

**Nutrient profiles: Options for  
definitions for use in relation to food  
promotion and children's diets**

**Final report**

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## **EXECUTIVE SUMMARY**

Diet and obesity are important factors in determining risk of cancer, stroke and coronary heart disease. Health promotion targeted solely at individuals has not been successful in arresting the ongoing rise in prevalence of obesity, and this has led the Food Standards Agency to consider new approaches which have the potential to reinforce healthy eating advice, and make it easier for consumers to make healthy choices. The Agency's Action Plan on Food Promotions and Children's Diets, for example, seeks to address the imbalance in the way foods are currently promoted to children and their carers.

Although many would argue that the overall balance of the diet is more important than the individual foods consumed, it is the "imbalance" in the consumption of individual foods that can contribute to health problems. In addition, dietary surveys provide clear evidence of the areas in which children's diets in particular need to improve, i.e., by reducing their consumption of fat (especially saturated fat), salt and sugar, and increasing their consumption of fruit and vegetables. It is therefore appropriate to consider nutrient profiling, which can be defined as "the science of categorising foods according to their nutritional composition", to enable interventions that differentiate between foods on this basis. Various nutrient profiling systems have been developed throughout the world, and applied in a variety of consumer information and regulatory contexts. However, there is often a lack of detail available about the criteria underpinning these systems, or the scientific rationale on which they have been based.

The purpose of this project was to develop a nutrient profiling model to support the Agency's work to redress the current imbalance in the way foods are currently promoted to children. This will include advice on nutrition and health claims aimed specifically at children, and advice on the balance of TV advertising for foods during children's programming. The work was based on existing Government healthy eating advice, and built on modelling work carried out in connection with the Department of Health's 5 A DAY initiative. The models developed focused on children aged from 11 to 16, although they are likely to be applicable to other age groups, and work extending the principle in this way is in hand.

The work was overseen by an Expert Group, comprising nutrition scientists; dietitians; food industry and consumer organisation representatives; and policy makers. The research took a systematic approach to developing models, taking account of public health recommendations, basing criteria on Guideline Daily Amounts and Dietary Reference Values. The expert group assessed the success of each model on its overall performance against three factors:

- A statistical test of accuracy, based on the model correctly classifying indicator panels of approximately 200 “healthier” and “less healthy” foods.
- The proportion of a database of around 1000 foods, that was classified by the model as “less healthy”, “intermediate”, or “healthier”.
- The Expert Group’s qualitative assessment of how the models categorised approximately 100 key “example indicator foods”, representing the food groups on which healthy eating advice (the Balance of Good Health) is based.

The report recommends one model that, with further refinement, could form the basis of a workable system. This is a scoring model that takes account of energy, saturated fat, non-milk extrinsic sugars, and sodium; and the degree to which these nutrients are balanced by calcium, iron, long chain n-3 polyunsaturated fatty acids, and fruit and vegetable content. The model therefore identifies foods high in fat, salt or sugar, while recognising the important contribution of dairy, meat, fish, and fruit and vegetable based products to a balanced diet. The flexibility provided by the scoring system means that the model could be adapted to suit a range of applications.

Further work will be required to refine the model; to test it against a wider range of foods; and to consider how it might be applied in practice and communicated to stakeholders. The expert group was particularly keen for the model to be tested against a wider range of foods. The report therefore recommends:

- the development of a database of food composition data with which to test the preferred model;
- devising further panels of ‘healthier’, ‘intermediate’ and ‘less healthy’ indicator foods, across a wider range of food groups;
- considering what modifications to the proposed model would be necessary for its use for other age groups;
- assessing the acceptability of the model to both experts and consumers; and considering communication and support issues for consumers, health and other professionals, and the food industry as appropriate.

In summary, this work represents a significant step forward beyond nutrient profiling previously used in the UK or elsewhere. The model that has been developed has potential for use to underpin a range of interventions, including some involving consumer information and public health messages. The approach used delivers the opportunity to encourage product formulation and innovation with public health benefits. Although further work on the model will be required before it is ready for use in these contexts, the results of this work demonstrate that nutrient profiling can be made to work in practice.

## SUMMARY

### Background

1. The type of foods eaten and the frequency with which they are consumed is associated to varying degrees with several chronic diseases, including cardiovascular disease, Type 2 diabetes, some types of cancer and dental caries and also the precursors to these diseases – in particular obesity and hypertension. The continuing high levels and, in some cases, the increasing rates of diet-related diseases have recently been highlighted in several high-profile reports, including a report on public health for the Prime Minister, the Secretary of State for Health and the Chancellor of the Exchequer (Wanless, 2004).
2. It is recognised that the causes of chronic disease are complex, and actions to tackle them must be multifactorial, but a key area for action, highlighted in many recent reports on public health in the UK, is the promotion of foods to children (e.g. House of Commons Health Committee, 2004).
3. The effect of food promotion on the choice of foods by children is difficult to assess. Food choice a complex area where it is not easy to measure the effect of single factors and the interaction between multiple determinants. In order to try and shed some light on this, the Food Standards Agency (FSA) commissioned a report to review all of the research carried out to date on the effects of food promotion to children. This report concluded there is sufficient evidence that food promotion does have an effect, particularly on children's preferences, purchase behaviour and consumption (Hastings et al., 2003).
4. On this basis the FSA agreed an Action Plan on Food Promotion and Children's Diets (Food Standards Agency, 2004). This includes developing advice and guidelines for the food industry on reducing amounts of fat, salt and sugar in products specifically aimed at children, and agreeing guidelines on the labelling of these products to enable consumers to identify more easily and accurately what are healthier options.
5. Following on from this, the FSA commissioned this work, which aims:
  - (a) *To identify a range of options for nutrient profiles that could be used to define 'healthier food choices' and 'foods high in fat, salt or sugar' in relation to specific aspects of the promotion of food to children.*
  - (b) *To assess how these nutrient profiles would apply to a range of foods.*

### Role of the Expert Group

6. The work was overseen throughout by an expert group of nutrition scientists; representatives from industry and a consumer organisation; and policy makers. The membership of the expert group is given on page 15.

7. The role of group was to oversee the work and provide specialist input. The direction of the work was determined on the basis of their discussions and consensus views. The main body of the report provides a more detailed discussion of the rationale behind the decisions taken, and the alternatives considered.

## Methodology

8. The work consisted of three broad phases:
  - Phase 1: Background work including a literature review to identify existing use of nutrient profiles in relation to food promotion to children and the development of a theoretical approach to developing nutrient profiles (Sections 1 and 2).
  - Phase 2: Discussions by the Expert Group to determine the focus of the work (Section 2).
  - Phase 3: Initial testing and subsequent refinement of definitions and models (Sections 3 and 4).

