



Paper for discussion:

Agenda Item: 1

Members are requested to discuss the paper and are asked to agree that:

- The procedure used to develop a Nutrient Profiling model has been sufficiently robust for the intended purpose.
- The model has, throughout its development, been tested using appropriate methods and in a transparent manner.
- The model appropriately classifies foods, in the context of the purpose for which it has been developed.



ASSESSMENT OF NUTRIENT PROFILING MODEL DEVELOPED BY THE FOOD STANDARDS AGENCY

Introduction

1. At its meeting in February 2005 SACN supported the need for the development of a nutrient profiling model, and whilst noting the difficulties in producing a model, were supportive of the approach taken to develop the model that the Agency was consulting on at that time (that model is referred to below as 'SSCg3d').¹ Some issues for further consideration were however raised. The Committee also requested the opportunity to comment further as development of the model was taken forward, and that individual members continue to be closely involved with the development work.

Issue

This paper has three main objectives to:

- Update the Committee on the work undertaken since it last considered the nutrient profiling model being developed by the Agency to help restrict broadcast advertising of less healthy foods.
- Describe the action that has been taken to address the scientific and technical issues raised by the Committee at its meeting in February 2005, and the Committee's request that individual members of the committee be involved in the development work.
- Seek the views of the Committee on the appropriateness and suitability of the refined nutrient profiling model (referred to below as 'WXY') as a technically sound and practical device to assist Ofcom control the advertising and promoting of food (i.e. to restrict the advertising of less healthy foods).

Action Sought

2. The Committee is invited to consider the work undertaken by the Agency to refine nutrient profiling model SSCg3d and to comment on the suitability of the resulting

¹ SACN/05/04 – Discussion Paper: SACN Response to Nutrient Profiling Consultation

model WXY to help distinguish less healthy foods from healthier choices. Examples of how model WXY classifies individual foods are shown in Annex C.

It is specifically asked to agree that:

- The procedure used to develop a Nutrient Profiling model has been sufficiently robust for the intended purpose.
- The model has, throughout its development, been tested using appropriate methods and in a transparent manner.
- The model appropriately classifies foods, in the context of the purpose for which it has been developed.

Background

3. The Agency's Action Plan on Food Promotions and Children's Diets, and the Department of Health White Paper: *Choosing Health*, contain a series of commitments aimed at redressing the current imbalance in the way foods are promoted to children. In support of these commitments, the Agency commissioned research to develop a nutrient profiling model which could be used as a mechanism to help restrict broadcast advertising of foods which are considered less healthy to children.
4. This work was taken forward by the British Heart Foundation Health Promotion Research Group who were commissioned to develop the profiling model, in conjunction with an Expert Group (comprising nutrition scientists; dieticians; food industry and consumer organisation representatives; and policy makers) which was convened by the Agency to act as an external body to input into the scientific development and scrutiny of the model for the intended application. Professor John Cummings and Professor Annie Anderson from SACN were invited by the Agency to participate in the expert working group meetings, which have been held to refine and test the model. An expert group of nutrition professionals has been involved in each stage of the model development work. In addition, assessments generated by the model as to the healthiness of individual foods have been compared with expert opinion and healthy eating advice to ensure consistency with that advice.
5. The Agency held a full public consultation exercise on an earlier version of the model in November last year. As part of this consultation activity, the Agency also held a Scientific Workshop to discuss the development of the model, described in more detail in paragraph 14 below.
6. Throughout the development of the model, the Agency's aim has been to devise a model that identifies foods high in fat, salt or sugar, while recognising the positive

contribution of other foods to a balanced diet (such as dairy, meat and fish products, fruits and vegetables and some cereal based foods). The work has also taken account of initiatives to reduce salt intake, promote the Department of Health's 5-a-day campaign, and the principles of the Balance of Good Health model.

