

UK Biobank

24-hour dietary recall questionnaire

Version 1.1

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This manual details the procedure for the 24-hour dietary recall questionnaire, administered at an Assessment Centre of the UK Biobank and via the internet.

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1 Introduction

1.1: This manual details the procedure for the 24-hour dietary questionnaire. This was administered at the last (8th) 'station' of the Assessment Centre visit, as listed in Table 1. The questionnaire was also e-mailed to all participants with a known working email address (~320,000 participants), who were asked to complete the questionnaire on four separate occasions over an approximate annual period (Feb 2011 - April 2012). The 24-hour dietary questionnaire was not administered at the repeat assessment of participants (during 2012-2013).

Table 1: Sequence of assessment visit

	Visit station	Assessments undertaken
1	Reception	<ul style="list-style-type: none"> • Welcome & registration • Generating a USB key for Participants
2	Touch screen Section	<ul style="list-style-type: none"> • Consent • Touch screen questionnaire • Hearing Test • Cognitive function tests
3	Interview & blood pressure	<ul style="list-style-type: none"> • Interviewer questionnaire • Blood pressure measurement • Measurement of arterial stiffness
4	Eye measurements	<ul style="list-style-type: none"> • Visual acuity • Refractometry • Intraocular pressure • Optical Coherence Tomography
5	Physical measurements	<ul style="list-style-type: none"> • Height (Standing and Sitting) • Hip & Waist measurement • Weight and Bio-impedance measurement • Hand-grip strength • Ultrasound Bone Densitometry • Spirometry (Lung function test)
6	Cardio-respiratory fitness test	<ul style="list-style-type: none"> • Exercise/fitness ECG test
7	Sample collection & exit	<ul style="list-style-type: none"> • Blood samples collected • Urine sample collected • Saliva sample collected
8	Web-based diet questionnaire	<ul style="list-style-type: none"> • Dietary assessment

1.2: Throughout this document, the term 'Participant' refers to a study participant who is taking part in the Assessment Centre process, regardless of whether they eventually give or withhold consent to take part in the UK Biobank study.

1.3: The collection of data from assessment visits uses the direct data entry system of the Assessment Centre Environment (ACE).

1.4: At the start of their visit, each participant is issued with a USB key at the Reception station. This contains Participant ID, name, date of birth and gender. As the participant progresses between stations the USB key acts as an identifying token. The USB key is encrypted so can only be read by assessment centre computers. None of the participant's test data is transferred to the USB key. At the end of the assessment visit all identifying data on the USB key is removed

2 Staff

All procedures are performed by the Receptionist or any staff member who has received suitable training and has been granted the relevant module permissions. These staff can include: Study Interviewer, Duty Manager, Phlebotomist, Laboratory Technician or Measurement Technician. Two members of staff are always present to oversee the touch screen and web-based diet questionnaire areas. The Assessment Centre Manager oversees that all staff work in accordance with this procedure.

3 Web-based dietary questionnaire: design considerations

3.1: During the touchscreen section (station 2) of the Assessment visit, participants completed a relatively short set of questions about the frequency of commonly consumed foods. The questions were designed to classify participants according to commonly eaten food groups and were based on the expected distribution in the British population. As this approach does not allow assessment of total energy intake or some other specific nutrients, it is supplemented by the administration of repeated 24-hour dietary recall questionnaires. This was first introduced as part of the Assessment visit towards the end of recruitment, and was also completed remotely via the internet for those participants who have provided UK Biobank with e-mail addresses. Participants were invited on four separate occasions over one year to complete the questionnaire in order to account for seasonal variation in dietary intake and to provide an average measure for each individual (i.e. as a marker of habitual intake).

3.2: The questionnaire, suitable for internet use, was developed and the relative validity in relation to an interviewer-administered 24-hour recall was assessed by the Cancer Epidemiology Unit in Oxford for UK Biobank. More details can be found elsewhere (Liu et al, 2011). It is based on a set of detailed questions on the intake of foods and beverages consumed during the previous 24-hour period. It takes 10-15 minutes to complete and automatically generates the energy and nutrient values of the reported food items. The information provided from this web-based questionnaire is comparable to a traditional interviewer-administered 24-hour dietary recall on the types and quantities of foods and beverages consumed and the daily nutrient intakes.

