National Diet and Nutrition Survey

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What is the National Diet and Nutrition Survey (NDNS)?

- **A national survey of the dietary habits and nutritional status of the UK population**

- **Dietary habits:**
  - the foods people eat
  - the nutrients they take in in their food

- **Nutritional status**
  - physical measures (in blood, urine or anthropometry) that reflect how well (or badly) nourished people are in relation to the nutrients in the diet
  - in blood and urine these can be:
    - concentrations of nutrients themselves
    - products of their metabolism
    - functional processes they regulate.
Why do we conduct national surveys?

- for monitoring progress against government targets eg salt, saturated fat
- for monitoring progress on diet and nutrition objectives of UK Health Departments, eg ‘Choosing Health’
- to enable estimates to be made of compounds added to foods eg preservatives, colourings, flavourings
- to identify areas where further research is needed
Who pays?

- England: Department of Health

- Scotland, Wales, Northern Ireland: Food Standards Agency
National Health and Nutrition Examination Survey (NHANES)

For the past 40 years, the U.S. Public Health Service has been interviewing and examining tens of thousands of Americans. Teams of doctors, dentists, nutritionists, and health technicians head out to communities across the United States for the National Health and Nutrition Examination Survey (NHANES), which is updated annually.
History of NDNS:

- Dietary and Nutritional Survey of British Adults 1986-87

NDNS programme:
- Children aged 1.5 - 4.5 y - fieldwork 1992-3
- People aged 65 + y - fieldwork 1994-5
- Young people aged 4-18 years - fieldwork 1997
- Adults aged 19-64 years - fieldwork 2000-1

- Low Income Diet and Nutrition Survey 4+ years 2003-05
Following a review, FSA Board agreed a rolling programme for NDNS, running continuously with fieldwork carried out every year:

- Generate data more rapidly
- Track changes over time more easily
- Collect additional data at short notice
- More responsive to policy needs

- Core survey of 1000 people per year, 1½ years upwards
- Private households representative of UK
- England, Scotland, Wales, Northern Ireland

- 1000 per year enables trend data every 2-3 years
NDNS rolling programme consortium:

- Coordination
- Sampling
- Fieldwork – interviewers and nurses
- Reporting

- Dietary assessment
- Nutrient database management
- Blood/urine samples -collection, processing, analysis
- Field lab coordination
- DLW
- Sun exposure

- Survey doctor
- Physical activity
NDNS – Critical features

1. Nationally representative
   • Achieved through:
     • national coverage of UK
     • sampling of entire population
     • carried out throughout year
     • high response rate
Sampling in NDNS

Postcode Address File (PAF)
Post Office
small users < 25 items of mail per day

120 Primary Sampling Units (PSUs)
randomly selected

3240 addresses, 27 each PSU, randomly selected
If >1 household at address, 1 chosen at random

27 addresses per PSU

9 addresses:
1 adult, 1 child
If >1 adult or child, chosen at random

18 addresses:
1 child
“child boost”
NDNS – Critical features

1. Nationally representative
   • Achieved through:
     • national coverage of UK
     • sampling of entire population
     • carried out throughout year
     • high response rate

2. Accurate and valid data
   • Achieved through:
     • optimal methods for collecting dietary intakes, physical activity, anthropometry etc
     • up to date food composition database
     • uniform and rigorous blood and urine collection, processing and analysis
NDNS – Dietary assessment

- NDNS to date used weighed record
  - burdensome
  - affects response rate and hence representativeness of sample:
    - adults 1986/87 70%
    - adults 2000/01 47%

- 24 hour recall/ 4 day estimated diary
  - less burdensome
  - dietary data comparable
  - higher response rate likely
NDNS Comparison study
Energy intake by 24h recall and estimated diary
NDNS Comparison Study
Summary

- Energy intake similar for both methods - intake for diary lower than recall in men aged 35-49y

- Few differences in misreporting between methods.
  - both substantial under-reporting, but not consistent direction