**Phase 1: Background work including a literature review to identify existing use of nutrient profiles in relation to food promotion to children and the development of a theoretical approach to developing nutrient profiles and (Sections 1 and 2).**

### *Review of existing practice (Section 1)*

9. The review found the following
  - Food labelling legislation in both the USA and Canada contains definitions based on nutrient criteria.
  - The majority of the work that was identified on nutrient profiling for use in vending machine policies was from the USA, and examples of some detailed guidance are given.
  - Various approaches have been adopted to healthier school lunch provision including: checklists for use by caterers; nutrient assessments of menus provided over a period of time; lists of recommended foods; and the use of nutrient profiles to identify foods which can contribute to healthier food provision.
  - Over the last few years there have been various initiatives around the world to raise awareness of the issue of marketing of foods to children. Generally speaking these propose either banning all food advertising targeted at certain age groups of children, or banning or restricting the marketing and advertising of ‘unhealthy’ or ‘junk’ foods. There is usually very little attempt to define what is meant by these terms, although specific foods are often mentioned. Restrictions are most

frequently applied to products such as chocolate, sweets, soft drinks, snacks and 'other similar products'.

- Nutrient criteria are used in some countries to assess eligibility for health claims, addition of nutrients, and also in public health point of purchase schemes. Many retailers in the United Kingdom also run healthier choice schemes, to highlight products that meet certain nutrient criteria. These schemes are often for the general population, rather than being intended for children. However, several UK retailers do have ranges of foods specifically for children, and most of these specify that the foods contain 'controlled levels of sugar, fat and salt', as well as restricting the use of additives. Some manufacturers of children's foods, and organisations who licence characters for use on products, have adopted a similar approach.

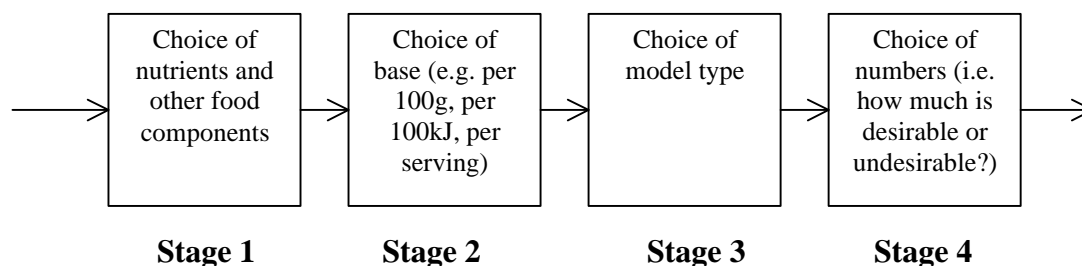
10. Existing schemes have the following features:

- Choice of nutrients: The nutrients selected for developing nutrient profiles almost always include total fat and sodium. Saturated fat is often included. Sugars are included less frequently. Energy is also sometimes included.
- Several of the schemes take account of nutrients that are eaten at lower than the recommended intake. Fibre is the most frequently selected, followed by calcium. Some schemes, particularly those from North America, include iron, vitamin C, vitamin A, and protein. Many schemes make specific provisions which promote foods containing fruits and vegetables.
- Choice of base: The most common choice of base is 'per serving', although 'per 100g' is also used frequently. An energy base (e.g. per 100kJ) is used infrequently.
- Choice of model type: A threshold model is used most commonly, with only one or two schemes attempting to use scoring systems. The schemes are evenly split between those which use an 'across the board' or a 'food category' approach.
- Choice of thresholds or scoring criteria: These are sometimes based on public health recommendations, particularly for vitamins and minerals, but for many schemes it is not possible to identify the reasons for the choice of numbers, and it is assumed that it is often a pragmatic decision.

### *A theoretical approach to developing nutrient profiles (Section 2)*

11. The development of nutrient profiles necessarily involves a number of stages. These stages can be approached in any order, and decisions at any one stage affect decisions at others. However the most logical order is shown in the figure below:

### Stages in developing profiles



- **Choice of nutrients:** There are a number of different nutrients and other food components that could possibly be used in nutrient profiles. Rationales for choice of nutrients and components are described in detail in Section 2.
- **Choice of base:** There are three basic ways of setting nutrient profiles: per 100g, per 100kJ and per serving. The strengths and weaknesses of each method are discussed in Section 2.
- **Choice of model type:** There are three different options for model types that can be used for nutrient profiling; threshold models, simple scoring systems, and complex scoring systems. Once the type of model is chosen it is necessary to choose between food category specific or across the board criteria. Again there is an in depth discussion of the advantages and disadvantages of each approach in Section 2.
- **Choice of numbers:** The levels set for the thresholds of the individual nutrient criteria (or points scored for a particular level) can be pragmatically chosen, taken from respected sources, or linked to public health recommendations. The ways in which this can be done are described further in Section 3.

### Phase 2: Discussions by the Expert Group to determine the focus of the work (Section 2)

12. **Ages of children:** The project focused on the development and testing of definitions for ‘foods high in fat, salt or sugar’ and ‘healthier food choices’ for children aged 11-16.<sup>1</sup> It was noted that the principles would be applicable to children of any age between 5 and 16 and also to adults.

<sup>1</sup> For many of the nutrients relevant to this work, dietary recommendations are set as a proportion of energy intake, and are therefore the same for children over 5 as for adults. However, recommendations for iron and calcium intake are higher for 11-16 year olds because of the body’s increased requirements for these nutrients during puberty. This age group was therefore chosen in order to ensure that the definitions were relevant to the group with the greatest requirement for these nutrients.

13. ***The intended uses of definitions and models:*** The project concentrated on developing and testing definitions of ‘foods high in fat, salt or sugar’ and ‘healthier food choices’ for the purpose of:
- Advice on the use of nutrition and health claims on foods aimed specifically at children; and
  - Advice on the balance of TV advertising for foods during children’s TV programmes.
- But the potential use in signposting on labels and menus would also be taken into account.
14. The Expert Group agreed that models should be based on the following guiding principles:
15. ***Choice of nutrients:*** Simple definitions involving only criteria for energy, saturated fat, non-milk extrinsic (NME) sugar and sodium should be developed and tested (for the sake of brevity here called ‘A’ nutrients), but that more complex definitions involving these nutrients together with criteria for fruit and vegetables, long chain n-3 polyunsaturated fatty acids (‘B’ nutrients), and calcium and iron (‘C’ nutrients) should also be developed.
- (Note: A cumulative approach was used such that definitions involving ‘B’ nutrients include ‘A’ nutrients, and definitions involving ‘C’ nutrients included both ‘A’ and ‘B’ nutrients)*
16. ***Fortification:*** Where definitions involved criteria for calcium, iron and n-3 fatty acids then those criteria should in principle be for the levels of those nutrients prior to any fortification, except where products had been fortified in line with legal requirements. (However, in practice, because limited pre-fortification data were available, model testing was based on final nutrient levels).
17. ***Choice of base:*** The base/denominators to be considered for definitions should be: per 100g, per 100kJ, per 100g AND/OR per serving, per 100kJ AND/OR per serving.
18. ***Choice of model type:*** Both threshold models and scoring systems should be investigated. ‘Across-the-board’ rather than food ‘category specific’ criteria should be investigated in the first instance.
19. ***Choice of numbers:*** The numbers used for thresholds or points scored should bear a consistent and transparent relationship to public health recommendations.

### **Phase 3: Initial testing and subsequent refinement of definitions and models (Sections 3 and 4)**

#### ***Initial testing (Section 3)***

20. Twenty-eight definitions of ‘foods high in fat, salt or sugar’ were developed on the basis of the recommendations of the Expert Group. On the basis of testing the 28 definitions, eight definitions were selected for development into complete

models with definitions of ‘foods high in fat, salt or sugar’, ‘healthier food choices’ and ‘intermediate foods’. The Expert Group agreed that three models were worthy of further consideration and should be tested further and if possible refined.

