Appendix B. Weighting the NDNS core sample Sarah Tipping

B.1 Introduction

NDNS requires weights to adjust for differences in sample selection and response. The weights adjust for differential selection probabilities of households and individuals, non-response to the individual questionnaire, non-response to the nurse visit and non-response to providing a blood sample. Non-response weights were generated using logistic regression modelling and calibration. Figures presented in this report are based on weighted data.¹

B.2 Selection weights

Selection weights are required to correct for the unequal selection of:

- 1. dwelling units at multi dwelling unit² addresses,
- 2. catering units at multi catering unit³ addresses,
- 3. individuals within dwelling or catering units, and
- 4. the sample across months.

Most addresses selected from the Postcode Address File (PAF) contain a single dwelling unit. However, a small number of addresses contain multiple dwelling units; at these addresses the interviewer selected one dwelling unit at random using a Kish grid.⁴ The selected dwelling unit was then included in the sample. The dwelling unit selection weights (w₁) adjust for this selection. The weights are equivalent to the number of dwelling units identified at the address and were trimmed at three to avoid any large values. The dwelling unit selection weights ensure dwelling units at addresses containing more than one are not under-represented in the issued sample.

At each selected dwelling unit the interviewer enumerated the number of catering units and selected one at random using a Kish grid.⁴ The catering unit selection weights (w₂) adjust for this selection of catering units. The catering unit selection weights ensure that

catering units in multi-occupied dwelling units or addresses are not under-represented in the sample.

The selection of individuals within catering units depended on the selection 'type' of the address. Each sample point contained nine general sample addresses and 18 child boost addresses. At general sample addresses one adult (aged 19 years and over) and, where available, one child (aged 1.5 to 18 years) were selected at random from each responding catering unit by the interviewer. At child boost addresses one child was selected at random by the interviewer. Adults and children were weighted separately as they will always be analysed separately, hence this sample design feature reduced costs but does not increase the degree of clustering in the sample.

Individual selection weights (w₃) are required to ensure individuals in larger catering units are not under-represented in the sample. The individual selection weight is the inverse of the individual selection probabilities. For adults this is equivalent to the number of eligible adults in the catering unit, for children this is the number of eligible children in the catering unit. Pregnant or breastfeeding women were not eligible for the survey and were excluded from selection.

Prior to the launch of Year 1 fieldwork, NDNS used a 'Run In' sample to test field procedures. The Run In sample was selected alongside the Year 1 sample using the same methods and was subsequently incorporated into the Year 1 data. The Run In sample was carried out in February and March 2008, therefore an additional set of weights were needed to correct for the unequal distribution of the sample across months in Year 1. The Run In sample weights (w_4) ensure the full sample (the Year 1 sample plus Run In and the Year 2 sample) is seasonally representative.

The combined selection weight (w_{sel}) is the product of the dwelling unit, catering unit and individual selection weights and the Run In weight.

B.3 Individual calibration weight

A set of household weights were not required as all analyses have been carried out at the individual level; any information collected about the household or catering unit has been reported in terms of the individual.

A set of individual weights were generated for the analysis of fully responding individuals (the 2,126 individuals who responded to the individual interview and completed three or four food diary days). These weights were generated using calibration methods. The aim was to reduce bias resulting from sampling error and differential non-response by age and sex and Government Office Region to the individual interview. An iterative procedure was used to adjust a starting weight until the distribution of the (weighted) sample matched that of the population for a set of key variables. The adjustment kept the values of the final weights as close as possible to those of the initial weights, which ensured the properties of the initial weights were retained in the final calibrated weights. The composite selection weights (w_{sel}), described in section B.2, were used as the initial weights.

The key variables used to create the individual weight were: age (grouped); by sex; and Government Office Region. The population figures used were taken from the 2009 midyear population estimates.⁵ The calibration was run separately for adults and children, children from the general sample and child boost addresses were weighted together as the two samples of children should be analysed together. The figures used for weighting adults are shown in Table B.1; those used for weighting children are shown in Table B.1; those used for weighting children are shown in Table B.2. **(Tables B.1, B.2)**

The calibration weights generated were re-scaled so that the sum of the weights equalled the number of participating individuals; these are the final individual weights for the core sample (wti_adY12 and wti_chY12). Thus the final individual weights adjust for dwelling unit, catering unit and individual selection, the Year 1 Run In sample, and for the age/sex and regional profiles of participating individuals.

B.4 Nurse interview non-response weight

Participants who completed three or four food diary days (i.e. those deemed fully productive) were asked for their consent for a nurse to contact them to arrange a visit. Approximately three quarters of these participants (76% of adults, 77% of children) went on to do a nurse interview. Non-response weights were generated to adjust for differences between participants and non-participants to the nurse visit. These weights have been used for all analyses of nurse level data.

A number of cross-tabulations were run and chi-square tests used to check which variables from the individual and household questionnaires had a significant relationship with nurse visit response. These variables were then used in the weighting.

The first step in creating the nurse weights was to model response behaviour using logistic regression.⁶ A logistic regression models the relationship between an outcome variable (response to the nurse interview) and a set of predictor variables. The predictor variables were a set of socio-demographic, participant and household/catering unit characteristics collected during the interview. Adults and children were modelled separately. The model generated a predicted probability for each participant. This is the probability the participant would take part in the nurse interview, given the characteristics of the individual and the household/catering unit. Participants with characteristics associated with non-response were under-represented in the nurse sample and therefore receive a low predicted probability. These predicted probabilities were then used to generate a set of non-response weights; participants with a low predicted probability got a larger weight, increasing their representation in the sample. The full non-response models for adults and children are given in Tables B.3 and B.4.

(Tables B.3, B.4)

The final stage of designing the nurse weights was to calibrate the weights produced by the non-response model. The weighting totals were estimates based on weighted data from the individual questionnaire. This stage of weighting makes participants to the nurse visit match the population distribution in terms of age, sex and Government Office Region and match the weighted participants to the individual questionnaire in terms of household size, ethnicity of Main Food Provider (MFP) and economic activity of the Household Reference Person (HRP). The figures used for weighting adults are shown in the first column of Table B.9; those used for weighting children are shown in the first column of Table B.10. The initial weights were the weights from the non-response model. **(Tables B.9, B.10)**

As before the calibration weights were re-scaled so that the sum of the weights equalled the number of participants who had a nurse visit. These are the final nurse weights for the core sample (wtn_adY12 and wtn_chY12) and adjust for unequal selection, non-response to the household/MFP and individual interviews and non-response to the nurse visit.

B.5 Effective sample size

The effect of the sample design on the precision of survey estimates is indicated by the effective sample size (neff). The effective sample size measures the size of an (unweighted) simple random sample that would achieve the same precision (standard error) as the design being implemented. If the effective sample size is close to the actual sample size then the design is efficient and has a good level of precision. The lower the effective sample size, the lower the level of precision. The actual sample size of individual interviews/participants is 1,031 and the effective sample size is 837. This means the individual sample has the same level of precision as a simple random sample of 837 hence a 95% confidence interval around an estimate of 50% is (46.6%, 53.4%). Had the effective sample size been 1,031, and therefore equal to the actual sample size, the confidence intervals would have been (46.9%, 53.1%). Large fluctuations in the size of the selection probabilities (and therefore large fluctuations in the size of the selection weights) will cause the effective sample size to be low compared with the actual sample size. Samples that select one person per household tend to have lower efficiency than samples that select all household members due to the selection weights required to make the sample representative. However, this aspect of the sample design was unavoidable in NDNS as eating habits are so highly correlated within households.

The efficiency of a sample is given by the ratio of the effective sample size to the actual sample size. The individual sample has an efficiency of 81%. Table B.5 shows the effective sample size and efficiency of the final individual and nurse weights.

(Table B.5)

In addition to the weights, the precision of estimates is also affected by the degree to which the sample is clustered. The NDNS sample was clustered within geographical areas to reduce fieldwork costs. A high degree of clustering can have a negative impact on the precision of the survey estimates, since individuals within a cluster tend to be more alike. Design factors (defts) show the extent to which the sample design has increased the standard error and can be used to assess the impact of clustering. The effects of clustering vary; it impacts more on some survey estimates than others. Table B.6 shows the design factors due to clustering for a number of estimates. Other elements of the sample design have been ignored to enable the impact of clustering to be isolated. Whilst the impact on some estimates is relatively large, the overall effects are small. For example, the estimate for children of the mean proportion of food energy taken from saturated fat has a design factor of 1.11, this means the standard error (and therefore confidence interval) around this estimate was increased by 11% by the clustered design. **(Table B.6)**

B.6 Impact of the weights

The impact of the non-response and selection weights on the data can be seen in Tables B.7 to B.10. Tables B.7 and B.8 compare weighted fully productive individuals (those completing three or four food diary days) to the UK population. Tables B.9 and B.10 compare those visited by a nurse to individuals who responded to the individual interview and completed at least three food diary days.

(Tables B.7 to B.10)

B.7 Alcohol and smoking weight

An additional weight was required for a specific analysis of smoking behaviour and alcohol use of individuals aged 16 years and over. The alcohol and smoking weight allows the results for young people aged 16 to 18 years to be analysed with the results for adults aged 19 years and over. This weight was generated for all core sample participants at general sample addresses⁷ who were aged 16 years and over and had competed an individual interview and at least three food diary days. A nurse weight was not required for this specific sample. As before, calibration methods were used to generate the weights. The initial weight was the composite selection weight (wsel), described in section B.2. This weight was adjusted using an iterative procedure to give a final weight (wti_adY1216) that made the age, sex and regional distribution of the weighted sample representative of the UK population aged 16 years and over. Table B.11 shows the weighted and unweighted distribution of the participants aged 16 years and over.

B.8 Blood weights

An additional set of weights was generated to correct for differential non-response to giving a blood sample. Non-response, whether due to refusal or inability to give a blood sample, will cause the blood data to be biased if there are systematic differences between individuals that provide a blood sample and individuals that do not.

Blood samples were taken during the nurse visit. Only participants who fulfilled certain eligibility criteria were asked whether they would be prepared to give a blood sample. Participants were ineligible if they:

- had a clotting or bleeding disorder (e.g. conditions such as haemophilia and low platelets (thrombocytopenia))
- had ever had a fit
- were currently on anticoagulant drugs, e.g. Warfarin therapy
- had volunteered information that they are HIV or Hepatitis B or C positive

Response to the blood sample was higher for adults than for children; 50% of adults and 27% of children who had completed three or four diary days provided a blood sample. Response amongst children was closely linked to age: whilst 39% of those aged 11 to 18 years provided a blood sample, only 19% of younger children (aged 1.5 to 10 years) did so.

The 'blood participants' (i.e. those who provided a blood sample) were weighted to match all 'nurse participants' (i.e. those who were visited by a nurse and were eligible to provide a blood sample). It can be assumed that the eligible nurse participants (weighted by the nurse weight) are representative of all eligible persons in the population, since the nurse weights make the full nurse sample representative of the population. The final blood weights should therefore make the blood sample participants representative of all eligible persons in the population. The final blood weights should therefore make the blood sample participants representative of all eligible persons in the population. This assumption is made because there are no available estimates of the actual eligible population (i.e. the population providing a blood sample).

The methods used to generate the blood weights were similar to those used to generate the nurse weights. Cross-tabs and chi-square tests were used to check which variables from the individual and household questionnaires were significantly associated with a participant giving blood. These variables were then entered into a logistic regression model.

A logistic regression models the relationship between a binary outcome variable (whether or not a participant gave blood) and a set of predictor variables. The predictor variables were a set of socio-demographic participant and household characteristics collected from the individual interview. Adults and children were modeled separately. The model generated a predicted probability for each participant. This is the probability the participant would give blood during the nurse interview, given the characteristics of the participant and the household. Participants with characteristics associated with nonresponse were under-represented in the blood sample and therefore received a low predicted probability. These predicted probabilities were then used to generate a set of non-response weights; participants with a low predicted probability received a larger weight, increasing their representation in the sample.

The small sample size for children led to a very basic model that contained only age and sex, household size and region. The adult sample was larger therefore more variables were entered into the adult model. This contained age and sex, region, household size, ethnicity and general health. The full models for adults and children are given in Tables B.12 and B.13.

(Tables B.12, B.13)

The non-response weights from the model were combined with the final nurse weights to give the final blood weights (the final nurse weights incorporate the selection weights, weights for non-response to the individual questionnaire and weights for non-response to the nurse visit). These weights were scaled, so the mean weight equalled one and the weighted sample size matched the unweighted sample size.

