Nutrient profiling for front-of-pack labelling

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FAO/WHO Information Meeting on Front-of-Pack Nutrition Labelling, Charlottetown, Prince Edward Island, 16th May 2013
Summary

• Definitions and principles of nutrient profiling
• Purposes of nutrient profiling
  – General purposes
  – Specific applications
• Development of np models
• Validation of np models
• Nutrient profiling for front-of-pack nutrition labelling
• Some conclusions
A definition

Nutrient profiling is:
’The science of classifying or ranking foods according to their nutritional composition for reasons related to preventing disease and promoting health’

Source: WHO, Guiding Principles and Framework Manual for the development or adaptation of nutrient profile models. in press.
WHO Manual

Contents

• Definition and guiding principles
• Module 1: Planning
• Module 2: Development and adaptation
• Module 3: Validation
• Module 4: Implementation, monitoring and evaluation
A conceptual model for the relationship between nutrient profiling and health

- Healthiness of foods
- Amount and frequency of consumption
- The combination of foods
- Healthiness of a diet
- Amount and frequency of physical activity
- Health
A conceptual model for the relationship between nutrient profiling and health

- Healthiness of foods
  - Amount of consumption
  - Frequency of consumption
  - The combination of foods
- Healthiness of a diet
  - Amount and frequency of physical activity
- Health
General purposes of nutrient profiling

• Descriptions that relate to the nutrient levels in foods
  – Reduced fat, increased fibre
  – High fat, low fibre
  – Red for fat, green for fibre
  – ‘Energy dense, nutrient poor’

• Descriptions that refer directly to the effects of consuming the food on a person’s health
  – Healthier, less healthier
  – Healthy, unhealthy
Specific applications of nutrient profiling

<table>
<thead>
<tr>
<th></th>
<th>Voluntary public health interventions</th>
<th>Public health regulation</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1. Product</strong></td>
<td>Product reformulation</td>
<td>Compositional standards</td>
</tr>
<tr>
<td><strong>2. Promotion</strong></td>
<td>Front-of-pack labelling</td>
<td>Health and nutrition claims legislation</td>
</tr>
<tr>
<td>(advertising)</td>
<td>Advertising regulation</td>
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</tr>
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<td><strong>3. Place</strong></td>
<td>Place-based promotions</td>
<td>Standards for public provision (schools, hospitals)</td>
</tr>
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<td></td>
<td></td>
</tr>
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Specific applications of nutrient profiling

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Front-of-pack nutrition labelling: different formats

**Nutrients one-by-one**

Each pudding contains

- Calories: 420 (21% of your guideline daily amount)
- Sugar: 53.8g (60%)
- Fat: 14.5g (21%)
- Saturates: 8.2g (41%)
- Salt: 1.0g (17%)

**Nutrients combined**

- Healthier choice
- Ok choice
- Less healthy choice

**100**

3.

- LOW FAT: 7.7g per serving
- LOW SATURATES: 2.0g per serving
- HIGH SUGAR: 42.2g per serving
- MED SALT: 2.0g per serving

4.

NuVal 1-100
Differences between the aims of nutrient profile models

1. To give a single classification or score v keeping the nutrients separate
2. To identify healthy foods v unhealthy foods
3. To help consumers choose between foods within categories v across all foods
1. Do want nutrients to be combined to give a single classification or score or do you want to keep them separate?

### FSA/Ofcom model

<table>
<thead>
<tr>
<th>Points</th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>…</th>
<th>10</th>
</tr>
</thead>
<tbody>
<tr>
<td>Energy (kJ)</td>
<td>≤335</td>
<td>&gt;335</td>
<td>&gt;670</td>
<td>…</td>
<td>&gt;3350</td>
</tr>
<tr>
<td>Sat fat (g)</td>
<td>≤1.0</td>
<td>&gt;1.0</td>
<td>&gt;2.0</td>
<td>…</td>
<td>&gt;10.0</td>
</tr>
<tr>
<td>Total sugar (g)</td>
<td>≤4.5</td>
<td>&gt;4.5</td>
<td>&gt;9</td>
<td>…</td>
<td>&gt;45.0</td>
</tr>
<tr>
<td>Sodium (mg)</td>
<td>≤90</td>
<td>&gt;90</td>
<td>&gt;180</td>
<td>…</td>
<td>&gt;900</td>
</tr>
<tr>
<td>Protein (g)*</td>
<td>≤1.6</td>
<td>&gt;1.6</td>
<td>&gt;3.2</td>
<td>…</td>
<td>&gt;8.0</td>
</tr>
<tr>
<td>Fibre (NSP) (g)</td>
<td>≤0.7</td>
<td>&gt;0.7</td>
<td>&gt;1.4</td>
<td>…</td>
<td>&gt;3.5</td>
</tr>
<tr>
<td>Fruit, Veg &amp; Nuts (g)</td>
<td>≤40</td>
<td>&gt;40</td>
<td>&gt;60</td>
<td>…</td>
<td>&gt;80</td>
</tr>
</tbody>
</table>

For both food and drinks: scores are based on the content of nutrient in 100g.

*If food scores 11 for protein, fibre and F&V then scores 0 for protein except if scores 5 for FV&N

**Healthy/Intermediate food = 3 or less**

**Healthy/Intermediate drink = 0 or less**

**Less healthy food = 4 or more**

**Less healthy drink = 1 or more**

### FSA/Traffic light labelling model

<table>
<thead>
<tr>
<th>Fat</th>
<th>Saturates</th>
<th>Sugars</th>
<th>Salt</th>
</tr>
</thead>
<tbody>
<tr>
<td>Green (Low)</td>
<td>≤ 3.0 g/100g</td>
<td>≤ 1.5 g/100g</td>
<td>≤ 5.0 g/100g</td>
</tr>
<tr>
<td>Amber (Medium)</td>
<td>&gt; 3.0 to ≤ 20.0 g/100g</td>
<td>&gt; 1.5 to ≤ 5.0 g/100g</td>
<td>&gt; 5.0 to ≤ 12.5g/100g</td>
</tr>
<tr>
<td>Red (High)</td>
<td>&gt; 20.0 g/100g</td>
<td>&gt; 5.0 g/100g</td>
<td>&gt; 12.5g/100g</td>
</tr>
</tbody>
</table>

*Fat: 7.7g per serving
Saturates: 2.0g per serving
Sugar: 42.2g per serving
Salt: 2.0g per serving
2. Do you want to identify healthy foods or unhealthy foods (or both?)

- Healthy
- Unhealthy

Nordic keyhole

FSA(Ofcom model for marketing restrictions)
3. Do you want to help consumers choose between foods within categories or across all foods?

Healthier

Less healthy
3. Do you want to help consumers choose between foods within categories or across all foods?
3. Do you want to help consumers choose between foods within categories or across all foods?

Healthier

Less healthy
Developing a new model

1. Decide upon scope of and exemptions to the model
2. Decide on the food categories for the model
3. Decide which nutrients and other food components should be involved
4. Decide on the reference amount for the model (per 100g, per 100kJ or per serving)
5. Decide whether to use thresholds, scoring or both
6. Decide which numbers to use
2. Different models have different numbers of categories

- Australian Tick programme (71)
- Swedish keyhole (26)
- Choices International logo (23)
- Sainsbury’s traffic light scheme (6)
- FSA traffic light scheme (2)
3. Different models involve different nutrients and other food components

- Energy
- Total fat
- Saturated fat
- Trans-fatty acids
- Total carbohydrate
- Total sugar
- NME sugar
- Added sugar
- Sodium
- Vitamins:
  - A
  - C
  - E
- Minerals:
  - Iron
  - Calcium
  - Magnesium
  - Potassium
- Protein
- Fibre
- n-3 polyunsaturated fatty acids
- Fruit, vegetables and nuts
- Whole grain
- Fish
Nutrients and other food components for Nordic Keyhole

- Energy
- Total fat
- Saturated fat
- Trans-fatty acids
- Total carbohydrate
- Total sugar
- Free sugar
- Added sugar
- Sodium

- Vitamins:
  - A
  - C
  - E
- Minerals:
  - Iron
  - Calcium
  - Magnesium
  - Potassium
- Protein
- Fibre
- n-3 polyunsaturated fatty acids

- Fruit, vegetables and nuts
- Whole grain
- Fish
Nutrients for the FSA traffic light scheme

- Energy
- Total fat
- Saturated fat
- Trans-fatty acids
- Total carbohydrate
- Total sugar
- Free sugar
- Added sugar
- Sodium
- Vitamins:
  - A
  - C
  - E
- Minerals:
  - Iron
  - Calcium
  - Magnesium
  - Potassium
- Protein
- Fibre
- n-3 polyunsaturated fatty acids
- Fruit, vegetables and nuts
- Whole grain
- Fish
4. Different models have different reference amounts

Healthiness of foods

Amount and frequency of consumption

Combination of foods

Healthiness of a diet

Amount and frequency of physical activity

Health
4. Different models have different reference amounts

- Healthiness of foods
  - Amount of consumption
  - Frequency of consumption
  - Combination of foods

- Healthiness of a diet
  - Amount and frequency of physical activity

- Health
Different ways of validating np models

- Use of indicator foods
- Comparison with views of expert nutritionists
- Comparison with currently achieved diets
- Comparison with theoretically healthy diets
- Prediction of health outcomes
Validation of nutrient profiling

- Healthiness of foods
- Healthiness of a diet
- Health
Validation of nutrient profiling

Construct validity testing

Healthiness of foods → Healthiness of a diet → Health
Example: *Comparison of the way the FSA/Ofcom model classifies foods with a DQI*

Validation of nutrient profiling

Construct (predictive) validity testing

Healthiness of foods → Healthiness of a diet → Health
Example: Analysis of the way the ONQI model predicts health outcomes in the Nurses Health Study

Nutrient profiling for front-of-pack labelling

• What is the best model?
• Can we say what it is in the absence of a gold standard?
WHO Catalogue of Nutrient Profile Models

- Draft of 4\textsuperscript{th} March 2013
- 119 models indentified, 54 met the inclusion criteria
- 14: food labelling; 11: school food provision; 9: marketing restrictions
- Only 19 of the included models have been validated in any way
### Possible models for front-of-pack labelling

<table>
<thead>
<tr>
<th>Scheme</th>
<th>Responsible agency</th>
<th>Country</th>
</tr>
</thead>
<tbody>
<tr>
<td>Keyhole</td>
<td>Swedish National Food Administration, Norwegian Directorate of Health and the Norwegian Food Safety Authority, Danish Veterinary and Food Administration</td>
<td>Sweden, Norway, Denmark</td>
</tr>
<tr>
<td>Fruits &amp; Veggies—More Matters</td>
<td>National Cancer Institute, Centers for Disease Control</td>
<td>US</td>
</tr>
<tr>
<td>Healthier Choice Symbol and Healthier Snack Symbol</td>
<td>Health Promotion Board</td>
<td>Singapore</td>
</tr>
<tr>
<td>Traffic Light Labelling</td>
<td>Food Standards Agency, Department of Health</td>
<td>UK</td>
</tr>
<tr>
<td>Heart Check</td>
<td>American Heart Association</td>
<td>US</td>
</tr>
<tr>
<td>Health Check</td>
<td>Canadian Heart and Stroke Foundation</td>
<td>Canada</td>
</tr>
<tr>
<td>Protects Health Scheme</td>
<td>Slovenian Heart Foundation</td>
<td>Slovenia</td>
</tr>
<tr>
<td>Tick programme</td>
<td>Australian Heart Foundation</td>
<td>Australia</td>
</tr>
<tr>
<td>Heart Symbol</td>
<td>Finnish Heart Association and Finnish Diabetes Association</td>
<td>Finland</td>
</tr>
<tr>
<td>Choices International</td>
<td>Choice International Foundation</td>
<td>International</td>
</tr>
<tr>
<td>GI Symbol</td>
<td>Glycemic Index Limited</td>
<td>Australia and New Zealand</td>
</tr>
<tr>
<td>The Sensible Solution</td>
<td>Kraft International</td>
<td>International</td>
</tr>
<tr>
<td>Giant Food Healthy Ideas</td>
<td>Giant Food</td>
<td>US</td>
</tr>
<tr>
<td>Smart Spot</td>
<td>PepsiCo</td>
<td>International</td>
</tr>
</tbody>
</table>

+ EUFIC: Global Update on Nutrition Labelling (February 2013)
Nutrients, categories and reference amounts used by five European np models for front-of-pack labelling

<table>
<thead>
<tr>
<th>Model</th>
<th>Kcal/ kJ</th>
<th>Added Sugar</th>
<th>Total Sugar</th>
<th>Fat</th>
<th>Saturated Fat</th>
<th>Trans fat</th>
<th>Cholesterol</th>
<th>Sodium/Salt</th>
<th>Protein</th>
<th>Fibre</th>
<th>Vitamins/Minerals</th>
<th>Fats Total Nutrients</th>
<th>Categories</th>
<th>Base</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Keyhole</strong></td>
<td>8</td>
<td>26</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Per serving</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Choices International</strong></td>
<td>6</td>
<td>23</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Combination</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Finnish Heart Symbol</strong></td>
<td>6</td>
<td>42</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Per 100g</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>UK FSA Traffic Light Labelling</strong></td>
<td>4</td>
<td>2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Combination</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Sainsbury Traffic Light Labelling</strong></td>
<td>5</td>
<td>6</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td>Combination</td>
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<tr>
<td><strong>Totals</strong></td>
<td>3</td>
<td>2</td>
<td>4</td>
<td>4</td>
<td>5</td>
<td>2</td>
<td>1</td>
<td>5</td>
<td>0</td>
<td>3</td>
<td>0</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


Comparing nutrient profile models: possibilities

• Strictness
  – The percentage of foods classified as e.g. ‘healthier’ by a model
    • Overall
    • Within categories

• Agreement
  – The extent to which two models classify the same foods as e.g. ‘healthier’
    • Overall
    • Within categories
Comparing the Keyhole, Choices International and Finnish Heart Symbol: methods

• The home-shopping website of the major retailer in the UK – Tesco - was used as the sampling frame
• All of the pre-packaged foods sold through that website were sampled randomly in November 2011
• 400 foods was selected; 382 products were purchased
• Compositional data were supplemented with data from food composition tables
Comparing the Keyhole, Choices International and Finnish Heart Symbol: preliminary and unpublished results

### Strictness

<table>
<thead>
<tr>
<th>Health logo model</th>
<th>% permitted</th>
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<tr>
<td>Keyhole</td>
<td>13%</td>
</tr>
<tr>
<td>Finnish Heart Symbol</td>
<td>17%</td>
</tr>
<tr>
<td>Choices International</td>
<td>21%</td>
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Comparing the Keyhole, Choices International and Finnish Heart Symbol: preliminary and unpublished results

### Agreement

<table>
<thead>
<tr>
<th>Health logo model</th>
<th>Choices International</th>
<th>Finnish Heart Symbol</th>
<th>Keyhole</th>
</tr>
</thead>
<tbody>
<tr>
<td>Choices International</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Finnish Heart Symbol</td>
<td>0.41</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Keyhole</td>
<td>0.24</td>
<td>0.27</td>
<td>1</td>
</tr>
</tbody>
</table>

Kappa interpretation: <0.20 Poor, 0.21-0.40 Fair, 0.41-0.60 Moderate, 0.61-0.80 Good, 0.81 – 1.00 Very good
Comparing the Keyhole, Choices International and Finnish Heart Symbol: preliminary and unpublished results

Strictness within categories

- Fatty and sugary foods
- Composite foods
- Fruit and veg
- Bread, cereals and potatoes
- Meat, fish and alternatives
- Milk and dairy

Choices International
Finnish Heart Symbol
Keyhole
Conclusions

• There is a growing consensus that the same basic model can be used for different applications in different countries?

• Models where the algorithms look very different end up classifying foods in the same way

• Differences between models: are they really important?

• There is a need for further work on the validation of models to create a gold standard(s)