***Further testing (Section 4)***

21. This round of development and testing followed a more incremental approach than the previous round, starting with a threshold model and making sequential changes to this model. 12 models were developed on the basis of the recommendations of the Expert Group following the initial testing, and were tested further. Two possible modifications to the two most promising of these 12 models were also tested.
22. The models tested in this round were compared to each other when judged by various ‘success’ criteria: including: simplicity and transparency; accuracy; and distribution of foods between ‘high in fat, salt or sugar’ ‘intermediate’ and ‘healthier choice’ categories
23. As a result of this round of testing one model was identified for further consideration: (Model SSCg3d). This used a simple scoring system, Group C nutrients and a per 100g base, with a modification for drinks. *(One member of the Expert Group would have preferred a ‘per serving’ base, because of concerns that choice of the 100g base would lead to anomalies for foods eaten in larger or smaller portion sizes).*
24. The scoring bands for foods are as follows (to a maximum of 10 points per nutrient/food component):
  - Energy: = 335kJ = 0; 335-670kJ = 1; 670-1005kJ = 2, etc.
  - Saturated fat: = 1.0g = 0; 1.0-2.0g = 1; 2.0-4.0g = 2, etc.
  - NME sugars: = 2.4g = 0; 2.4-4.8g = 1; 4.8-7.2g = 2, etc.
  - Sodium: = 90mg = 0; 90-180mg = 1; 180-270mg = 2, etc.
  - Calcium: = 105mg = 0; 105-210mg = 1; 210-315mg = 2, etc.
  - Iron: = 1.5mg = 0; 1.5-3.0mg = 1; 3.0-4.5mg = 2, etc.
  - n-3 fatty acids: = 0.05g = 0; 0.05-0.10g = 1; 0.10-0.15g = 2, etc.
  - Fruit and vegetables: 0-30% = 0; 50% = 2; 70% = 4; 100% = 10.<sup>2</sup>

The scoring bands for drinks are half the width of these bands. This is because the high water content of such products means they tend to be less nutrient dense per 100g.

**Total score = A nutrients – B nutrients – C nutrients.**

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<sup>2</sup> The Guideline Daily Amounts used to develop this model were: Energy: 2130 kcal, 8950 kJ; Saturated fat: 26g; NME sugars: 63g; Sodium: 2.35 g; Calcium: 690mg; Iron: 10.1mg; n-3 fatty acids: 0.4g; Fruit and vegetables: 380g.

25. The food is defined as a 'healthier food choice' if the score is 2 or less, as 'intermediate' if the score is 3-8, and as a 'food high in fat, salt or sugar' if the score is 9 or more.
26. Although scoring systems, such as Model SSCg3d, are seemingly more complex than threshold models they are also more accurate. Scoring systems are also more flexible than threshold models, making them more adaptable to a variety of purposes. Scoring systems can more easily be used for comparing foods within categories (i.e., because foods can be compared on the basis of their points score, as well as their overall category, thus providing greater distinction between foods with similar nutrient content).

## Conclusions and recommendations for future work

27. Nutrient profiling attempts to develop objective criteria to define, for example, 'foods high in fat, salt or sugar' or 'healthier food choices'. Expert judgements about what constitutes a 'food high in fat, salt or sugar' or a 'healthier food choice' are based on recommended quantities of nutrients, the form in which nutrients are present in particular foods, considerations about frequency of consumption, interactions between food components, bio availability, and many other issues. It is difficult to capture these considerations in a mathematical model, however this study has identified a model which goes some way towards doing so. This significant step forward offers the prospect of development of a scheme which could be used in a number of ways to tackle problems with children's diets. It is recommended that future work tests the preferred model against experts' assessments of a wider range of foods.
28. The specific recommendations made for future work are:
  - the development of a database of food composition data with which to test the preferred model.
  - devising a panel of 'healthier' and 'less healthy' indicator foods with input from experts in practical food and nutrition.
  - considering what modifications to the proposed model would be necessary for its use for other age groups.
  - assessing the acceptability of the model to both experts and consumers.
  - considering communication and support issues for consumers, health and other professionals, and the food industry as appropriate.
29. A glossary of terms used in this report can be found on page 90.

## References

Food Standards Agency (2004) *Agency agrees plan for an overhaul of the way food is promoted to children* - press release, action plan and consultation document. Food Standards Agency, London.

Hastings G, Stead M, McDermott L, Forsyth A, MacKintosh A M, Rayner M, Godfrey C, Caraher M & Angus K (2003) *Review of Research on the effects of food*

*promotion to children*. Prepared for the Food Standards Agency, London, by University of Strathclyde, Glasgow.

House of Commons Health Committee (2004) Obesity: Third report of session 2003-4. House of Commons, London.

Wanless D (2004) *Securing Good Health for the Whole Population*. HM Treasury and Department of Health, London.

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## **SECTION 1. REVIEW OF RELEVANT NATIONAL AND INTERNATIONAL LITERATURE**

### **1.1 Summary**

The aim of the review was to identify national and international data applicable to children aged 2- 16 years, which contains information relevant to defining 'foods high in fat, salt or sugar and 'healthier food choices'.

A multi-pronged approach was used to collecting information, including: key word searches in Medline and an extensive personal database; Internet searches; contacting key individuals and organisations directly.

Food labelling legislation in both the USA and Canada contains relevant definitions, and these are summarised in the review.

The majority of the work that was identified on vending machines was from the USA, and examples of some detailed guidance are given.

Various approaches have been adopted to healthier school lunch provision including: checklists for use by caterers; nutrient assessments of menus provided over a period of time; lists of recommended foods; and the use of nutrient profiles to identify foods which can contribute to healthier food provision.

Over the last few years there have been various initiatives around the world to raise awareness of the issue of marketing of foods to children. Generally speaking these propose either banning all food advertising targeted at certain age groups of children, or banning or restricting the marketing and advertising of 'unhealthy' or 'junk' foods. There is usually very little attempt to define what is meant by these terms, although specific foods are often mentioned. Restrictions are most frequently applied to products such as chocolate, sweets, soft drinks, snacks and 'other similar products'.

Nutrient criteria are used in some countries to assess eligibility for health claims, addition of nutrients, and also in public health point of purchase schemes. Many retailers in the United Kingdom also run healthier choice schemes, where products that meet certain nutrient criteria are indicated in some way. These schemes are often for the general population, rather than being intended for children. However, most UK retailers do have ranges of foods specifically for children, and most of these specify that the foods contain 'controlled levels of sugar, fat and salt', as well as restricting the use of additives. Some manufacturers of children's foods, and organisations who licence characters for use on products, have adopted a similar approach.

Overall, there does not appear to be an explicit and transparent basis to most of the schemes that were identified, and there is little evidence of systematic development and testing of schemes.

## 1.2 Objectives

This review was intended to inform further stages in this project. It was not systematic or comprehensive, but provided information that has been used to inform decisions made in later stages of this project.