The final stage of the nurse weights was to calibrate the weights produced by the nonresponse model. This step was not done for the blood weights. The weighted blood sample was already very close to the weighted eligible nurse sample and hence this additional step was not necessary. The impact of the weights on key variables for adults and children are shown in Tables B.14 and B.15.

(Tables B.14, B.15)

¹ Chapter 2 which covers response rates uses unweighted data.

² A Dwelling Unit is an address or part of an address, which has its own front door. The front door does not have to be at street level, but it must separate one part of the address from other parts (i.e. only those who live behind the door have access to the area, it is not a communal part of the address).

³ A Catering Unit is a "group of people who eat food that is bought and prepared for them (largely) as a group". A household will consist of more than one catering unit if any of its members generally buy and prepare food separately from other members. For example, a household of students may share a living space but they all cook and prepare food independently and hence would form separate catering units within the household.

⁴ A Kish grid is a framework to ensure that the unit is selected without interviewer bias. The number of units is listed across the top of the grid, with a random number below to indicate which unit should be selected.

⁵ (Office for National Statistics. *Mid 2009 Population Estimates*. [Online] Available: <u>http://www.statistics.gov.uk/statbase/Product.asp?vlnk=15106</u> (accessed 17/01/2011).

⁶ This step was not carried out on Year 1 data. The small sample sizes resulted in weak non-response models and this stage was left out.

⁷ It was more efficient to exclude those aged 16 to 18 years from the child boost than include them and weight them down.

Appendix B TABLES: Weighting the NDNS core sample

- B.1 2009 mid-year population estimates for adults (aged 19 years and over).
- B.2 2009 mid-year population estimates for children (aged 1.5 to 18 years).
- B.3 Non-response nurse model for adults (aged 19 years and over).
- B.4 Non-response nurse model for children (aged 1.5 to 18 years).
- B.5 Effective sample size (neff) and efficiency of weights.
- B.6 Estimated design factors (defts) due to the effects of clustering for a set of key survey estimates.
- B.7 Weighted and unweighted distribution of fully productive adults (aged 19 years and over) completing three or four food diary days.
- B.8 Weighted and unweighted distribution of fully productive children (aged 1.5 to 18 years) completing three or four food diary days.
- B.9 Weighted and unweighted distribution of adult participants (aged 19 years and over) to the nurse visit.
- B.10 Weighted and unweighted distribution of child participants (aged 1.5 to 18 years) to the nurse visit.
- B.11 Weighted and unweighted distribution of participants aged 16 years and over (for smoking behaviour and alcohol use weights).
- B.12 Non-response blood model for adult participants (aged 19 years and over).
- B.13 Non-response blood model for child participants (aged 1.5 to 18 years).
- B.14 Weighted distribution of adult participants (aged 19 years and over) providing a blood sample.
- B.15 Weighted distribution of child participants (aged 1.5 to 18 years) providing a blood sample.

Table B.	1	
2009 mid-year population estimation	tes ¹ for adults (aged 19
years and over)	Ectimato	Boroont
Covernment Office Degien	EStimate	Fercent
Sovernment Office Region	2 0 2 2 0 1 5	4.2
North East	2,023,915	4.2
North West	5,320,959	11.1
Yorkshire & the Humber	4,078,043	8.5
East Midlands	3,459,520	7.2
West Midlands	4,159,118	8.7
East of England	4,455,897	9.3
London	5,997,729	12.5
South East	6,506,960	13.6
South West	4,108,912	8.6
Wales	2,328,628	4.9
Scotland	4,084,631	8.5
Northern Ireland	1,331,000	2.8
Age in years (grouped) by sex		
Males 19-29	4,712,490	9.8
Males 30-39	4 068 789	8.5
Males 40-49	4 523 232	9.5
Males 50-59	3 689 579	7.7
Males 60-64	1 817 994	3.8
Males 65-69	1 364 484	2.9
Males 70+	3 057 932	6.4
Females 19-29	4 524 411	9.4
Females 30-39	4 084 952	9.0 8.5
Females 40-49	4 631 401	9.7
Females 50-59	3 795 520	79
Females 60-64	1 001 153	1.0
Females 65-69	1,301,133	4.0
Fomalos 70	1,472,575	0.1
	4,210,790	0.0
Total	47,855,312	100
' (Office for National Statistics. <i>Mid</i> 2009 http://www.statistics.gov.uk/statbase/Pro	Population Estimation Estimation	ates. [Online] 106 (accessed

Table B.2								
2009 mid-year population estimates ¹ for children (aged 1.5								
to 18 years)	F atimata	Danaant						
Occurrence office Device	Estimate	Percent						
Government Office Region								
North East	515,578	4.0						
North West	1,446,298	11.3						
Yorkshire & the Humber	1,081,683	8.5						
East Midlands	911,218	7.1						
West Midlands	1,165,342	9.1						
East of England	1,203,146	9.4						
London	1,570,023	12.3						
South East	1,773,152	13.9						
South West	1,034,843	8.1						
Wales	617,990	4.8						
Scotland	1,019,759	8.0						
Northern Ireland	419,550	3.3						
Age in years (grouped) by sex								
Males 1.5-3	963,815	7.6						
Males 4-6	1,080,841	8.5						
Males 7-10	1,387,434	10.9						
Males 11-14	1,490,292	11.7						
Males 15-18	1,613,923	12.6						
Females 1.5-3	918,832	7.2						
Females 4-6	1,028,279	8.1						
Females 7-10	1,327,931	10.4						
Females 11-14	1,420,114	11.1						
Females 15-18	1,527,119	12.0						
Total	12,758,580	100						

