Weighting

Overview of weighting

The same weighting approach was taken in Wave 4 as in Waves 1, 2 and 3. Weights were initially calculated separately for each country in two stages:

1. Calculation of selection weights (described in the section on selection weights)
2. Calibration of selection weights to country population totals (described in section on population weights)

Next, weights were created for use in analyses of combined-country data by scaling the weighted country sample sizes to be proportional to the corresponding country population values (for adults aged 16 and over).

Because it was not possible to include all questions in the postal questionnaires (see the section called 'Questionnaire development and cognitive testing'), four separate question-type weights were calculated in each country, and in the combined all-country sample.

These four question-type weights were designed to be used as follows:

1. All-questionnaire weights to be used for questions asked of all sample members in all online and postal questionnaires
2. Online questionnaire weights to be used for questions asked only of online participants (i.e., questions not asked in the postal questionnaires)
3. Online questionnaire plus Eating Out (EO) postal questionnaire weights to be used for questions asked only of online participants and postal questionnaire respondents receiving only the EO version (i.e., questions not asked in the EH postal questionnaires)
4. Online questionnaire plus Eating at Home (EH) postal questionnaire weights to be used for questions asked only of online participants and postal questionnaire respondents receiving only the EH version (i.e., questions not asked in the EO postal questionnaires)

Four additional weights (one for each of these question types) were calculated for the combined all-country sample. Once the main weights were calculated as described above, supplementary 'Wales & Welsh-England' weights were calculated. These were designed to allow comparisons to be made between Wales and England (excluding London) after controlling for country profile differences in age within gender, ethnic group, number of adults per household, and urban-rural mix.

Calculation of selection of weights

Selection weights were created to compensate for (i) variations in within-household individual selection probabilities and response propensities and (ii) the fact that, by design, some questions were not included in all questionnaires. As a maximum of two eligible adults were interviewed per household, adults in larger households are less likely to be included in the survey. So without this weight, individuals living in households in which some eligible adults were not interviewed would be underrepresented relative to individuals living in households in which all eligible adults were interviewed. They were calculated in the following stages:

1. The all-questionnaire selection weight was calculated as: (number of eligible people aged 16 years or over in the household)/(number of participants in the household).
2. The online questionnaire selection weight was calculated as: (number of eligible people aged 16 years or over in the household)/(number of online participants in the household).
3. Next the Online questionnaire plus EO questionnaire weight and the online questionnaire plus EH questionnaire weight were calculated by doubling the value of the all-questionnaire selection weight for postal respondents relative to the corresponding value for online respondents (because the relevant questions were only asked in half the postal questionnaires).

Values were capped to the range 1-3 for the all-questionnaire and online selection weights, and to the range 1-6 for the online questionnaire plus EO questionnaire and online questionnaire plus EH questionnaire weights to restrict variance inflation.

Calibration to population values

Next, selection weights were applied to the three individual country samples and each was calibrated to the corresponding country population values for the number of adults aged 16 or over by:

(i)   age band within gender
(ii)   geographic area (defined separately for each country)
(iii)   deprivation quintile (calculated using each country's multiple deprivation index).

These weighting variables are often used as standard in social surveys because they correlate reliably with both response propensity and a wide range of survey variables. We note that in some previous rounds of the face-to-face Food and You survey, working status was used as a weighting variable instead of deprivation quintile. In Waves 1 to 4 of Food and You 2 it was decided not to use this variable for weighting the sample because survey fieldwork took place during the Covid-19 pandemic, during which rates of employment were likely to be unstable. Deprivation quintile was used as a substitute indicator of general economic prosperity. Weighting targets are shown in the next section, taken from ONS Mid 2020 Population Estimates and NISRA Mid 2020 Population Estimates.

Table 7: Population totals for age within gender in England

Age band	Males	Females
16-24	3,066,029	2,884,608
25-29	1,924,416	1,847,077
30-34	1,916,412	1,908,240
35-39	1,852,969	1,885,240
40-44	1,730,268	1,746,035

Age band	Males	Females
45-49	1,803,208	1,835,431
50-54	1,911,318	1,964,033
55-59	1,852,593	1,909,189
60-64	1,568,489	1,628,324
65-69	1,347,714	1,436,586
70+	2,278,001	2,546,119
All	1,165,748	1,689,851

Table 8: Population totals for age within gender in Wales

Age band	Males	Females
16-24	180,657	164,947
25-29	106,877	101,237
30-34	98,579	98,093
35-39	91,729	94,144
40-44	85,290	87,640
45-49	93,969	98,496
50-54	105,438	111,532
55-59	108,081	114,141
60-64	95,915	101,501

Age band	Males	Females
65-69	87,314	92,641
70+	149,473	163,436
All	71,981	103,745

Table 9: Population totals for age within gender in Northern Ireland

Age band	Males	Females
16-24	104,333	96,676
25-29	60,377	59,442
30-34	62,883	63,699
35-39	60,758	63,594
40-44	56,927	61,017
45-49	59,844	63,095
50-54	63,786	66,797
55-59	62,595	64,908
60-64	53,421	55,599
65-69	44,862	45,831
70+	68,762	77,834
All	32,527	50,133

Table 10: Population totals for regions in England

England region code	England region name	Population total
E12000001	North East	2,203,353
E12000002	North West	5,957,266
E12000003	Yorkshire and the Humber	4,474,428
E12000004	East Midlands	3,963,265
E12000005	West Midlands	4,791,343
E12000006	East of England	5,051,203
E12000007	London	7,149,281
E12000008	South East	7,442,850
E12000009	South West	4,664,909
Total	-	45,697,898

Table 11: Population totals for regions in Wales

Wales Region	Population total
North	579,711
Mid	174,082
South West	586,562
South East	1,266,501
Total	2,606,856

Table 12: Population totals for regions in Northern Ireland

Northern Ireland (local government district code)	Northern Ireland (Local government district name)	Population total
N09000001	Antrim and Newtonabbey	113,924
N090000011	Ards and North Down	132,057
N09000002	Armagh City, Banbridge and Craigavon	168,360
N09000003	Belfast	274,369
N09000004	Causeway Coast and Glens	116,337
N09000005	Derry City and Strabane	118,371
N09000006	Fermanagh and Omagh	91,929
N09000007	Lisburn and Castlereagh	116,887
N09000008	Mid and East Antrim	112,616
N09000009	Mid Ulster	114,153
N090000010	Newry, Mourne and Down	140,697
Total	-	1,499,700

Table 13: Population totals for deprivation quintiles in England

England_Quintiles	16+_Pop_2020
1	9,138,329
2	9,140,152
3	9,139,700

England_Quintiles	16+_Pop_2020
4	9,139,337
5	9,140,380
Total	45,697,898

Table 14: Population totals for deprivation quintiles in Wales

England_Quintiles	16+_Pop_2020
1	521,330
2	520,803
3	521,290
4	522,008
5	521,425
Total	2,606,856

Table 15: Population totals for deprivation quintiles in Northern Ireland

England_Quintiles	16+_Pop_2020
1	299,268
2	300,459
3	299,450
4	300,395

England_Quintiles	16+_Pop_2020
5	300,128
Total	1,499,700

Initial calibration was carried out separately in each country for each of the four questionnaire type weights described above. For each questionnaire type weight, calibration adjustment factors were calculated by dividing the individual country weights by the selection weights. These adjustment factors were then capped at the 99th percentile value to limit variance inflation and applied to selection weight to produce final individual country weights.

After calibration and adjustment factor capping, the individual country level weights were scaled to equalise unweighted and weighted sample sizes in each country.

The aim of these within-country calibration procedures was to match the profile of the weighted sample to that of the population aged 16 or over on gender, age band, geographic region, and deprivation quintile. In practice, there will be slight discrepancies between weighted sample totals and population figures as a result of the adjustment factor caps.

Creation of all-country weight

An all-country version of each questionnaire type weight was then constructed by combining the individual country samples and rescaling final individual country weights so that weighted sample country proportions matched the respective country population (aged 16 years or over) proportions.

Wales and Welsh England standardisation weight

This weight was designed to calibrate English sample estimates to Welsh population characteristics for comparative purposes. It was calculated from the England sample as follows:

1. London cases were dropped (London being in many ways unique in the UK)
2. The non-London England sample proportions were calibrated to the weighted Wales sample proportions for four variables: number of adults in the household, ethnic group, urban-rural and age by gender. These four variables were selected when the 'Wales & Welsh-England' weights were first constructed in Wave 1. Weighted estimates for Wales and non-London England were compared across a range of candidate variables and statistically significant differences were found for urban-rural, ethnic group, household size and age within gender.

The final weighing variables were defined as follows:

Age within gender (male and female)

Males	Females

16-24	16-24
25-29	25-29
30-34	30-34
35-39	35-39
40-44	40-44
45-49	45-49
50-54	50-54
55-59	55-59
60-64	60-64
65-69	65-69
70+	70+

Number of adults in household

- 1 adult
- 2 adults
- 3+ adults
- Question not answered

Ethnic group

- White
- Asian
- Black
- Mixed
- Other/not answered

Urban-rural

Urban: OA falls into a built-up area with a population of 10,000 or more
Rural: All other OAs

'Wales & Welsh-England' weights were calculated only for respondents in England outside London and in Wales (where they were the same as the individual country weight for Wales).

Table 16: Summary of list of weights and when to use each one

Weight	When to be used
wt1	Estimates for all-countries: questions asked of all s
wt2	Estimates for all-countries: questions asked only o
wt3	Estimates for all-countries: questions asked of all s completing the EO version of the postal questionna
wt4	Estimates for all-countries: questions asked of all s completing the EH version of the postal questionna
wt5	Individual country estimates for England, Wales ar the online and postal questionnaire
wt6	Individual country estimates for England, Wales ar asked in postal questionnaire)
wt7	Individual country estimates for England, Wales ar the online questionnaires and those completing the
wt8	Individual country estimates for England, Wales ar the online questionnaires and those completing the
wt9	'Wales and Welsh-England' estimates: questions a 'Wales and Welsh-England' estimates: questions a
wt10	'Wales and Welsh-England' estimates: questions a those completing the EO version of the postal que
wt12	'Wales and Welsh-England' estimates: questions a those completing the EH version of the postal ques