Appendix B Methodology for Years 10 and 11 of the NDNS RP

B.1 Overview of methodology

This appendix provides an overview of methodology for Years 10 and 11 of the NDNS RP. The methodology outlined in this appendix is consistent with Year 9 unless stated otherwise. Detail of the methodology for Year 9 can be found in appendix B of the Years 1 to 9 report.[1]

The NDNS RP has run continuously since 2008 and is a cross-sectional survey, designed to be representative of the UK population. In order to meet the aims of the survey (see Introduction to main report) a sample of people representative of the UK population aged 1.5 years and over was required per year.

The sample was drawn from the 'small users' sub-file of the Postcode Address File (PAF), a computer list, prepared by the Post Office, of all the addresses (delivery points) which receive fewer than 25 articles of mail a day. 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). The survey aims to collect data from a UK representative core sample of 1,000 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. Extra addresses were selected in Northern Ireland (NI) to boost the NI sample size and enable comparisons to be made with the UK.

At each address, the interviewer enumerated the number of households and, in cases where there were 2 or more, randomly selected 1 household for the NDNS RP. From each selected household the interviewer randomly selected up to 1 adult and 1 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),[i] completion of an estimated 4-day food diary by the participant, measurements of height and weight and collection of a spot urine sample (aged 4 years and over).

The interviewer also collected information on shopping and food preparation practices and facilities in the household by additionally interviewing the *Main Food Provider* (MFP)[ii] 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)[iii] in each household and asked questions about housing tenure, as well as his or her employment, to determine the socioeconomic classification of the household.[iv]

Participants who took part in the CAPI interview and completed a food diary for at least 3 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 further physical measurements and a blood sample.

B.2 Sample design

B.2.1 Selecting addresses

The sample was drawn from the PAF. In each of Year 10 and Year 11, 4,480 addresses were selected from 160 PSUs: 3,920 addresses in 140 PSUs for the core UK sample and 560 addresses in 20 PSUs for the NI 'country boost' sample.

In each PSU, 28 addresses were randomly selected. At each address, the interviewer established the number of households and, in cases where there were 2 or more, selected 1 household at random.

B.2.1 Selecting participants

As only around one-third of households contain children, over-sampling of children was required to achieve equal numbers of adult (19 years and over) and child (1.5 to 18

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[i] A guardian is defined as a person with legal responsibility for the child.
[ii] The Main Food Provider (MFP) is the person in the household with the main responsibility for shopping and preparing food. If these tasks were shared equally between 2 people, for example if 1 person did all the shopping and another person did all the cooking, then either resident could be classified as the MFP.
[iii] 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 1 householder and they had equal income, then the eldest was selected as the HRP.
[iv] 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 to classify HRPs into the National Statistics Socio-economic Classification (NS-SEC) groupings.

years) participants each year. In order to achieve equal numbers of adults and children in the sample, the 28 selected addresses were randomly allocated to 1 of 2 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 a number of addresses (10 in Year 10 and either 9 or 10 in Year 11[v]) the interviewer selected 1 adult and, where present, 1 child for inclusion in the survey ('basic' addresses). The remaining addresses (18 in Year 10 and either 18 or 19 in Year 11[v]) were for a 'child boost' where only a child was recruited, and therefore the interviewer only carried out interviews in households with children. In households containing more than 1 eligible person (adult and/or child), interviewers selected the participant(s) using a random selection procedure.

B.3 Ethics approval

Ethics approval for the study was obtained from the Cambridge South NRES Committee (Ref. No. 13/EE/0016). Research governance[vi] approval was obtained where required by the Research and Development (R&D) Committee for each laboratory.

B.4 Fieldwork

Fieldwork in England, Scotland and Wales was carried out by NatCen's panel of interviewers and nurses. In Northern Ireland, stage 1 fieldwork was carried out by interviewers working for the Northern Ireland Statistics and Research Agency (NISRA). Nurse fieldwork in Northern Ireland was conducted by NatCen nurses.[vii]

Fieldwork was issued monthly to interviewers and nurses in each fieldwork year as follows:

	Interviewers (Stage 1)	**Nurses (Stage 2)**
Year 10		
Quarter 1	April-June 2017	July-September 2017
Quarter 2	July-September 2017	October-December 2017
Quarter 3	October-December 2017	October-December 2017
Quarter 4	January-March 2018	April-June 2018
Year 11		
Quarter 1	April-June 2018	July-September 2018
Quarter 2	July-September 2018	October-December 2018
Quarter 3	October-December 2018	October-December 2018
Quarter 4	January-March 2019	April-June 2019

[v] In Year 11, half of PSUs had a 9:19 split and half had a 10:18 split).
[vi] The Research Governance Framework can be found at https://www.hra.nhs.uk/planning-and-improving-research/policies-standards-legislation/uk-policy-framework-health-social-care-research/.
[vii] Only 'core UK' sample points in NI were eligible for a nurse visit; 'country boost' cases in NI were not eligible for a nurse visit.

