

Methods to Collect Dietary Intake in Children 6-11 years

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Choosing a method

What is the question ?

Individual food or nutrient of interest?

Energy and Macronutrient intake?

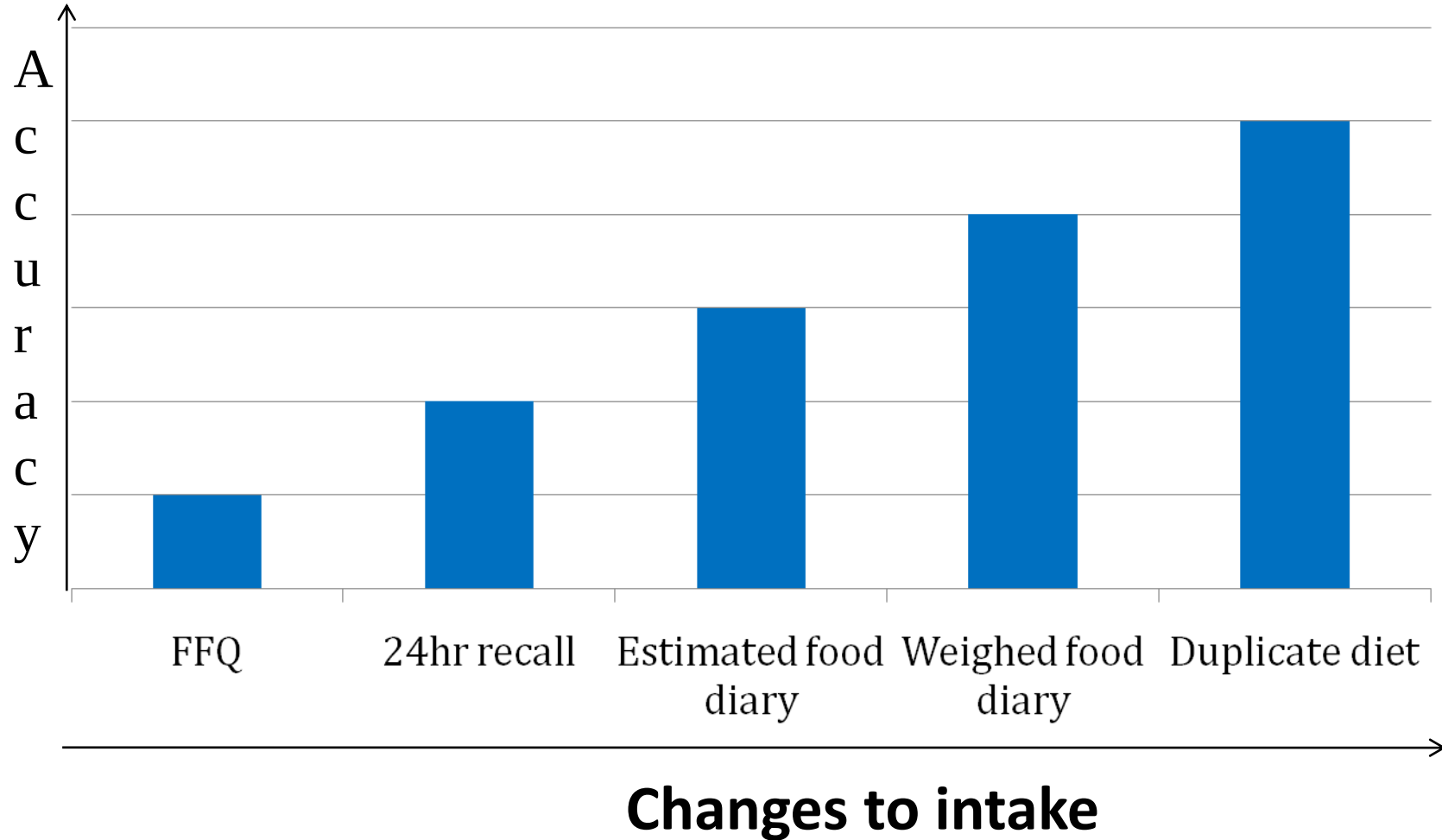
Usual dietary intake?

Population level change following an intervention?

What is the budget ...?