The focus of the review was to identify national and international data applicable to children aged 2-16, which contains information relevant to definitions of 'foods high in fat, salt or sugar and 'healthier food choices'.

This included:

- Healthy eating advice, including dietary guidelines, guideline daily amounts (or equivalent) and food guides. Since the focus of the work is policy in the context of the UK and EU,

This element of the review is restricted to information relating to the UK.

- Information on:
  - definitions of 'foods high in fat, salt or sugar and 'healthier food choices'
  - nutrient or food based profiling intended for foods or drinks that are promoted to or formulated for consumption by children. This includes foods or drinks: which are for available in vending machines in schools; provided through other school or pre-school food provision; which carry health claims which claim health benefits for children; or are advertised during children's TV programmes.

This element of the review included searches for information from the UK, other European and Nordic countries, North America, Australia and New Zealand.

## 1.3 Methods

A multi-pronged approach was used to collecting information, including:

- Key word searches in Medline and an extensive personal database. The key words used were: 'nutrient profile', 'nutrient criteria', 'un/healthy food/s', 'un/healthful food/s', definition, advertising, children, vending, 'menu signposting', school, 'school food service', catering, meals. Searches were carried out for publications over the past 10 years.

Papers were excluded which focused on public health interventions in schools, or which defined dietary quality indices for individuals.

- Internet searches a) key word b) government department websites in Australia/New Zealand, Canada and the USA. The searches were all made using 'Google', and used the same keywords as the Medline searches, except that 'kids' was used in addition to 'children'.
- Key individuals who may have knowledge of the area or who work in organisations which are known to be undertaking relevant initiatives, were approached. This included: contacts in government agencies in the USA, Canada, Australia, and selected European countries; academic contacts in Europe; international organisations including the EU, WHO, FAO and international consumer groups; advocacy groups in the USA and UK; and members of the Expert Group for this project, which included representatives with links to retailers, food service providers, and food manufacturers. A 'snowballing' approach was used, with one contact passing on the request for information to other contacts.

## **1.4 Findings**

### **1.4.1 Dietary guidance for children**

#### **1.4.1.1 UK**

The Department of Health has published Dietary Reference Values (DRV) for groups in the population (Department of Health, 1991). For children the categories for these age groups are: 1-3 years, 4-6 years, 7-10 years, 11-14 years, and 15-18 years. The DRV report is the main source document for vitamin, mineral, and energy recommendations for children.

The report also contains population recommendations for a total fat intake of 35% of food energy, and saturated fat intake of 11 % of food energy, as well as recommendations for monounsaturated and polyunsaturated fat intakes as a percentage of energy. It also recommends consumption of 18 grams of non-starch polysaccharide a day. These recommendations are for adults.

The Balance of Good Health, the UK's Food Guide, is based on dietary reference values as well as food intake data. The guide states that is not applicable to children below five years old. Between the ages of two and five is regarded as a transition between an infant diet and an adult diet, and recommendations for fat and fibre do not apply to children aged less than five years old. For children aged five and over, the adult recommendations apply.

The Dietary Reference Value report also reiterates an earlier recommendation for non milk extrinsic (NME) sugars (Department of Health: Committee on Medical Aspects of Food Policy, 1989) that at a population level NME sugar intake should be reduced to 11 % of food energy. The Weaning Diet Panel of the Committee on Medical Aspects of Food Policy considered this recommendation. Their final report concluded that this value for NME sugars is also applicable to pre-school children, because they are at a relatively high risk of dental caries (Department of Health, 1994).

The Committee on Medical Aspects of Food Policy also recommended that in the UK fruit and vegetable consumption should be increased to at least five portions per person per day on average. This is applicable to children of all ages as well as adults. However, although quantified portion sizes have been developed for adults, they have not yet been developed for children.

The Scientific Advisory Committee on Nutrition recently reviewed salt and health, and made recommendations for average intakes by population sub-groups including children (Scientific Advisory Committee on Nutrition, 2003). The relevant recommendations are 1-3 years, 2 g/day; 4-6 years, 3 g/day; 7-10 years, 5 g/day; 11-14 years, 6 g/day.

In terms of individual food products intended for consumption by children it should be noted that recent regulations provide detailed nutrient profiles for cereal foods intended for consumption by children under three years old (e.g. for relevant legislation from one of the countries of the UK (National Assembly for Wales, 2004))

In 1998 (that is, after all of the dietary recommendations mentioned previously had been published, apart from the Scientific Advisory Committee on Nutrition report on salt) the Caroline Walker Trust published nutritional guidelines for children under five in child care (Caroline Walker Trust, 1998). This was accompanied by a practical menu planner for use by child care establishments (Caroline Walker Trust, 2000). With the exception of salt, these guidelines provide a synthesis of dietary guidance for children between two and five years of age. In relation to fibre, the report additionally makes the point that recommendations for children would be expected to be proportionate to the adult recommendations.

Finally, although the Balance of Good Health is not intended for children below five years old, versions have been developed (for example by retailers) for children over this age showing the types of food more likely to be consumed by children.

### **1.4.1.2 USA**

The USA also has detailed dietary recommendations, and these have evolved in very similar ways to those in the UK. The points made here are relevant to recommendations for children, in particular the so-called 'healthy eating' recommendations for fat, fibre, salt and sugar.

As long ago as 1996 the American Heart Association made a recommendation that the dietary guidelines for the reduction of risk of heart disease should apply to all children over two years of age. The relevant recommendations in the USA are to reduce saturated fat to less than 10 % of total calories, total fat to an average of no more than 30 % of total calories, and dietary cholesterol to less than 300 milligrams per day.

The USDA has developed a food pyramid (the American Food Guide) specifically for 2-6 year old children, and this can be downloaded from the USDA website. At the time of writing this report there was a consultation in process proposing revisions to the food intake patterns that formed the basis for the pyramid, including the guide for

children. These proposals included nutritional goals for proposed daily food intake patterns for children of different ages between 1-18 years of age. The goals showed an explicit graded progression in dietary recommendations between infancy and adulthood for fat and fibre. Salt and added sugar recommendations were the same for young children as for adults. A detailed table was found at [http://www.usda.gov/cnpp/pyramid-update/FGP\\_docs/TABLE 3.pdf](http://www.usda.gov/cnpp/pyramid-update/FGP_docs/TABLE_3.pdf).

### 1.4.2 Relevant definitions

The searches included looking for information on definitions of ‘foods high in fat, salt or sugar and ‘healthier food choices’. This section describes those definitions that appear in legislation from the USA and Canada.

In the USA there is an extremely lengthy definition of the term ‘healthy’ or any derivative of the term e.g. ‘healthful’, ‘healthier’, ‘healthily’, and ‘healthiness’. This is contained in Federal Regulation 58, 1993, with the most recent amendment being FR 63, 1998. There is a far more consumer friendly definition in the USDA’s guidance to food labelling, which is reproduced here:

“A "healthy" food must be low in fat and saturated fat and contain limited amounts of cholesterol and sodium. In addition, if it's a single-item food, it must provide at least 10 percent (of the Daily Reference Value) of one or more of vitamins A or C, iron, calcium, protein, or fiber. Exempt from this "10-percent" rule are certain raw, canned and frozen fruits and vegetables and certain cereal-grain products. These foods can be labeled "healthy," if they do not contain ingredients that change the nutritional profile, and, in the case of enriched grain products, conform to standards of identity, which call for certain required ingredients. If it's a meal-type product, such as frozen entrees and multi-course frozen dinners, it must provide 10 percent of two or three of these vitamins or minerals or of protein or fiber, in addition to meeting the other criteria. The sodium content cannot exceed 360 mg per serving for individual foods and 480 mg per serving for meal-type products.”