Stage 1 fieldwork commenced on the first weekday of the month, and interviewers were given 6 weeks in which to complete their assignment. Stage 2 fieldwork for a particular month started 8 weeks after the interviewer deadline. Nurses had up to 7 weeks to complete their work.

B.5 Overview of survey components and fieldwork procedures

The survey was delivered in 2 stages:

Stage 1: Interviewer visits:

- Estimated 4-day food diary
- Detailed background interview
- Interview with MFP
- Height and weight measurements
- Physical activity questionnaire
- Collection of spot urine sample

Stage 2: Nurse visit:

- Blood sample
- Physical measurements,[viii] waist and hip, demispan and infant length
- Blood pressure[ix]
- Collection of information about prescribed medicines

B.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 (or guardian's) consent to interview.

Interviewers carried out 3 visits to households who agreed to participate:

- **Visit 1:** Estimated 4-day food diary explained to the participant and left with them to complete; interviewer-administered CAPI; height and weight measurements; collection of spot urine sample; Computer Assisted Personal Interview (CASI) in which participants aged 8 years and older were asked to

[viii] See section B.5.2 for age ranges for each physical measurement.
[ix] Blood pressure was measured in Years 1-10 but not Year 11.

record their smoking and drinking habits.[x] Participants aged 16 years and above were asked to fill in a paper self-completion questionnaire designed to collect information about physical activity (the Recent Physical Activity Questionnaire (RPAQ)[xi]

- **Visit 2:** The diary check visit, where the interviewer reviewed the completion of the 4-day food diary so far and filled in any missing information with the participant
- **Visit 3:** Review and collection of 4-day food diary, RPAQ self-completion and further CAPI questionnaire administration[xii,xiii]

At the end of the third interviewer visit, interviewers gave each participant completing at least 3 food diary recording days a token of appreciation (£30 high street gift card). 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.

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 3 main elements: household composition/ structure interview, MFP interview and individual interview. The individual questionnaire, asked of each selected participant, had 2 parts: Part 1, which was asked at the first interviewer visit; and Part 2, which was asked at the third visit after the interviewer collected the food diary. The content of the CAPI questionnaires is shown in appendix D.

Collection of dietary data: the 4-day food diary

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

Height and weight measurements

Protocols for height and weight measurements are provided in appendix L.

Spot urine sample

Spot urine samples were collected in order to provide an assessment of iodine concentrations in the UK population. Participants aged 4 years and over were asked to

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[x] Prior to Year 11, participants aged 8-24 years had the option of recording this information in a paper self-completion questionnaire.

[xi] Questions for children (2-15 years) were asked in CAPI.

[xii] Height and weight measurements and spot urine collection could also be carried out at this visit if not possible at visit 1.

[xiii] Children aged under 16 years were asked about physical activity during the CAPI interview.

provide a single small sample of urine in a sterile container (a 'spot urine sample') after reading the relevant information leaflets and providing written consent (see appendices C and H).[xiv] Participants providing a spot urine sample were given a £5 (high street gift card as a token of appreciation.

B.5.2 Stage 2: the nurse visit

Stage 2 of the survey was carried out by a NatCen qualified nurse and took place within 2 to 4 months of the interviewer stage. All individuals completing 3 or 4 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 and sought agreement for the nurse to make contact. Nurses could provide these again if necessary. The nurse asked questions about prescribed medications before taking, with agreement, a number of physical measurements and a venous blood sample.

Measurements taken by the nurse
A summary of the imeasurements 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 4 years and over[xv]
Infant length measurement	Aged 18 to 23 months
Waist and hip circumferences	Aged 11 years and over
Demispan	Aged 65 years and over and those aged 16 to 64 years where height could not be measured
Non-fasting blood sample	Aged 1.5 to 3 years and people not willing to fast[xvi]
Fasting blood sample	Aged 4 years and over

[xiv] Individuals using a urinary catheter, menstruating females and children aged 4 and over who are not dry during the day were excluded from providing a urine sample.
[xv] Blood pressure was measured in Years 1-10 but not Year 11.
[xvi] In Years 1-10, the non-fasting option was only offered to participants with diabetes. In Year 11, anyone not willing to fast was offered the option to provide a non-fasting sample.

