The real cost of obesity: Disparities in diet quality and health

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Fruit and vegetables and the prevention of obesity and its associated diseases,
EGEA International Conference, 17-19 April 2007, Brussels, Belgium

Disparities in obesity rates can be seen at local level

“All politics is local”
Disparities by county in the US

United States Of Obesity
Weight is not evenly distributed in the U.S. The highest concentration of obese Americans forms a wide belt across the southern states.

A necessary question:
Is obesity an economic issue?
How do people make food choices

Grains, Sugar/fat → Food choices → Obesity

Grains, Sugar/fat

Health

Variety

A disconnect between the ideal diet.....
First question

Do energy-dense foods cost less?

- Energy density defined as kcal/100g
- Energy cost defined as €/1000 kcal, edible portion
- Added sugars and fats cost less
- The recommended healthier foods cost more (note log scale)
Energy density (kcal/100g) and energy cost (Euros/1000kcal) – INCA study

Log scale!

Energy density (kcal/100g) and energy cost (Euros/1000kcal) – INCA study
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- oil
- butter
- sugar
- desserts
- milk
- grains
- cheese
- pasta
- meat
- fish/shellfish
- foie gras

[Graph showing the energy density and cost for various food items.]
Energy density (kcal/100g) and energy cost (Euros/1000kcal) – INCA study

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Energy density (kcal/100g) and energy cost (Euros/1000kcal) – INCA study

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Energy density (kcal/100g) and energy cost (Euros/1000kcal) – INCA study

Energy density (kcal/100g) and energy cost ($/1000kcal) – Seattle 2006 Supermarket prices
A comment about rising prices

- Seattle food prices collected in 2004 and 2006
- Same supermarkets, same foods, same packages
- The foods were split by energy density

Second question

Are energy-dense foods nutrient-poor?

- Energy-dense taste better and cost less
- But are they lacking in key nutrients?
- We need nutrient profiling and a nutrient density score
- Then we can look at nutrients per calorie and nutrients per unit cost
Examples of nutrient profiling:
Creating a nutrient density score for foods

- Nutrient Density Score is the ratio between the amount of nutrients in a food and the energy that the food provides
  \[ NDS = \frac{NAS}{ED} \times 100 \]
- Nutrient Adequacy Score is based on percent DVs for \( N \) key nutrients as provided by 100 g of food
  \[ NAS = \frac{\sum (Nutrient_i/DV_i) \times 100}{N} \]
- Nutrient-to-price ratio \( NPR = \frac{NAS}{\text{price per 100g}} \)

Maillot et al. 2007 (submitted for publication)

Fruit and vegetables have low energy density and high nutrient density

Darmon, Darmon, Maillot, Drewnowski JADA 2005
Higher nutrient-density (per 100g) usually means higher cost (also per 100g)

Darmon, Darmon, Maillot, Drewnowski JADA 2005

Third question

Do energy-dense diets cost less?

- INCA I is a nationally representative study of 1,985 French adults, based on 7-day diet records.
- Mean national food prices for >650 foods supplied by the French government (INSEE); by market research agencies (SECODIP), and by industry websites
- Diet costs estimated by multiplying unit price for each item by portion size and summing over all foods consumed by that person
- That is the estimated cost of the diet – assuming that all foods are purchased and prepared at home
At each intake quintile, higher energy density = lower cost (€/wk)

Drewnowski et al. 2007
At each intake quintile, higher energy density = lower cost (€/wk)

Drewnowski et al. 2007
At each intake quintile, higher energy density = lower cost (€/wk)

As dietary ED increases – so do total energy intakes
Last question:

What happens when you stratify diets by energy cost?

Food expenditures can be a proxy for SES

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<th>Q1</th>
<th>Q2</th>
<th>Q3</th>
<th>Q4</th>
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<td>Energy Intake</td>
<td>4.9 €/10MJ</td>
<td>5.9 €/10MJ</td>
<td>6.9 €/10MJ</td>
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<tr>
<td>Vitamin C</td>
<td>4.5 €/d</td>
<td>5.3 €/d</td>
<td>6.0 €/d</td>
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<tr>
<td>Vitamin D</td>
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<td>β Carotene</td>
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<td>9.4 €/d</td>
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<td>Folic acid</td>
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<tr>
<td>Vit E</td>
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<td>5.9 €/d</td>
<td>6.5 €/d</td>
<td>7.1 €/d</td>
</tr>
</tbody>
</table>

Low-cost diets: more energy, fewer nutrients
What do we know about food, health, and income?

Engel’s Law (1867)
As incomes rise, food costs account for lower share of incomes

Share of income spent on food in the US keeps declining

Boyd Orr: UK 1937
USDA’s Economic Research Service Food Review, 23, 2000
Consumption by income: Boyd Orr 1937

What can you get for $100/week for a family of 4.  
The USDA Thrifty Food Plan: 1999
Access to healthy foods

- Affordability
  - Energy-dense foods are cheaper
- Accessibility
  - Energy-dense foods are closer
- Convenience
  - Fast foods take less time to prepare

A challenge for public health nutrition

Less expensive | More expensive
---|---

- If a meal of grilled chicken, broccoli and fresh fruit **costs more** and is less **convenient** than a burger and fries, the battle against obesity will be lost
  - Editorial, The Lancet January 31, 2004
Are obesity and poverty linked by the low cost of energy-dense foods that are both palatable and convenient?

The paradox – it is possible to spend less and get more
But the calories will be refined grains, added sugar and fat
Conclusions:

The real cost of obesity lies in the current hierarchy of food prices and the promotion of low cost energy-dense foods.

Obesity is an economic issue.