Labels in the USA also include ‘Daily Values’ (DVs) for macronutrients that are sources of energy: fat, saturated fat, total carbohydrate (including fibre), and protein; and for cholesterol, sodium and potassium, which do not contribute calories. DVs for the energy-producing nutrients are based on the number of calories consumed per day. DVs for some nutrients represent the uppermost limit that is considered desirable. The DVs for total fat, saturated fat, cholesterol, and sodium are:

- total fat: less than 65 g
- saturated fat: less than 20 g
- cholesterol: less than 300 mg
- sodium: less than 2,400 mg

The DV’s for vitamins, minerals and protein are based on Reference Daily Intakes (the old Recommended Daily Amounts).

Manufacturers can declare nutrients as a percentage of dietary values, except for foods intended for children aged less than 4 years of age. These may only carry % DVs for protein, vitamins and minerals.

The USA also has guidance for nutrient content claims, expressed as grams per serving. For example a food that makes a low fat claim must contain less than 3g fat per serving. The main point of relevance to this report is that 'a little' of a nutrient is regarded as a synonym for 'low'.

In contrast, in Canada there is guidance for nutrient content relating to the Daily Values (which are similar to those in the USA) (Health Canada, 2004). The DV is intended to help individuals assess whether a food contains 'a lot' or 'a little' of a nutrient. Examples of specific criteria for nutrition claims included:

- A food that has a % DV of 5% or less for fat, sodium or cholesterol would be low in these three nutrients
- A food that has a % DV of 10% or less for saturated + trans fats would be low in these two nutrients
- A food that has a % DV of 15% or more for calcium, vitamin A or fibre would be high in these nutrients

There is no DV for sugars in Canada (and there does not appear to be one in the USA either) because "there is no recognised guideline on the amount that should be consumed by healthy populations".

Finally, there are several populist websites on the internet that attempt to define 'junk' or 'unhealthy' food. It is worth noting that these often include the use of additives and the degree of processing foods are subject to, as part of a definition.

### 1.4.3 Vending machines

France introduced amendments to its public health bill in July 2004, which could affect vending machine provision in schools. Nutritional profiles would be used to determine which foods should not be provided in machines. This, and other requirements still to be developed, could take effect from September 2005.

The remainder of the work that was identified for this section comes from the USA.

The Surgeon General recommended that "healthy snacks and foods are provided in vending machines, school stores, and other venues within the school's control; prohibit student access to vending machines, school stores, and other venues that compete with healthy school meals in elementary schools and restrict access in middle, junior, and high schools" (US Dept of Health and Human Services, 2001). This was supported by a recent report by the Democratic Party as part of a review of the Children's Bill, which was finally passed in May 2004 (Democratic Staff of the Senate Committee on Agriculture & Nutrition, 2004). This report also provides a useful overview of recent initiatives in different states of the USA to improve availability of healthy foods in vending machines.

1. "An individual food item sold to a pupil during morning or afternoon breaks at elementary schools shall meet all of the following standards: (a) not more than 35 percent of total calories shall be from fat. This subparagraph does not apply to the sale of nuts or seeds. (b) Not more than 10 percent of its total calories shall be from saturated fats. (c) not more than 35 percent of its total weight shall be composed of sugar. This subparagraph does not apply to the sale of fruits or vegetables".

2. "Regardless of the time of day, water, milk, 100 percent fruit juices, or fruit-based drinks that are composed of no less than 50 percent fruit juice and that have no added sweeteners are the only beverages that may be sold to pupils at an elementary school." California Senate Bill 19.

3. "Resolved, that effective January 2004, the only beverages authorized for sale at the Los Angeles Unified School District before, during, and until one half hour after the end of the school day at all sites accessible to students shall be: fruit based drinks that are composed of no less than 50 percent fruit juices and have no added sweeteners; drinking water; milk, including, but not limited to, chocolate milk, soy milk, rice milk, and other similar dairy or non-dairy milk; and electrolyte replacement beverages that do not contain more than 42 grams of added sweetener per 20 ounce serving".

4. "Vending machines accessible to students shall not dispense sodas, drinks that contain caffeine or a high concentration of sugar, candy, or similar products during school hours."

The Centre for Food and Justice, Urban and Environmental Policy Institute has compiled a list of innovative school policies, including some relating to vending machines (Center for Food and Justice, 2002). These included: The American School Food Service Association (ASFA) produces various resources to support healthier food provision (<http://www.asfa.org/childnutrition/fsoperations>). This includes a publication on 'Healthy school snacks and beverages: selected policies and guidelines', which is only available to members. ASFSA's website also contains a guide to assessing the healthiness of foods for vending machines, from Utah (American Food Service Association, Date unknown). This uses a scoring system, based on work by the Dairy Council. If a food has points, it is considered healthy; if a food has zero or negative points, it is not considered healthy. The guidance is reproduced below:

1. Add one point to the food for each of the following:
  - Has 10% or more Daily Value for vitamin A
  - Has 10% or more Daily Value for vitamin C
  - Has 10% or more Daily Value for calcium
  - Has 10% or more Daily Value for iron
  - Has 10% (5g) or more Daily Value for protein
  - Has 10% or more Daily Value for fiber
  
2. Subtract one point from the food for each of the following
  - Has 10% or more Daily Value for total fat (based on a 30% fat diet)
  - Has 250 or greater kilocalories

3. If the food still has any points left, then the food is considered healthy. Foods with zero or negative points are not considered to be healthy.

4. Also, any fruit or vegetable, regardless of whether or not it fits the criteria, is suitable for the vending machine. In addition, fruit juice should be 100% juice or at least 75% juice.

The detailed document provides examples of foods that are healthy or unhealthy choices using this scoring system.

Another example of guidance is from San Antonio in Texas (Health Collaborative San Antonio, 2004). Snacks and beverages for vending machines were placed in 3 categories: healthiest, healthier, and excluded.

#### Snacks:

Healthiest – must meet both criteria

- 3 grams of Total Fat or fewer per serving (Nuts and seeds exempt from restrictions.)
- 30 grams of Carbohydrates or fewer per serving (All candies are considered unhealthy. Fruit in any form is permitted, regardless of carbohydrate count.)

Healthier – must meet both criteria

- 5 grams of Total Fat or fewer per serving (Nuts and seeds exempt from restrictions.)
- 30 grams of Carbohydrates or fewer per serving (All candies are considered unhealthy. Fruit in any form is permitted, regardless of carbohydrate count.)

#### Drinks:

Healthiest

- Milk – Low fat (1%) or non-fat preferred, any flavor
- Water – Pure
- Juice – at least 50% fruit or vegetable juice

Healthier

- Water – Flavored or vitamin enhanced
- Low-Calorie Beverage – (<50 calories per 12 oz serving)

These guidelines were used to develop lists of foods that fell into the three categories. These lists included food items that were marginal in terms of exclusion.