The nurse fieldwork documents are provided in appendices G and H. Measurement protocols are provided in appendix L.

Blood sample

After providing the physical measurements, participants aged 4 years and over were asked whether they were willing to give a blood sample by venepuncture after an overnight fast[xvi] (those aged 1.5 to 3 years were asked to provide a non-fasting blood sample). The nurse obtained written consent from the participants aged 16 years and over 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 written assent from the child where possible. For those aged 10 years or younger, blood was taken by a NatCen paediatric phlebotomist who accompanied the nurse on the visit.[xvii, 2] 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 a £20 high street gift card as a token of appreciation for agreeing to this part of the study.

B.6 Feedback to participants and GPs

Participants who completed 3 or 4 diary recording days were asked whether they would like to be sent feedback on the analysis of their food diary and how this compared to nutrient intake 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[xviii] (if aged 4 years and over) and other age-dependent anthropometric measurements: waist and hip circumferences (if aged 11 years and over); demispan measurement (if aged 65 years and over) and infant length (if aged 18 to 23 months). Participants who provided a blood sample were asked whether they wished to be sent results of the blood sample analyses most related to their health. Participants were also asked if they wanted details of these analyses, their BMI and their blood pressure readings[xviii] to be sent to their GP. If an individual wished to receive results (and/or have them sent to their GP), written consent was obtained from them (or from the parent/guardian in the case of a child). See appendix J for an example of feedback.

[xvii] Nurses qualified and experienced in paediatric phlebotomy took blood samples from children. Protocols and procedures are in line with official RCN guidelines.

[xviii] Blood pressure was measured in Years 1-10 but not Year 11.

B.7 Fieldwork quality control

B.7.1 Project specific training for interviewers and nurses

All interviewers and nurses working on the NDNS RP 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.

B.7.2 Training for interviewers

All new-to-NDNS RP interviewers (and those who had not worked on the study in the previous fieldwork year) attended a 1.5-day training course where they were fully briefed on the protocols and administration of the survey. Interviewers who had worked on the previous survey year attended a 1-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 the placement, checking and collection of the 4-day diaries. All new interviewers and those who had not worked on the survey in the preceding 12 months were accredited on taking consistent, accurate height and weight measurements.

After the briefing, “early work” checks were carried out on the first 2 or 3 diaries returned by each interviewer with timely feedback provided on any areas of concern. Before working on a second or subsequent assignment, all interviewers received feedback on the diaries from their previous assignment.

B.7.3 Training for nurses

Nurse briefings lasted 1 day and covered equipment training, blood sampling and questionnaire administration (including practice sessions). Nurses were also briefed on the demispan, waist and hip and infant length measurement protocols. All other physical measurements were either regularly taken by nurses on the NDNS RP and other NatCen surveys or the newer nurses attended a general training session which covered these protocols. New nurses were accredited during the briefing. This provided training and assessment on taking consistent and accurate waist and hip and demispan measurements. Existing nurses who did not hold a valid demispan or waist and hip measurement accreditation attended a separate ‘accreditation’ session.

Nurses who had a gap of 3 months or more between assignments and new-to-NDNS RP nurses completed three homework exercises (covering blood sample tube labelling,

and consents/blood despatch) which were marked and individual feedback given to each nurse prior to starting fieldwork.

B.8 Weighting the survey data

It is necessary to apply weighting factors to the data collected in the NDNS RP for 2 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 1 adult and 1 child were selected from any 1 household to take part. This meant that adults living in households with 1 or more other adults, and children in households with 1 or more other child were less likely to be selected than were adults or children in single adult/child households.

In addition, 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 2 stages to the weighting scheme: the first was to generate a set of design weights to correct for 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. The sample design includes an adjustment for selecting more addresses in Northern Ireland. All of the addresses in NI, and therefore participants, are weighted down as a result. The applied weights puts the 4 countries into their correct population proportions in the UK so that, for example, the percentage of the NDNS RP sample in NI is the same as the percentage of the UK population that is in NI.

[1] https://www.gov.uk/government/statistics/ndns-time-trend-and-income-analyses-for-years-1-to-9

[2] Royal College of Nursing (2013). An education and training competence framework for capillary blood sampling and venepunture in children and young people, RCN London. ISBN 978-1-908782-56.