Accuracy vs Participant Burden





Challenges young children

- Limited food knowledge
- Increased eating outside of the home
- Multiple carers involved in food provision
- Eating while engaged in other activities
- Motivation/ Interest

Challenges young children

- “Usual Intake” may be a challenge in children
- Social desirability bias
 - Parent and Child
- Food Leftover/ Spillages and Swaps



School-based Fruit and vegetable intervention

- Interested in picking up change in intake
- Children aged 4 to 11 years old
- Intervention school vs Control school
- Hybrid prospective food diary and FFQ method
- Parent/in school observer completed



6.00am - 9.00am

Time slot 1

- ☒ White bread or toast
- ☐ Wholemeal bread or toast
- ☐ Margarine
- ☒ Butter
- ☐ Jam or preserves
- ☐ Weetabix
- ☐ Cornflakes
- ☐ Frosties

- ☐ Coco Pops
- ☐ Rice Krispies
- ☐ Milk full-fat with cereal
- ☐ Milk, semi-skimmed with cereal
- ☐ Banana
- ☐ Egg
- ☐ Yoghurt
- ☐ Sugar

- ☐ Biscuits—not chocolate
- ☐ Biscuits—chocolate
- ☐ Orange juice, unsweetened
- ☐ Apple juice, unsweetened
- ☒ Milk, full-fat drink
- ☐ Milk, semi-skimmed drink
- ☐ Squash - reduced sugar
- ☐ Squash

- ☐ Tea with milk
- ☐ Water

Others

Bacon grilled

Tomato ketchup

Strawberry milk shake powder

- Six timeslots based on peaks in intake
- Most commonly consumed foods included as tick list
- Linked to age and gender specific portion sizes
- Space to enter foods not on list

FAST
Food Assessment in Schools Tool

Comparison against weighed intakes

- 4 day FAST compared with 4 day weighed intake for 70 children
- Mean intakes of fruit were within 3% of weighed intakes
- Mean intakes of fruit and vegetables were within 0.1% of weighed intakes

Adamson, A. J., Griffiths, J. M., Carlin, L. E., Barton, K. L., Wrieden, W. L., Matthews, J. N. S., & Mathers, J. C. (2003). FAST: Food Assessment in Schools Tool. *Proceedings of the Nutrition Society*, 62(1a), 84A.

Assessing exposure to food contact materials

- Required detailed individual level data
- Parent/carer completed weighed intake for out of school
- In school observation (weighed intakes) by trained researchers

Foster, E. Mathers, J.C. and Adamson, A.J. 2010. Packaged food intake by British children aged 0 to 6 years. *Food additives and contaminants*, 27(3), pp.380-388.

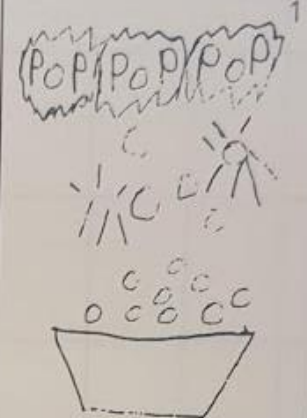
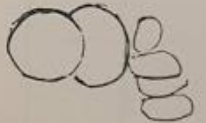


Combined parent and child diary – Write and Draw

Example

Time	Description of food or drink	To be filled in by the Nutritionist		
7.30	rice Krispies			
7.45	full fat milk			
7.45	apple			
7.45	Bread			

You may also draw your food or drink if you like

1 	2 	3 
4 	5	6
7	8	9

Interviewing children

- Phrase questions around textures, colour, pictures on packs (incl. how cooked boiled roasted)

“It was the brown bread with bits in it”