### 1.4.4 School lunches

#### **1.4.4.1 UK**

National minimum nutritional standards for school meals were reintroduced in the UK in 2001. The regulations are based on the main food groups shown in the Balance of

Good Health. For primary schools the emphasis is on achieving an appropriate balance of foods from the different food groups over a period of time. For secondary schools the regulations stipulate (roughly) that at least two items from the four main food groups of the Balance of Good Health must be available each day. During the consultation on the draft regulations there was extensive discussion about whether nutrient monitoring or a checklist for use by caterers was more appropriate. The final form of the regulations lends itself more to using a checklist. The Department for Education and Skills provides guidance on healthy lunches for pre-school children, primary and secondary school children. This includes a description of the national nutritional standards, good catering practice, and advice on how the standards can be monitored.

Thus the core approach to school lunches and nutrition focuses, quite understandably, on the overall menu provided over a number of days rather than the nutrient profile of individual food products. It is worth noting though that although the current approach to monitoring schools meals tends towards a catering checklist, there have been very well respected tools developed proposing nutrient based guidelines for school meals. The original work was done by the Caroline Walker Trust (CWT) who produced nutritional guidelines for school meals (Caroline Walker Trust, 1993). This was followed by a computerised assessment pack using the CWT guidelines, produced by the National Heart Forum (National Heart Forum, 1995).

More recently in Scotland the Scottish Executive's Expert Panel on School Meals established nutrient standards for the nutritional content of school meals (Scottish Executive, 2002) largely based on CWT guidelines but modified to take into account Scientific Advisory Committee on Nutrition guidance on salt. As part of these Scottish guidelines FSA Scotland prepared target nutrient specifications for manufactured products ([www.scotland.gov.uk/library5/education/niss-00.asp](http://www.scotland.gov.uk/library5/education/niss-00.asp)). These guidelines will be monitored as part of the Her Majesty's Inspectorate of Education programme of school inspections and by independent research in 2007. Nutritional software (Scottish Executive, 2004) was also produced to help local authorities plan menus and monitor nutritional intake to meet the nutrient standards.

In the catering sector more generally, menu labelling or signposting schemes have been developed. These commonly consist of symbols attached to food items on a menu, which meet certain criteria, often fat levels. Relatively few of these have been described in detail in the scientific literature and even less are from the UK. Balfour tested out different formats for labelling, and foods were judged to be high in a nutrient if they contained more than 50 % of the Dietary Reference Value, or low in a nutrient if they contained less than 10 % of the Dietary Reference Value (Balfour et al 1994.). Williams evaluated the 'Star-struck' scheme. Foods were assigned one yellow star to indicate medium fat items i.e. contained between 5 and 10 grams of fat/100g, or two yellow stars to indicate low-fat i.e. less than 5 g fat/100g. Medium fibre was indicated by one green star i.e. a product had to contain between 2 - 4 g fibre/100g, and high fibre was indicated by two green stars i.e. a product contained >4g fibre/100g (Williams & Poulter, 1991).

Finally some catering companies, including Sodexho, have used smart cards to offer rewards to children who choose healthier items.

#### **1.4.4.2 France**

France has voluntary food based dietary guidelines for ‘community’ meals prepared by public and private organisations (Ministere de l'Economie dFedl, 2001). These cover school meals, hospital and prison provision. The guidelines provide advice on the general structure and desirable frequency of provision for some food items in 20 consecutive meals. A list of acceptable frequently consumed foods, with portion sizes is also provided. The objective of the guidelines is to decrease fat intake, particularly saturated fat, and to increase iron, calcium, fibre and vitamin (including vitamin C) intakes. Recently some work at the National Institute for Medical and Health Research (INSERM) has explored the possibility of using linear programming based on the guidelines, to evaluate and provide guidance on the foods provided, and the nutritional value of meals in school canteens. This approach is currently under discussion but preliminary work has indicated that this approach might provide a basis for designing user-friendly programs which could be used in school meal planning to generate a large number and variety of nutritionally adequate menus (Darmon et al., 2004).

#### **1.4.4.3 Australia**

There are a wide variety of approaches to encouraging healthier menu provision for school lunches throughout Australia. Several states operate reward schemes and accreditation programmes, where schools need to meet a range of standards, often including list of recommended foods and preparation methods. New South Wales operates a canteen smart card which gives the highest points to recommended foods, including sandwiches, muffins and approved ice-creams and juices. Fewer points are earned for foods that should be limited in the diet, such as reduced fat hot dogs. No points are given for sport drinks, pies and crisps.

New South Wales and the Western Australian School Canteen Association (WASCA) both operate schemes that combine lists of recommended foods with using nutrient profiles to a certain extent.

WASCA runs a Star Canteen Accreditation Programme. This awards schools operating healthy canteens by using a star rating of three, four or five stars. These stars are earned by using recommended core foods and ‘Star Choice registered products’. Detailed lists of recommended foods are provided. The national criteria used to assess Star Choice Registered Products address levels of fat, salt, fibre and sugar in foods, and some categories of products also have a criterion for calcium. The Star Choice Products Register and Canteen Buyer's Guide lists mainly processed foods that meet the criteria. This is limited in some ways since only products that have been submitted are assessed. WASCA also recommends product which are indicated by the National Heart Foundation Australia's Pick the Tick scheme (see Section 4.5). New South Wales has published a Canteen Menu Planning Guide (New South Wales Health, 2004), which divides foods into three categories: Green – ‘Fill the menu’; Amber – ‘Select carefully’; and Red – ‘Occasional foods’. Occasional foods are only intended to be consumed on two occasions per term - when there is a particular celebration or event happening. . Figure 1 reproduces the relevant section from the Canteen Menu Planning Guide.

Figure 1: Nutrient criteria in the New South Wales Canteen Menu Planning Guide (New South Wales Health, 2004).

**THE 'OCCASIONAL' FOOD CRITERIA**

If the item you are considering has more than the number specified in the energy, saturated fat or sodium column, or less than the number in the fibre column, it is an 'Occasional' food.

**ASSESSED PER 100gm**

CATEGORY		NUTRIENT CRITERIA		
Food or Drink	Energy (kJ) per 100g	Saturated Fat (g) per 100g	Sodium (mg) per 100g	
Savoury pastries, pasta, pizzas, oven baked potato products	>1000kJ	>5g	>400mg	
Crumbed & coated foods, frankfurters, sausages	>1000kJ	>5g	>700mg	

**Note:** All **DEEP FRIED FOODS** fit into the **RED** end of the spectrum and are limited for sale in school canteens. They are too high in kilojoules and fat (usually saturated fat).

**ASSESSED PER SERVE (as sold in the actual canteen)**

CATEGORY		NUTRIENT CRITERIA			
Food or Drink	Energy (kJ) per serve	Saturated Fat (g) per serve	Sodium (mg) per serve	Fibre (g) per serve	
Sugar sweetened drinks and ices*	>300kJ		>100mg		
Snack food bars & sweet biscuits	>600kJ	>3g		<1.0g	
Savoury snack foods & biscuits	>600kJ	>3g	>200mg		
Ice creams, milk based ice confections & dairy desserts	>600kJ	>3g			
Cakes, muffins & sweet pastries etc	>900kJ	>3g		<1.5g	

**Note:** All types of **CONFECTIONERY** fit into the **RED** end of the spectrum and are limited for sale in school canteens. They are foods of minimal nutritional value.  
\*The sugar sweetened drinks and ices criteria applies to: soft drinks, flavoured mineral waters, energy drinks, sports drinks, sports waters, slushies, ice blocks and ice confections.