3.3: The questionnaire contained questions on the consumption of about 200 commonly consumed foods and drinks (see section 5.9) as well as a section on whether meals were consumed outside the home. There were also some questions at the end of the questionnaire that asked about physical activity.

3.4: Most often, individuals were presented with a main yes/no question on the screen (e.g. did you eat any bread or crackers yesterday?). The online questionnaire was developed to take advantage of computer technology in such a way that a positive answer would result in the screen expanding to reveal an additional set of questions. Participants were then required to select the amount of each food consumed during the previous day using standard categories to indicate the amount consumed (e.g. four slices of bread during the day). For foods without a standard measure (e.g. cheese, rice), a portion size was specified as a 'serving' and a description of that particular serving size could be found in the help section of the questionnaire. If participants' serving of the food item is twice the specified amount, they are asked to double it.

3.4: So that the replies could be coded automatically to provide estimated daily nutrient intake, open-ended questions were avoided, although some free text boxes were available for use when the options listed did not cover a particular food item.

4 Method of assessment

4.1: The questionnaire was first introduced as part of the Assessment visit towards the end of recruitment for the last 70,000 participants. Participants who had provided UK Biobank with e-mail addresses were also invited, via e-mail, to complete the questionnaire online on four separate occasions between Feb 2011 and April 2012.

1st e-mail invitations: Feb 2011 - April 2011

2nd email invitations: June 2011 - Aug 2011

3rd email invitations: Oct 2011 – Dec 2011

4th email invitations: April 2012 – June 2012

4.2: The e-mail invitations were issued on specific days of the week in order to capture variations in intake between week days and week-end days. For the first and second round of e-mail invitations, participants were allowed 3 days to complete the questionnaire, after which time the link had expired; this was extended to 14 days for the third and fourth round of e-mail invitations.

5 Content of the 24-hour recall questionnaire

5.1: Participants were asked to report what food and drinks they had consumed yesterday (i.e. during the preceding 24 hours), by completing questions about the frequency of intake of about 200 commonly consumed foods and drinks. Participants were informed at the start approximately how long it would take to complete and were encouraged to try and complete it even if their food and drink consumption the previous day was not typical of their usual consumption. A demonstration version of the 24-hour recall questionnaire can be found at the following website: <https://questionnaires.ceu.ox.ac.uk/diet/show/index.html>



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Questions on Diet

Thank you for agreeing to answer these questions about your diet.

It will take about 10-15 minutes to complete.

We are asking what you ate and drank **yesterday**. By yesterday, we mean the time period from Thursday 20 September 00:00 (12:00am) to 23:59 (11:59pm). Yesterday may not have been a typical day for you. That does not matter.

We recommend reading the [Brief User Guide](#) below before proceeding. Please click the button found at the end of the guide when you are ready to begin.

Thank you for taking the time and trouble to answer these questions.

Professor Rory Collins
UK Biobank Principal Investigator



What did you have to eat yesterday?

Are you happy with the size of the lettering?

If you would like to change it, please click on the choices below before proceeding:

5.2: Participants were encouraged to read the brief user guide and, where the foods may not match the items listed exactly, to try and choose a food or a combination of foods that most closely resembles what they had; and to not duplicate food items.

Brief User Guide

You may find it helpful to spend a couple of minutes thinking about what you ate and drank yesterday before you start.

The foods you ate may not match the items on our list exactly. Please choose a food or a combination of foods that most closely resembles what you had. Sometimes an *Other* option is available but we would prefer you to pick something else where possible.

Please don't record the same food item more than once. For example, if you had one jaffa cake, please do not record it as one chocolate covered biscuit and then again as one slice of cake as this would seem like you had two jaffa cakes instead of one.

It is not essential to answer *No/None* to all the foods you didn't eat within a particular group of foods. Only key questions need answering and if they are overlooked, a pop-up box will appear to alert you.

Additional help with a question will be revealed by clicking on the *Show Help* link to the right of the question.

Click [here](#) if you would like to read more or press the *Proceed* button to begin.

Proceed

A [Small](#)

A [Medium](#)

A [Large](#)

A [Even larger](#)

5.3: Participants were asked to answer all of the main yes/no questions, and were given instructions on how to select items. For example, if a participants wanted to select 1 bowl of porridge, they could either answer every question by selecting '1' for porridge and 'None' for the all the other cereals, or by only answering the porridge item. As a result, not every question within a grid needs to be answered.