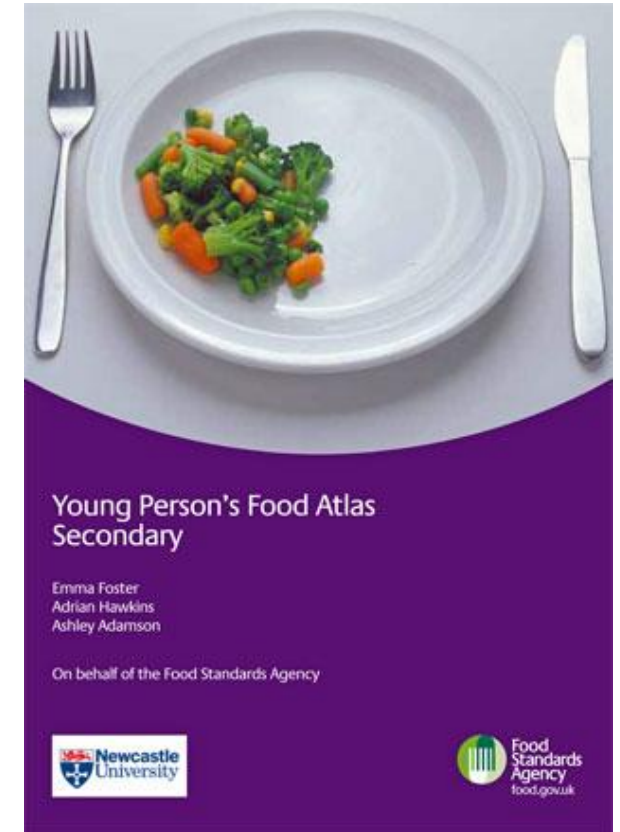
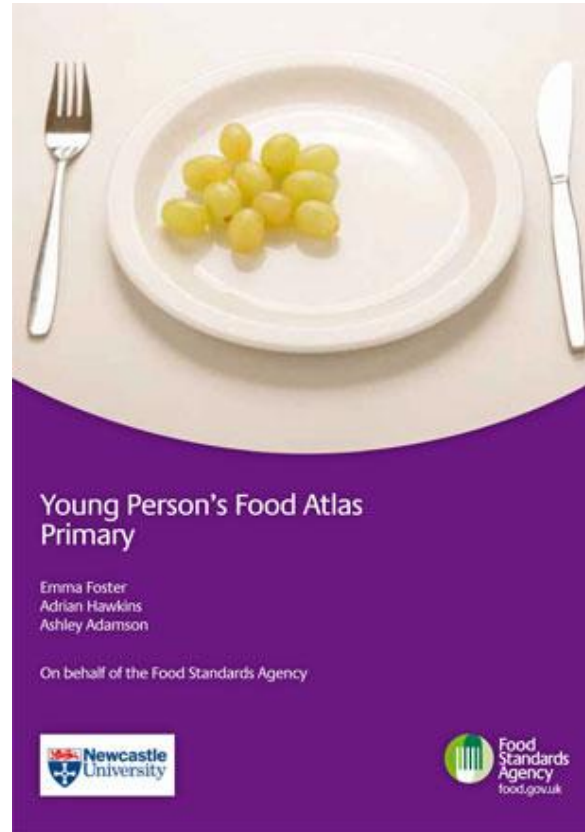
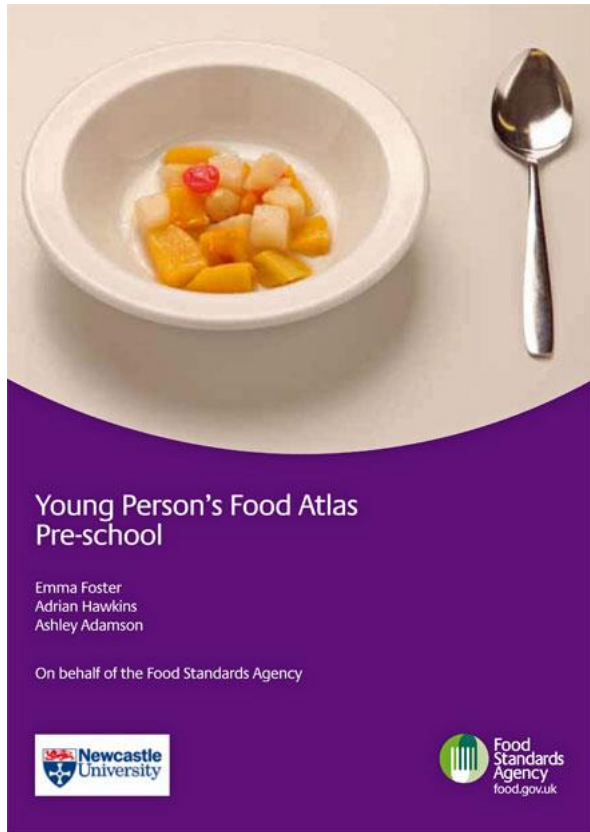
“It was silky milk”

“The one with the lion on the packet”

“He put them inside the oven”



Food Portion Photographs for use in 24hr recalls or estimated food diary interviews with parents and/or children

