To what extent the improvement of nutritional quality of foods contribute to public health goals?

Session: “Critical Nutrients: new evidences for health and food industry proposals”

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Many chronic diseases linked to food consumption

Several strategies for improving dietary practices can be introduced by health policy makers:
- the implementation of a "nutritional-tax"
- the implementation of a mandatory nutritional label
- the product reformulation
### Reformulation of foods

| Pros: Facilitate healthy choices by consumers, even those who are not fully informed about or conscious of the links between food consumption and health | Cons: Can result in higher production costs or additional investments (innovative processing, use of new ingredients, ...) May lead to rejection by consumers (sensory/taste modifications) |

**Examples:**
- Decreasing the salt content in restaurants or processed food (New York City, United Kingdom)
- Other nutrients targeted: saturated fatty acids (UK), trans fatty acids (USA, Denmark)
Reformulation of foods is manageable: nutrient content varies within categories of products

**BACKGROUND**

The variability in food composition is not only due to differences between product categories, but also due to composition variability within the majority of food categories.
OUR GOAL

If one assumes that individuals continue to consume the same amounts within each food category, ...

But that the nutritional characteristics of each food category have been improved in a realistic way (i.e. acceptable from both a technological and a sensorial point of view), ...

What would be the impact on the nutritional intake of individuals?
**DATA**

**nutritional characteristics of processed food items**

**Oqali database**

More than 23,000 products

Parameters:
- **Nutrient content:** energy, protein, fat, saturated fat, carbohydrates, sugars, fibre and sodium
- **All information available on the packages:** nutrition facts panels, nutrition and health claims, logos, consumption guidelines, ...

Sources:
- Product packaging
- Data from manufacturers and retailers
- Nutrient analyses

**individuals’ consumption patterns**

**INCA 2**

- Completed by the French Food Safety Agency
- Information on individuals’ daily food consumption collected in 2006 from a sample of 4000 subjects that was representative of the French population

**market shares of food items**

**TNS Kantar Worldpanel**

Provides details of the quantities bought and the corresponding food expenditures by a representative panel of 20,000 households in France
3 food groups were considered in this study:
- breakfast cereals
- biscuits/pastries
- bread-based products

In collaboration with food technologists, each group was divided into food categories corresponding to relatively homogeneous groups of products with regard to the technologies and/or ingredients used.

<table>
<thead>
<tr>
<th></th>
<th>Data available (number of items)</th>
<th>Categories of products (number)</th>
<th>Market coverage (%)</th>
<th>Improved categorie of products (number)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Breakfast cereals</td>
<td>355</td>
<td>29</td>
<td>75% (2008)</td>
<td>17</td>
</tr>
<tr>
<td>Biscuits ans pastries</td>
<td>1792</td>
<td>67</td>
<td>72% (2008)</td>
<td>22</td>
</tr>
<tr>
<td>Bread based products</td>
<td>620</td>
<td>31</td>
<td>57% (2009)</td>
<td>15</td>
</tr>
</tbody>
</table>
**METHOD: scenarios analysis**

3 scenarios of food composition modifications
The formulation of the lowest nutritional quality food items was modified to improve the overall level of quality within a given food category.

### Sugars – Fat – Sodium

**Scenario 0**
Current situation

**Scenario 1**
items that have sugars, fat or sodium content above the 3rd quartile are adjusted to meet the values of the 3rd quartile
(25% of the items are improved)

**Scenario 2**
items that have sugar, fat or sodium content above the median are modified such that the content is reduced to the median values
(50% of the items are improved)

**Scenario 3**
items that have sugars, fat or sodium content above the 1st quartile are adjusted to meet the values of the 1st quartile
(75% of the items are improved)

### Fibre

**Scenario 0**
Current situation

**Scenario 1**
items that have fiber content below the 1st quartile are adjusted to meet the values of the 1st quartile
(25% of the items are improved)

**Scenario 2**
items that have fibre content below the median are modified such that the content is increased to the median values
(50% of the items are improved)

**Scenario 3**
items that have fibre content below the 3rd quartile are adjusted to meet the values of the 3rd quartile
(75% of the items are improved)

The modifications of the nutrient content were considered independently, and the simulation results reveal the impacts if the scenarios are applied to sugars or fat or sodium or fibre.
Breakfast cereals
Biscuits and pastries
Bread-based products

TNS Kantar Worldpanel
\(\Rightarrow\) To assign a market share to each food item

INCA 2
\(\Rightarrow\) To assess the daily amounts of cereals, biscuits and pastries and bread-based products consumed by the French population
\(\Rightarrow\) Adults and children sub-populations are distinguished
\(\Rightarrow\) high consumers (above the third quartile in terms of consumption) and low consumers are distinguished

Scenarios of food composition modification

Variation in the total quantity of sugars, fat, fibre and sodium delivered to the market

Changes in the distribution of individuals consumption of these nutrients among adults and children
RESULTS: impacts on the total amount of nutrients delivered to the market