- Slightly more over-reporting with recall in young children

- No difference in response rate between methods

- Some challenges in the field for both methods
  - weekend days largest problem for recall
<table>
<thead>
<tr>
<th>Time</th>
<th>Where? With whom? TV on? Table?</th>
<th>What</th>
<th>Brand Name</th>
<th>Amount eaten</th>
</tr>
</thead>
<tbody>
<tr>
<td>8:00</td>
<td>IN KITCHEN</td>
<td>JAM SANDWICH</td>
<td>STRAWBERRY</td>
<td>2 Tbsp Jam 2 Thin Hand Cut</td>
</tr>
<tr>
<td></td>
<td>AT TABLE</td>
<td>COFFEE MILK</td>
<td>STREAMLINED HOUSE WHOLE MEAL</td>
<td>1 MING</td>
</tr>
<tr>
<td></td>
<td>NO TV</td>
<td>SUGAR</td>
<td>NO BUTTER</td>
<td>1 Tbsp</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>NESCAFE GOLD BUND</td>
<td>2 Tbsp Splash</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>BODREDA WHOLE MILK</td>
<td></td>
</tr>
<tr>
<td>9:00</td>
<td>NO TV</td>
<td>SQUASH NOT NAS</td>
<td>ROBINSON'S HI JUICE ORANGE</td>
<td>500 mL 1 pint orange 5 pint Tap Water</td>
</tr>
<tr>
<td></td>
<td>AT TABLE</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>IN DINING ROOM WITH WIFE</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12:15</td>
<td>IN KITCHEN</td>
<td>SOUP CHICKEN Y LEEK</td>
<td>BEECHER'S DRIED.</td>
<td>230 mL WATER 1 small bowl 500 mL 1 pint Squash 5 pint Tap Water</td>
</tr>
<tr>
<td></td>
<td>WITH WIFE</td>
<td>SQUASH NOS</td>
<td>ROBINSON'S SUMMER FRUITS</td>
<td></td>
</tr>
<tr>
<td></td>
<td>AT TABLE</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>NO TV</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12 noon to 2pm</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Coding diet diaries
NDNS Survey Design

Advance letters

Recruitment

1st interviewer visit:
questionnaires; ht, wt; diary placement

2nd Interviewer visit:
Diary check

3rd interviewer visit:
Collect diary; questionnaires incl. physical activity; introduce nurse visit

4th interviewer visit:
DLW and dose administration

5th interviewer visit:
Collect and dispatch DLW urine samples to HNR

Children 4-15 yrs:
Recruitment and placement to Actigraph protocol

Children 4-15 yrs:
Actigraph pick-up

1st Nurse visit:
CAPI interview; BP; anthropometry; procedures for blood and 24-hour urine sample; consent

2nd Nurse/Phlebotomist visit
Collect 24-hour urine; consent and take blood sample

Diet coding at HNR

Feedback
Diet to respondent blood to respondent and GP

Samples to laboratories for analysis

Years 1 and 3
10% of total sample eligible:
Introduction to DLW sub-study

Diet to respondent and GP

Diet coding at HNR

Samples to laboratories for analysis

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NDNS Reporting

Yr 1: data collection  
Feb 2008 – Mar 2009

Yr 1 dataset to Archive*  
(limited to specific measures)  
Spring 2010  
Headline Results

Yr 2: data collection  
Apr 2009 – Mar 2010

Yr 1+2 dataset to Archive  
(limited to specific measures)  
Summer 2011  
Headline Results

Yr 3: data collection  
Apr 2010 – Mar 2011

Yr 1-3 dataset to Archive  
(limited to specific measures)  
Summer 2012  
Headline Results

Yr 4: data collection  
Apr 2011 – Mar 2012

Yr 1-4 dataset to Archive  
Summer 2013

Final Report

*ESRC Data Archive at the University of Essex

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A survey carried out on behalf of the Food Standards Agency and the Department of Health

National Diet and Nutrition Survey

Headline results from Years 1 and 2 (combined) of the Rolling Programme (2008/2009 – 2009/10)

Edited by: Beverley Bates, Alison Lennox, Chris Bates, Gillian Swan
What is in the Year 1 and 2 report

- **Food consumption**
  - Consumption of foods and food groups for 1.5-3y, 4-10y, 11-18y, 19-64y, 65+y
  - Comparisons with previous NDNS surveys
  - Consumption of fruit, vegetables, meat, fish including mixed dishes
  - Fruit and vegetable portions compared with 5-a-day – not toddlers or young children