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

Table B.3 Non-response model for edulte (and 40 years and eyer) ^{1,2,3,4,5}									
B S.F. Wald df Sig Fyn(R)									
Number of people in		0.2.	14.294	4	.006				
catering unit									
1					baseline				
2	540	.244	4.889	1	.027	.583			
3	330	.282	1.368	1	.242	.719			
4	.144	.324	.197	1	.657	1.155			
5+	749	.301	6.181	1	.013	.473			
Ethnic group			4.362	1	.037				
White					baseline				
Not white	581	.278	4.362	1	.037	.560			
Housing tenure			1.294	1	.255				
Own/buying					baseline				
Rent	203	.179	1.294	1	.255	.816			
Age in years (grouped) by			15.766	13	.262				
Sex					haadina				
Males 19-29	015	250	000	4	Daseline	005			
Males 30-39	015	.000	.002	1	.900	.900			
Males 40-49	041	.ააა	3.7 14 E01	1	.054	.527			
Males 50-59	.275	.302	.021 202	1	.470	1.317			
Males 60-64	.201	.011	.303	1	.002	1.323			
Males 65-69	.132	.020	.004	1	.001	1.141			
Males 70+	.070	.403	.031	1	.001	1.073			
Females 19-29	100	.550	.201	1	.010	.040 776			
Females 30-39	254	.300	.520	1	.400	.770			
Females 40-49	009	.342	.007	1	.190	1 107			
Females 50-59	- 457	.370	.230	1	20/	633			
Females 60-64	4 37 1.041	.433 643	2 622	1	.234	2 831			
Females 65-69	- 245	360	2.022	1	507	2.001			
Females 70+	245	.309	.440	I	.507	.705			
Government Office			20.062	11	044				
Region			20.002		.011				
North Fast					baseline				
North West	151	.475	.101	1	.751	.860			
Yorkshire & the Humber	920	.470	3.831	1	.050	.399			
Fast Midlands	072	.505	.020	1	.887	.931			
West Midlands	779	.472	2.722	1	.099	.459			
Fast of England	773	.466	2.748	1	.097	.462			
London	019	.475	.002	1	.969	.982			
South Fast	125	.463	.073	1	.787	.882			
South West	567	.475	1.425	1	.233	.567			
Wales	424	.525	.651	1	.420	.655			
Scotland	310	.486	.405	1	.524	.734			
Northern Ireland	.446	.721	.383	1	.536	1.562			
Constant	2.015	.521	14.979	1	.000	7.501			

¹ The response is 1 = individual aged 19+ years responded to the nurse visit, 0 = non response ² Only variables that are significant at the 0.05 level are included in the model

³ The model R² is 0.056 (Cox and Snell)
 ⁴ B is the estimate coefficient with standard error S.E.
 ⁵ The Wald-test measures the impact of the categorical variable on the model with the appropriate number of degrees of freedom df. If the test is significant (sig. < 0.05) then the categorical variable is considered to be 'significantly associated' with the response variable and therefore included in the model

Table B.4									
Non-response nurse mo	Non-response nurse model for children (aged 1.5 to 10 years)								
Number of people in	D	3.E.	10.848	<u>u</u>	<u>.</u>	схр(в)			
catering unit				Ū					
2					baseline				
3	.578	.349	2.748	1	.097	1.782			
4	.994	.345	8.312	1	.004	2.703			
5+	.593	.342	3.010	1	.083	1.810			
Work status of HRP			11.001	2	.004				
Never worked					baseline				
Currently working (full	1.119	.364	9.438	1	.002	3.062			
or part time)	005	077	0.005		000	4 00 4			
Previously worked, not	.685	.377	3.305	1	.069	1.984			
now									
Ethnic group			3.044	1	.081				
White			0.0.1		baseline				
Not white	388	.222	3.044	1	.081	.679			
Housing tenure			2.979	1	.084				
Own/buying					baseline				
Rent	.328	.190	2.979	1	.084	1.389			
Ronk									
Age in years			6.899	9	.648				
(grouped) by sex									
Males 1.5-3					baseline				
Males 4-6	002	.361	.000	1	.995	.998			
Males 7-10	.095	.344	.077	1	.781	1.100			
Males 11-14	018	.334	.003	1	.957	.982			
Males 15-18	.292	.339	.743	1	.389	1.339			
Females 1.5-3	069	.369	.035	1	.852	.933			
Females 4-6	.420	.383	1.205	1	.272	1.522			
Females 7-10	.589	.367	2.572	1	.109	1.802			
Females 11-14	.286	.348	.676	1	.411	1.331			
Females 15-18	.334	.344	.940	1	.332	1.396			
			40.000						
Government Office			16.803	11	.114				
North East					baseline				
North West	-1.180	.580	4.139	1	.042	.307			
Yorkshire & the	-1.355	.593	5,233	1	.022	.258			
Humber					-				
East Midlands	-1.443	.601	5.760	1	.016	.236			
West Midlands	-1.200	.590	4.140	1	.042	.301			
East of England	-1.689	.578	8.537	1	.003	.185			
London	-1.100	.583	3.559	1	.059	.333			
South East	783	.585	1.791	1	.181	.457			
South West	904	.613	2.175	1	.140	.405			
Wales	-1.222	.631	3.752	1	.053	.295			
Scotland	-1.149	.600	3.672	1	.055	.317			
Northern Ireland	-1.558	.659	5.591	1	.018	.211			
Constant	.484	.773	.393	1	.531	1.623			

- ¹ The response is 1 = individual aged 1.5-18 years responded to the nurse visit, 0 = non response ² Only variables that are significant at the 0.05 level are included in the model ³ The model R² is 0.047 (Cox and Snell) ⁴ **B** is the estimate coefficient with standard error **S.E.**

- ⁵ The **Wald**-test measures the impact of the categorical variable on the model with the appropriate number of degrees of freedom **df**. If the test is significant (**sig**. < 0.05) then the categorical variable is considered to be 'significantly associated' with the response variable and therefore included in the model

	Table B.5							
Effective sa	Effective sample size (neff) and efficiency of weights							
Variable name	Variable label	Ν	Min	Max	Mean	Std. Deviation	Effective sample size (neff)	Efficiency
wti_adY12	Adult weight for individual and diary	1031	0.22	3.51	1.00	0.48	837	81%
wtn_adY12	Adult weight for nurse visit	780	0.18	2.76	1.00	0.50	625	80%
Wtb_adY12	Adult weight for blood sample	511	0.21	3.53	1.00	0.60	383	75%
wti_chY12	Child weight for individual and diary	1095	0.25	2.94	1.00	0.51	866	79%
wtn_chY12	Child weight for nurse visit	838	0.23	3.21	1.00	0.53	655	78%
Wtb_chY12	Child weight for blood sample	300	0.27	2.63	1.00	0.54	233	78%

Tabl	Table B.6							
Estimated design factors (defts) due to the effects of clustering for a set of key survey estimates								
Survey estimates	Childre	en	Adults	5				
	Mean	deft	Mean	deft				
Mean % energy from saturated fatty acids	80	1.11	94	1.00				
Mean fruit intake g/day	13	1.17	13	1.08				
	%	deft	%	deft				
How often eat meals out	_		_					
3 or more times per week	2	1.03	5	0.98				
1-2 times per week	16	1.04	22	0.95				
1-2 times per month	51	1.03	43	1.04				
Rarely or never	31	1.03	29	1.10				
Type of appetite								
Good	65	1.02	67	1.11				
Average	27	1.02	27	1.11				
Poor	7	1.09	6	1.16				
Use of food services (lunch club, meals on wheels, etc)								
Yes	-		21	1.08				
Νο	-		79	1.08				
What usually has for lunch at school								
Cooked school meal	34	1.11	-					
Cold school meal	7	0.98	-					
Packed lunch (from home)	46	1.11	-					
Buy lunch from shop/cafe	9	1.03	-					

Goes home Does not eat lunch	2 2	1.07 0.96	-	
Base (unweighted)	1095		1031	

Table B.7							
Weighted and unweighted distribution of fully productive adults (aged 19 years and over) completing three or four food diary days							
	Population estimates	Fully produc	ully productive adults				
		Unweighted	Weighted by selection wt	Weighted by wti_adY12			
	%	%	%	%			
Government Office							
Region							
North East	4.2	4.0	3.5	4.2			
North West	11.1	11.2	11.6	11.1			
Yorkshire & the	8.5	8.2	7.8	8.5			
Humber							
East Midlands	7.2	9.1	8.8	7.2			
West Midlands	8.7	10.0	9.8	8.7			
East of England	9.3	8.8	9.3	9.3			
London	12.5	9.1	9.7	12.5			
South East	13.6	14.3	14.4	13.6			
South West	8.6	8.3	8.6	8.6			
Wales	4.9	5.9	5.5	4.9			
Scotland	8.5	7.5	7.3	8.5			
Northern Ireland	2.8	3.6	3.6	2.8			
Age in years							
(grouped) by sex							
Males 19-29	9.8	6.5	8.0	9.8			
Males 30-39	8.5	7.9	7.6	8.5			
Males 40-49	9.5	8.1	8.2	9.5			
Males 50-59	7.7	7.8	8.4	7.7			
Males 60-64	3.8	3.4	3.7	3.8			
Males 65-69	2.9	2.8	3.0	2.9			
Males 70+	6.4	6.5	5.7	6.4			
Females 19-29	9.5	8.1	8.2	9.5			
Females 30-39	8.5	11.9	11.8	8.5			
Females 40-49	9.7	9.6	10.6	9.7			
Females 50-59	7.9	10.4	10.3	7.9			
Females 60-64	4.0	4.8	4.3	4.0			
Females 65-69	3.1	3.3	3.1	3.1			
Females 70+	8.8	9.1	6.9	8.8			
Base (unweighted)	47,855,312	1,031	1,031	1,031			

Weighted and unweighted distribution of fully productive children (aged 1.5 to 18 years) completing three or four food diary days							
	Population estimates	Fully producti	ve children				
		Unweighted	Weighted by selection wt	Weighted by wti_chY12			
	%	%	%	%			
Government Office							
Region							
North East	4.0	3.9	3.9	4.0			
North West	11.3	12.1	12.7	11.3			
Yorkshire & the	8.5	8.1	7.6	8.5			
Humber Fast Midlanda	7 1	8.0	0.0	7 1			
East Midlands	7.1 Q 1	0.9	9.0 8.0	7.1 0.1			
	9.1	9.2 8.0	0.5 7 /	9.1			
Last of England	12 3	10.0	10.3	12.3			
South East	12.0	14.3	10.0	12.0			
South West	8.1	77	7.5	81			
	4.8	5.8	5.5	4.8			
Scotland	8.0	8.4	8.5	8.0			
Northern Ireland	3.3	3.6	3.7	3.3			
Age in years							
Males 1 5-3	7.6	10.7	9.1	7.6			
Males 4-6	8.5	8.8	8.2	8.5			
Males 7-10	10.9	10.4	11.4	10.9			
Males 11-14	11.7	11.1	11.6	11.7			
Males 15-18	12.6	10.6	9.7	12.6			
Females 1.5-3	7.2	9.3	7.9	7.2			
Females 4-6	8.1	8.8	9.5	8.1			
Females 7-10	10.4	10.7	12.3	10.4			
Females 11-14	11.1	9.4	10.6	11.1			
Females 15-18	12.0	10.2	9.9	12.0			
Base (unweighted)	12,758,580	1,095	1,095	1,095			

 Table B.9

 Weighted and unweighted distribution of adult participants (aged 19 years and over) to the nurse visit

	Participants completing three or four food diary	Participants t	to nurse visit		
	Weighted by wti_adY12	Unweighted	Weighted by selection wt	Weighted by model NR wt only	Weighted by wtn_adY12
	%	%	%	%	%
Number of people in catering unit					
1	16.7	27.9	16.4	16.9	16.7
2	35.2	31.7	34.1	35.1	35.2
3	21.2	18.7	22.2	21.2	21.2
4	15.1	14.0	17.1	15.3	15.1
5+	11.8	7.7	10.3	11.6	11.8
Work status					
Working (full or part time)	62.6	59.6	63.4	62.3	62.6
Not working	37.4	40.4	36.6	37.7	37.4
Ethnic group					
White	91.2	93.5	93.0	91.3	91.2
Not white	8.8	6.5	7.0	8.7	8.8
Housing tenure					
Own/buying	71.3	70.3	73.2	71.8	71.3
Rent	28.7	29.7	26.8	28.2	28.7
Type of appetite					
Good	66.9	66.7	67.7	67.6	66.9
Average	27.4	26.8	26.6	26.9	27.4
Poor	5.7	6.5	5.7	5.6	5.7
Avoid any foods					
Yes	60.6	61.2	61.5	60.5	60.6
No	39.4	38.8	38.5	39.5	39.4

	Table B.9							
Weighted and unweigh nurse visit	Weighted and unweighted distribution of adult participants (aged 19 years and over) to the nurse visit							
	Participants completing three or four food diary days Weighted by wti adX12	Participants t	to nurse visit Weighted by	Weighted by	Weighted by			
	wii_dd112		Sciection wi	only	wiii_dd112			
	%	%	%	%	%			
Government Office								
North Fast	4.2	4.6	3.8	4.2	4.2			
North West	11.1	11.7	12.3	11.3	11.1			
Yorkshire & the	8.5	7.4	6.7	8.5	8.5			
Humber								
East Midlands	7.2	9.6	9.5	7.3	7.2			
West Midlands	8.7	8.7	8.9	8.7	8.7			
East of England	9.3	7.9	8.3	9.3	9.3			
London	12.5	9.1	10.0	12.1	12.5			
South East	13.6	15.0	15.4	13.7	13.6			
South West	8.6	8.5	8.2	8.6	8.6			
Wales	4.9	5.6	5.4	4.9	4.9			
Scotland	8.5	7.7	7.5	8.6	8.5			
Northern Ireland	2.8	4.1	4.1	2.8	2.8			
Age in years (grouped) by sex								
Males 19-29	9.8	6.5	8.2	9.7	9.8			
Males 30-39	8.5	7.9	7.7	8.6	8.5			
Males 40-49	9.5	7.2	7.0	9.5	9.5			
Males 50-59	7.7	8.6	9.3	7.7	7.7			
Males 60-64	3.8	3.8	4.1	3.8	3.8			
Males 65-69	2.9	2.7	3.2	2.9	2.9			
Males 70+	6.4	6.7	5.8	6.4	6.4			
Females 19-29	9.5	7.4	7.9	9.0	9.5			
Females 30-39	8.5	11.4	11.1	8.8	8.5			
Females 40-49	9.7	9.7	10.5	9.7	9.7			
Females 50-59	7.9	10.8	10.8	8.0	7.9			
Females 60-64	4.0	4.4	3.8	4.0	4.0			
Females 65-69	3.1	3.8	3.7	3.1	3.1			
Females 70+	8.8	9.0	6.8	8.8	8.8			
Base (unweighted)	1,031	780	780	780	780			

	Participants	Participants	to nurse visit		
	completing three or four food diary days				
	Weighted by wti_chY12	Unweighted	Weighted by selection wt	Weighted by model NR wt only	Weighted by wtn_chY12
	%	%	%	%	%
Number of people in catering unit					
1	0.0	0.0	0.0	0.0	0.0
2	4.3	3.6	6.2	4.3	4.3
3	23.6	22.8	32.9	23.6	23.6
4	38.4	40.5	39.5	38.5	38.3
5+	33.8	33.1	21.4	33.6	33.8
Work status of HRP					
Working (full or part- time)	79.5	81.6	83.3	79.7	79.4
Not working	16.7	15.5	14.4	16.7	16.8
Ethnic group					
White	83.8	85.6	86.9	84.0	83.8
Not white	16.2	14.4	13.1	16.0	16.2
Housing tenure					
Own/buying	66.1	66.4	67.4	66.2	66.0
Rent	33.9	33.6	32.6	33.8	34.0
Type of appetite					
Good	65.5	66.0	65.9	65.6	65.5
Average	27.3	26.6	26.7	26.8	27.3
Poor	7.2	7.4	7.4	7.6	7.2
Avoid any foods					
Yes	75.8	75.5	74.2	76.6	75.8
No	24.2	24.5	25.8	23.4	24.2

Table B.10						
Weighted and unweighted distribution of child participants (aged 1.5 to 18 years) to the nurse visit						
	Participants completing three or four food diary days	Participants t	to nurse visit			
	Weighted by wti_chY12	Unweighted	Weighted by selection wt	Weighted by model NR wt only	Weighted by wtn_chY12	
	%	%	%	%	%	
Government Office						
Region						
North East	4.0	4.6	4.5	4.1	4.0	
North West	11.3	12.4	12.1	11.3	11.3	
Yorkshire & the Humber	8.5	7.2	7.4	8.5	8.5	
East Midlands	7.1	8.7	8.7	7.2	7.1	
West Midlands	9.1	8.8	8.8	9.2	9.1	
East of England	9.4	6.4	7.2	9.3	9.4	
London	12.3	10.1	9.9	12.1	12.3	
South East	13.9	16.4	15.8	13.9	13.9	
South West	8.1	8.0	8.2	8.2	8.1	
Wales	4.8	5.4	5.7	4.9	4.8	
Scotland	8.0	8.6	8.5	8.0	8.0	
Northern Ireland	3.3	3.4	3.2	3.3	3.3	
Age in years (grouped) by sex	7.0		10 5		- 0	
Males 1.5-3	7.6	8.7	10.5	7.5	7.6	
Males 4-6	8.5	7.8	8.2	8.4	8.5	
Males 7-10	10.9	11.3	10.1	10.9	10.9	
Males 11-14	11.7	11.2	10.7	11.6	11.7	
Males 15-18	12.7	9.8	10.6	12.6	12.6	
Females 1.5-3	7.2	7.5	9.1	7.1	7.2	
Females 4-6	8.1	10.0	9.1	8.1	8.1	
Females 7-10	10.4	13.2	11.8	10.5	10.4	
Females 11-14	11.1	10.4	9.7	11.3	11.1	
Females 15-18	11.9	10.0	10.1	11.9	12.0	
Base (unweighted)	1,095	838	838	838	838	

Table B.11					
Weighted and unweighted distribution of participants aged 16 years and over (for smoking behaviour and alcohol use weights)					
	Population	Participants completing three or four food			
	estimates	Unweighted	Weighted by selection wt	Weighted by wti_adY1216	
	%	%	<u>%</u>	<u></u> %	
Government Office	70	70	70	70	
Region					
North East	4.2	3.8	3.3	4.2	
North West	11.1	11.3	11.9	11.1	
Yorks & Humber	8.5	8.0	7.6	8.5	
East Midlands	7.2	9.0	8.8	7.2	
West Midlands	8.7	10.0	9.8	8.7	
East of England	9.3	8.5	9.1	9.3	
London	12.4	9.1	9.8	12.4	
South East	13.6	14.2	14.2	13.6	
South West	8.6	8.9	8.9	8.6	
Wales	4.9	5.8	5.4	4.9	
Scotland	8.5	7.7	7.6	8.5	
Northern Ireland	2.8	3.7	3.8	2.8	
Age in years (grouped) by sex					
Males 16-18	2.4	3.3	2.5	2.4	
Males 19-24	5.2	3.2	4.8	5.2	
Males 25-39	12.3	10.3	10.2	12.3	
Males 40-49	9.0	7.6	7.8	9.0	
Males 50-59	7.3	7.3	8.0	7.3	
Males 60-64	3.6	3.2	3.6	3.6	
Males 65-69	2.7	2.7	2.9	2.7	
Males 70+	6.1	6.1	5.4	6.1	
Females 16-18	2.3	2.5	2.2	2.3	
Females 19-24	4.9	4.4	4.7	4.9	
Females 25-39	12.2	14.4	14.3	12.2	
Females 40-49	9.2	9.0	10.1	9.2	
Females 50-59	7.6	9.8	9.9	7.6	
Females 60-64	3.8	4.5	4.1	3.8	
Females 65-69	2.9	3.1	3.0	2.9	
Females 70+	8.4	8.6	6.6	8.4	
Base (unweighted)	50,242,909	1,094	1.094	1.094	

Table B.12						
Non-response blood mode		its (aged 1	9 years and	a over) 🗥	Cia.	Evm(B)
Number of people in	В	3.E.	3 317		506	Ехр(В)
catering unit			0.017	-	.000	
1					baseline	
2	056	.291	.036	1	.849	.946
3	121	.326	.137	1	.711	.886
	.130	.367	.124	1	.724	1.138
5+	482	.370	1.696	1	.193	.618
Ethnic group			1.261	1	.261	
White					baseline	
Not white	.396	.353	1.261	1	.261	1.486
Housing tenure			.488	1	.485	
Own/buving					baseline	
Rent	156	.223	.488	1	.485	.856
Ron						
Work status			1.341	1	.247	
Working (full or part time)					baseline	
Not working	288	.249	1.341	1	.247	.750
- · · · · · · · · · · · · · · · · · · ·		-	-			
Age in years (grouped) by			25.943	13	.017	
sex						
Males 19-29					baseline	
Males 30-39	.723	.423	2.916	1	.088	2.060
Males 40-49	142	.391	.132	1	.717	.868
Males 50-59	.774	.432	3.218	1	.073	2.169
Males 60-64	.998	.561	3.161	1	.075	2.713
Males 65-69	.549	.588	.871	1	.351	1.731
Males 70+	1.329	.562	5.602	1	.018	3.778
Females 19-29	.051	.378	.018	1	.893	1.052
Females 30-39	.838	.427	3.838	1	.050	2.311
Females 40-49	1.029	.421	5.977	1	.014	2.799
Females 50-59	.369	.413	.799	1	.371	1.447
Females 60-64	2.601	.871	8.907	1	.003	13.475
Females 65-69	.470	.594	.626	1	.429	1.600
Females 70+	1.058	.491	4.643	1	.031	2.881
Government Office			18.391	11	.073	
Region						
North East					baseline	
North West	903	.551	2.688	1	.101	.405
Yorkshire & the Humber	.276	.599	.213	1	.645	1.318
East Midlands	515	.580	.790	1	.374	.597
West Midlands	162	.584	.077	1	.781	.850
East of England	827	.566	2.133	1	.144	.437
London	193	.564	.117	1	.732	.824
South East	128	.551	.054	1	.817	.880
South West	.189	.590	.102	1	.749	1.208
Wales	029	.634	.002	1	.963	.971
Scotland	.277	.598	.215	1	.643	1.319
Northern Ireland	074	.705	.011	1	.916	.929

Table B.12						
Non-response blood model for adults (aged 19 years and over) ^{1,2,3,4,5}						
	В	S.E.	Wald	df	Sig.	Exp(B)
General health (self-assessed)			1.245	1	.264	
Good					baseline	
Fair/poor	273	.245	1.245	1	.264	.761
Weight measured			8.816	1	.003 baseline	
No	-1.52	.512	8.816	1	.003	.219
Constant	.918	.625	2.159	1	.142	2.504

¹ The response is 1 = individual aged 19+ years gave blood, 0 = non response ² Only variables that are significant at the 0.05 level are included in the model ³ The model R² is 0.089 (Cox and Snell) ⁴ **B** is the estimate coefficient with standard error **S.E.** ⁵ The **Wald**-test measures the impact of the categorical variable on the model with the appropriate number of degrees of freedom df. If the test is significant (sig. < 0.05) then the categorical variable is considered to be 'significantly associated' with the response variable and therefore included in the model

Table B.13						
Non-response blood model for children (aged 1.5 to 18 years) ^{1,2,3,4,5}						
	В	S.E.	Wald	df	Sig.	Exp(B)
Age in years (grouped) by			25.943	13	.017	
sex						
Males 1.5-3					baseline	
Males 4-6	.284	.435	.426	1	.514	1.328
Males 7-10	.727	.408	3.182	1	.074	2.070
Males 11-14	1.229	.405	9.197	1	.002	3.417
Males 15-18	2.162	.406	28.305	1	.000	8.687
Females 1.5-3	172	.491	.123	1	.726	.842
Females 4-6	.069	.452	.024	1	.878	1.072
Females 7-10	.771	.412	3.510	1	.061	2.163
Females 11-14	1.332	.404	10.847	1	.001	3.789
Females 15-18	1.539	.405	14.464	1	.000	4.662
Government Office			27.222	11	.004	
Region						
North East					baseline	
North West	.299	.461	.420	1	.517	1.348
Yorkshire & the Humber	.401	.486	.680	1	.410	1.493
East Midlands	.262	.499	.276	1	.599	1.300
West Midlands	.155	.471	.108	1	.743	1.167
East of England	.296	.470	.397	1	.529	1.345
London	1.241	.458	7.360	1	.007	3.460
South East	.452	.449	1.017	1	.313	1.572
South West	.901	.492	3.360	1	.067	2.463
Wales	.969	.551	3.089	1	.079	2.635
Scotland	1.252	.484	6.695	1	.010	3.496
Northern Ireland	174	.587	.088	1	.767	.840
Constant	-1.70	.506	11.224	1	.001	.184

¹ The response is 1 = individual aged 19+ years responded to the nurse visit, 0 = non response ² Only variables that are significant at the 0.05 level are included in the model ³ The model R^2 is 0.130 (Cox and Snell) ⁴ **B** is the estimate coefficient with standard error **S.E.**

⁵ The Wald-test measures the impact of the categorical variable on the model with the appropriate number of degrees of freedom df. If the test is significant (sig. < 0.05) then the categorical variable is considered to be 'significantly associated' with the response variable and therefore included in the model

Table B.14				
Weighted distributions of adult participants (a sample	aged 19 years and over)	providing a blood		
	Eligible respondents at the nurse visit Weighted by wtn_adY12	Participants giving a blood sample Weighted by wtb_adY12		
	%	%		
Number of people in catering unit				
1	16.4	16.5		
2	35.4	35.0		
3	22.0	22.3		
4+	26.2	26.2		
Work status				
Working (full or part time)	63.6	63.8		
Not working	36.4	36.2		
Ethnic group				
White	90.9	90.8		
Not white	9.1	9.2		
Housing tenure				
Own/buying	73.7	73.8		
Rent	26.3	26.2		
Type of appetite				
Good	68.1	68.4		
Average	26.5	26.7		
Poor	5.4	4.8		
Avoid any foods				
Yes	60.4	62.5		
NO	39.6	37.5		
Government Office Pagion				
North Fast	0.7	0.7		
North East	3./	3.7		
North West	10.2	9.8		
ForkShire & the Humber	8.8	8.9		
East Midlands	7.3	7.5		
Vest Midlands	8.5	8.6		
	8.8	8.7		
South East	13.4	13.7		
South West	13.6	13.7		
Wales	9.0	9.0		
Sectland	4.8	4.0		
Northorn Iroland	0.0	0.9		
	3.1	3.0		

Table	Table B.14			
Weighted distributions of adult participants (a	ged 19 years and over)	providing a blood		
sample				
	Eligible respondents	Participants giving		
	at the nurse visit	a blood sample		
	Weighted by	Weighted by		
	wtn_adY12	wtb_adY12		
	%	%		
Age in years (grouped) by sex				
Males 19-29	9.4	9.1		
Males 30-39	8.3	8.4		
Males 40-49	9.0	9.2		
Males 50-59	7.8	8.0		
Males 60-64	4.0	4.0		
Males 65-69	3.0	2.9		
Males 70+	5.9	6.0		
Females 19-29	9.2	9.2		
Females 30-39	8.8	8.8		
Females 40-49	9.8	9.8		
Females 50-59	8.4	8.3		
Females 60-64	4.3	4.3		
Females 65-69	3.1	3.2		
Females 70+	9.0	8.8		
Constal health (aslf assessed)				
Very good	00.0	25.0		
Good	36.3	35.9		
Fair	45.5	45.7		
Poor	14.8	14.4		
Venupeer	3.1	3.3		
	0.4	0.6		
Marital status				
Married	52.9	50 F		
Cobabiting	JZ.0 15.2	52.5 15.7		
Single	10.0	10.7		
Widowed	17.0	10.9		
Divorced	0.4	0.0 7.0		
Senarated	0.0	7.0		
Jeparateu	1.0	1.9		
Any qualifications				
Yes	77 1	77 0		
No	22.0	77.9 22.1		
	22.9	22.1		
Cigarette smoking status				
Current cigarette smoker	10.7	20.0		
Ex-regular cigarette smoker	19.7 22 F	20.0		
Never regular cigarette smoker	20.0 56 Q	22.1 57 Q		
	50.0	51.9		

Table B.14				
Weighted distributions of adult participants (aged 19 years and over) providing a blood sample				
	Eligible respondents at the nurse visit	Participants giving a blood sample		
	Weighted by	Weighted by		
	wtn_adY12	wtb_adY12		
	%	%		
Frequency drank any alcohol in last 12				
months				
Almost every day	11.8	11.3		
Five or six days a week	3.8	4.5		
Three or four days a week	15.3	16.5		
Once or twice a week	34.8	33.4		
Once or twice a month	14.0	13.5		
Once every couple of months	9.3	8.5		
Once or twice a year	10.2	11.7		
Not at all in the last 12 months	0.8	0.5		
Base (unweighted)	693	511		

Table B.15			
Weighted distributions of child participants (a sample	aged 1.5 to 18 years) prov	/iding a blood	
	Eligible respondents at the nurse visit Weighted by wtn_chY12	Participants giving a blood sample Weighted by wtb_chY12	
	%	%	
Number of people in catering unit			
2	4.3	5.3	
3	23.1	21.9	
4	38.5	39.0	
5+	34.1	33.8	
Work status of HRP			
Never worked	3.6	3.9	
Currently working (full or part time)	80.7	78.9	
Previously worked, not now	15.7	17.2	
Ethnia group			
White	83.7	8/1	
Not white	16.3	15.9	
	10.0	10.0	
Housing tenure			
Own/buying	66.9	69.6	
Rent	33.1	30.4	
Type of appetite			
Good	64.8	65.0	
Average	28.0	25.5	
Poor	7.2	87	
	1.2	0.1	
Avoid any foods			
Yes	75.7	74.7	
No	24.3	25.3	
Government Office Region			
North East	4.4	4.2	
North West	11.5	10.9	
Yorkshire & the Humber	7.8	7.0	
East Midlands	7.0	6.9	
West Midlands	9.9	10.1	
East of England	9.7	10.1	
London	12.0	12.7	
South East	13.8	14.8	
South West	7.5	7.8	
vvales	4.2	4.1	
Scolland	8.5	8.7	
Normern Ireland	3.7	2.7	

Table B.15				
Weighted distributions of child participants (a sample	Weighted distributions of child participants (aged 1.5 to 18 years) providing a blood sample			
	Eligible respondents at the nurse visit Weighted by wtn_chY12	Participants giving a blood sample Weighted by wtb_chY12		
	%	%		
Age in years (grouped) by sex				
Males 1.5-3	7.0	7.0		
Males 4-6	8.5	8.6		
Males 7-10	10.9	10.4		
Males 11-14	11.4	11.3		
Males 15-18	13.9	14.5		
Females 1.5-3	6.6	5.9		
Females 4-6	8.1	7.2		
Females 7-10	10.4	11.3		
Females 11-14	11.6	12.2		
Females 15-18	11.6	11.6		
General health (self-assessed)				
Very good	60.9	60.1		
Good	32.7	33.0		
Fair	5.2	5.2		
Poor	0.8	1.0		
very poor	0.4	0.7		
Base (unweighted)	718	300		