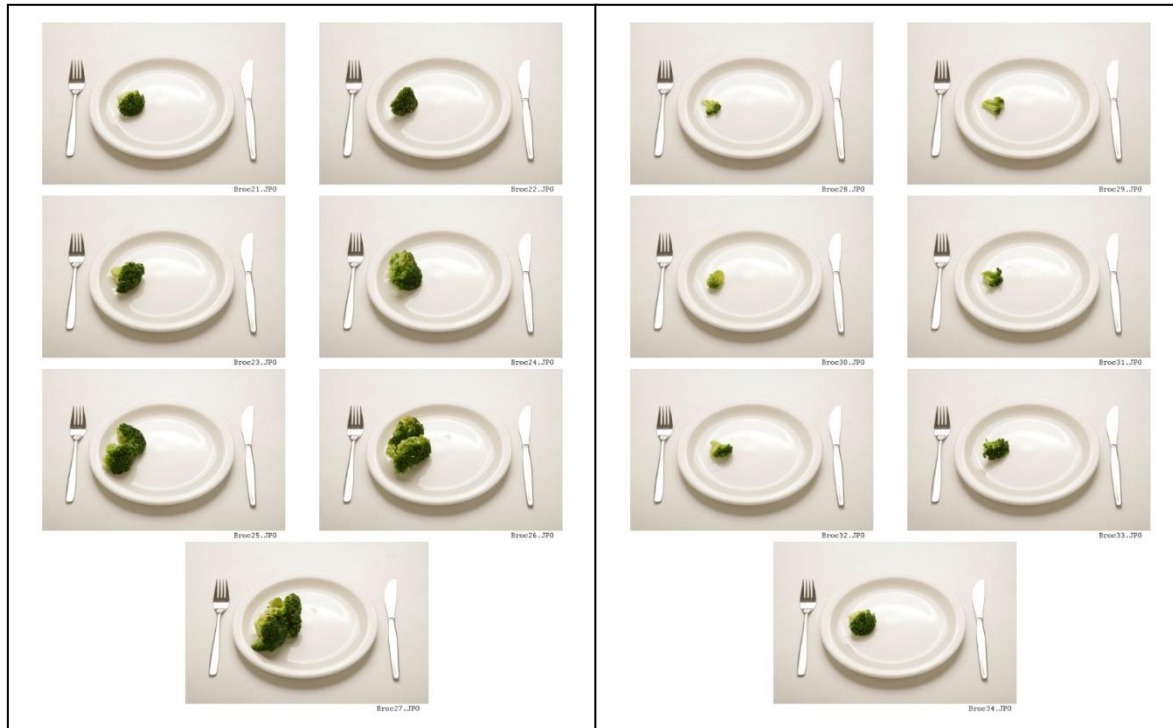


Foster E, Hawkins A, Adamson A. Young person's food atlas: pre-school. London: Food Standards Agency; 2010.

<https://webstore.ncl.ac.uk/product-catalogue/publications/faculty-of-medical-sciences/institute-of-health-society/young-persons-food-atlas-preschool-primary-and-secondary>

Format

- 2050 portion size images of 104 different foods
- Estimation of amount served and amount leftover



Validation

- Feeding study with 596 children aged 4 to 16 years (Absolute Validation)
- 4-day weighed food diary comparison in 360 children (Relative Validation)
 - Estimates of portion size using food photographs on day 5
 - Interviews with both parent and child



Key findings

- Mean intakes of Energy and Macronutrients were within 5% of weighed intakes
- The limits of agreement for energy (mean ratio +/- 2 standard deviations) were between an under-estimate of 40% to an over-estimate of 58% of energy intake by the weighed diary
- By 11 years children were able to report their intake with accuracy and precision similar to that of their parents

Foster, E., Hawkins, A., Barton, K.L., Stamp, E., Matthews, J.N. and Adamson, A.J., 2017. Development of food photographs for use with children aged 18 months to 16 years: Comparison against weighed food diaries–The Young Person's Food Atlas (UK). *PloS one*, 12(2), p.e0169084.



**Development of INTAKE24 –
A computerised 24 hour dietary recall**

[Add meal](#)**Breakfast**

Early snack



Lunch



Mid-day snack



Dinner



Late snack



When did you have your breakfast? Please tell us the approximate time.

▲	▲
08	: 00
▼	▼

[I did not have breakfast, delete it](#)[Around that time](#)

[Add meal](#)**Breakfast**

08:00

Toast

??

Egg

??

Early snack

?

Lunch

?

Mid-day snack

?

Dinner

?

Late snack

?

Breakfast (08:00)

Please list everything that you had for your breakfast.

Food

– Toast

– Egg

[Add a food](#)

Drinks

– Coffee

[Add a drink](#)[Change meal time](#)[Delete this meal](#)[I have finished, continue](#)

[Add meal](#)

Breakfast	08:00
Toast	??
Egg	??
Coffee	??
Early snack	10:00
twix	??
crisps	??
coke	??
Lunch	13:00
Baked Potato	??
Beans	??
Apple	??
Lemonade	??
Dinner	19:30
Pie and Chips	??
Peas	??
Crumble	??
Ice Cream	??
Water	??

Below is the list of foods from our database that look like "Toast".

Please choose the one that you have actually had, or the one that you think is reasonably close.

[Search again](#)

Matching foods

Toast, white bread
Toast, soft grain bread, e.g. mighty white
Toast, Wholemeal bread
Toast, brown bread
Toast, Granary Bread (with seeds or bits)
Crumpets/ pikelets toasted
Teacakes, toasted
English style bread Muffins, white, toasted
Toast, Hovis or wheatgerm

Matching food categories

Toast, white and softgrain

Toast, wholemeal / brown / granary

Browse all foods

Add meal

Breakfast 08:00

Toast, white bread ✓ ?

Egg ? ?

Coffee ? ?

Early snack 10:00

twix ? ?

crisps ? ?

coke ? ?

Lunch 13:00

Baked Potato ? ?

Beans ? ?

Apple ? ?

Lemonade ? ?

Dinner 19:30

Pie and Chips ? ?

Peas ? ?