Development of Model SSCg3d

7. Initial development of the model focused on the 'target' macronutrients of fat, saturated fat, sugar and sodium, as well as energy density, as being those most relevant to the policy objectives. The early stages of the project concentrated on considering the appropriate measures for these nutrients (e.g., considering approaches based on total fats, saturated fats and total energy) and how best they might be combined. The nutrients saturated fat, NME sugar and sodium, and a measure of energy density, were subsequently included in model SSCg3d.
8. It was recognised that some categories of food, while high in fat or sugar, play a positive role in the diet (such as dairy products, meat products and fruit). To ensure that the model recognised the contribution such foods make to a balanced diet, 'balancing' nutrients were chosen to act as markers of these foods. The micronutrients calcium, iron and n-3 PUFA's, as well as a measure of fruit and vegetable content were incorporated into model SSCg3d following testing that showed them to be effective in identifying foods from the dairy products, meat and fish products, oily fish, and fruit and vegetable based products respectively.
9. In choosing the scoring thresholds for each nutrient, the expert group agreed to link the thresholds to COMA and SACN dietary recommendations in a transparent way. This was achieved by deriving Guideline Daily Amounts (GDA) for each nutrient / food component on the basis of Dietary Reference Values (DRV's) or other COMA / SACN dietary goals.² Scoring thresholds were set at equal increments of the GDA for each target nutrient (i.e. the score for a given proportion of the GDA for one nutrient was equivalent to the same as the same proportion of the GDA for other nutrients). Initial testing activities concentrated on establishing the most appropriate proportion of the GDA on which to base these increments. The scoring thresholds for n-3 PUFAs and fruit and vegetable content were set to take account of DH / FSA advice on the consumption of *portions* of oily fish, fruit and vegetables (i.e., such that maximum scoring points were awarded for a full portion). Testing demonstrated that this approach classified foods appropriately.

² Department of Health, *Dietary Reference Values for Food Energy and Nutrients for the United Kingdom* (1991).

There is currently no widely accepted GDA value for total sugars. The scoring thresholds for total sugar, which were later included in model WXY, were therefore based on the figure of 90g currently being proposed by the Institute of Grocery Distributors (IGD).

10. Three different ways of measuring the nutrients were also assessed: per 100g, per portion and per 100kJ, as well as combinations of these bases. Choice of base was found to have little effect on the overall accuracy of models.
11. The expert group considered that the “per 100g” base had the advantage of transparency and simplicity. By contrast, a “per portion” base posed significant practical difficulties, including the difficulty of defining and agreeing portion sizes, and the potential for the manufacturer’s quoted portion size to be manipulated to ‘improve’ the profiling score. On the basis of the results of testing, and with regard to the practical concerns noted above, the expert group agreed that the per 100g base was the most appropriate means of measuring nutrient content.
12. A matrix of potential models was developed and tested to identify the components that were most effective. The results of three separate tests were used by the Expert Group to help assess each potential model:
 - A statistical accuracy test, based on the model correctly classifying indicator panels of approximately 200 “healthier” and “less healthy” foods;
 - A statistical ‘spread test’ that examined the proportion of a database of around 1000 foods classified by the model as “less healthy”, “intermediate”, or “healthier”;
 - A qualitative assessment of how the models categorised approximately 120 key “example indicator foods”, representing the food groups on which healthy eating advice (the Balance of Good Health) is based.

Consultation Activity on Model SSCg3d

13. In November 2004, the Agency launched a 12-week public consultation on model SSCg3d. Over 80 responses to the formal consultation were received from a wide range of stakeholders including food manufacturers, public health bodies, local authorities and consumer organisations. A full summary of responses is available on the Agency’s website.³
14. As part of the consultation process, the Agency held a scientific workshop to seek the views of nutrition and public health academics on model SSCg3d, the way in which it had been developed and its suitability for policy applications. Around 30 delegates attended the workshop, which was chaired by SACN member Professor Annie Anderson. Most of the participants were independent academic nutrition scientists from the UK, with international experts, and a representative from the European Commission as well as members of the expert group also attending. Overall, the workshop attendees supported the approach the Agency had taken to develop a nutrient profiling model that could be used to underpin policies relating to advertising

³ www.food.gov.uk/healthiereating/nutres/nutprof/

restrictions, and agreed that the model should go forward into a phase of further testing.⁴

15. Although the nutrient profiling model was originally developed with respect to recommended dietary intakes for children aged 11-16, a separate study commissioned by the Agency found the model to be equally suitable to all people over the age of 5 years, subject to further consideration of the threshold for salt.⁵ Those who attended the scientific workshop shared this view.

Work to refine the model – development of model WXY

16. A number of suggestions for possible refinements to model SSCg3d were made in the consultation, and at the academic workshop. In addition, SACN members made the following observations about model SSCg3d:

- Absence of a measure of fibre or wholegrain had a detrimental effect for bread and cereal based products.
- The scoring system used in the model did not differentiate adequately between fats.
- A food high in fat, salt or sugar could potentially obtain an inappropriately 'healthier' score by virtue of its content of 'balancing' nutrients.
- A food might be fortified with 'balancing' nutrients in order to improve its rating, and that the eventual model should be robust against such manipulation.

17. The expert group met in April to discuss these comments and also to consider the refinements suggested by other stakeholders. As a result of this meeting, the group agreed that refinement should be undertaken to address five broad issues:

- A refinement to take account of *carbohydrate quality* – initial approaches to include the inclusion of criteria for total sugars (to replace NME sugars) and fibre.
- A refinement to take account of the nutrient density of foods, by *introducing a water content criterion*.
- A refinement to recognise the importance to the diet of foods from the meat, fish and alternatives category of the Balance of Good Health whilst avoiding the limitations of the approach used in SSCg3d: initial approaches to include the use of protein as an alternative marker to iron, calcium and n-3 PUFAs.
- A refinement to improve the differentiation within the fats and oils category; initial approaches to include: capping the points score for energy density, and removing the energy density criterion.
- A refinement to the weighting of scores for fruit and vegetable based foods: initial approaches to include a lower ceiling in the points score for fruit and vegetable content.

⁴ A detailed note of the outcomes of the meeting can be viewed at:
<http://www.food.gov.uk/healthiereating/nutres/nutprof/workshop250205>

⁵ <http://www.food.gov.uk/multimedia/pdfs/nutprofmodelforadults.pdf>

18. The suggested refinements were tested in two stages. The first round of testing examined each of the proposed modifications individually, to allow an assessment of whether they were likely to improve the effectiveness of the model. The outcomes of this testing are described in Annex A. The second round of testing concentrated on combining the individual refinements identified as helpful in the first round into a complete model. On the basis of this further testing, the contractor recommended two models for further consideration by the expert group:
- **Model WXY1** - which incorporates criteria for: energy, total sugars, fibre, saturated fat, sodium, protein and fruit and vegetables.
 - **Model 1.1A** - which incorporates criteria for: energy, non-milk extrinsic sugars (NMES), fibre, saturated fat, sodium, calcium, iron, n-3 fatty acids and fruit and vegetables.
19. During the development of model WXY1, the contractor tested a number of variations of the model to investigate whether basing the fibre criteria on an AOAC rather than NSP measure made a significant difference to the accuracy of the model. This followed concerns expressed by stakeholders that analysis of NSP fibre presented more practical difficulties than the analysis of AOAC fibre. The results of the testing indicated that, with the use of an appropriate conversion factor, the way in which fibre was measured made little difference to either the individual classification of foods, or to the overall accuracy of the model. The database for this testing was limited however. In view of concerns about the potential for individual foods to achieve inappropriately high scores and because of the fact that the NSP method is recognised as being the more scientifically sound method for fibre analysis, the expert group agreed to recommend that the NSP measure fibre be used in conjunction with the model. The group agreed that it would be appropriate to review this recommendation in the light of new scientific data becoming available.
20. The Expert Group agreed that, of these models, model WXY1 showed the most promise, appropriately ranked foods, and offered a number of practical benefits. The Group agreed that work should be taken forward on this model to establish the scoring thresholds that would define “less healthy” foods for the purposes of further broadcast advertising restrictions. The Expert Group also agreed that it was important also to agree a second scoring threshold to define “healthier choices” to support actions to encourage the positive promotions of such foods. The Expert Group did not feel it appropriate to set a similar threshold in the case of drinks, in view of the different role played by drinks in nutrient intake. The final model with the agreed scoring thresholds is shown in full at Annex B. Examples of how the model rates individual foods are given at Annex C.

21. The Expert Group had previously agreed that further work should be undertaken to develop panels of indicator foods to allow more rigorous accuracy tests to be carried out, and to involve nutrition professionals in establishing these indicator panels. The views of practising nutrition professionals were therefore obtained by means of on-line questionnaire.
22. The on-line questionnaire was e-mailed to members of the Nutrition Society, and to Dieticians on the BDA's Community and Paediatric registers. The questionnaire included 120 foods, which were chosen with reference to NDNS data to ensure the list was representative of actual diets. Respondents were asked to rate a random selection of 40 of the foods on a scale of 1 to 6. The results of the on-line questionnaire were used to provide a mean rating for each food, as well as an indication of the level of consensus between respondents around that rating.
23. Responses to the questionnaire from over 700 nutrition and dietetic professionals were included in the analysis. There was a high level of agreement between respondents as to the appropriate rating of each food. The mean rating for each food was compared to the points score for that food as given by model WXY. There was a good co-relation between the scores, demonstrating a strong level of agreement between model WXY and the views of a large sample of nutrition and dietetic professionals. A full report of the exercise will be published in the autumn.
24. The work to refine and test model SSC3gd has led to the development of model WXY which has a number of clear benefits over its predecessor both in terms of its scientific and practical suitability for the intended application.

Annex A

Area for refinement	Specific refinements tested	Outcomes
1. Examine a refinement to investigate an alternative approach to take account of carbohydrate quality – initially this will be the inclusion of criteria for total sugars and fibre (to replace NME sugars).	1.1 Fibre (NSP) criterion added; 1.2 NMES replaced with total sugars criterion; 1.3 NMES replaced with total sugars and fibre (NSP) criteria.	The Expert Group agreed that refinement 1.3 was the most helpful. This refinement classified cereal-based products more appropriately (and in particular, breakfast cereals and bread products). The refinement also addressed the practical issue of defining and analysing for NME sugars.
2. Examine a refinement that takes account of the nutrient density of foods, by introducing a water content criterion.	2.1 Water content multiplier added; 2.2 Energy density removed, water content multiplier added.	The Expert Group agreed that neither of these refinements were helpful. These refinements constituted a significant change to the basis of the model, and both had the effect of significantly disrupting the classification of products across all categories.
3. Examine an alternative approach to recognising the importance to the diet of foods from the meat, fish and alternatives category of the Balance of Good Health: initial approaches should include the inclusion of protein as an alternative marker to iron, calcium and n-3 PUFAs.	3.1 Iron and calcium replaced with protein criterion; 3.2 Iron, calcium and n-3 fatty acids criteria replaced with protein criterion.	The Expert Group agreed that refinement 3.2 was the most helpful. This refinement classified products from the meat, fish and alternatives category appropriately as well as improving the accuracy of the model with respect to dairy products. The refinement also offered the practical advantages of obviating the need for further analysis of products (i.e., above that required for nutritional labelling) and resolved the group's concern about the inappropriate fortification of foods with iron or calcium.
4. Examine a refinement to further differentiate fats and oils; initial approaches should include: capping the points score for energy density, and removing the energy density criterion.	4.1 Energy density scores capped at lower level; 4.2 Energy density and saturated fat replaced with a fat quality criterion.	Neither of these refinements proved effective in allowing better differentiation of fats and oils without disrupting the classifications of other products. The expert group agreed that it may be possible to address the classification of fats and oils by other routes, such as by agreeing separate overall points threshold for these products.
5. Examine a refinement to the weighting of scores for fruit and vegetable content: initial approaches should include a lower ceiling in the points score for fruit and vegetable content.	5.1 Fruit and vegetables scores capped at lower level; 5.2 All 'C' nutrient scores capped at lower level; 5.3 Ceiling removed for 'A' nutrients.	The Expert Group agreed that refinement 5.2 was the most helpful refinement. This refinement ensured that foods with high levels of the 'balancing nutrients' that are also high in fat, salt or sugar would be appropriately classified.

Nutrient Profiling Model WXY

This is a “simple scoring” system, where points are allocated on the basis of the nutritional content in 100g of the food or drink. There are three steps to working out the overall score for the food or drink - as follows:

1. Step one: Work out total ‘A’ points

A maximum of ten points can be awarded for each nutrient.

Total ‘A’ points = (points for energy) + (points for saturated fat) + (points for sugars) + (points for sodium)

The following table indicates the points scored, depending on the content of each nutrient in 100g of the food:

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

2. Step two: Work out total ‘C’ points

A maximum of five points can be awarded for each nutrient. / food component.

Total ‘C’ points = (protein) + (points for fibre) + (points for fruit and veg content)

The following table indicates the points scored, depending on the content of each nutrient / food component in 100g of the food:

Points ⇒	0	1	2	3	4	5
Protein (mg)	<1.6	≥1.6	≥3.2	≥4.8	≥6.4	>8.0
Fibre (mg)	<0.7	≥0.7	≥1.4	≥2.1	≥2.8	>3.5
Fruit & Veg (%)	<30	≥30	≥50	-	≥70	100

3. Step three: Work out overall score

Overall score = (total ‘A’ points) minus (total ‘C’ points)

- A **food** is classified as “less healthy” where it scores **4 points or more**; and as a “healthier choice” where it scores **zero points or less**.
- A **drink** is classified as “less healthy” where it scores **1 point or more**.

Examples of Foods Rated by the Current Model

The following examples are based on data from McCance and Widdowson Food Composition Tables. These data are representative of foods on the market, although some variation within products is to be expected (e.g., between different brands of corn flakes). **The following is intended as an indicative list.**

The overall points score for each food is given below in parentheses.

- **Breakfast Cereals**

High in saturated fat, salt or sugar: Bran Cereal (6); Sugar Coated Puffed Oats (7); Corn Flakes (10); Honey and Nut Corn Flakes (14)

Intermediate Products: Muesli (3); Shreddies (3)

Healthier Choices: Shredded Wheat (-6); Oatmeal (-5); Ready Brek (-5); Weetabix (-3); Muesli with no added sugar (-2);

- **Fast Food**

High in saturated fat, salt or sugar: Takeaway Quarter-pounder with Cheese (5); Takeaway Chicken Nuggets (6); French Fries (7); Takeaway Hamburger (7);

Intermediate Products: Cheese and Tomato Thin Base Pizza (3); Takeaway Egg Fried Rice (3)

Healthier Choices: Takeaway Stir Fried Vegetables (-4); Takeaway Pizza Fish Topped (-3)

- **Confectionery**

High in saturated fat, salt or sugar: Candied popcorn (11); Chew Sweets (15); White Chocolate (18); Chocolate Wafer Bar (18); Mixed Toffees (25)

- **Snacks**

High in saturated fat, salt or sugar: Roasted and Salted Peanuts (10); Dry Roasted Peanuts (13); Potato Crisps (16); Corn Snacks (22)

Intermediate Products: Plain Popcorn (3); Fruit Fromage Frais (3); Fruit Maltloaf (3)

Healthier Choices: Strawberries (-5); Cherries (-4); Grapes (-2); Low Fat Fruit Yoghurt (0)

- **Drinks**

High in saturated fat, salt or sugar: Lemonade (1); Cola (2); Thick Takeaway Milkshake (2)

Healthier Choices: Orange Juice (-4); Apple Juice (-3); Skimmed Milk (-2); Semi-skimmed Milk (0); Whole milk (0); Tea without milk (0)

▪ Other Foods

High in saturated fat, salt or sugar: Potato Croquettes, fried (4); BLT sandwich, white bread (5); Microwave chips (6); Economy Burgers (12); Chocolate Fudge Cake (15); Streaky Bacon, fried (18)

Intermediate Products: Mashed Potato (with butter) (1); White Bread (1) Spaghetti Bolognese (1); Roasted Chicken Leg (2); Pork loin chops (2); Lasagne (3); Cod Fish Fingers (3)

Healthier Choices: Apples (-5); Fresh Pasta (-4); Grilled Chicken Breast (-4); Wholemeal Bread (-3); Bananas (-1); Roasted Beef Topside, lean (-1); Roast Leg of Lamb, lean (0); Low Fat Yoghurt (0)