How well does the Belgian population comply with the DRV’s for Energy and Macronutrients?

Karin De Ridder, PhD, MD

Head of team “Nutrition & Health”
Scientific Institute of Public Health
Food Consumption Survey 2014

- National representative survey
  - ± 3200 Belgians (3-64 years)
    - Children (3-9 y)
    - Adolescents (10-17 y)
    - Adults (18-64 y)
- Two 24-hour recalls (<10 y: + two one-day food diaries)
- Interviewers = dieticians
- DRV’s from the Superior Health Council of Belgium (2016)
Data collection - children (3-9 years)

- General questionnaire part 1 (CAPI)
- Food frequency questionnaire (paper)
- Health questionnaire (paper)
- Accelerometer and logbook (7 days)
- 24-hour recall 2 (GloboDiet)
- Anthropometric measurements
- General questionnaire part 2 (CAPI)

Home visit 1: 1-2 days
- One-day food diary 1

Telephone: 2 weeks
- 24-hour recall 1 (GloboDiet)

Home visit 2: 1-2 days
- One-day food diary 2
Data collection - adolescents and adults

Home visit 1

- 24-hour recall (GloboDiet)
- General questionnaire part 1 (CAPI)

1-4 weeks

Home visit 2

- 24-hour recall (GloboDiet)
- Anthropometric measurements
- General questionnaire part 2 (CAPI)

Telephone

- Food frequency questionnaire (paper)
- Health questionnaire (paper)
- Accelerometer and logbook (7 days) (adolescents)

Reminder second home visit
Estimation of “habitual” intake

- Statistical program to Assess Dietary Exposure (SPADE)
- Model *daily* or *episodically* consumed nutrients
  - Daily: transformation – model in function of age – back-transformation (eliminate within-person variance)
  - Episodical: Probability (intake frequency) * usual amount on consumption day (Monte Carlo simulation)
- Intake from different sources (food and dietary supplements)
- Comparison with DRV’s
Dietary reference values (DRV’s)

From: Health and Welfare, Canada, 1983; as adapted by Netherlands Health Council, 2000
Energy intake

- Under-reporting: 24.3% of study population
- Exclusion of under-reporters
Energy intake

Mean contribution (%) of food groups

- Potatoes and other tubers: 4.2%
- Fruits, nuts and seeds, olives: 5.2%
- Non-alcoholic beverages: 5.2%
- Fats and oils: 6.6%
- Sugar and confectionery: 7.5%
- Cakes and sweet biscuits: 8.3%
- Milk, milk beverages and fermented milk beverages: 12.6%
- Meat, meat products and substitutes: 13.5%
- Cereal and cereal products: 22.5%
Total carbohydrates

<table>
<thead>
<tr>
<th>Mean intake</th>
<th>Recommendation</th>
<th>% population &lt;50 EN%</th>
</tr>
</thead>
<tbody>
<tr>
<td>44.1 EN%</td>
<td>50-55 EN%</td>
<td>83.1%</td>
</tr>
</tbody>
</table>

% of population carbohydrate intake < 50 EN%

<table>
<thead>
<tr>
<th>Age Group</th>
<th>3-5 y</th>
<th>6-9 y</th>
<th>10-13 y</th>
<th>14-17 y</th>
<th>18-39 y</th>
<th>40-64 y</th>
</tr>
</thead>
<tbody>
<tr>
<td>%</td>
<td>43.7</td>
<td>54.1</td>
<td>63.2</td>
<td>70.2</td>
<td>84.5</td>
<td>94.9</td>
</tr>
</tbody>
</table>

% population carbohydrate intake <50 EN%

- 2004: 81.1%
- 2014: 87.8%

(15-64 y)
Total carbohydrates

Mean contribution (%) of food groups

- Potatoes and other tubers: 7.5%
- Milk, milk beverages and fermented milk beverages: 7.5%
- Fruits, nuts and seeds, olives: 8.3%
- Cakes and sweet biscuits: 9.6%
- Sugar and confectionery: 9.9%
- Non-alcoholic beverages: 10.1%
- Cereal and cereal products: 37.3%
### Mono- and disaccharides/ Polysaccharides

<table>
<thead>
<tr>
<th></th>
<th>Mono- &amp; disaccharides</th>
<th>Polysaccharides</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean intake</td>
<td>21 EN%</td>
<td>23 EN%</td>
</tr>
</tbody>
</table>

#### Mean intake of mono- & disaccharides and polysaccharides (EN%)

![Bar chart showing the mean intake of mono- & disaccharides and polysaccharides across different age groups.](chart)

- **3-5 y**: 27 EN% mono- & disaccharides, 23 EN% polysaccharides
- **6-9 y**: 26 EN% mono- & disaccharides, 24 EN% polysaccharides
- **10-13 y**: 24 EN% mono- & disaccharides, 24 EN% polysaccharides
- **14-17 y**: 23 EN% mono- & disaccharides, 24 EN% polysaccharides
- **18-39 y**: 20 EN% mono- & disaccharides, 24 EN% polysaccharides
- **40-64 y**: 19 EN% mono- & disaccharides, 22 EN% polysaccharides
Mono- and disaccharides

Mean contribution (%) of food groups

- Alcoholic beverages: 5.0%
- Vegetables: 5.5%
- Cereal and cereal products: 6.8%
- Cakes and sweet biscuits: 10.5%
- Fruits, nuts and seeds, olives: 14.7%
- Milk, milk beverages and fermented milk beverages: 15.0%
- Sugar and confectionery: 19.0%
- Non-alcoholic beverages: 19.7%
**Fiber**

<table>
<thead>
<tr>
<th>Mean intake</th>
<th>Recommendation</th>
<th>% population &lt; PRI</th>
</tr>
</thead>
<tbody>
<tr>
<td>18 g/day</td>
<td>10-25 g/day <em>(age-gender dependent)</em></td>
<td>84%</td>
</tr>
</tbody>
</table>

---

### % population fiber intake < PRI

- **3-5 y**: 58.2%
- **6-9 y**: 63.5%
- **10-13 y**: 72.7%
- **14-17 y**: 80.3%
- **18-39 y**: 90.3%
- **40-64 y**: 86.1%

### % population fiber intake < PRI by Region

- **Flanders**: 76.5%
- **Wallonia**: 95.9%

---

*(age-gender dependent)*
Mean contribution (%) of food groups

- Cereal and cereal products: 30 - 40%
- Fruits, nuts and seeds, olives: 10 - 20%
- Vegetables: 10 - 20%
- Potatoes and other tubers: 5 - 10%
- Cakes and sweet biscuits: 5 - 10%
- Sugar and confectionery: 5 - 10%

3-5 y
3-64 y
## Protein

<table>
<thead>
<tr>
<th>Mean intake</th>
<th>Recommendations</th>
<th>% population &lt;EAR</th>
<th>% population &gt;PRI</th>
</tr>
</thead>
<tbody>
<tr>
<td>15,3 EN%</td>
<td>PRI: 15 EN%</td>
<td>0,7</td>
<td>52,1</td>
</tr>
<tr>
<td></td>
<td>EAR: 10 EN%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>♂: 1,4 g/kg/day</td>
<td>PRI: 0,83-0,90 g/kg/day</td>
<td>♂: 0,1</td>
<td>♂: 97,2</td>
</tr>
<tr>
<td>♀: 1,3 g/kg/day</td>
<td>EAR: 0,66-0,73 g/kg/day</td>
<td>♀: 0,5</td>
<td>♀: 93,3</td>
</tr>
<tr>
<td></td>
<td>(age-gender dependent)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Mean contribution (%) of food groups

- **Vegetables**: 3%
- **Cakes and sweet biscuits**: 3,9%
- **Fish, shellfish and amphibians**: 6,3%
- **Milk, milk beverages and fermented milk beverages**: 19%
- **Cereal and cereal products**: 21,4%
- **Meat, meat products and substitutes**: 34,6%
## Total fat

<table>
<thead>
<tr>
<th>Mean intake</th>
<th>Recommendation</th>
<th>% population &gt;35 EN%</th>
</tr>
</thead>
<tbody>
<tr>
<td>35,5 EN%</td>
<td>20&lt; &amp; &lt;30-35 EN%</td>
<td>53,3%</td>
</tr>
</tbody>
</table>

### % of population fat intake >35 EN%

<table>
<thead>
<tr>
<th>Age range</th>
<th>% population</th>
</tr>
</thead>
<tbody>
<tr>
<td>3-5 y</td>
<td>31.5</td>
</tr>
<tr>
<td>6-9 y</td>
<td>46.0</td>
</tr>
<tr>
<td>10-13 y</td>
<td>49.4</td>
</tr>
<tr>
<td>14-17 y</td>
<td>50.6</td>
</tr>
<tr>
<td>18-39 y</td>
<td>52.6</td>
</tr>
<tr>
<td>40-64 y</td>
<td>58.1</td>
</tr>
</tbody>
</table>
Total fat

Mean contribution (%) of food groups

- Cereal and cereal products: 6.5%
- Sugar and confectionery: 7.7%
- Condiments, spices, sauces and yeast: 8.2%
- Cakes and sweet biscuits: 10.0%
- Fats and oils: 18.2%
- Milk, milk beverages and fermented milk beverages: 18.4%
- Meat, meat products and substitutes: 20.4%
## Saturated fatty acids

<table>
<thead>
<tr>
<th>Mean intake</th>
<th>Recommendation</th>
<th>% population &gt;10 EN%</th>
</tr>
</thead>
<tbody>
<tr>
<td>13.1 EN% (31 g/day)</td>
<td>&lt;10 EN%</td>
<td>90.4%</td>
</tr>
</tbody>
</table>

### Mean contribution (%) of food groups

- **Condiments, spices, sauces and yeast**: 4.1%
- **Cereal and cereal products**: 4.1%
- **Sugar and confectionery**: 7.5%
- **Cakes and sweet biscuits**: 12.6%
- **Fats and oils**: 14%
- **Meat, meat products and substitutes**: 20.4%
- **Milk, milk beverages and fermented milk beverages**: 29.1%
# Mono-unsaturated fatty acids

<table>
<thead>
<tr>
<th>Mean intake</th>
<th>Recommendation</th>
<th>% population &lt;10 EN%</th>
<th>% population &gt;20 EN%</th>
</tr>
</thead>
<tbody>
<tr>
<td>12,8 EN% (31 g/day)</td>
<td>10-20 EN%</td>
<td>11,8</td>
<td>0,4</td>
</tr>
</tbody>
</table>

### Mean contribution (%) of food groups

- **Cereal and cereal products**: 5.8%
- **Condiments, spices, sauces and yeast**: 9.3%
- **Cakes and sweet biscuits**: 9.4%
- **Sugar and confectionery**: 9.5%
- **Milk, milk beverages and fermented milk beverages**: 13.1%
- **Fats and oils**: 20.7%
- **Meat, meat products and substitutes**: 21.8%
## Poly-unsaturated fatty acids

<table>
<thead>
<tr>
<th>Mean intake</th>
<th>Recommendation</th>
<th>% population &lt; 5 EN%</th>
<th>% population &gt; 10 EN%</th>
</tr>
</thead>
<tbody>
<tr>
<td>6.3 EN% (15 g/day)</td>
<td>5-10 EN%</td>
<td>23.0</td>
<td>2.5</td>
</tr>
</tbody>
</table>

### Graphs:

#### % population intake < 5 EN%
- 3-5 y: 50%
- 6-9 y: 36.5%
- 10-13 y: 29.9%
- 14-17 y: 26.5%
- 18-39 y: 21.5%
- 40-64 y: 18.2%

#### % population intake 5-10 EN%
- 2004: 68%
- 2014: 78% (15-64 y)
## Omega-3 and omega-6 fatty acids

<table>
<thead>
<tr>
<th></th>
<th>Mean intake</th>
<th>Recommendations (=AI)</th>
<th>Prevalence inadequate intake</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Omega-3 FA</strong></td>
<td>0.74 EN%</td>
<td>1-2 EN%</td>
<td>/</td>
</tr>
<tr>
<td><strong>LNA</strong></td>
<td>0.63 EN%</td>
<td>1 EN%</td>
<td>/</td>
</tr>
<tr>
<td><strong>EPA+DHA</strong></td>
<td>190 mg</td>
<td>250-500 mg/day</td>
<td>/</td>
</tr>
<tr>
<td><strong>Omega-6 FA</strong></td>
<td>5 EN%</td>
<td>4-8 EN%</td>
<td>low (median (4.8 EN%) &gt; AI)</td>
</tr>
<tr>
<td><strong>LA</strong></td>
<td>4.9 EN%</td>
<td>4 EN%</td>
<td>low (median (4.8 EN%) &gt; AI)</td>
</tr>
</tbody>
</table>
Omega-3 fatty acids

Mean contribution (%) of food groups

- Milk, milk beverages and fermented milk beverages: 7.5%
- Cakes and sweet biscuits: 8.0%
- Fish, shellfish and amphibians: 8.2%
- Cereal and cereal products: 11.0%
- Meat, meat products and substitutes: 15.3%
- Condiments, spices, sauces and yeast: 16.9%
- Fats and oils: 18.5%
Omega-6 fatty acids

Mean contribution (%) of food groups

- Sugar and confectionery: 5.2%
- Cakes and sweet biscuits: 8.4%
- Cereal and cereal products: 14.7%
- Condiments, spices, sauces and yeast: 15.1%
- Meat, meat products and substitutes: 17.1%
- Fats and oils: 22.4%
Poly-unsaturated fatty acids

Mean contribution (%) of food groups

- Milk, milk beverages and fermented milk beverages: 4.9%
- Sugar and confectionery: 6%
- Cakes and sweet biscuits: 7.9%
- Cereal and cereal products: 12.7%
- Condiments, spices, sauces and yeast: 14.3%
- Meat, meat products and substitutes: 15.7%
- Fats and oils: 23.5%
Trans-fatty acids (industrial + natural)

<table>
<thead>
<tr>
<th>Mean intake</th>
<th>Recommendation</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.4 EN% (0.9 g/day)</td>
<td>As low as possible (industrial TFA’s)</td>
</tr>
</tbody>
</table>

Mean habitual trans-fatty acid intake (EN%)

- 2004: 0.7 EN%
- 2014: 0.4 EN%

Mean contribution (%) of food groups

- Cakes and sweet biscuits: 13.7%
- Fats and oils: 19.3%
- Meat, meat products and substitutes: 21.1%
- Milk, milk beverages and fermented milk beverages: 35.9%

(15-64 y)
### Cholesterol

<table>
<thead>
<tr>
<th>Mean intake</th>
<th>Recommendation</th>
<th>% population &gt;300 mg/day</th>
</tr>
</thead>
<tbody>
<tr>
<td>224 mg/day</td>
<td>&lt; 300 mg/day</td>
<td>17.2%</td>
</tr>
</tbody>
</table>

#### % population cholesterol >300 mg/day

![Bar chart showing % population cholesterol >300 mg/day by age group and gender.]

- Men: % population cholesterol >300 mg/day
  - 3-5 y: 1.9%
  - 6-9 y: 5.5%
  - 10-13 y: 9.1%
  - 14-17 y: 11.8%
  - 18-39 y: 17.4%
  - 40-64 y: 22.2%

- Women: % population cholesterol >300 mg/day
  - 3-5 y: 0%
  - 6-9 y: 10%
  - 10-13 y: 20%
  - 14-17 y: 30%
  - 18-39 y: 40%
  - 40-64 y: 50.8%

#### % population cholesterol >300 mg/day by year

- Men: 2004: 28%, 2014: 6.6%
- Women: 2004: 50.8%, 2014: 20.1%
Mean contribution (%) of food groups

- Fats and oils: 3.2%
- Fish, shellfish and amphibians: 8.2%
- Cakes and sweet biscuits: 8.5%
- Eggs and egg products: 8.9%
- Milk, milk beverages and fermented milk beverages: 23.6%
- Meat, meat products and substitutes: 41.3%
Thanks for your attention!

More detailed or other results?

https://fcs.wiv-isp.be