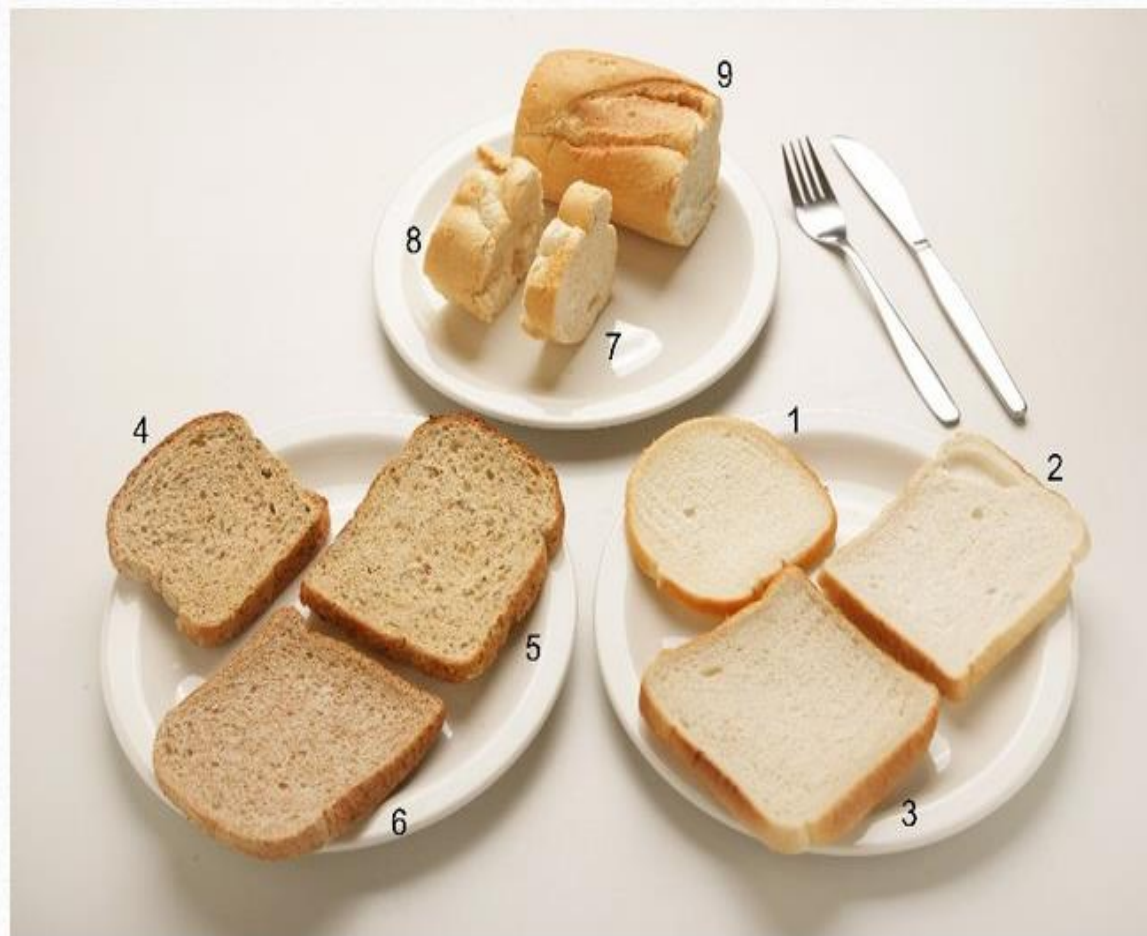
Crumble ? ?

Ice Cream ? ?

Water ? ?

[Go back to previous step](#)

Please select an item from the picture below that most closely resembles what you've had.



[Add meal](#)

Breakfast 08:00

Toast, white bread ✓✓

Boiled eggs ✓✓

Coffee made with semi skimmed milk ✓✓

Early snack 10:00

Twix ✓?

crisps ??

coke ??

Lunch 13:00

Baked Potato ??

Beans ??

Apple ??

Lemonade ??

Dinner 19:30

Pie and Chips ??

Peas ??

Crumble ??

Ice Cream ??

Water ??

[Go back to previous step](#)

Please choose how many of those you've had



one

whole item(s) and



no fraction

[I had that many](#)

[Add meal](#)

Breakfast 08:00

Toast, white bread ✓✓

Boiled eggs ✓✓

Coffee made with semi skimmed milk ✓✓

Early snack 10:00

Twix ✓✓

Walkers Crisps all flavours ✓✓

Diet cola, any flavour
e.g. diet cherry coke - in a can ✓✓

Lunch 13:00

Baked potato / Jacket potato, skin eaten ✓✓

Baked beans ✓ ?

Apple ? ?

Lemonade ? ?

Dinner 19:30

Pie and Chips ? ?

Peas ? ?

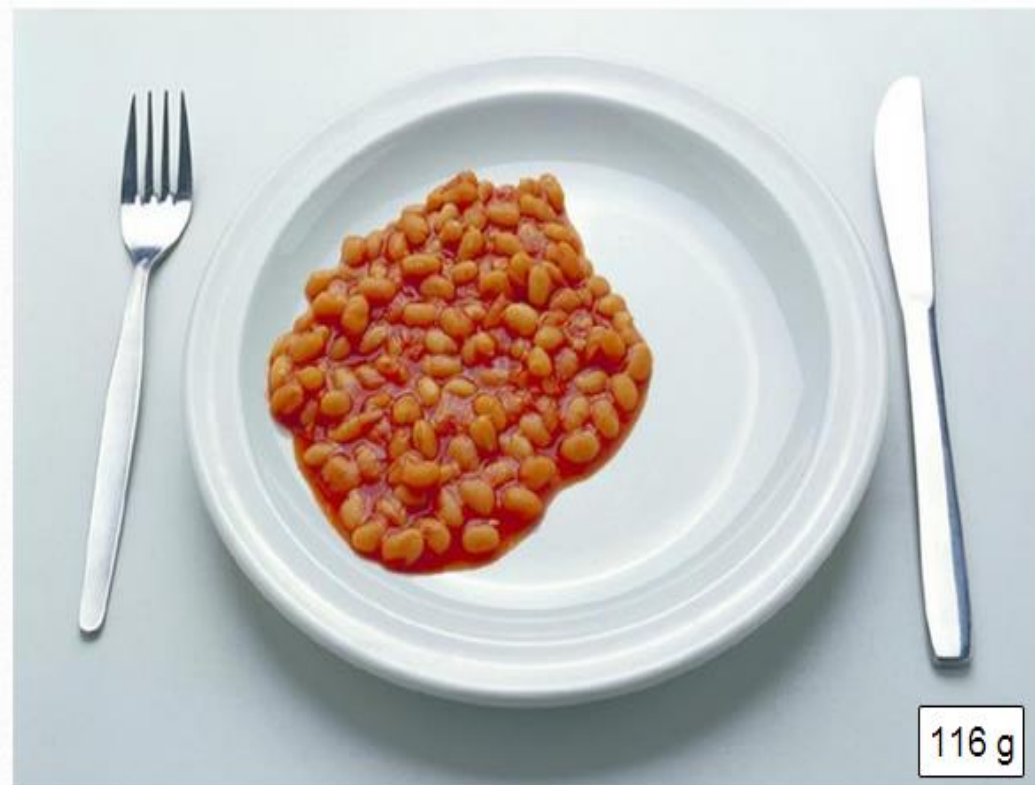
Crumble ? ?

Ice Cream ? ?

Water ? ?

[Go back to previous step](#)

Using these pictures of baked beans please choose how much **baked beans** you've been served.

[I had less](#)[I had more](#)[I had that much](#)

[Add meal](#)
[Go back to previous step](#)

How would you like to estimate your portion size of *Lemonade* ?

Breakfast 08:00

Toast, white bread ✓✓

Butter, Salted ✓✓

Boiled eggs ✓✓

Coffee ✓✓

Semi skimmed milk ✓✓

Early snack or drink 10:00

Twix ✓✓

Walkers Crisps ✓✓

Diet cola, any flavour
e.g. diet cherry coke ✓✓



In a glass



In a can

Early snack or drink 10:30

Baked beans ✓✓

Butter, Salted ✓✓

Lemonade ✓①

Lunch 13:00

Baked potato / Jacket
potato, skin eaten ✓✓

Baked beans ✓✓

Apples - skin was eaten ✓✓

Lemonade ✓✓



In a bottle

Evening meal 19:30

Individual steak pie ✓✓

[Add meal](#)

Breakfast 08:00

Toast, white bread ✓✓

Boiled eggs ✓✓

**Coffee made with
semi skimmed milk** ✓?

Early snack 10:00

twix ??

crisps ??

coke ??

Lunch 13:00

Baked Potato ??

Beans ??

Apple ??

Lemonade ??

Dinner 19:30

Pie and Chips ??

Peas ??