An increase in the nutritional quality of the lowest quality products within each food category can modify the total quantities of nutrients delivered to the market.
# RESULTS: Impacts on the Total Amount of Nutrients Delivered to the Market

## Quantities of Nutrients Delivered to the Market

<table>
<thead>
<tr>
<th>Food groups</th>
<th>Nutrient</th>
<th>Current situation (tons)</th>
<th>Δ1 (%)</th>
<th>Δ2 (%)</th>
<th>Δ3 (%)</th>
<th>(\text{Δ}1)</th>
<th>(\text{Δ}2)</th>
<th>(\text{Δ}3)</th>
<th>(\text{Δ}1)</th>
<th>(\text{Δ}2)</th>
<th>(\text{Δ}3)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Breakfast cereals</td>
<td>sugars</td>
<td>34049</td>
<td>-3%</td>
<td>-6%</td>
<td>-11%</td>
<td>(-993) to (-3830) t</td>
<td>(+146) to (+1105) t</td>
<td>(-1111) to (-8888) t</td>
<td>(-1352) to (-5723) t</td>
<td></td>
<td></td>
</tr>
<tr>
<td>29 categories</td>
<td>fat</td>
<td>8773</td>
<td>-4%</td>
<td>-8%</td>
<td>-13%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Study period: 2008</td>
<td>fiber</td>
<td>6101</td>
<td>2%</td>
<td>7%</td>
<td>18%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>sodium</td>
<td>389</td>
<td>-4%</td>
<td>-9%</td>
<td>-20%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Biscuits/pastries</td>
<td>sugars</td>
<td>146641</td>
<td>-1%</td>
<td>-2%</td>
<td>-6%</td>
<td>(-1111) to (-8888) t</td>
<td>(-1352) to (-5723) t</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>51 categories</td>
<td>fat</td>
<td>84467</td>
<td>-2%</td>
<td>-3%</td>
<td>-7%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Study period: 2008</td>
<td>fiber</td>
<td>14916</td>
<td>1%</td>
<td>4%</td>
<td>19%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>sodium</td>
<td>1195</td>
<td>-3%</td>
<td>-7%</td>
<td>-16%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bread-based products</td>
<td>sugars</td>
<td>37771</td>
<td>-5%</td>
<td>-9%</td>
<td>-22%</td>
<td>(+317) to (+3115) t</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>31 categories</td>
<td>fat</td>
<td>32812</td>
<td>-1%</td>
<td>-4%</td>
<td>-14%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Study period: 2009</td>
<td>fiber</td>
<td>15777</td>
<td>2%</td>
<td>6%</td>
<td>20%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>sodium</td>
<td>1939</td>
<td>-3%</td>
<td>-7%</td>
<td>-14%</td>
<td>(-49) to (-272) t</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The impacts range from 1% to 5% for S1, from 2% to 9% for S2, and from 6% to 22% for S3, depending on the food group and nutrient considered.
**RESULTS:** impacts on individuals’ nutrient consumption levels for children

<table>
<thead>
<tr>
<th>Food groups</th>
<th>Nutrient</th>
<th>S0 (g/d)</th>
<th>S1 (g/d)</th>
<th>S2 (g/d)</th>
<th>S3 (g/d)</th>
<th>Variation of nutrient consumption</th>
</tr>
</thead>
<tbody>
<tr>
<td>Breakfast cereals – 817 individuals</td>
<td>sugars</td>
<td>7.07</td>
<td>6.89</td>
<td>6.67</td>
<td>6.42</td>
<td>-2.6% to -9.1%</td>
</tr>
<tr>
<td></td>
<td>fat</td>
<td>1.32</td>
<td>1.27</td>
<td>1.21</td>
<td>1.17</td>
<td>-4.2% to -11.6%</td>
</tr>
<tr>
<td></td>
<td>fibre</td>
<td>1.01</td>
<td>1.03</td>
<td>1.07</td>
<td>1.18</td>
<td>+1.8% to +16.6%</td>
</tr>
<tr>
<td></td>
<td>sodium</td>
<td>0.071</td>
<td>0.068</td>
<td>0.065</td>
<td>0.06</td>
<td>-3.6% to -15.8%</td>
</tr>
<tr>
<td>Biscuits and pastries – 1087 individuals</td>
<td>sugars</td>
<td>2.89</td>
<td>2.88</td>
<td>2.85</td>
<td>2.77</td>
<td>-0.5% to -4.2%</td>
</tr>
<tr>
<td></td>
<td>fat</td>
<td>1.7</td>
<td>1.68</td>
<td>1.65</td>
<td>1.61</td>
<td>-1.2% to -5.1%</td>
</tr>
<tr>
<td></td>
<td>fibre</td>
<td>0.27</td>
<td>0.27</td>
<td>0.28</td>
<td>0.31</td>
<td>+0.5% to +14.6%</td>
</tr>
<tr>
<td></td>
<td>sodium</td>
<td>0.024</td>
<td>0.024</td>
<td>0.023</td>
<td>0.022</td>
<td>-1.9% to -11.0%</td>
</tr>
<tr>
<td>Bread based products – 1025 individuals</td>
<td>sugars</td>
<td>2.42</td>
<td>2.35</td>
<td>2.27</td>
<td>2.09</td>
<td>-3.0% to -13.7%</td>
</tr>
<tr>
<td></td>
<td>fat</td>
<td>2.6</td>
<td>2.59</td>
<td>2.55</td>
<td>2.34</td>
<td>-0.4% to -9.9%</td>
</tr>
<tr>
<td></td>
<td>fibre</td>
<td>0.75</td>
<td>0.76</td>
<td>0.77</td>
<td>0.89</td>
<td>+1.4% to +18.8%</td>
</tr>
<tr>
<td></td>
<td>sodium</td>
<td>0.108</td>
<td>0.105</td>
<td>0.102</td>
<td>0.098</td>
<td>-2.6% to -9.6%</td>
</tr>
</tbody>
</table>