- **Nutrient Intakes**
  - Intakes of macronutrients, selected minerals and vitamins for 1.5-3y, 4-10y, 11-18y, 19-64y, 65+y
  - Comparisons with government recommendations
  - Comparisons with previous surveys
  - Contributions of major food groups to intakes of macronutrients

- **Height, weight, BMI, supplement, alcohol use, smoking**


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Limitations of NDNS Y1 and 2 data

- Small sample sizes until 4 years complete
  - Limited number of age subdivisions

- Comparing to previous surveys:
  - 4 day records instead of 7 days
  - 7 day surveys (NDNS 4-18y (1997) and 19-64y (2000/01)) remodelled for 4 days to allow comparisons
  - NDNS 1.5-4.5 y (1992/93) and 65+ years (1994/95) were 4 day records corrected to 7d for reports. 4 day raw data used for comparison, recalculated for equivalent age group; % consumers in report are for 4 days only
NDNS Y1 and 2
Total Energy intake kcal/d
NDNS Y1 and 2 compared to earlier surveys
Total energy intake kcal/d
NDNS Y1 and 2
Sources of total energy

% contribution to energy intake:
- Cereals and cereal products
- Milk and milk products
- Meat and meat products
- Vegetables, potatoes
- Sugar, preserves, confectionery
- Non-alcoholic beverages
- Alcoholic beverages

1.5-3y: 30 (Cereals), 25 (Milk), 10 (Meat), 11 (Vegetables), 8 (Sugar), 4 (Non-alcoholic beverages)
4-10y: 36 (Cereals), 15 (Milk), 13 (Meat), 11 (Vegetables), 10 (Sugar), 6 (Non-alcoholic beverages)
11-18y: 34 (Cereals), 9 (Milk), 17 (Meat), 6 (Vegetables), 5 (Sugar), 4 (Non-alcoholic beverages)
19-64y: 29 (Cereals), 9 (Milk), 11 (Meat), 11 (Vegetables), 7 (Sugar), 4 (Non-alcoholic beverages)
65+y: 30 (Cereals), 12 (Milk), 16 (Meat), 11 (Vegetables), 11 (Sugar), 4 (Non-alcoholic beverages)
NDNS - Sources of total energy – adults 19-64 y  1986/87 vs 2000/01 vs 2008/10

- Cereals and cereal products
- Milk and milk products
- Meat and meat products
- Vegetables, potatoes
- Sugar, preserves, confectionery
- Non-alcoholic beverages
- Alcoholic beverages

% contribution to energy intake

1986/87: 30 (Cereals and cereal products) + 11 (Milk and milk products) + 16 (Meat and meat products) + 12 (Vegetables, potatoes) + 6 (Sugar, preserves, confectionery) + 7 (Non-alcoholic beverages) + 7 (Alcoholic beverages) = 75

2000/01: 31 (Cereals and cereal products) + 10 (Milk and milk products) + 15 (Meat and meat products) + 13 (Vegetables, potatoes) + 6 (Sugar, preserves, confectionery) + 7 (Non-alcoholic beverages) + 7 (Alcoholic beverages) = 78

2008/10: 29 (Cereals and cereal products) + 9 (Milk and milk products) + 17 (Meat and meat products) + 11 (Vegetables, potatoes) + 5 (Sugar, preserves, confectionery) + 5 (Non-alcoholic beverages) + 7 (Alcoholic beverages) = 71
NDNS Y1 and 2
Protein intake % total energy

![Bar chart showing protein intake by age and gender from 1994/95, 97, 2000/01 and 2008/10.]
## Macronutrient Recommendations

<table>
<thead>
<tr>
<th>Nutrient</th>
<th>Population Average (% of food energy)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Total Fat</strong></td>
<td></td>
</tr>
<tr>
<td>Of which</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Saturated fat</td>
</tr>
<tr>
<td></td>
<td>Not more than 11%</td>
</tr>
<tr>
<td></td>
<td>Trans fat</td>
</tr>
<tr>
<td></td>
<td>Not more than 2%</td>
</tr>
<tr>
<td><strong>Total Carbohydrate</strong></td>
<td></td>
</tr>
<tr>
<td>Of which</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Intrinsic and milk sugars</td>
</tr>
<tr>
<td></td>
<td>At least 39%</td>
</tr>
<tr>
<td></td>
<td>Non milk extrinsic sugars (NMES)</td>
</tr>
<tr>
<td></td>
<td>Not more than 11%</td>
</tr>
<tr>
<td>Fibre*</td>
<td>18g per day</td>
</tr>
</tbody>
</table>