The green category includes fresh or minimally processed foods, whereas the amber category is mainly processed foods that have some sugar, salt or fat added to them. The canteen guide provides detailed lists of the types of foods that fall into these two categories, but does not appear to have nutrient criteria to define them.

#### 1.4.4.4 USA

Current USDA regulations only apply to foods served in cafeterias at the time of meal service, and contain a ban on the sale of a category of foods called “foods of minimal nutritional value”. This comprises sodas, water ices, chewing gum, and candies composed predominantly of sugar. Some states have established what appears to be called in the USA ‘competitive food policies’. The extent of these policies varies, with some states using the basic USDA requirement, but barring the sale of foods of minimal nutritional value until after the lunch period (e.g. Maryland). Other states, for example West Virginia, have taken the basic requirements much further and regulate the sale of all foods during the teaching day, have established nutritional guidelines for sugar, and required that foods sold as individual items must be the same as those foods offered through the National School Lunch Programme (Democratic Staff of the Senate Committee on Agriculture Nutrition and Forestry, 2004). The Children’s Bill, which was passed in May 2004, rejected an amendment to commission the National Academy of Sciences’ Institute of Medicine to provide recommendations on school nutrition guidelines to the Secretary of Agriculture.

The National School Lunch Programme is administered by the USDA and as well as being available on a means tested basis is encouraged more widely by offering

subsidies for school lunch provision which are part of the Programme. Meals must meet Federal nutrition standards, which are based on the Dietary Guidelines for Americans, and the school lunches must also provide at least one third of the Recommended Daily Allowances of protein, vitamin A, vitamin C, iron, calcium, and calories. The USDA's Team Nutrition encourages adoption of these standards using a variety of communication channels and support activities.

The USDA also provides childcare meal patterns for children aged 1-2 years, 3-5 years, and 6-12 years. Unlike the Caroline Walker Trust guidelines, USDA guidance is presented in terms of types and amounts of different foods.

The American School Food Service Association recognises that most food service directors are more familiar with what they call a 'traditional food based meal pattern'. However, they provide information on nutrient standard menu planning, and a list of approved nutrient standard menu planning software programs.

Thus, in the USA, most of the information that was retrieved suggests that it is more usual to use a menu based approach rather than a product-based approach. Some research studies have used a more product specific approach. For example the Pathway study, a model for lowering fat in school meals, used dietary guidance to derive food specific guidelines for fat in different categories of food (Snyder et al., 1999). The maximum amounts of fat (grams) that were permitted per serving were:-

Meat or meat alternative	<12
Meat or meat alternative with bread, fruit or vegetables	<15
Vegetables or fruit	1
Salad dressings	3
Oven-baked fries	3
Salads	3-5
Breads, pasta and rice	3
Quick breads	5
Snacks	3
Desserts	5
Milk and cheese	5

#### 1.4.5 Advertising and marketing foods to children

Over the last few years there have been various initiatives around the world to raise awareness of the issue of marketing of foods to children. Generally speaking these propose either banning all food advertising targeted at certain age groups of children, or banning or restricting the marketing and advertising of 'unhealthy' or 'junk' foods. There is usually very little attempt to define what is meant by these terms, although specific foods are often mentioned. For example in New Zealand, one of the groups responding to a Ministry of Health discussion document on children's food, would like to see control of the marketing of soft drinks, pies, sweets and chocolate.

In France an amendment to the Public Health Bill, which was adopted in July 2004 would introduce requirements for television advertising of foods and drinks. There would be restrictions on the types of foods and drinks which could be advertised, and any departure from this would only be agreed if a financial contribution were made. This contribution would be used by the Institute of Health Education and Prevention to fund information and education initiatives.

Recently the World Health Organisation published a review of international practices in marketing of foods to children, including: television advertising, in school marketing, sponsorship, product placement, internet marketing and sales promotions (Hawkes, 2004).

Relevant sections from the report are summarised below:-

1. Television advertising is perhaps the most popular means of promoting food and beverage products worldwide and consequently has been the subject of more debate, in terms of its effects on children, than any other marketing practice. It is also the most widely regulated; 85% of the 73 countries surveyed had some form of regulation on television advertising to children and almost half (44%) had specific restrictions on the timing and content of television advertisements directed at children. Two countries and one province have banned television advertising to children.

2. In France, an amendment to the Public Health Law to ban commercials for high-fat and high-sugar foods during children's television has been proposed to parliament. The International Obesity Task Force (IOTF) has proposed that advertising of "inappropriate foods and drinks" to children be prohibited.

3. 22 of the 73 countries surveyed have either a specific clause on food advertising contained within their existing regulations on advertising, or a separate code covering food advertising that is distinct from regulations pertaining to nutrition and health claims

Generally speaking, the purpose of incorporating a food clause is to prevent advertisements that promote 'unhealthy' diets (15 countries), especially when these advertisements are targeted at children (10 of the 15 countries). The wording of the guidelines varies between countries, for instance:

- advertisements should not give the impression that sweets, soft drinks etc. can replace a regular meal
- advertisements should in general encourage healthy diets, and discourage unhealthy ones
- advertisements should not encourage excessive consumption.

In most countries, it is not clear how these guidelines are applied, interpreted and enforced.

4. The review contains a list of regulations specific to food advertising in different countries. Scanning this list indicates there are several countries that require that when confectionery is advertised, a toothbrush and logo also has to be shown. Restrictions are most frequently applied to products such as

chocolate, sweets, soft drinks, snacks and ‘other similar products’. Brazil requires that when food products are advertised they shall expressly indicate if possible the nutritional and calorific value of the product being advertised. In the United States “representation of food products should be made so as to encourage sound use of the product with a view towards healthy development of the child and development of good nutritional practices”

5. In-schools marketing: In Saudi Arabia the sale of carbonated soft drinks is either totally or partially prohibited, in the United States foods of minimal nutritional value must not be sold in food service areas during the school lunch period.

#### 1.4.6 Point of purchase schemes

Nutrient profiles are or will be used in the legislation of some countries to determine foods which are eligible for addition of nutrients or to carry a health claim (Stockley, 2003). Public health agencies and charities have developed point of purchase programmes to identify ‘healthier’ foods, for example foods that can carry a heart symbol, or a logo indicating that the food can contribute to eating 5 portions of fruit and vegetables per day without compromising other healthy eating guidance. Table 1 in Appendix 1 summarises the nutrient criteria which are applied to eligibility for health claims, addition of nutrients, and public health point of purchase schemes.