Answering Questions

To ensure nothing is accidentally overlooked, we ask that you answer all of the main No/Yes questions (these questions appear in their own shaded box such as the 'Please give this question a go' box above).

However, we do not expect you to select 'None' or 'No' for every item in grids with lots of options (such as the cereal selection above).

For example, if you had eaten 1 bowl of porridge, you could either:

- answer every question by selecting 'None' for the cereals you didn't eat and '1' for porridge, or
- only answer the porridge item.

Some people prefer to answer every item as they go, others prefer to only select the options that apply to them. It is up to you how you would like to answer.

Rest assured, if you miss a required question then you will be alerted by a pop-up box.

Since we are asking about foods rather than meals, some dishes will need to be recorded in parts. E.g. spaghetti bolognaise would need to be saved as pasta, beef, tomato-based sauce (plus mushrooms or vegetable pieces if there were vegetables present).

5.4: If a participant chose to move onto the next page without answering a required question (usually the main question at the top of each page), then they were alerted by a pop-up box and could only progress onto the next page once it was completed.



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Did you eat any bread or crackers yesterday? No Yes [Show Help](#)

E.g. toast, sandwiches, rice cakes, bread rolls, hotdog roll, crumpets, tortilla wraps.

[Back](#) [Next](#)

Message from webpage

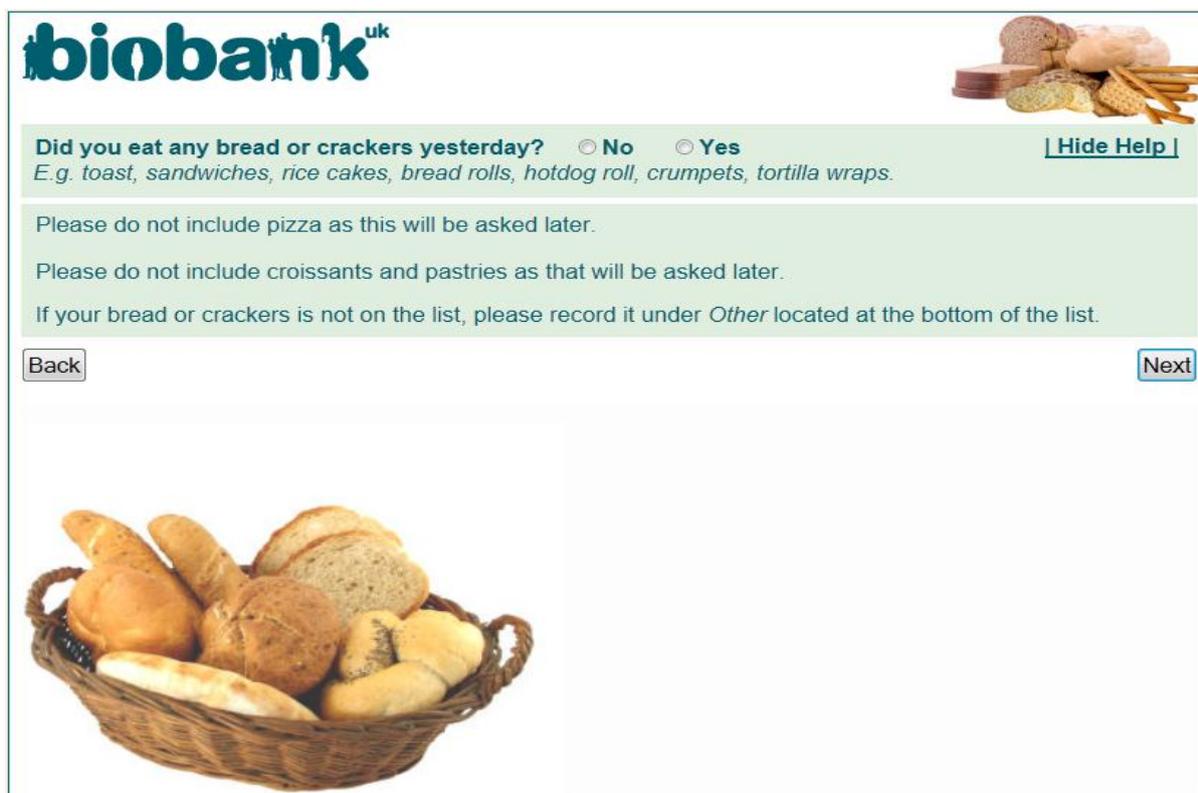
 Please answer the question:
'Did you eat any bread or crackers yesterday?'