*Non-starch polysaccharides (NSP)*
NDNS Y1 and 2
Fat and saturated intake % food energy

<table>
<thead>
<tr>
<th></th>
<th>Fat</th>
<th>SFA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Toddlers</td>
<td>24.1</td>
<td>14.8</td>
</tr>
<tr>
<td>M 4-10yM</td>
<td>35.7</td>
<td>13.5</td>
</tr>
<tr>
<td>M 11-18yM</td>
<td>24.1</td>
<td>12.7</td>
</tr>
<tr>
<td>M 19-64yM</td>
<td>34.0</td>
<td>12.8</td>
</tr>
<tr>
<td>M 65+y</td>
<td>34.4</td>
<td>12.8</td>
</tr>
<tr>
<td>F 4-10yF</td>
<td>34.4</td>
<td>12.8</td>
</tr>
<tr>
<td>F 11-18yF</td>
<td>34.4</td>
<td>12.8</td>
</tr>
<tr>
<td>F 19-64y</td>
<td>34.4</td>
<td>12.8</td>
</tr>
<tr>
<td>F 65+y</td>
<td>36.9</td>
<td>14.3</td>
</tr>
</tbody>
</table>
NDNS Y1 and 2
Fat intake % food energy

<table>
<thead>
<tr>
<th></th>
<th>M 18-64y</th>
<th>F 18-64y</th>
</tr>
</thead>
<tbody>
<tr>
<td>1986/87</td>
<td>40.4</td>
<td>40.3</td>
</tr>
<tr>
<td>2000/01</td>
<td>35.5</td>
<td>34.7</td>
</tr>
<tr>
<td>2008/10</td>
<td>35.2</td>
<td>34.4</td>
</tr>
</tbody>
</table>
NDNS Y1 and 2
Saturated fatty acids % food energy

M 19-64y
- 1986/87: 16.5
- 2000/01: 13.3
- 2008/10: 12.9

F 19-64y
- 1986/87: 17
- 2000/01: 13.1
- 2008/10: 12.6
NDNS Y1 and 2
Sources of saturated fatty acids

% contribution to SFA intake
NDNS Y1 and 2
Sources of saturated fatty acids

- Whole milk
- Semi-skimmed milk
- Cheese
- Yoghurt, fromage frais, other dairy desserts
- Ice cream

1.5-3y: 6% SFA 1992/93
4-10y: 6% SFA 1992/93
11-16y: 7% SFA 1997
19-64y: 10% SFA 2000/01, 9% 86/87
65+: 8% SFA 1994/95
NMES intake Y1 and 2 vs earlier surveys

![Bar chart showing NMES intake Y1 and 2 vs earlier surveys for different age groups and genders. The chart compares data from 1992/93, 1994/95, 1997 or 2000/01 and 2008/10.](chart_image)

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NDNS Y1 and 2 Sources of NMES

% contribution to NMES intake

- Cereals and cereal products
- Milk and milk products
- Vegetables, potatoes
- Sugar, preserves, confectionery
- Non-alcoholic beverages
- Alcoholic beverages

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NDNS % consumers – Y1 and 2 vs earlier surveys

Soft drinks, not low calorie

<table>
<thead>
<tr>
<th>Category</th>
<th>1992/93, 1994/95, 1997 or 2000/01</th>
<th>2008/10</th>
</tr>
</thead>
<tbody>
<tr>
<td>Toddlers</td>
<td>80/48</td>
<td></td>
</tr>
<tr>
<td>M 4-10y</td>
<td>84/72</td>
<td></td>
</tr>
<tr>
<td>M 11-18y</td>
<td>87/80</td>
<td></td>
</tr>
<tr>
<td>M 19-64y</td>
<td>51/56</td>
<td></td>
</tr>
<tr>
<td>M 65+y</td>
<td>28/31</td>
<td></td>
</tr>
<tr>
<td>F 4-10y</td>
<td>85/72</td>
<td></td>
</tr>
<tr>
<td>F 11-18y</td>
<td>80/79</td>
<td></td>
</tr>
<tr>
<td>F 19-64y</td>
<td>44/53</td>
<td></td>
</tr>
</tbody>
</table>
NDNS % consumers – Y1 and 2 vs earlier surveys

Chocolate confectionery

<table>
<thead>
<tr>
<th>Category</th>
<th>% Consumers 1992/93, 1994/95, 1997 or 2000/01</th>
<th>% Consumers 2008/10</th>
</tr>
</thead>
<tbody>
<tr>
<td>Toddlers</td>
<td>53</td>
<td>21</td>
</tr>
<tr>
<td>M 4-10y</td>
<td>62</td>
<td>28</td>
</tr>
<tr>
<td>M 11-19y</td>
<td>55</td>
<td>28</td>
</tr>
<tr>
<td>M 19-64y</td>
<td>63</td>
<td>21</td>
</tr>
<tr>
<td>M 65+y</td>
<td>58</td>
<td>28</td>
</tr>
<tr>
<td>F 4-10y</td>
<td>56</td>
<td>28</td>
</tr>
<tr>
<td>F 11-19y</td>
<td>58</td>
<td>28</td>
</tr>
<tr>
<td>F 19-64y</td>
<td>45</td>
<td>21</td>
</tr>
<tr>
<td>F 65+y</td>
<td>46</td>
<td>28</td>
</tr>
</tbody>
</table>

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NDNS Y1 and 2
Sources of NMES

- Cereals and cereal products
- Milk and milk products
- Vegetables, potatoes
- Sugar, preserves, confectionery
- Non-alcoholic beverages
- Alcoholic beverages

% contribution to NMES intake

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NDNS Y1 and 2
Sources of NMES

% contribution to NMES intake

Sugar confectionery
Chocolate confectionery
Sugars, inc table sugar, preserves, sweet spreads
NDNS Sources of NMES for toddlers
2008/10 vs 1992/93

- Sugars, inc table sugar, preserves, sweet spreads
- Sugar confectionery
- Chocolate confectionery

% contribution to NMES intake

1992/93: 9
2008/10: 8
NDNS Y1 and 2
Sources of NMES

% contribution to NMES intake
NDNS Y1 and 2
Sources of NMES

Fruit juice
Soft drinks, not low calorie
Alcoholic beverages

% contribution to NMES intake

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NDNS Y1 and 2
Sources of NMES in toddlers

- **Fruit juice**
- **Soft drinks, not low calorie**

% contribution to NMES intake

1992/93:
- Fruit juice: 7%
- Soft drinks, not low calorie: 32%

2008/10:
- Fruit juice: 15%
- Soft drinks, not low calorie: 10%

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Fruit and vegetables in toddlers

% consumers  1992/93 vs 2008/09

- Apples and Pears
- Bananas
- Citrus not canned
- Other not canned
- Raw carrots
- Salad other raw
- Raw tomatoes
- Peas
- Leafy green
- Carrots

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Diet and Nutrition Survey of Infants and Young Children (DNSIYC) – Aims

- food and nutrient intakes, nutritional status of a representative sample of UK infants and young children aged 4 to 18 months
- detailed information on breast and breast milk substitutes consumed
- characteristics of subjects with intakes and/or status of specific nutrients above and below national reference values
- database to enable calculation of intakes of natural toxicants, contaminants, additives and other food chemicals for risk assessment
- blood indices of nutritional status, or biomarkers to relate to dietary, physiological and social data
DNSIYC – Comparison with NDNS

- Not rolling
- 1800 subjects
- Different sampling frame – Child Benefit Register
- 5 months fieldwork because of availability of sample
- Dietary assessment similar
- Similar dietary feedback
- Stable isotope method for breast milk volume estimation
- Use of clinics rather than nurse visiting home – necessitated by paediatric phlebotomy experience
- Mobile unit for rural areas – due to difficulty with paediatric phlebotomy by home nurses
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