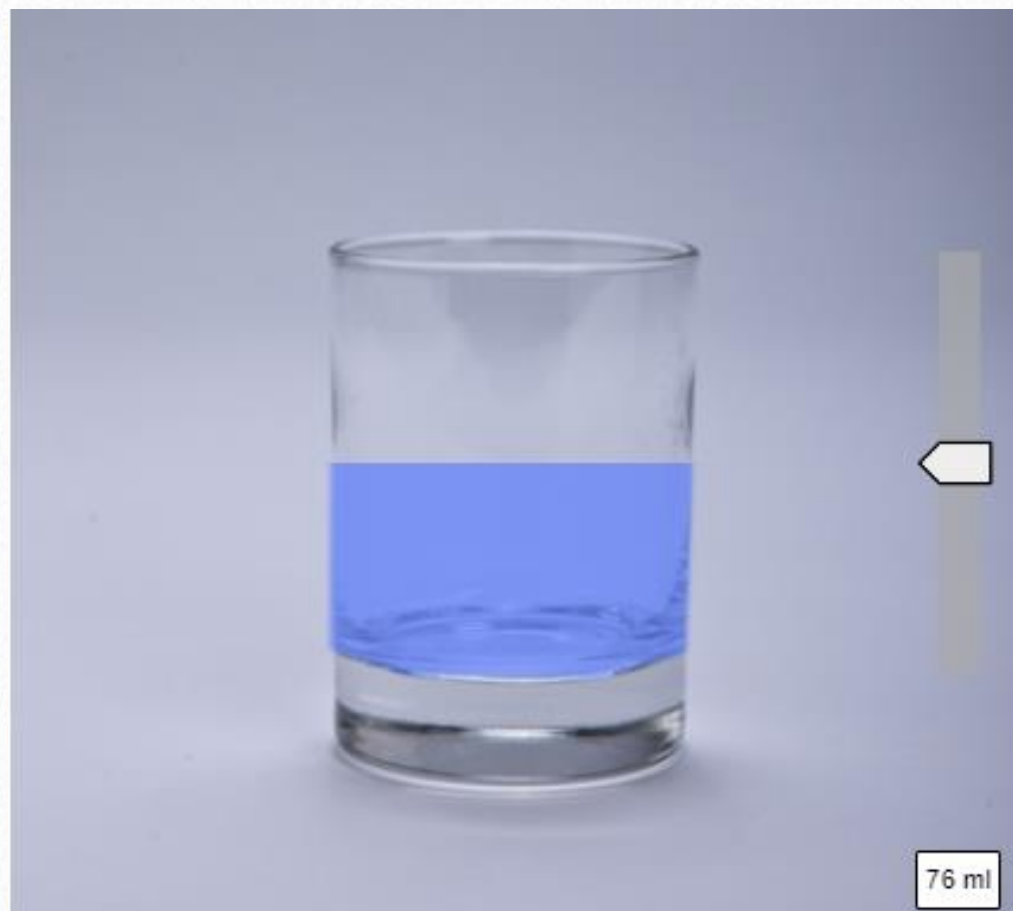
Crumble ??

Ice Cream ??

Water ??

[Go back to previous step](#)

Please use the slider on the right to choose how full your cup or glass was.



It was less full

It was more full

It was that full

[Add meal](#)[Go back to previous step](#)**Breakfast** 08:00

Toast, white bread ✓✓

Boiled eggs ✓✓

Coffee made with semi skimmed milk ✓✓

Did you have any butter or margarine on your toast?

Early snack 10:00

Twix ✓✓

Walkers Crisps all flavours ✓✓

Diet cola, any flavour
e.g. diet cherry coke - in
a can ✓✓**Lunch** 13:00Baked potato / Jacket
potato, skin eaten ✓✓

Baked beans ✓✓

Apples - skin was eaten ✓✓

Diet lemonade - in a
carton / bottle / can ✓✓**Dinner** 19:30

Individual steak pie ✓✓

Oven chips ✓✓

[Add meal](#)[Go back to previous step](#)

Breakfast 08:00

Toast, white bread ✓✓

Butter, Salted ✓✓

Boiled eggs ✓✓

Coffee ✓✓

Semi skimmed milk ✓✓

Was this lemonade the same as the one you had before?

277 ml serving size

Drank it all

Nothing added (e.g. milk, sugar, sauces)

Early snack or drink 10:00

Twix ✓✓

Walkers Crisps ✓✓

Diet cola, any flavour
e.g. diet cherry coke ✓✓

Early snack or drink 10:30

Baked beans ✓✓

Butter, Salted ✓✓

Lemonade ✓?

Lunch 13:00

Baked potato / Jacket
potato, skin eaten ✓✓

Baked beans ✓✓

Apples - skin was eaten ✓✓

Lemonade ✓✓

Evening meal 19:30

Individual steak pie ✓✓

[Add meal](#)

Did you have any meals, snacks or drinks between your lunch (at 13:00) and your evening meal (at 19:30)?

[Yes, add a meal or a snack](#)[No, I did not](#)

Breakfast 08:00

Toast, white bread ✓✓

Butter, Salted ✓✓

Boiled eggs ✓✓

Coffee ✓✓

Semi skimmed milk ✓✓

Early snack or drink 10:00

Twix ✓✓

Walkers Crisps ✓✓

Diet cola, any flavour
e.g. diet cherry coke ✓✓

Lunch 13:00

Baked potato / Jacket
potato, skin eaten ✓✓

Baked beans ✓✓

Apples - skin was eaten ✓✓

Lemonade ✓✓

Evening meal 19:30

Individual steak pie ✓✓

[Add meal](#)**Breakfast** 08:00

Toast, white bread ✓✓
Butter, Salted ✓✓
Boiled eggs ✓✓
Coffee ✓✓
Semi skimmed milk ✓✓

Early snack or drink 10:00

Twix ✓✓
Walkers Crisps ✓✓
Diet cola, any flavour
e.g. diet cherry coke ✓✓

Lunch 13:00

Baked potato / Jacket
potato, skin eaten ✓✓
Baked beans ✓✓
Apples - skin was eaten ✓✓
Lemonade ✓✓

Evening meal 19:30

Individual steak pie ✓✓

Where did most of your food that you had for your breakfast come from?

- ☒ Home
☐ School
☐ Convenience store
☐ Supermarket
☐ Fast food outlet e.g McDonalds
☐ Café
☐ Restaurant
☐ Friend/Relatives
☐ Other:

[Continue](#)

Intake24 – Use in Children

- Public Health England Sugar Smart campaign

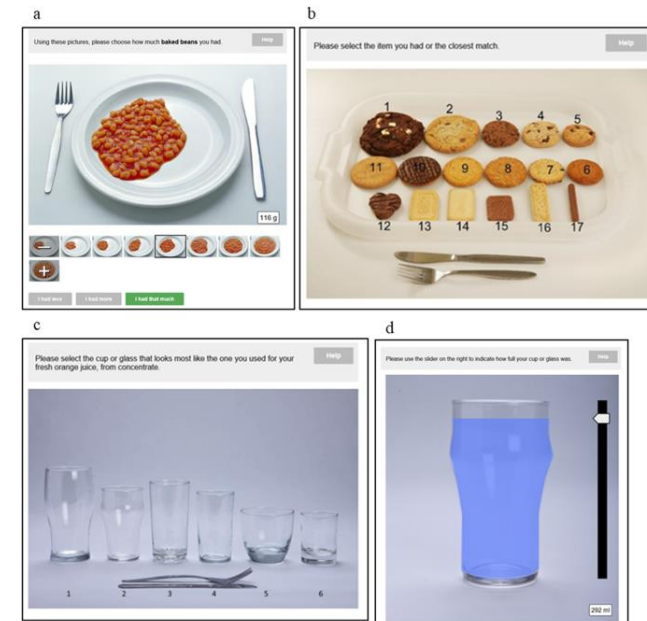
Bradley, Jennifer, et al. "Impact of a health marketing campaign on sugars intake by children aged 5–11 years and parental views on reducing children's consumption." BMC public health 20 (2020): 1-11.

- UK National Diet and Nutrition Survey 1.5 years to adults

www.gov.uk/government/collections/national-diet-and-nutrition-survey

- Scottish Health Survey ages 11+

www.foodstandards.gov.scot/publications-and-research/publications/pilot-of-intake24-in-the-scottish-health-survey



Welcome to Intake24

Intake24 is an open-source self-completed computerised dietary recall system based on multiple-pass 24-hour recall. The online system offers similar data quality to interviewer-led recalls at a significantly lower cost.

[Try a demo »](#)[Watch a video »](#)

What is dietary recall?

A dietary recall is a method of dietary assessment based on a face-to-face interview conducted by specifically trained personnel. During the interview, an individual is asked to recall their food and beverage consumption during the previous day.

[Read more »](#)

System features

Online 24-hour dietary recall. Under 20 minutes average completion time. High tolerance to spelling mistakes. Accurate image-based portion size estimation. Automated coding to nutrient data. Instant availability of nutrient reports.

[View details »](#)

Food database

Over 2800 foods with carefully selected automated portion size estimation methods. More than 2500 portion size images which have been extensively validated in a feeding study and against 4-day weighed diaries.

System output

Data are output in spreadsheet format for easy manipulation and analysis. Nutrient intake can be output as soon as the participant has finished entering their data. Data output includes food groups, energy, macro- and micronutrients.

[See example »](#)

Validation

Newcastle University conducted a comparison of Intake24 with interviewer-led recalls was conducted in 180 people. Intake24 was found to under-estimate energy intake by just 1% on average. Mean intakes of all macronutrients and micronutrients (except non-milk extrinsic sugars) were within 4% of the interviewer-led recall.

[Read more »](#)

Open-source

Intake24 source code is available under the terms of the [Apache License](#). The food database, including food definitions, portion size photographs and nutrient data is available under the terms of the [Open Government License](#).

[View details »](#)

Local adaptations

Intake24 offers full support for localisation and internationalisation of both the user interface and the food database

Publications

Studies and research papers published by the Intake24 team.

Participant feedback

Feedback from participants in the field test of Intake24 in those aged 11+ years (up to and including older adults)

The Challenge!



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