OK



5.5: For composite dishes (i.e. dishes that are made up of more than one food item), participants were most often required to record the ingredients individually. For example, spaghetti bolognese would need to be entered as pasta, beef, tomato-based sauce (plus mushrooms or vegetables, etc.).

5.6: Additional help with answering a question was available by clicking on the 'Show Help' link to the right of the question. Clicking the link again concealed it.



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Did you eat any bread or crackers yesterday? No Yes [Hide Help](#)

E.g. toast, sandwiches, rice cakes, bread rolls, hotdog roll, crumpets, tortilla wraps.

Please do not include pizza as this will be asked later.

Please do not include croissants and pastries as that will be asked later.

If your bread or crackers is not on the list, please record it under *Other* located at the bottom of the list.

[Back](#) [Next](#)



5.7: At the bottom of the page a series of boxes was used to reflect progress through the questionnaire.

Progress

At the bottom of the page there will be a series of boxes reflecting your progress through the questionnaire, such as:



Each box represents a page in the questionnaire. Solid boxes (■) show pages that you have seen and outline boxes (□) represent later pages.

5.8: The first questions asked about typical serving size; whether what they ate and drank yesterday was typical, and if not, the reason; and whether they routinely followed a special diet, and if so, what kind of diet.

Compared to other people:			Show Help
	Smaller	Average	Larger
How would you describe your serving size?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<p>Would you say that what you ate and drank yesterday was fairly typical for you? <input checked="" type="radio"/> No <input type="radio"/> Yes <i>N.B. Your questionnaire answers are just as important to us if your day was not typical.</i></p>			
Reason for not eating or drinking normally		No	Yes
Were you ill?		<input type="radio"/>	<input type="radio"/>
Were you fasting?		<input type="radio"/>	<input type="radio"/>
Were you away from home or your place of work?		<input type="radio"/>	<input type="radio"/>
Other reasons		<input type="radio"/>	<input type="radio"/>
Do you routinely follow a special diet?			Show Help
Diet	No	Yes	
Gluten free or wheat free diet	<input type="radio"/>	<input type="radio"/>	
Diet for lactose intolerance	<input type="radio"/>	<input type="radio"/>	
Low calorie / weight controlled diet	<input type="radio"/>	<input type="radio"/>	
Vegetarian diet (no meat, no poultry and no fish)	<input type="radio"/>	<input type="radio"/>	
Vegan diet	<input type="radio"/>	<input type="radio"/>	
Other special diet	<input type="radio"/>	<input type="radio"/>	
			<input type="button" value="Next"/>

5.9: The questions were grouped into the following broad categories:

1. Typical diet
2. Hot and cold beverages
3. Alcoholic beverages
4. Cereal
5. Milk, eggs, and cheese
6. Bread, pasta, and rice
7. Soups, snacks, and pastries
8. Meat and fish
9. Vegetarian alternatives
10. Spreads, sauces, and cooking oils
11. Fruit and vegetables
12. Meal type
13. Vitamin and mineral supplements
14. Physical activity

5.10: The question at the end of the questionnaire which asked about the use of vitamin and mineral supplements was not incorporated into the daily nutrient intake values that are generated for each participant.

5.11: At the end of the questionnaire, a summary page of all food and beverage items and the quantities reported appeared and participants were asked to check the list and make amendments where necessary. Participants also had the opportunity to make additional comments, had they not already had the chance earlier in the questionnaire.

	Item	Amount / Eaten
CHANGE	Serving size compared to other people	Average
CHANGE	Standard tea (e.g. Tetley, Earl Grey)	4 Mugs/Cups
CHANGE	Did you add milk to your standard tea?	Yes
CHANGE	Milk used most frequently	Semi-skimmed
CHANGE	Sliced bread White	4 Slices
CHANGE	Chocolate bars (e.g. Crunchie, Snickers)	1 Bar
CHANGE	Dried / powdered soup (e.g. Cup-a-Soup)	1 Mug/Bowl
CHANGE	Hard cheese (e.g. Cheddar, Parmesan)	1 Serving
CHANGE	Omelettes or scrambled egg	1 Serving
CHANGE	Chicken or turkey (e.g. roast, drumsticks, curry)	1 Serving
CHANGE	Olive oil in cooking	Yes
CHANGE	Mixed side salad	1 Serving
CHANGE	Banana	2 Whole fruit
CHANGE	Meals prepared and cooked at home	Yes
CHANGE	Time spent doing vigorous effort activities	None
CHANGE	Time spent doing moderate effort activities	None
CHANGE	Time spent doing light effort activities	Under 1 hour

If you would like to **change anything** or **add anything**, please move back to the relevant page:

- use one of the change links above;
- use our back button *below*;
- select an option from the box and press Go.

Alcohol
Biscuits
Bread
Cake
Cereal

If you're not sure where to add something, you may type it into the extras box below.

Extras:

5.12: The full questionnaire (pdf format) can be found in the 'Additional Resources' tab in Showcase.

6 Data collection

6.1: Data was collected on the frequency of intakes of about 200 commonly consumed food and beverage items over the previous 24 hours, with more data-fields relating to whether other ingredients were added to these foods (e.g., milk, sugar, butter, etc.).

Data collected about the invitation and completion of dietary questionnaires:

- Questionnaire number
- Date and time (including day of week) each questionnaire was requested
- Date and time (including day of week) each questionnaire was completed
- Time taken to complete the questionnaire
- Number of questionnaires completed

Data collected from the dietary questionnaire:

- Portion size
- Reasons diet was atypical diet yesterday
- Type of special diet
- Intake of cold soft drinks, comprising: drinking water; low-calorie drinks; carbonated (fizzy) drinks; squash; juice (orange, grapefruit, pure fruit/vegetable); smoothies (fruit, dairy)
- Intake of coffee, comprising: instant; filtered; cappuccino; latte; espresso; decaffeinated; other types and whether milk, sugar or artificial sweetener was added
- Intake of tea, comprising: standard; rooibos; green; herbal; other types and whether milk, sugar or artificial sweetener was added
- Intake of other non-alcoholic drinks, comprising: milk and flavoured milk; hot chocolate (low-calorie, regular); other drinks
- Intake of alcoholic drinks, comprising: wine (red, rose, white and either small, medium, large); beer/cider; fortified wine; spirits; other alcoholic drinks
- Breakfast cereal, comprising: porridge (with water, milk); muesli; oat crunch; sweetened; plain; bran; whole-wheat; other type of cereal, and whether dried fruit, milk, sugar or artificial sweetener was added
- Type of milk, comprising: cow's milk (semi-skimmed, skimmed or whole); cholesterol lowering milk; soya milk (with or without added calcium); goat's or sheep's milk; rice or other vegetable milk; powdered milk; other type of milk
- Bread intake, comprising: sliced (white, mixed flour, wholemeal, seeded, other); baguette (white, mixed flour, wholemeal, seeded, other); baps (white, mixed flour, wholemeal, seeded, other); rolls (white, mixed flour, wholemeal, seeded, other); naan; garlic bread; crispbread; oatcakes; other bread type
- Butter/margarine on bread/crackers, comprising: bread slices; baguettes; baps; rolls; crispbread; oatcakes; other bread (including the number of slices/items, and whether it was spread thickly, medium or thinly)
- Type of butter/margarine on bread/crackers, comprising: butter (spreadable, low-fat, normal, unknown type); olive spread; polyunsaturated margarine; dairy spread; soya margarine; unknown margarine (each of which have options for very low-fat, low-fat, normal, cholesterol-lowering, unknown type); hard margarine; other type of butter/margarine; other type of spread
- Pastry intake, comprising: double crust; single crust
- Crumble intake (e.g. fruit crumble, vegetable crumble)
- Pizza intake
- Pancake intake
- Scotch pancake intake
- Yorkshire pudding intake
- Indian snacks intake
- Pastries/Scones, comprising: croissants; Danish pastry; scones
- Milk-based puddings, comprising: yogurt (low-fat, full-fat); ice-cream; dessert; milk-

based puddings; other types; soya dessert

- Cakes/desserts, comprising: Fruitcake; cake; doughnut; sponge pudding; cheesecake; other dessert
- Sweets/biscuits, comprising: chocolate bar (white, milk, dark); chocolate-covered raisins; sweets (chocolate, diet); biscuits (chocolate-covered, chocolate, sweet); cereal bars; other sweets/biscuits
- Savoury snacks, comprising: peanuts (salted, unsalted); nuts (salted, unsalted); seeds; crisps; biscuits (savoury, cheesy); olives; other savoury snacks
- Soup intake, comprising: powdered; canned (containing pulses, meat, fish, vegetables, pasta, other ingredients); home-made (containing pulses, meat, fish, vegetables, pasta, other ingredients)
- Starchy food intake, comprising: pasta (white, wholemeal); rice (white, brown); sushi; snackpot; couscous; other grains
- Cheese intake, comprising: hard (low-fat, full-fat); soft; blue; cheese spread (low-fat, full-fat); cottage cheese; feta; mozzarella; goat; other cheese
- Egg intake, comprising: whole eggs; omelette; eggs in sandwiches; scotch eggs; other eggs
- Meat intake, comprising: sausage; beef; pork; lamb; crumbed or deep-fried poultry; bacon; ham; liver; other meat, and whether fat was removed from meat and skin removed from poultry
- Fish intake, comprising: tinned tuna; oily; breaded; battered; white; prawns; lobster/crab; shellfish; other type of fish
- Vegetarian alternatives, comprising: vegetarian sausages/burgers; tofu, Quorn; other types
- Spreads/sauces intake, comprising: jam/honey; cream; peanut butter; yeast extract; hummus; guacamole; chutney/pickle; tomato ketchup; brown sauce; mayonnaise (low-fat, full-fat); salad dressing; oil for drizzling; pesto; sauces (tomato-based, cheese, white/cream); gravy; other sauces
- Cooking fat, comprising: unknown; olive; sunflower; vegetable; rapeseed; other type; butter (normal, spreadable, low-fat, unknown); lard; olive spread (very low-fat, low-fat, normal, cholesterol-lowering, unknown); polyunsaturated margarine (very low-fat, low-fat, normal, cholesterol-lowering, unknown); dairy spread (very low-fat, low-fat, normal, cholesterol-lowering, unknown); soya (very low-fat, low-fat, normal, cholesterol-lowering, unknown); other soft margarine (very low-fat, low-fat, normal, cholesterol-lowering, unknown); hard margarine; other type of fat; no fat used
- Vegetable intake, comprising: baked beans; pulses; potatoes (fried, boiled/baked and whether butter added, mashed); mixed vegetables; vegetable pieces; coleslaw; side salad; avocado; broad beans; green beans; beetroot; broccoli; butternut squash; cabbage/kale; carrot; cauliflower; celery; courgette; cucumber; garlic; leek; lettuce; mushroom; onion; parsnip; peas; sweet pepper; spinach; sprouts; sweetcorn; sweet potato; tomato (fresh, tinned); turnip/swede; watercress; other vegetables
- Fruit intake, comprising: stewed fruit; prunes; dried fruit; mixed fruit; apple; banana; berry; cherry; grapefruit; grape; mango; melon; orange; satsuma; peach/nectarine; pear; pineapple; plus; other fruit
- Meals out of home, comprising: takeaway meals; restaurant meals; bought sandwiches; ready meals

- Home cooked meals
- Added salt to food
- Vitamin supplement use, comprising: multivitamin; multivitamin with iron; multivitamin with calcium; multivitamin with multimineral; vitamin A; vitamin B6; vitamin B12; vitamin C; vitamin D; vitamin E; folic acid; iron; calcium; chromium; magnesium; selenium; zinc; glucosamine/chondroitin; fish oil; evening primrose oil; other supplements
- Time spent doing physical activity, comprising: vigorous; moderate; light
- Free-text information was also collected, whereby participants could add items not covered in the questionnaire.

6.2 The quantity of each food and beverage consumed during the previous 24-hours is calculated by multiplying the assigned portion size of each food or beverage by the amount consumed. The nutrient intakes for each participant are calculated by multiplying the quantity consumed by the nutrient composition of the food or beverage, as taken from the UK food composition database McCance and Widdowson's The Composition of Foods and its supplements (see reference list), and stored in a secure database.

Each food and beverage listed in the questionnaire was assigned a portion size based on the unit listed in the questionnaire, where the majority of portion sizes were taken from "Food portion sizes" (Ministry of Agriculture, Fisheries and Food, 1993).

For single food items (e.g. white rice), a nutrient code that most closely resembled that particular food was selected from the McCance and Widdowson nutrient database. Where there were two or more types of foods specified (e.g. "unsalted nuts (e.g. almonds, cashews, walnuts)"), multiple food codes were used or single food codes where the nutrient composition of the foods were similar.

6.3: The daily intake of the following nutrients was estimated:

- Total food weight (g)
- Total energy (kilojoules-kJ)
- Protein (g)
- Total fat (g)
- Carbohydrate (g)
- Saturated fat (g)
- Polyunsaturated fat (g)
- Total sugars (g)
- Englyst dietary fibre (g)
- Calcium (mg)
- Iron (mg)
- Vitamin B6 (mg)
- Vitamin B12 (μg)
- Folate (μg)

- Vitamin C (mg)
- Potassium (mg)
- Magnesium (mg)
- Retinol (μg)
- Carotene (μg)
- Vitamin E (mg)
- Vitamin D (μg)
- Alcohol (g)
- Starch (g)

7 Data presentation in Showcase

7.1: Data from each of the (up to five) 24-hour recall web questionnaires is stored separately, as defined instances (because each questionnaire was completed at a defined date). However, the data presented in the UK Biobank Showcase reflects the data from all questionnaires combined. Hence, the number of items may be more than the number of participants.

7.2: Where appropriate, questions that yielded a yes/no response were amalgamated into a single data-field for ease of use (e.g., use of vitamin and mineral supplements, type of diet).

References

Ministry of Agriculture, Fisheries and Food (1993) Food Portion Sizes, 2nd ed. London: HMSO.

Holland B, Welch A, Unwin I et al. (1991) McCance and Widdowson's the Composition of Food, 5th ed. Cambridge: Royal Society of Chemistry.

Food Standards Agency (2002) McCance and Widdowson's the Composition of Foods, 6th ed. Cambridge: Royal Society of Chemistry.

Holland B, Unwin I & Buss D (1988) Cereals and Cereal Products. Third Supplement to McCance and Widdowson's the Composition of Foods, 4th ed. Cambridge: Royal Society of Chemistry.

Holland B, Brown J & Buss D (1993) Fish and Fish Products. Third Supplement to McCance and Widdowson's the Composition of Food, 5th ed. Cambridge: Royal Society of Chemistry.

Holland B, Unwin I & Buss D (1992) Fruit and Nuts. First Supplement to McCance and Widdowson's the Composition of Foods, 5th ed. Cambridge: Royal Society of Chemistry.

ChanW, Brown J, Lee S et al. (1995) Meat, Poultry and Game. Fifth Supplement to McCance and Widdowson's the Composition of Foods, 5th ed. Cambridge: Royal Society of Chemistry.

Chan W, Brown J, Church S et al. (1996) Meat Products and Dishes. Sixth Supplement to McCance and Widdowson's the Composition of Foods, 5th ed. Cambridge: Royal Society of Chemistry.

Holland B, Unwin I & Buss D (1989) Milk Products and Eggs. Fourth Supplement to McCance and Widdowson's the Composition of Foods, 4th ed. Cambridge: Royal Society of Chemistry.

ChanW, Brown J & Buss D (1994) Miscellaneous Foods. Fourth Supplement to McCance and Widdowson's the Composition of Foods, 5th ed. Cambridge: Royal Society of Chemistry.

Holland B, Welch A & Buss D (1992) Vegetable Dishes. Second Supplement to McCance and Widdowson's the Composition of Foods, 5th ed. Cambridge: Royal Society of Chemistry.

Holland B, Unwin I & Buss D (1991) Vegetables, Herbs and Spices. Fifth Supplement to McCance and Widdowson's the Composition of Foods, 5th ed. Cambridge: Royal Society of Chemistry.

Liu B, Young H, Crowe FL, et al., Development and evaluation of the Oxford WebQ, a low-cost, web-based method for assessment of previous 24 h dietary intakes in large-scale prospective studies. *Public Health Nutrition*, 2011;41(11):1998-2005.