Nutrition and health of schoolchildren

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British Nutrition Foundation
Background

- Briefing paper ‘Nutrition, health and schoolchildren’; published in September issue of Nutrition Bulletin
- Update of a briefing paper that was published in 2002
- Pulling together latest facts on a variety of topics relating to nutrition and health of schoolchildren
Nutritional habits of schoolchildren:
- National Diet and Nutrition Survey
- Family food survey
- Various other reports

Nutrition in schools:
- School food standards (England, Scotland, Wales, Northern Ireland)
- Curriculum (again one for each country)

Which ones can I trust??

How does diet affect health?
- Articles in journals (e.g. Nutrition Bulletin) and health magazines
- Various websites (NHS, Department of health, BNF and FFL (of course!!), School food trust)

Too much???

“I need information on healthy eating in schoolchildren. Where do I get this from?”
Nutritional requirements of schoolchildren

Dietary habits of schoolchildren (Findings of the National Diet and Nutrition Surveys)

Physical activity in schoolchildren

Factors affecting food choice

Food provision in school (e.g. school food standards)

Promoting healthy lifestyles in children

Nutrition, physical activity and their impact on health in childhood

- Overweight and obesity
- Cardiovascular risk factors
- Iron deficiency anaemia
- Oral health
- Bone development
- Food allergy and intolerance
- Mental health

Briefing Paper

‘Nutrition, health and schoolchildren’
Energy intake in children

- Energy intakes have hardly changed since 1997
- Mean energy intakes reported are below estimated average requirements (EARs)
- It is unlikely that children are not meeting their energy requirements

NDNS Rolling Programme Years 1&2 (Bates et al. 2011)
Macronutrient intake in children

<table>
<thead>
<tr>
<th>Macronutrient</th>
<th>% of food energy</th>
<th>Change from 1997 to 2008-10 (NDNS Rolling Programme Years 1 and 2)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Protein</td>
<td>~14.5%</td>
<td>↑ in all age groups by about 1-2% of food energy</td>
</tr>
<tr>
<td>Fat</td>
<td>~34%</td>
<td>↓ in all age groups by about 1-1.5% of food energy</td>
</tr>
<tr>
<td>Saturated fatty acids</td>
<td>13.4% (4-10y)</td>
<td>↓ in all age groups by about 1-1.5%; still above recommended upper level of 11%</td>
</tr>
<tr>
<td></td>
<td>12.6% (11-18y)</td>
<td></td>
</tr>
<tr>
<td>Carbohydrates</td>
<td>~51%</td>
<td>↔ in all age groups</td>
</tr>
<tr>
<td>NMES*</td>
<td>14.4% (4-10y)</td>
<td>↓ in boys and girls aged 4-10 y by about 3%;</td>
</tr>
<tr>
<td></td>
<td>15.7% (11-18y)</td>
<td>↓ in boys and girls aged 11-18 y by about 0.5%</td>
</tr>
</tbody>
</table>

*Non-milk extrinsic sugars

NDNS Rolling Programme Years 1&2 (Bates et al. 2011)
## Proportion of children below LRNI* of selected vitamins and minerals

<table>
<thead>
<tr>
<th>Nutrient</th>
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<tbody>
<tr>
<td></td>
<td>Boys</td>
<td>Girls</td>
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</tr>
<tr>
<td>Vitamin A</td>
<td>3%</td>
<td>5%</td>
<td>12%</td>
<td>13%</td>
</tr>
<tr>
<td>Riboflavin</td>
<td>0</td>
<td>0</td>
<td>8%</td>
<td>17%</td>
</tr>
<tr>
<td>Folate</td>
<td>0</td>
<td>0</td>
<td>2%</td>
<td>6%</td>
</tr>
<tr>
<td>Iron</td>
<td>0</td>
<td>1%</td>
<td>5%</td>
<td>43%</td>
</tr>
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<td>Calcium</td>
<td>0</td>
<td>2%</td>
<td>8%</td>
<td>14%</td>
</tr>
<tr>
<td>Magnesium</td>
<td>0</td>
<td>2%</td>
<td>27%</td>
<td>50%</td>
</tr>
<tr>
<td>Potassium</td>
<td>0</td>
<td>0</td>
<td>16%</td>
<td>31%</td>
</tr>
<tr>
<td>Zinc</td>
<td>4%</td>
<td>10%</td>
<td>11%</td>
<td>18%</td>
</tr>
<tr>
<td>Selenium</td>
<td>0</td>
<td>2%</td>
<td>22%</td>
<td>47%</td>
</tr>
<tr>
<td>Iodine</td>
<td>1%</td>
<td>3%</td>
<td>7%</td>
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*Lower Reference Nutrient Intake (LRNI) is amount of nutrients sufficient for only a small number of people; those below LRNI likely to have insufficient intakes

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NDNS Rolling Programme Years 1&2 (Bates et al. 2011)
# Food consumption in low-income families compared to general population

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<td>Wholemeal bread (girls)</td>
<td>Pizza</td>
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<tr>
<td>Buns, cakes and pastries</td>
<td>Whole milk</td>
</tr>
<tr>
<td>Semi-skimmed and skimmed milk</td>
<td>Fat spreads</td>
</tr>
<tr>
<td>Vegetables</td>
<td>Beef, veal, lamb and pork</td>
</tr>
<tr>
<td>Fruit (boys)</td>
<td>Processed meats</td>
</tr>
<tr>
<td>Fruit juice (boys)</td>
<td>Oily fish and canned tuna</td>
</tr>
<tr>
<td>Carbonated soft drinks (diet)</td>
<td>Non-carbonated and carbonated soft drinks (diet)</td>
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Source: NDNS 1997 Young Person Survey; Low-income diet and nutrition survey
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*NDNS 1997 Young Person Survey; Low-income diet and nutrition survey*
Physical activity in schoolchildren

• Important for maintaining energy balance and therefore healthy body weight

• Aiding bone and musculoskeletal development
  – In particular weight bearing activities such as jumping, running, skipping and strength exercises

• Reducing risk of type 2 diabetes and hypertension

• Psychological and social benefits
How much physical activity?

New physical activity guidelines (DH 2011) – first UK-wide guidelines

• All children and young people should engage in moderate to vigorous intensity physical activity for at least 60 minutes and up to several hours every day.

• Vigorous intensity activities, including those that strengthen the muscle and bone, should be incorporated at least three days a week.

• All children and young people should minimise the amount of time spent being sedentary (sitting) for extended periods.
How many are meeting the recommendations?

- Difficult to assess physical activity levels
  – mostly self-reported data
- Estimations vary significantly depending on methods used
  – *2008 Health Survey for England*: 24%-32% of children meet recommendations (excl. physical activity during school time)
  – *Scottish Health Survey 2009*: 56-72% of children reach recommendations (excl. physical activity during school time)
Physical activity in boys and girls

Proportion of English children aged 5-to-15 years meeting physical activity recommendations (2008 Health Survey for England)
Physical activity in different ethnic groups

Proportion of English children aged 2-to-15 to have achieved a high level of activity (2004 Health Survey for England)

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Sedentary behaviour

- Being sedentary (sitting) considered an independent risk factor for overweight and obesity
- Sedentary activities often associated with negative eating habits
- 2008 Health Survey for England: Sedentary time in children (excluding sleeping and school) was 3.5 hours on weekdays and 4 hours on weekend days.
- Average time being sedentary increases with age
Overweight and obesity in boys in England

Source: 2009 Health Survey for England

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Overweight and obesity in girls in England

Source: 2009 Health Survey for England
Overweight and obesity in boys and girls in Scotland

Scottish Health Survey 2009

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How do overweight and obesity develop?

- The body stores excess energy in the form of body fat
- Weight gain happens when energy in > energy out
Dietary factors involved in development of childhood obesity

An overall healthy diet is important, although specific dietary factors may be linked with overweight and obesity:

- Larger portions served increase amount of food and energy consumed
- Higher energy density (i.e. higher calorie foods) does not influence total amount eaten
- Evidence on the effect of sugar-sweetened beverages on bodyweight and body fat inconclusive
- Eating breakfast may have a protective effect against becoming overweight or obese
Health implications of overweight and obesity in childhood

• Some obese children already have some changes associated with vascular disease (e.g. type 2 diabetes, insulin resistance)

• Childhood overweight and obesity track into adulthood

• However, most overweight and obese adults were thin as children – thinness does not protect against overweight

• Overweight and obesity in childhood are not independent risk factors for cardiovascular disease in later life
Bone health

• Most of bone mass is achieved during childhood and teenage years
• Diet and physical activity have impact on bone health and development
• Activities with high impact on bones (e.g. jumping, running, strength exercises) are best for bone development
Dietary factors involved in bone health

**CALCIUM**
- Main mineral in the bone
- Sources: Dairy foods are the richest source of calcium; other sources are green vegetables, fish eaten with bones, fortified flour (in the UK), calcium-enriched water, fortified foods

**VITAMIN D**
- Necessary for absorption of calcium
- Sources: most vitamin D produced in skin through sunlight exposure; dietary sources include oily fish, fish liver oils, eggs, liver, butter, fortified spreads

Other nutrients: vitamin K, vitamin A, protein;
Fruit and vegetable intake positively associated with bone health
Vitamin D deficiency

• Severe vitamin D deficiency in children can lead to rickets (softening of bones)

• Re-emergence of rickets in some subgroups of the population in the UK, predominantly African-Caribbean and South Asian

• People with dark skin and those who cover up are advised to take vitamin D supplements (10 µg/day)
Oral health

• Number of children with dental caries has fallen significantly since the 1970s
• Mainly due to introduction of water fluoridation, increased use of fluoridated toothpaste and generally better oral hygiene
• More than three quarters of children in the UK report brushing teeth at least twice a day
Dietary factors linked to oral health

• **Frequency** of eating foods containing sugar and other fermentable carbohydrates (starch) more important than total amount eaten

• Stickiness of carbohydrates linked to dental decay

• Chewing sugar free gum can reduce dental caries

• Acids in food and drink (e.g. fruit juices, fresh fruit, soft drinks) can soften enamel; excessive tooth brushing should be avoided after consuming these
Iron deficiency anaemia

- Iron deficiency
  - 15-to-18-year-old girls: almost 25%
  - Younger girls and all boys: 3-12%

- Iron deficiency anaemia
  - 15-to-18-year-old girls: 5%
  - Younger girls: 1.7-2.5%
  - All boys: 0.6-1.2%

Scientific Advisory Committee on Nutrition, 2010
Iron deficiency anaemia

- Almost half of 11-to-18 year old girls have very low iron intakes, compared to only 5% of boys in this age group and 0-1% in younger children.

- Anaemia particularly common in girls who have tried to lose weight and among vegetarians.

*Scientific Advisory Committee on Nutrition, 2010*
Cognitive function - Breakfast

• Some evidence that breakfast consumption can lead to some improvements in problem solving, attention and memory

• Positive effect may be more obvious later in the morning

• No evidence to suggest that one type of breakfast more beneficial than another
Cognitive function – Breakfast clubs

• Breakfast clubs have small but positive impact on some educational outcomes
• Improvements mainly in mathematics or arithmetic scores
• This could be due to decreased absenteeism
• Studies mainly carried out in schools with a high proportion of children from low socio-economic backgrounds
Cognitive function – Omega-3 fatty acids

• Evidence does not suggest that taking omega-3 supplements in *healthy* children improves cognitive function and performance

• Some evidence suggesting omega-3 supplements may have positive effects in children with dyspraxia and attention deficit hyperactivity disorder (ADHD)
Improving food provision in schools

- Major developments in food provision in schools over recent years
- School food standards introduced in all four areas of the UK
- All countries have food-based standards
- Most countries also have nutrient-based standards or guidelines
- All countries have standards or guidelines for food other than school lunch
Evaluation of effect of standards in English primary schools

- Compared with 2005, caterers now provide a more healthy lunch that meets food-based and most nutrient-based standards
- Average meal taken now contains over two portions of fruit and vegetables, and is lower in fat, sugar and salt
- Substantial increases in fruit and vegetable consumption (60% on average) and 32% decrease in sodium intake
- More improvements need to be made for some nutrients (e.g. iron and zinc)

Source: School Food Trust, 2009
Evaluation of effect of standards in English primary schools

- Primary school pupils respond positively to changes
- Introduction of healthier food in school is not a barrier to increasing take up
- In both the primary and secondary sectors take up has increased since introduction of standards
- Outcomes of a survey in secondary schools in England due to be published in December 2011 by the School Food Trust

Source: School Food Trust, 2009
For more information

- Briefing paper is available at [http://onlinelibrary.wiley.com](http://onlinelibrary.wiley.com)
- Summary of the paper is available for free
- Briefing paper will be available for free after one year of publication (September 2012) on the BNF website [www.nutrition.org.uk](http://www.nutrition.org.uk)
# Overweight and obesity in Reception and Year 6 (England)

<table>
<thead>
<tr>
<th></th>
<th>Overweight</th>
<th>Obese</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Reception</strong> (age 4-5 years)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Boys</td>
<td>13.9%</td>
<td>10.5%</td>
</tr>
<tr>
<td>Girls</td>
<td>12.7%</td>
<td>9.2%</td>
</tr>
<tr>
<td><strong>Year 6</strong> (age 10-11 years)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Boys</td>
<td>14.6%</td>
<td>20.4%</td>
</tr>
<tr>
<td>Girls</td>
<td>14.6%</td>
<td>17.0%</td>
</tr>
</tbody>
</table>

*Source: National Child Measurement Programme, Department of Health 2010*