Breakfast cereals:
- 2.6% - 9.1% decrease in the intake of sugars provided by these products
- 1.8% - 16.6% increase in the intake of fibre provided by these products

Biscuits and pastries:
- decrease in sugars intake provided by these products of 0.5% - 4.2%
- decrease in fat intake of 1.2% - 5.1%
**RESULTS:** impacts on individuals’ nutrient consumption levels for adults

<table>
<thead>
<tr>
<th>Food groups</th>
<th>Nutrient</th>
<th>Average adult consumers</th>
<th>Variation of nutrient consumption</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>S0 (g/d)</td>
<td>S1 (g/d)</td>
<td>S2 (g/d)</td>
</tr>
<tr>
<td>Breakfast cereals 317 indiv.</td>
<td>sugars</td>
<td>6.95</td>
<td>6.82</td>
</tr>
<tr>
<td></td>
<td>fat</td>
<td>2.29</td>
<td>2.26</td>
</tr>
<tr>
<td></td>
<td>fibre</td>
<td>1.9</td>
<td>1.93</td>
</tr>
<tr>
<td></td>
<td>sodium</td>
<td>0.093</td>
<td>0.092</td>
</tr>
<tr>
<td>Biscuits and pastries 927 indiv.</td>
<td>sugars</td>
<td>1.94</td>
<td>1.93</td>
</tr>
<tr>
<td></td>
<td>fat</td>
<td>1.16</td>
<td>1.15</td>
</tr>
<tr>
<td></td>
<td>fibre</td>
<td>0.2</td>
<td>0.2</td>
</tr>
<tr>
<td></td>
<td>sodium</td>
<td>0.018</td>
<td>0.018</td>
</tr>
<tr>
<td>Bread based products 1111 indiv.</td>
<td>sugars</td>
<td>2.07</td>
<td>2.02</td>
</tr>
<tr>
<td></td>
<td>fat</td>
<td>2.31</td>
<td>2.31</td>
</tr>
<tr>
<td></td>
<td>fibre</td>
<td>1.13</td>
<td>1.14</td>
</tr>
<tr>
<td></td>
<td>sodium</td>
<td>0.145</td>
<td>0.142</td>
</tr>
</tbody>
</table>

Increase in fibre intake provided by bread based products of 1%-12.1%
Decrease in sodium intake of 1.6%-8.8%
RESULTS: impacts on individuals’ nutrient consumption levels for high consumers

For children high consumers of breakfast cereals:
- the daily intake of sugars provided by breakfast cereals decreases by 0.4-1.4 g
- the daily intake of fibre increases by 0.04-0.37 g

For children high consumers of biscuits and pastries:
- the daily intake of sugars provided by these products decreases by 0.03-0.22 g
- the daily intake of fat decreases by 0.04-0.15 g

For adults high consumers of bread-based products, the simulation leads to:
- a 10-30 mg decrease in the daily intake of sodium provided by these products
- a 0.03-0.31 g increase in the daily intake of fibre
- a 0.13-0.63 g decrease in the daily intake of sugars
DISCUSSION

Limitations

1. Impacts on nutritional composition may be overestimated: food modifications in practice can be more complex than was simulated here. Example: a decrease in fat may necessitate an increase in the sugars content for technological or sensorial reasons.

2. At the same time, these impacts have been underestimated: we only considered an increase in the minimum quality within each food category. It is likely that products of a higher nutritional quality will also be modified to maintain quality differentiation within the food family.

3. It will be important for future research to assess the impact of such a strategy not only on a few select food groups, but on all processed foods.
CONCLUSION

Scenarios = implementation of minimum quality standards (MQS) within each food category
The potential magnitude of the effects suggests that such a strategy can constitute a relevant
target for public authorities

Practical application: implementation of charters of commitments between firms and the
Government (France)
The MQS approach proposed here can target health benefits through the modification of foods
in a domain that is acceptable:
   – by consumers: food products retaining their familiar tastes
   – by food companies: food products produced using well-mastered technologies

This study has shown that this strategy can yield significant results
The goals and results can be strengthened once the legitimacy of the plan increases
Thank you for your attention

For further information: