The UK Ofcom Nutrient Profiling (NP) Model
Defining 'healthy' and 'unhealthy' foods and drinks for TV advertising to children

Mike Rayner, Peter Scarborough, British Heart Foundation Health Promotion Research Group, Department of Public Health, University of Oxford

Tim Lobstein, International Obesity Task Force, London

Consumer groups and public health organisations have called for bans on the advertising of 'unhealthy' food to children for several decades. The definition of 'unhealthy' has been a topic of considerable argument. Food companies have resisted having any products described as 'unhealthy' but have gradually developed a number of different schemes which define products they believe are 'healthy' (or at least 'healthier') and appropriate for advertising to children. Health and consumer groups have called for a single scheme - or 'nutrient profiling model' - consistent with international recommendations for preventing chronic disease and with national food-based dietary guidelines. A simple system which could be applied to all products and with a clearly defined cut-off for defining which foods are not suitable for advertising to children would be ideal.

What sort of nutrient profiling model?

There are a number of technical questions which need to be considered:

- Which nutrients should be included?

- Should the profiling criteria differ according to the type of food being profiled, or should all foods be assessed using the same criteria?

- What is the reference amount: for example, should foods be compared per 100g, per 100 kcal or per portion or serving?

- Should the final result be presented as a single figure or as a set of figures relating to different aspects of the nutritional quality of the food?

The answers to these questions depend on the purpose of the nutrient profiling model. If the requirement is simply to define the presence of 'high' or 'low' levels of nutrients, then the methodological questions are fairly easily answered, and indeed nutrient profiling in this sense has been widely accepted for national and international legislation. Codex Alimentarius and various other bodies have defined threshold values for making 'high' and 'low' claims for nutrients in food products, per unit of food, and include specific requirements for presenting information on which a nutrient-related claim is made. A similar approach is used for claims which make comparisons such as a 'higher' or 'lower' level of a nutrient relative to similar foods.

An extension of these principles is to combine several different nutrients into a single score which can be used to show that a product is nutritionally better than another, similar one. For example, a manufacturer or retailer may promote a 'healthy eating' range, or a government or public health body may endorse a labelling scheme to identify 'better for you' products. Several schemes to identify healthier options within classes of foods are already available, such as the US manufacturers' *Smart Choices* programme (http://www.smartchoicesprogram.com/nutrition.html) and the Swedish Keyhole labelling scheme (http://www.slv.se/upload/nfa/documents/food_regulations/Keyhole_2005_9.pdf).

In 2007 a review of nutrient profiling models commissioned by the UK Food Standards Agency identified over 40 different schemes (http://www.food.gov.uk/healthiereating/advertisingtochildren/nutlab/nutprofilereview/nutprofilelitupdatedec07). More schemes have been developed since then. They vary considerably in the nutrients they consider (ranging from just a few to over 20) and whether they use different criteria according to the type of food being profiled or whether all foods are assessed using the same criteria. The *Smart Choices* scheme has different criteria for 19 different food categories, the *Keyhole* scheme has 26 food categories, and one scheme – used for the Australian Heart Foundation Tick Program (http://www.heartfoundation.org.au/sites/tick/Pages/default.aspx) has different criteria for more than 70 food categories. The schemes also vary in the reference amounts they are based upon, and in the measurement criteria they use to score the different aspects of nutritional quality.

For the purposes of defining foods suitable for advertising to children, the nutrient profiling model needs to be relatively simple to understand and to apply. An ideal model uses easily-available information, it should take into account 'positive' elements (e.g. micronutrients, fruit, vegetables and dietary fibre) and 'negative' elements (e.g. saturated fats, salt/sodium and added sugars) and it should provide a single answer which lies on a single scale that runs from 'healthy' to 'unhealthy'.

The UK model

The UK regulator for broadcast media is the Office of Communications, usually called Ofcom, and in anticipation of new regulations to control advertising to children, it requested advice on how to profile the nutrients in foods in

order to judge their suitability for advertising to children. In response, the UK Food Standards Agency commissioned the British Heart Foundation Health Promotion Research Group at Oxford University to carry out a research programme to develop a nutrient profiling model. The development of the model has been well-documented elsewhere (http://www.food.gov.uk/foodlabelling/researchandreports/nutrientprofiles). The model was formally passed to Ofcom at the end of 2005 and has subsequently been incorporated into a regulation (http://www.ofcom.org.uk/consult/condocs/foodads_new/statement). This prohibits advertising of specified food and beverages during children's programmes and programmes for which children under the age of 16 years form a disproportionate part of the audience.

In the development of the model, various prototypes were compared with each other and with a set of foods categorised for their compliance with healthy eating guidelines. This was first done relatively informally by a small 'expert group' consisting of academic nutritionists and representatives from industry, consumer organisations and public health bodies, but then more formally using an on-line survey of professional nutritionists in the UK.   The survey asked the nutritionists to assess 40 foods for their 'healthiness'.   The 40 foods were randomly drawn from 120 different food products representative of the UK diet. The professionals' ratings were compared with the ratings obtained from the prototype models (http://www.food.gov.uk/multimedia/pdfs/npreportsept05.pdf).

The best prototype model showed a close correlation with the professional ratings of $r = 0.80$ (95% CI 0.73-0.86). In this model, a single score based on a set of 'negative' indicators (energy, saturated fat, sugars and sodium) is counter-balanced by a score based on 'positive' indicators (protein, fibre and 'fruit, vegetables and nuts'). The protein score was found to be a good indicator of a range of micronutrients that would otherwise merit inclusion in the model. All measurement criteria were per 100 grams. The final model included various refinements to allow for some anomalous foods: in particular, the protein score was disallowed if the score for 'fruit, vegetables and nuts' was too low.

The model generates a final single score which determines whether the food can be advertised to children. Two threshold levels were set: one threshold for all food products and another for beverages.

Note that the model uses a 100g measure rather than actual serving size. This is justified on the basis that the model is designed to measure the nutritional quality of the food regardless of the way it is eaten. Using a 'per serving' approach would have been possible but to do so introduces several difficulties, not least of which is the fact that serving sizes and consumption patterns are an individual matter and cannot be standardised, especially across different age groups.

Early prototypes of the model gave a score for added sugars (technically non-milk extrinsic sugars), but this was later replaced with a score for total sugar, a move which received substantial support from food manufacturers who said they faced technical difficulties in analysing added sugars and that information on total sugars is a requirement of UK (based on European) food labelling legislation. The contribution of foods high in natural sugars to a balanced diet is addressed through the inclusion of criteria for protein (in which dairy products usually score well) and for fruit and vegetables.

Early prototypes also gave scores for calcium, iron and n-3 poly-unsaturated fatty acids. These were later replaced with a score for protein, primarily to make scoring foods easier (protein levels are required by food labelling legislation but calcium, iron and n-3 polyunsaturated fatty acid levels are not) but also because prototype models which gave a score for protein rather than the other three nutrients gave similar results.

Subsequent to the adoption of the model the British Heart Foundation Health Promotion Research Group have further investigated the validity of the model - and in particular have shown that people in the UK who have less healthy diets consume more of their calories in the form of foods defined as less healthy by the model.

The model was developed for the regulation of food advertising in the UK, and was tested on a range of foods in UK national databases. For use outside the UK the model should be assessed using relevant national food databases, and for international use it should be assessed on a broad range of products from different national cuisines.

Added value and further applications of nutrient profiling

A clear result of using nutrient profiling as a means of assessing eligibility for marketing is that the profiling scheme becomes a driver for product reformulation. Processed foods that fail to meet the criteria permitting their advertising to children might benefit from reformulation, enabling the manufacturer to continue to advertise them. For example, most breakfast cereals promoted on children's television are high in sugar, and some are also high in salt. It is hoped that the controls in marketing may stimulate manufacturers to produce products that are lower in sugar and salt, thereby avoiding the advertising restrictions.

Although developed for restrictions on marketing through broadcast media, the model also has the potential to be used as the basis for developing regulations for non-broadcast advertising and promotion – for example for product placements in films or for internet advertising.

Nutrient profiling models could clearly support a wide range of public health initiatives. They are already used extensively as the basis of food labelling schemes. Note however that the front-of-pack 'traffic light' labelling scheme recommended for use by the UK Food Standards Agency uses a different nutrient profiling scheme than the one that has been developed for restrictions on marketing of foods to children. The three 'traffic light' colours indicate high, medium and low levels, for each of four nutrients: fat, saturated fats, sugars and salt/sodium. Nutrient profiling could also be used to support labelling in catering outlets, where, for example, traffic light signalling could help customers select healthier items from menus in advance of ordering their food.

In order to prevent poor quality foods from being promoted with health claims on the basis of a single 'good' ingredient, nutrient profiling can be used to decide if a food is sufficiently 'healthy' to be allowed to carry a health claim. The government body responsible for health claims regulation in Australia and New Zealand (Food Standards Australia New Zealand) has adapted the UK Ofcom model for assessing whether foods should be allowed to carry health claims. Their site includes a calculator that returns a score from the model (http://www.foodstandards.gov.au/foodmatters/ healthnutritionandrelatedclaims/nutrientprofilingcal3499. cfm). The European Commission is also in the process of developing a nutrient profiling scheme that would define which foods may carry a permitted nutrition or health claim.

The use of nutrient profiling can be extended to contractual relationships: for example the quality criteria for products supplied for school meal services and institutional catering in the workplace. The health sector, armed service, prisons and elderly care could include nutritional profiling standards, which in turn could be used for contract compliance and for health impact assessments of meal service policies.

Fiscal policies designed to benefit public health may, if they are considered appropriate, also benefit from using nutrient profiling as an assessment tool. One criticism made of the suggestion to impose a tax on foods such as soft drinks and snack foods is the difficulty of administering the tax because of the problem of defining what constitutes a soft drink, a snack food, etc. Nutrient profiling provides a method for categorising foods for taxation or subsidy. A taxation system based on nutrient profiling would also encourage manufacturers to reformulate their recipes and adjust their product portfolio.

The UK Ofcom nutrient profiling model in detail

The model provides a single score for any given food product, based on calculating the number of points for 'negative' nutrients which can be offset by points for 'positive' nutrients. Points are allocated on the basis of the nutritional content in 100g of a food or drink.

There are three steps to working out the overall score for the food or drink.

1. Calculate the total 'A' points

A maximum of ten points can be awarded for each ingredient (energy, saturated fat, sugar and sodium). The total 'A' points are the sum of the points scored for each ingredient.

Total 'A' points = [points for energy] + [points for saturated fat] + [points for sugars] + [points for sodium]

Points	Energy (kJ)	Sat Fat (g)	Total Sugar (g)	Sodium (mg)
0	≤ 335	≤ 1	≤ 4.5	≤ 90
1	>335	>1	>4.5	>90
2	>670	>2	>9	>180
3	>1005	>3	>13.5	>270
4	>1340	>4	>18	>360
5	>1675	>5	>22.5	>450
6	>2010	>6	>27	>540
7	>2345	>7	>31	>630
8	>2680	>8	>36	>720
9	>3015	>9	>40	>810
10	>3350	>10	>45	>900

If a food or drink scores 11 or more 'A' points then it cannot score points for protein unless it also scores 5 points for fruit, vegetables and nuts.

2. Calculate the total 'C' points

A maximum of five points can be awarded for each ingredient. The total 'C' points are the sum of the points for each ingredient (note that you should choose one or other of the dietary fibre columns according to how the fibre content of the food or beverage was calculated).

Total 'C' points = [points for fruit, vegetables and nut content] + [points for fibre (either NSP or AOAC)] + [points for protein]

NB. Guidance on scoring fruit, vegetables and nut content is available from the Food Standards Agency (http://www. foodstandards.gov.uk/multimedia/pdfs/nutprofpguide.pdf).

Points	Fruit, Veg & Nuts (%)	NSP Fibre (g)	or AOAC Fibre (g)	Protein (mg)
0	≤ 40	≤ 0.7	≤ 0.9	≤ 1.6
1	>40	>0.7	>0.9	>1.6
2	>60	>1.4	>1.9	>3.2
3	-	>2.1	>2.8	>4.8
4	-	>2.8	>3.7	>6.4
5	>80	>3.5	>4.7	>8.0

3. Calculate the overall score

If a food scores less than 11 'A' points then the overall score is calculated as follows:

Overall score = [total 'A' points] minus [total 'C' points].

If a food scores 11 or more 'A' points but scores 5 points for fruit, vegetables and nuts then the overall score is calculated as follows:

Overall score = [total 'A' points] minus [total 'C' points]

If a food scores 11 or more 'A' points but also scores less than 5 points for fruit, vegetables and nuts then the overall score is calculated without reference to the protein value, as follows:

Overall score = [total 'A' points] minus [fibre points + fruit, vegetables and nuts points only]

The model can be adjusted to take account of changes in public health nutritional policy. Within the model any threshold can be defined according to the judgment of the policy makers and their scientific advisers. For the purposes of the advertising controls introduced in the United Kingdom:

a **food** is classified as 'less healthy' where it scores **4 points or more**, and

a **drink** is classified as 'less healthy' where it scores **1 point or more**.

Frequently asked questions

There are a number of frequently asked questions about how to use the model to calculate scores for products. One of the most frequently asked questions is: 'What counts as a food and what as a drink?' For the purpose of the model a drink is defined as 'any liquid food, excluding oils, soups, condiments (vinegar, salad cream etc.) and dressings.'

Answers to other questions such as 'Should scores be calculated for products as eaten or as sold?', 'How do you calculate the scores for foods where nutritional information is provided by volume rather than weight?' and worked examples are available in technical advice provided by the Food Standards Agency (http://www.food.gov.uk/multimedia/pdfs/techguidenutprofiling.pdf).

The model can be adjusted so that points for foods and drinks fall on a scale from 1 to 100 where 1 is the least healthy and 100 is the most healthy product using a simple formula: NUTRITION PROFILING INDEX SCORE = (-2)*OLD SCORE + 70

The table below gives an indication of how the model categorises foods.

Examples of foods that can and cannot be advertised according to the UK Ofcom nutrient profiling model

Foods that can be advertised (points <4 for foods; <1 for drinks)	Foods that cannot be advertised (score ≥4 for foods; score ≥1 for drinks)
Wholemeal and white bread	Potato crisps including low fat
Muesli and wheat biscuit cereal with no added sugar	Most breakfast cereals
Fresh fruit	Cheddar cheese, half and full fat
Most nuts	Butter and margarine
Takeaway salads with no dressing or croutons	Most sausages and burgers
Most brands of baked beans	Raisins and sultanas
Some brands of baked oven chips	Cookies
Some brands of chicken nuggets	Confectionary
Fish fingers	French fries
Chicken breast	Peanut butter
Unsweetened fruit juice	Mayonnaise, reduced and full calorie
Skimmed, semi-skimmed and whole milk	Most pizzas
Diet cola	Sweetened milkshakes
	Cola and other carbonated sweetened drinks

Note that some of these classifications depend on the particular recipe for the product.

Source: Annex II of Rayner M, Scarborough P, Boxer A, Stockley L. Nutrient profiles: Development of final model. London: Food Standards Agency, 2005. (http://www.food.gov.uk/multimedia/pdfs/nutprofr.pdf)

Annotated reading list about the UK Ofcom nutrient profile model

The history of the model.

These reports describe the development of the UK Ofcom nutrient profiling model.

1. Rayner M, Scarborough P, Stockley L. Nutrient Profiles: Options for definitions for use in relation to food promotion and children's diets. London: Food Standards Agency, 2004. http://www.food.gov.uk/multimedia/pdfs/nutrientprofilingfullreport.pdf

2. Stockley L. Report on a scientific workshop to assess the Food Standards Agency's proposed approach to nutrient profiling. London: Food Standards Agency, 2005. http://www.food.gov.uk/multimedia/pdfs/nutprofworkshop250205.pdf

3. Rayner M, Scarborough P, Stockley L, Boxer A. Nutrient Profiles: Further refinement and testing of model SSCg3d. London: Food Standards Agency, 2005. http://www.food.gov.uk/multimedia/pdfs/npreportsept05.pdf

4. Rayner M, Scarborough P, Boxer A, Stockley L. Nutrient profiles: Development of final model. London: Food Standards Agency, 2005. http://www.food.gov.uk/multimedia/pdfs/nutprofr.pdf

The model was agreed at a board meeting of the UK Food Standards Agency held on 13th October 2005. See the minutes of this meeting. http://www.food.gov.uk/aboutus/ourboard/boardmeetings/boardmeetings2005/boardmeeting101305/boardminutes131005

Ofcom agreed to use the model in February 2007. See Office of communications. Television Advertising of Food and Drink Products to Children Final statement. London: Ofcom, 2007. http://www.ofcom.org.uk/consult/condocs/foodads_new/statement/statement.pdf

In 2007 the UK Food Standards Agency set up an Independent Review Panel to assess 'the effectiveness of the nutrient profiling model at differentiating foods on the basis of their nutrient composition'. As part of that review the BHF Health Promotion Research Group was commissioned to carry out a review of nutrient profiling models. See:

5. Stockley L, Rayner M, Kaur A . Nutrient profiles for use in relation to food promotion and children's diet: Update of 2004 literature review. London: Food Standards Agency, 2008. http://www.food.gov.uk/healthiereating/advertisingtochildren/nutlab/nutprofilereview/nutprofilelitupdatedec07

The Independent Review Panel finished its work in March 2009. See the report of their review for a board meeting of the UK Food Standards Agency of 25th March 2009. http://www.food.gov.uk/multimedia/pdfs/board/fsa090306v2.pdf

At this meeting the UK Food Standards Agency accepted the finding of the Independent Review Panel 'that the nutrient profiling model was generally scientifically robust and fit for purpose' and considered that there was no need to modify the model for the time being. See the minutes of this meeting. http://www.food.gov.uk/multimedia/pdfs/board/boardmins090325.pdf

Papers on the model published in peer-reviewed journals

Meanwhile the BHF Health Promotion Research Group has published a series of papers relating to the development of the model and its validation. These publications include the following:

6. Rayner M, Scarborough P, Williams C. The origin of Guideline Daily Amounts and the Food Standards Agency's guidance on what counts as 'a lot' and 'a little'. *Public Heath Nutrition* 2003: 7 (4); 549-556.

7. Scarborough P, Rayner M, Stockley L. Developing nutrient profile models: a systematic approach. *Public Health Nutrition* 2007: 10; 330-336.

8. Scarborough P, Rayner M, Stockley , Black A. Nutrition professionals' perception of the 'healthiness' of individual foods, *Public Health Nutrition* 2007: 10; 346-353.

9. Scarborough P, Boxer A, Rayner M, Stockley L. Testing nutrient profile models using data from a survey of nutrition professionals, *Public Health Nutrition* 2007: 10; 337-345.

10. Arambepola C, Scarborough M, Rayner M. Validating a nutrient profile model, *Public Health Nutrition* 2008: 11; 371–378.

11. Arambepola C, Scarborough P, Boxer A, Rayner M. Defining 'low in fat' and 'high in fat' when applied to a food. *Public Health Nutrition* 2009: 12: 341-350.

And other papers have discussed the model including:

Azais-Braesco, V, Goffi, C, Labouze, E. Nutrient profiling: comparison and critical analysis of existing systems. *Public Health Nutrition* 2006; 9(5): 613–622.

Lobstein T, Davies S. Defining and labelling 'healthy' and 'unhealthy' food. *Public Health Nutrition* 2009: 12; 331-340.