There was also a small increase in consumption of not low calorie soft drinks in men aged 19 years and over.

Tea, coffee and water consumption was higher in all age groups compared with previous surveys, except for adults aged 65 years and over, due mainly to increases in water consumption, which was particularly seen in children aged four to 18 years.

5.2.9 Alcoholic beverages

Alcoholic beverages were not reported for Year 1 of the rolling programme because the four days assessed for each participant comprised two weekdays and two weekend days and the average daily consumption of alcoholic beverages could have been overestimated. With Years 1 and 2 combined, the days of the week are more evenly represented, but there is still a slightly greater proportion of weekend days than if all days were represented equally. This may have some effect on the results for consumption of alcoholic beverages and for alcohol intake, and should be taken into account when comparing to previous surveys.

For adults aged 19 to 64 years, the proportion of consumers was similar to the previous survey, with 14% consuming spirits and liqueurs, 34% consuming wine, and 38% consuming beer, lager, cider and perry. There was a higher proportion of consumers of beer, lager, cider and perry among men, compared to women (55% versus 21%), while there was a higher proportion of women consumers of wine (42% versus 26%). The mean consumption of alcoholic beverages was higher for men (consumers only) than in the previous survey, with the mean consumption of spirits and liqueurs increasing from 37g per day to 83g per day, wine from 173g per day to 222g per day and beer, lager, cider and perry from 735g per day to 783g per day. For women, the increases were smaller but in the same direction. Hence for those who consumed alcoholic beverages, their consumption was higher than in 2000/01. Overall consumption of alcoholic beverages for all participants aged 19 to 64 years was similar to those reported in the previous survey of adults aged 19 to 64 years,[2] the greatest change being an increase in wine consumption for women from 53g per day to 69g per day.

In adults aged 65 years and over, the increases in wine consumption were more marked than for those aged 19 to 64 years, with per cent consumers increasing from 21 to 35% for men, and 20 to 32% for women. Mean consumption of wine by consumers increased from 102g per day to 180g per day for men and 73g per day to 114g per day for women from the previous survey of people aged 65 years and over.[4] Mean spirit and liqueur consumption by consumers changed little for both men and women, while mean beer, lager, cider and perry consumption by men consumers decreased slightly, with no change in women. For all participants

including non-consumers, there was little change in consumption of spirits and liqueurs, and beer, lager, cider and perry for adults aged 65 years and over, but the increase in the proportion of consumers of wine, and the increased consumption of it, was reflected in an increase in overall consumption from 18g per day to 48g per day for this age group.

Overall, data indicated that those who consumed alcoholic beverages consumed them in increased quantities compared to previous surveys. A higher proportion of younger and older adults consumed wine than in previous surveys, but there was no change in the proportions consuming other types of alcoholic beverages.

5.3 Vegetable, fruit, meat and fish consumption, including from composite dishes

This section reports consumption of fruit and vegetables, and meat and fish, including the contribution from composite dishes, but excluding the other components. These data were reported for the first time in NDNS Year 1 of the rolling programme as a result of a project to disaggregate all composite dishes in the NDNS food composition databank. The methodology for the disaggregation of composite dishes is provided in Appendix A.

5.3.1 Vegetable and fruit consumption, including from composite dishes

Table 5.3 shows consumption of vegetables, based on disaggregated data, as 73g per day for children aged 1.5 to three years, 113g per day for boys aged four to 18 years and 103g per day for girls aged four to 18 years, 189g per day for men aged 19 to 64 years and 186g per day for women aged 19 to 64 years, 195g per day for men aged 65 years and over and 169g per day for women aged 65 years and over. These figures are considerably higher than those obtained from traditional NDNS reporting methods, as reported in section 5.2. Traditionally, vegetables in mixed dishes were retained in those dishes and reported in the food group based on the main component of the dish, while the vegetables group comprised salad and cooked vegetables consumed and reported as discrete items. Taking vegetables from composite dishes into account, vegetable consumption was 18g (33%) higher per day for children aged 1.5 to three years, 23-35g (30-44%) higher per day for

children aged four to 18 years, 50g (36%) higher per day for adults aged 19 to 64 years, and 41g (29%) higher per day for adults aged 65 years and over. By comparison, figures for fruit consumption including those from composite dishes were only slightly higher (5-13g or 6-11%) than when assessed by traditional NDNS reporting methods, since there are far fewer composite dishes containing fruit and they are consumed less often than discrete items of fruit. Total fruit and vegetable consumption (excluding fruit juice) was calculated from the fruit and vegetable totals, giving an average consumption ranging from 171g per day for girls aged 11 to 18 years to 326g per day for men aged 65 years and over.

The number of portions of fruit and vegetables consumed per day has been calculated from the disaggregated data, in line with the "five-a-day" criteria, including up to one portion each of fruit juice and baked beans or pulses per day. Results have not been reported for children aged under 11 years since the standard 80g portion used in the analysis may be too large for younger children and a smaller portion size has yet to be set for this age group. For children aged 11 to 18 years, mean consumption was 3.1 "five-a-day" portions per day for boys and 2.7 portions per day for girls. Adults aged 19 to 64 years consumed 4.2 portions per day, with a range from 0.8 portions per day (lower 2.5 percentile) to 9.7 portions per day (upper 2.5 percentile). For adults aged 65 years and over, mean consumption was 4.4 portions per day with a range from 0.7 to 10.3 portions per day. The proportion of participants meeting the "five-a-day" guideline was 10% of children aged 11 to 18 years, 30% of adults aged 19 to 64 years and 37% of adults aged 65 years and over. It is not possible to compare these findings with those from previous surveys.

Numbers of portions of fruit and vegetables were calculated only in the previous NDNS survey of adults but this was not carried out on disaggregated data and used different portion size criteria.[2] Details of the methodology used in the previous NDNS survey of adults aged 19 to 64 years (2000/2001) are described in Appendix A. The methodology to calculate fruit and vegetable portions from the previous NDNS survey of adults (2000/2001) was applied to the non-disaggregated data from the current survey in order to better assess whether consumption had changed. This comparison showed that differences between surveys were small, but overall the direction of change in the number of fruit and vegetable portions was upwards.

5.3.2 Meat consumption, including from composite dishes

Estimates of consumption of meat from all sources including composite dishes indicated much lower consumption than when consumption of meat and meat dishes was described by the traditional approach as reported in section 5.2. The difference is due to the inclusion of non-meat components of meat dishes e.g. pasta and cheese in meat lasagne, in the estimates using the traditional approach. Meat consumption based on disaggregated data was 40g per day for children aged 1.5 to three years, 96g per day for boys aged four to 18 years, 74g per day for girls aged four to 18 years, 135g per day for men aged 19 to 64 years, 88g per day for women aged 19 to 64 years, 105g per day for men aged 65 years and over, and 78g per day for women aged 65 years and over. These figures show that reported consumption was 35-45% lower using the disaggregated method over non-disaggregated data for all age and sex groups. Thus, estimates of consumption of meat itself were quite different from estimates of consumption of meat and meat dishes. Each type of meat consumed was sub-categorised as red meat, which included beef, lamb, pork, sausages, burgers and kebabs or white meat, which included chicken and turkey. The proportion of red meat consumed ranged from 61% of total meat consumption for girls aged 11 to 18 years to 75% for men aged 65 years and over.

5.3.3 Fish consumption, including from composite dishes

Consumption of fish from all sources including composite dishes showed a similar reduction, with consumption figures for fish itself being 33-45% lower than for fish and dishes for all age and sex groups. Mean consumption of oily fish was well below the recommendation of at least one portion (140g) per week[6] in all age groups as the percentage of consumers was below 25% in all age groups except adults aged 65 years and over (36%). Mean consumption including non-consumers was 8g per day in adults aged 19 to 64 years, equivalent to 58g per week and 12g per day in adults aged 65 years and over, equivalent to 85g per week.

(**Table 5.3, Appendix A**)

5.4 Energy and macronutrient intake and percentage contribution of food groups to macronutrient and sodium intakes

This section presents daily intakes of energy and macronutrients estimated from the food consumption data, and shows the percentage contribution of the major food types to intake of each nutrient. This analysis has been carried out using the traditional NDNS food groups presented in section 5.2 and not the disaggregated food groups presented in section 5.3. It should be noted that no comparisons have been made between the new data for children aged 1.5 to three years and the previous survey.

5.4.1 Energy

Energy intakes for adults and children were similar to previous NDNS surveys, with mean daily intakes for total energy of 4.75MJ (1127 kcal) for children aged 1.5 to three years, 6.55 MJ (1556 kcal) for children aged four to 10 years, 7.69 MJ (1827 kcal) for children aged 11 to 18 years, 8.06 MJ (1918 kcal) for adults aged 19 to 64 years and 7.23 MJ (1721 kcal) for adults aged 65 years and over. Average energy intakes in NDNS, as in all dietary surveys, are known to be under-reported, especially in many adults and older children. Results from an assessment of under-reporting of energy intake in a sub-sample using the doubly labelled water technique[7] will be published as part of a future report.

Cereals and cereal products were the main source of energy for all age groups, contributing 30% of energy intake for children aged 1.5 to three years, 34-36% for children aged four to 18 years, 29% for adults aged 19 to 64 years, and 30% for adults aged 65 years and over. These contributions were similar to previous surveys. Milk and milk products was the second largest contributor to energy intake for children aged 1.5 to three years providing 25% of intake, but contributed much less for other age groups.

Meat and meat products contributed increasing proportions of energy with age, from 10% for children aged 1.5 to three years and 13% for those aged four to 10 years to 16-17% for those aged 11 to 18 years and adults aged 19 years and over. These contributions were similar to previous surveys. The contribution of the vegetables

and potatoes group to energy intake was similar for all age groups and largely unchanged compared with previous surveys.

(**Tables 5.4, 5.5, and 5.23a-c**)

5.4.2 Protein

Mean protein intakes were well above the Reference Nutrient Intake (RNI) in both children and adults.[1] Protein intakes were slightly higher for all age groups than in previous surveys, both in absolute terms and as a percentage of food energy. Protein provided 14-15% food energy for children aged four to 18 years and 17-18% food energy for adults aged 19 years and over, compared with 13-14% and 16-17% in the previous surveys respectively.

Meat and meat products were the largest contributors to protein intake for all age groups except children aged 1.5 to three years, with the contribution highest in children aged 11 to 18 years and adults aged 19 to 64 years (37-38%). There was little change in the contribution of this group compared with previous surveys.

Milk and milk products was the major contributor to protein intake for children aged 1.5 to three years, providing 35% of intake; the contribution decreased with age to 21% for children aged four to 10 years and 14-17% for those aged 11 to 18 years and adults aged 19 and over. There was little change in contribution to protein intake from this food group from previous surveys. Cereal and cereal products provided 23% of protein intake for children aged 1.5 to three years, 27-28% for children aged four to 18 years and 21-23% for adults aged 19 years and over. Again, there was little change from previous surveys.

(**Tables 5.4, 5.6, and 5.23**)

5.4.3 Carbohydrate

Total carbohydrate intakes provided 50.6% food energy for children aged 1.5 to three years, 51.0-51.6% for children aged four to 18 years and 46.2-47.7% for adults aged 19 years and over, indicating decreases with age. Intakes in absolute terms and as a percentage of food energy were little changed from previous surveys.

The major contributor to carbohydrate intake was cereals and cereal products, with the contribution ranging from 41% for children aged 1.5 to three years, 44-47% for

children aged four to 18 years, and 43-45% for adults aged 19 years and over. There was little change in contribution to carbohydrate intake from this group compared with previous surveys.

Milk and milk products contributed 16% of carbohydrate intake for children aged 1.5 to three years, but contributed much less for all other age groups (5-9%). The vegetables and potatoes group was the second largest contributor to carbohydrate intake for children aged four to 10 years and adults aged 19 years and over, providing 11% and 14% respectively. For children aged 11 to 18 years, non-alcoholic beverages was the second largest contributor to carbohydrate intake providing 14%, mainly from not low calorie soft drinks. Alcoholic beverages provided 3% of carbohydrate intake for adults aged 19 to 64 years.

(**Tables 5.4, 5.7, and 5.23a-c**)

5.4.4 Non-milk extrinsic sugars

The DRV for non-milk extrinsic sugars (NMES) is that the population average intake should provide no more than 11% of food energy intake.[1] Mean intakes of NMES as a percentage of food energy intake exceeded the DRV in all age groups except for children aged 1.5 to three years and adults aged 65 years and over who were slightly above the DRV. Intakes of NMES were lower than previous surveys in all age and sex groups, except for women aged 19 to 64 years. Decreases in intake were most marked for children aged four to 10 years where the proportion of food energy from NMES was reduced from 17.1% in 1997 to 14.4%.

The major sources of NMES were non-alcoholic beverages, cereals and cereal products and sugar, preserves and confectionery.

Non-alcoholic beverages contributed the largest percentage to NMES intakes for children aged 1.5 to three years and children aged four to 18 years. Not low calorie soft drinks provided 29% of NMES intake for children aged 11 to 18 years compared with 10% for children aged 1.5 to three years and 16% for children aged four to 10 years. This contribution was similar to that in the previous survey for children aged 11 to 18 years. The contribution of fruit juice was highest in children aged 1.5 to

three years and decreased with age, providing 15% for children aged 1.5 to three years, 10-13% for those aged four to 18 years and 8% for adults aged 19 years and over. For younger children aged four to 10 years, the contribution of fruit juice had increased compared with previous surveys, while there was little change in other age groups.

For children aged 1.5 to three years, 13% of NMES intake was provided by yogurt, fromage frais and dairy desserts.

Cereals and cereal products was the main contributor to NMES intake for adults aged 65 years and over, providing 31%, mainly from buns, cakes, pastries and fruit pies (14%). Cereals and cereal products provided 29% of NMES intake for children aged four to 10 years and 20-24% for the other age groups mainly from biscuits and from buns, cakes, pastries and fruit pies. These values were similar to previous surveys. The contribution from sugar, preserves and confectionery was higher in adults than in children, ranging from 19% for children aged 1.5 to three years to 24-27% (of which table sugar, preserves and sweet spreads accounted for 17-19%) for adults aged 19 years and over. These were smaller contributions than in previous surveys, especially in adults aged 65 years and over in whom sugar, preserves and confectionery had provided 42% of NMES intake. These smaller contributions were largely due to the reductions in consumption of table sugar in all age groups and of sugar confectionery and chocolate confectionery in children.

(**Tables 5.4, 5.8, and 5.23a-c)**

5.4.5 Non-starch polysaccharides

Mean intakes of non-starch polysaccharides (NSP) were 8.1g per day for children aged 1.5 to three years and 11.0-11.8g per day for children aged four to 18 years. For adults aged 19 years and over, the DRV is set at a population average intake of 18g per day; mean intakes were well below this at 13.4-13.9g per day. Mean NSP intake in children aged four to 10 years and adults aged 65 years and over was higher than in previous surveys.

Cereals and cereal products was the main source of NSP for all age groups, contributing 40% for children aged 1.5 to three years, 41-43% for children aged four

to 18 years, and 38-39% for adults aged 19 years and over. This contribution was lower than in previous surveys for adults aged 19 years and over whilst higher than in previous surveys for children.

Vegetables and potatoes were the second major contributor to NSP, showing an increasing contribution with age, from 25% in children aged 1.5 to three years to 33% for adults aged 65 years and over. Vegetables contributed more than potatoes in all age groups except for children aged 11 to 18 years and this was unchanged from previous surveys. The contribution of vegetables and potatoes to NSP intakes was lower than in previous surveys for children aged four to 18 years, while the contribution of fruit was slightly higher.

(**Tables 5.4, 5.12, and 5.23a-c**)

5.4.6 Total fat

Total fat provided 34-36% of food energy across all age groups. The DRV for total fat is that the population average intake should provide no more than 35% of food energy intake.[1] This recommendation applies to adults and children from the age of five years. Mean percentage food energy from total fat met the recommendation in all age and sex groups, except for men, where total fat provided 35.2% food energy for those aged 19 to 64 years and 37.1% food energy for those aged 65 years and over, and for women aged 65 years and over where total fat provided 35.9% food energy. Intakes were very similar to the previous surveys for adults aged 19 years and over but lower than the previous surveys for children.

The major contributors to total fat intake were meat and meat products, milk and milk products and cereals and cereal products.

Meat and meat products were the main source of total fat for children aged 11 to 18 years and adults aged 19 years and over, contributing 21-24% to intakes. This was little changed from previous surveys. Milk and milk products was the major contributor to total fat intake for children aged 1.5 to three years, providing 34%; the contribution was higher for younger children than in older children. There was little change in contribution from previous surveys. Cereals and cereal products

contributed 23-24% of total fat intake in children aged four to 18 years and 18-19% in the other age groups.

(**Tables 5.4, 5.9 and 5.23a-c**)

5.4.7 Saturated fatty acids

The DRV for saturated fatty acids is that the population average intake should not exceed 11% of food energy intake.[1] This recommendation applies to adults and children above the age of five years. Mean intakes in the current survey exceeded the DRV for all age groups at 14.8% of food energy for children aged 1.5 to three years, 13.4% for children aged four to 10 years, 12.6% for children aged 11 to 18 years, 12.8% for adults aged 19 to 64 years and 14.4% for adults aged 65 years and over. Saturated fatty acid intakes were slightly lower than in previous surveys for all age groups.

The main sources of saturated fatty acids were milk and milk products, meat and meat products and cereals and cereal products. Milk and milk products was the main source of saturated fatty acids for children aged 1.5 to three years, children aged four to 10 years and adults aged 65 years and over, providing 46%, 31% and 25% of intake respectively. This was higher than in previous surveys for children aged four to 10 years.

Meat and meat products were the main source of saturated fatty acids intake in adults aged 19 to 64 years, providing 25% of intake. This was slightly higher than in the previous survey. For children aged 11 to 18 years, meat and meat products and cereals and cereal products were highest contributors and contributed a similar proportion to intakes (23-24%).

(**Tables 5.4, 5.10, and 5.23a-c**)

5.4.8 *Trans* fatty acids

The DRV for *trans* fatty acids is that the population average intake should provide no more than 2% of food energy.[1] Mean intakes expressed as a percentage of food energy met the DRV for all age groups. Mean *trans* fatty acid intakes were less than 2g per day for all age groups, representing 0.7-0.9% of food energy. This was lower

than in previous surveys for all age groups. This level of intake for adults aged 19 to 64 years (0.8%) was also lower than the re-estimated value calculated in 2007 of 1.0% food energy based on consumption data from the 2000/01 NDNS and information from the food industry on the then current levels of *trans* fats in processed foods. [8]

Major contributors to *trans* fatty acid intake were meat and meat products, milk and milk products and cereal and cereal products. The contribution of milk and milk products to *trans* fatty acid intake decreased with age from 46% in children aged 1.5 to three years to 22-25% in older children and adults aged 19 years and over, while the contribution of meat and meat products increased with age from 12% in children aged 1.5 to three years to 21-25% in older children and adults aged 19 years and over. The intake of *trans* fat has decreased significantly in the UK over recent decades. *Trans* fatty acids are derived from two sources in the diet: those that occur naturally in meat and dairy products of ruminant animals, and those produced artificially through food processing. The levels of *trans* fats from artificial sources have been reduced in recent years. This has resulted in a relative increase in the contributions to intake of *trans* fats derived from natural sources. Hence, the relative percentage contribution to *trans* fatty acids from cereal and cereal products was lower than previous surveys, while that from meat and meat products and milk and milk products was higher.

(**Tables 5.4, 5.11, and 5.23a-c**)

5.4.9 Unsaturated fatty acids

The DRV for *cis* monounsaturated fatty acids is 13% of food energy as a population average.[1] Mean intakes ranged from 11.3% food energy for children aged 1.5 to three years to 12.8% food energy for children aged 11 to 18 years. *Cis*-monounsaturated fatty acids showed slight increases in absolute intakes and as percentage food energy for all age groups compared with previous surveys; this is probably due to the increases in meat consumption noted in section 5.2.4 & 5.4.8.

Intake of *cis* n-3 polyunsaturated fatty acids (PUFA), expressed as a percentage of food energy, increased with age from 0.7% for children aged 1.5 to three years to

1.1% for adults aged 65 years and over. When compared with previous surveys, differences were very small both in absolute terms and as a percentage of energy. However, the direction of change was upwards for all age groups. Intake of *cis* n-6 PUFA expressed as a percentage of food energy showed a similar trend with age, ranging from 4.0% for children aged 1.5 to three years to 4.9-5.1% for adults aged 19 years and over. The direction of change for *cis* n-6 PUFA was downwards for all age groups compared with previous surveys; again, differences were very small.

(**Table 5.4 and 5.23a-c**)

5.4.10 Sodium

Sodium intakes will be reported in the current survey using urinary excretion, derived from 24-hour urine collections, which are part of the survey protocol. The results from the urine analysis will be reported separately. In this section, contributions of food groups to sodium intake therefore are based on sodium intake calculated from the four-day diary and food composition tables and do not take account of the discretionary use of salt in cooking and at the table, as this is not captured in the dietary record.

The largest contributors to sodium intake were cereals and cereal products and meat and meat products.

Cereals and cereal products provided 34% of sodium intake for children aged 1.5 to three years, 37% for children aged four to 18 years, and 31-32% for adults aged 19 years and over, with white bread the largest single source. Meat and meat products provided 27% of sodium intake for children aged 11 to 18 years and adults aged 19 to 64 years and slightly less for the other age groups (19-24%). The contribution of cereals and cereal products was slightly lower, and that of meat and meat products slightly higher than in previous surveys.

(**Table 5.13**)

5.5 Vitamins and minerals

Intakes of vitamins and minerals are reported in two ways: from foods only and from all sources, that is, including supplements as recorded in the four-day diary. The proportion of individuals taking supplements is reported in Section 5.7.

For those vitamins and minerals where UK Reference Nutrient Intakes (RNIs) and Lower Reference Nutrient Intakes (LRNI) have been published, [1] the proportions of participants with intakes below the LRNI is shown and mean daily intakes are compared with the current RNI. The RNI for a vitamin or mineral is the amount of the nutrient that is sufficient for about 97% of people in the group. If the average intake of the group is at the RNI, then the risk of deficiency in the group is judged to be very small. However, if the average intake is lower than the RNI then it is possible that some of the group will have an intake below their requirement. 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. The proportion below the LRNI can be compared with previous surveys to assess any change in this measure. However, it should 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.

5.5.1 Vitamins

Average daily intakes of vitamins from food sources, with the exception of vitamin D, were close to or above the RNI for all age and sex groups. Mean intakes of vitamin A (as retinol equivalents) and vitamin C were higher than in previous surveys for all age groups due to higher fruit and vegetable and fruit juice consumption. For adults aged 65 years and over, vitamin intakes were higher than in the previous survey for the majority of vitamins assessed. Mean intakes of vitamin D were lower across all age and sex groups compared with previous surveys, except in women aged 65 years and over. While there were other changes in intakes compared with previous surveys, these were not in a consistent direction across the age groups.

The contribution of dietary supplements to mean vitamin intakes was most marked for adults aged 19 years and over. Folate-containing supplements increased mean intakes by 14% for women aged 19 to 64 years. Vitamin D-containing supplements increased mean intakes by 24-33% for children aged 1.5 to three years and children aged four to 10 years and by 41% for adults aged 65 years and over, although intakes were still well below the RNI. For all vitamins except vitamin D, mean intakes from food sources alone were above the RNI for all groups. Therefore dietary supplements containing vitamins made little difference to mean intakes in terms of meeting the RNI.

For vitamin A and riboflavin, 13% of children aged 11 to 18 years had intakes from food sources only below the LRNI. For many vitamins, there was no change from the previous surveys in the proportion of individuals below the LRNI, particularly where these proportions were 1% or less. Reductions were seen in the proportion of individuals below the LRNI for vitamin A for children aged four to 18 years and women aged 19 years and over, but not for men aged 19 years and over. The proportion with riboflavin intakes below the LRNI fell in girls aged 11 to 18 years and in adults aged 65 years and over, although this still remained high for girls aged 11 to 18 years (17%). The proportion of women aged 19 to 64 years with riboflavin intakes below the LRNI increased slightly from 9% in the previous survey to 11% in the current survey. Dietary supplements providing vitamins had little effect on the proportions with intakes below the LRNI.

(**Tables 5.14-5.17a, and 5.25-5.26c**)

5.5.2 Minerals

Average daily intakes of minerals from food sources were below the RNI for some age and sex groups. Children aged 11 to 18 years, especially girls, were more likely to have mean intakes below the RNI compared with the other age groups. Mean intakes of calcium, magnesium, potassium, zinc and selenium were below the RNI for children in this age group and, for girls only, iodine intakes were also below the RNI. Mean intakes of iron were well below the RNI for girls aged 11 to 18 years and women aged 19 to 64 years; 58% and 79% of the RNI respectively. Mean intakes of selenium, which had not been reported in previous surveys, were below the RNI in older children aged 11 to 18 years and adults aged 19 years and over.

For children aged four to 10 years, mean intakes of most minerals assessed were higher than in previous surveys, in particular calcium and zinc. A smaller increase in intakes was seen for these minerals in children aged 11 to 18 years. For adults aged 65 years and over, mean intakes for all minerals assessed were higher than seen previously.

The effect of dietary supplements containing minerals on mean intakes was most marked for women aged 19 years and over. Zinc-containing supplements increased mean intakes by 19% for women aged 19 to 64 years and 65 years and over. Dietary supplements containing minerals made little difference to mean intakes in terms of groups meeting the RNI with the exception of iron-containing supplements for women aged 19 to 64 years; these increased the mean intake of total iron by 21%, bringing the mean intake up from 79% to 97% of the RNI, although there was little change to the median intake suggesting that those with higher intakes from food sources were taking these supplements,

A high percentage of girls aged 11 to 18 years had intakes below the LRNI for all minerals assessed. Fifty per cent of girls in this age group had magnesium intakes from food sources below the LRNI and 44% had iron intakes below the LRNI. Iron intakes were below the LRNI for 22% of women aged 19 to 64 years. Selenium intakes were below the LRNI for a large proportion of adults and older children (around half of girls aged 11 to 18 years and women aged 19 years and over). In children aged four to 10 years, the proportions of individuals below the LRNI were extremely low for all minerals, except zinc where 7% had intakes below the LRNI.

The proportion of individuals below the LRNI was lower than previous surveys for children aged four to 18 years for those minerals where mean intake was seen to increase, such as calcium and zinc. For adults aged 65 years and over, the proportion with intakes below the LRNI for magnesium and potassium was much lower than in the previous survey, reflecting the higher mean intakes seen. Changes in the other age and sex groups were smaller and, although in most cases the proportions with intakes below the LRNI were lower since the previous surveys,

there were some that were higher. Dietary supplements providing minerals had little impact on the proportions with intakes below the LRNI.

(**Tables 5.18-5.21a, and 5.27-5.28c**)

5.6 Alcohol

This section reports on alcohol intake as grams per day and per cent total energy only, for both the total population (including non-consumers) and consumers only.

For the adult population overall (including non-consumers), mean intake was highest in those aged 19 to 64 years, providing 5.4% of energy intake compared with 3.4% for those aged 65 years and over. For adult consumers (those who reported consumption of alcoholic beverages in the four day diary), alcohol provided on average 8.8% and 6.5% of energy intake for those aged 19 to 64 years and 65 years and over respectively. A higher proportion of adults aged 19 to 64 years (61%) consumed alcohol than did adults aged 65 years and over (53%); in both age groups, the proportion of male consumers was higher than female consumers. For male consumers, intakes at the upper 2.5 percentile provided 35.5% of energy intake from alcohol over the four-day period for those aged 19 to 64 years and 23.7% for those aged 65 years and over.

For participants aged 11 to 18 years (including non-consumers), alcohol provided 0.9% of energy intake. Sixteen per cent of this age group had an alcohol intake during the four-day recording period, and for them, alcohol provided on average 6.1% of energy intake for boys and 5.3% of energy intake for girls. For male consumers aged 11 to 18 years at the upper 2.5 percentile, alcohol provided 26.7% of energy intake for the four days studied. It should be noted that most of the consumers of alcoholic beverages in the 11 to 18 years age group were aged 15 to 18 years.

The four days for Year 1 of the survey included two weekend days. Since alcoholic beverages are thought to be consumed more at weekends, consumption of alcoholic beverages was not reported or discussed for Year 1, and alcohol intake was described only briefly. Intakes for adults aged 65 years and over were not reported

for Year 1. Comparisons between the Year 1 and 2 data with Year 1 alone indicate that alcohol intakes were overestimated in Year 1, but only for boys aged 11 to 18 years and men. For girls aged 11 to 18 years, and women aged 19 to 64 years, the change of distribution of days of the week made very little difference to the mean and median intakes of alcohol and the upper and lower 2.5 percentiles, both in grams per day and as per cent total energy. This suggests that women are less affected by weekends in terms of consumption of alcoholic beverages and may have different patterns of social drinking than men.

Comparisons of alcohol intakes with previous surveys should take into account the fact that the Year 1 and 2 data combined still has a slightly greater proportion of weekend days than if all days of the week were equally represented. For adults aged 19 to 64 years, compared with the previous survey of this age group in 2000/01, alcohol intakes (grams per day) were higher for men and women consumers and slightly higher when non-consumers were included. For adults aged 65 years and over, the increases were more marked, particularly for older women, where the overall mean was nearly double in Years 1 and 2 to that in the previous survey of people aged 65 years and over [4] at 4.8g per day compared to 2.8g per day and the mean for consumers only was 11.3g per day compared to 8.6g per day. The biggest differences for all groups was for the upper 2.5 percentiles intakes.

Questions about alcoholic beverage consumption are also asked in the CAPI interview and via self-completion for children and young adults. This is reported in Section 3.6 in terms of units of alcohol and related to recommended sensible drinking guidelines. The time period recalled in the CAPI/self-completions is the seven days before interview and so does not overlap with the diary recording period.

(**Table 5.22**)

5.7 Dietary supplements

Information on consumption of dietary supplements was collected both in the four - day food diary and in the CAPI interview, which asks about consumption in the year before interview. Dietary supplements were defined for participants as products intended to provide additional nutrients or give health benefits and taken in liquid,

powder, tablet or capsule form. In the CAPI, participants were asked to list any dietary supplements taken over the past year. In the diary participants wrote down the details of the supplements they took on each diary recording day.

Twenty five per cent of adults aged 19 to 64 years (17% of men, 32% of women) and 37% of adults aged 65 years and over (36% of men, 38% of women) had taken at least one supplement during the four-day diary recording period. Supplement consumption was more common among children aged 1.5 to three years and children aged four to 10 years than children aged 11 to 18 years: 15% of children aged 1.5 to three years, 17% of those aged four to 10 years, and 9% of those aged 11 to 18 years had taken a supplement during the four-day diary period.

A higher proportion of participants reported having taken at least one supplement during the previous year than had done so in the four-day diary period, except women aged 19 years and over. This may be because of infrequent, intermittent or seasonal use of supplements which may not have been captured in the diary period. Twenty one per cent of children aged 1.5 to three years, 27% of children aged four to 10 years, 23% of children aged 11 to 18 years and 35-38% of adults aged 19 years and over reported having taken supplements in the past year.

For most age groups, the two most common types of supplements were fish oils (including cod liver oil) and multivitamins with or without minerals. Cod liver oil and other fish oils were taken by 6% of children aged 1.5 to three years and children aged four to 10 years, and 11% of adults aged 19 years and over during the four-diary days; the proportion taking multivitamins with or without minerals ranged from 7% in children aged 1.5 to three years and adults aged 65 years and over, to 12% in children aged four to 10 years and adults aged 19 to 64 years. For children aged 11 to 18 years, while multivitamins with or without minerals were the most common supplement taken (5%), the proportion taking fish oils (including cod liver oil) was similar to other supplements (2%).

The types of supplement reported as having been taken in the year before the interview were similar to those recorded in the diary.

(**Tables 5.29 and 5.30**)

[1] Report on Health and Social Subjects 41 *Dietary Reference Values (DRVs) for Food Energy and Nutrients for the UK*, Report of the Panel on DRVs of the Committee on Medical Aspects of Food Policy (COMA) 1991. The Stationery Office. London

[2] Henderson L, Gregory J, Swan G. National Diet and Nutrition Survey: adults aged 19 to 64 years. Volume 1: Types and quantities of food consumed. London: TSO, 2002.
Henderson L, Gregory J, Irving K, Swan G. National Diet and Nutrition Survey: adults aged 19 to 64 years. Volume 2: Energy, protein, carbohydrate, fat and alcohol intake. London: TSO, 2002.
Henderson L, Irving K, Gregory J, Bates CJ, Prentice A, Perks J, Swan G, Farron M. National Diet and Nutrition Survey: adults aged 19 to 64 years. Volume 3: Vitamin and mineral intake and urinary analytes. London: TSO, 2003.
Rustin D, Hoare J, Henderson L, Gregory J, Bates CJ, Prentice A, Birch M. National Diet and Nutrition Survey: adults aged 19 to 64 years. Volume 4: Nutritional status (anthropometry and blood analytes), blood pressure and physical activity. London: TSO, 2004
Hoare J, Henderson L, Bates CJ, Prentice A, Birch M, Swan G, Farron M. National Diet and Nutrition Survey: adults aged 19 to 64 years. Volume 5: Summary report. London: TSO, 2004
http://www.food.gov.uk/multimedia/pdfs/ndnsprintedreport.pdf

[3] Gregory JR, Lowe S, Bates CJ, Prentice A, Jackson LV, Smithers G, Wenlock R, Farron H. National Diet and Nutrition Survey: young people aged 4 to 18 years. Volume 1: Report of the diet and nutrition survey. London: TSO, 2000. Walker A, Gregory J, Bradnock G, Nunn J, & White D. National Diet and Nutrition Survey: young people aged 4 to 18 years. Volume 2: Report of the oral health survey. London: TSO, 2000

[4] Finch S, Doyle W, Lowe C, Bates CJ, Prentice A, Smithers G, Clarke PC. National Diet and Nutrition Survey: people aged 65 years and over. Volume 1: Report of the diet and nutrition survey. London: TSO, 1998.
Steele JG, Sheiham A, Marcenes W, Walls AWG. National Diet and Nutrition Survey: people aged 65 years and over. Volume 2: Report of the oral health survey. London: TSO, 1998.
http://www.esds.ac.uk/findingData/snDescription.asp?sn=4036

[5] Gregory JR, Collins DL, Davies PSW, Hughes JM, Clarke PC. National Diet and Nutrition Survey: children aged 1 ½ to 4 ½ years. Volume 1: Report of the diet and nutrition survey London: HMSO, 1995.

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

[7] The doubly labelled water technique is widely agreed to be the most accurate way of assessing energy expenditure over several weeks. Participants in doubly labelled water studies drink a weighed amount of water labelled with known amounts of the stable isotopes of hydrogen (^2H) and oxygen ($^{18}O_2$) based on their body weight. Loss of the two isotopes from body water is assessed by measurement of the rate of decline in concentration of the isotope in 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 two isotopes reflects the rate at which CO_2 is produced from metabolism. Energy expenditure can then be estimated from the CO_2 production.

[8] http://www.food.gov.uk/multimedia/pdfs/reestimatetransfats.pdf