This table includes a relatively new scheme from Australia, called the Glycaemic Index Symbol Programme. The University of Sydney, Diabetes Australia and the Juvenile Diabetes Research foundation support the programme. To carry a GI symbol foods must meet specific nutritional criteria and have their glycaemic index measured using an approved method. This differs from previous schemes because a physiological effect of carbohydrates is measured, rather than assessing sugar or starch levels. The nutrition criteria include the product containing at least 10 grams of carbohydrate per serving. The other criteria are different for different food categories, and only a general summary is provided in Table 1 of Appendix 1.

As well as being used by government departments, and public health agencies, retailers and manufacturers have developed or are developing schemes. In the United Kingdom many supermarkets run programmes, where products that meet certain nutrient criteria are indicated in some way. For example, Tesco has recently announced that it will be running a traffic light labelling scheme to highlight total fat, saturated fat, salt and sugar content of products with a red, amber or green colour code.

However all of the schemes described above are for the general population, rather than being intended for children. Most UK retailers do have ranges of foods specifically for children, Waitrose has the Food Explorers range, and these foods contain ‘controlled levels of fat, added sugar and salt’. In addition treat foods have at least 25% less fat, added sugar or salt than a typical product. Asda has the ‘More for Kids’ range of foods for 4-8 year old children, with requirements for levels of fat, salt and sugar. Products also do not contain azo dyes, and additives have been taken out where possible. Marks and Spencer’s has the ‘Loved by Kids’ range, again with

controlled amounts of fat, salt and sugar, and no artificial colours or flavours, and no added preservatives.

Sainsbury's launched the Blue Parrot Café range in 2001. The development of criteria for this scheme is described in Sainsbury's Taste of Success website. The criteria are shown below:

- meat based meals to only contain selected cuts of meat, poultry or fish
- at least half a daily portion of vegetables in vegetable based meals
  
- drinks
  - fruit based (at least 10% fruit juice)
  - milk based and flavoured waters only
  - choice of products with artificial sweeteners and without
  
- desserts
  - fruit based desserts to contain added fruit
  - all products to have controlled fat and salt (sodium) levels
  
- a main meal product (entire meal)
  - 25g fat or less (maximum of 7g saturated fat)
  - 0.8g sodium
  
- meal component, e.g. chicken nuggets, sausages, jumbo fish fingers
  - 15g fat or less (maximum 5g saturated fat)
  - 0.4g sodium
  
- products for different eating occasions, e.g. lunch boxes (muffins, biscuits, bacon and cheese bites)
  - 5g fat maximum
  - 0.2g sodium
  
- additives approved by the Hyperactive Children's Support Group (although some additives are needed, for example cured meats and sausages contain additives essential to food safety)
  - only natural flavours
  - no flavour enhancers, e.g. monosodium glutamate
  
- some products to be gluten free, wheat free, dairy free, vegetarian
- include organic options where appropriate

Some manufacturers of children's food also use nutrient criteria. For example the Bird's Eye 'Captain's Promise' is that dishes contain less than 13 g total fat, 3.4g saturated fat, and 0.3 g sodium per serving (Orsi, 2004).

Finally, the BBC recently announced that it would be launching new standards for children's licensed products (e.g. the use of BBC characters like the Tweenies, Teletubbies and Fimbles) to address current concerns over levels of salt, sugar and fats.

## 1.5 Discussion

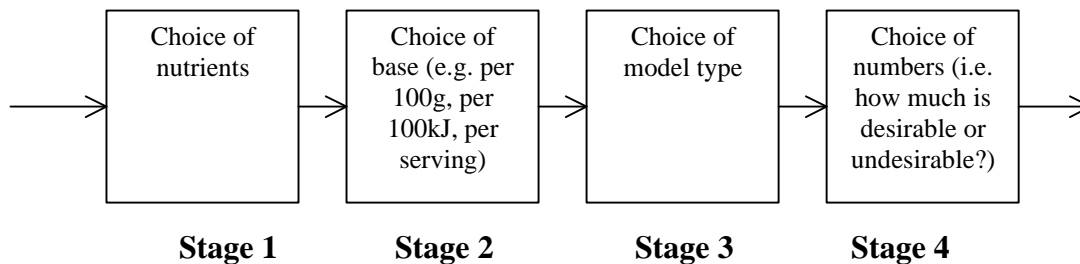
This review describes, in fairly general terms, initiatives that are relevant to developing nutrient profiles for foods promoted to children.

The review is useful in clarifying the overall context of initiatives, but not necessarily in identifying the details of specific schemes. This is often because the schemes operate on a commercial basis, or may have commercial implications, or because the underlying detail is not seen as relevant to the consumer and so is not easily accessible.

### 1.5.1 Correspondence between schemes identified in this review and a theoretical approach to developing nutrient profiles

The next section of this report describes a theoretical approach to developing nutrient profiles for children's foods. It suggests that the development of nutrient profiles involves four stages. The stages are shown in Figure 1.

**Fig 1. Stages in developing nutrient profiles**



An attempt has been made in Table 2 of Appendix 1 to examine each of the schemes where there was more detailed information, in order to extract information which is relevant to each of these stages.

#### *Choice of nutrients*

The nutrients selected for developing nutrient profiles almost always include total fat and sodium. Saturated fat is often included. Sugars are included less frequently. Energy is also sometimes included.

Several of the schemes involving nutrient profiling include nutrients where people eat less than the recommended intake. Fibre is probably the most frequently selected, followed by calcium. Some schemes, particularly those from North America include iron, vitamin C, vitamin A, and protein. Many schemes make specific provision to promote foods containing fruits and vegetables.

### *Choice of base*

The most common choice of base is probably 'per serving', although 'per hundred grams' is also used quite frequently. An energy base is used infrequently.

### *Choice of model type*

A threshold model is used most commonly, with one or two schemes attempting to use scoring. The schemes are about evenly split between those which use an across the board or a food category approach.

### *Choice of numbers*

These may be based on public health recommendations. This appears to be particularly true for vitamins and minerals. With many of the schemes it is not possible to identify the reasons for the choice of numbers, and it is assumed that it is often a pragmatic decision.

## 1.5.2 Evaluation of nutrient profiling schemes

It was not part of the objectives of this review to include evaluation of nutrient profiling schemes, although it would be desirable to do this in the future.

If this were undertaken as a future exercise, there would be two dimensions to consider: -

- a) the objective of the evaluation. These can be very variable, and include for example consumer acceptability, consumer understanding, wider acceptability to industry and others, and effects on consumer knowledge, attitudes, and /or behaviour.
- b) the setting in which the nutrition profiling initiative is located. For example the objectives of an evaluation would be very different in settings and initiatives as diverse as school canteens, organisations using vending machines, promotional and advertising campaigns, and point of choice schemes.

There are reviews that have already systematically considered evaluations of some of aspects of these two dimensions. For example a systematic review of consumer understanding of nutritional labelling (Cowburn and Stockley, in press) included point of choice initiatives, many of which were based on nutrient profiling. The review concluded that: these programmes in a supermarket setting could have a modest effect on sales of labelled products during the time the intervention was in place; these schemes were considered to be feasible interventions to help consumers compare between brands; and they seemed to work best when they were highly visible and supported by other information.

## 1.6 References

- American Food Service Association (Date unknown) A Step-by-Step Guide to Incorporating Healthy Foods into Your New or Existing School Vending Machine. American Food Service Association.
- Balfour D et al. (1994) Visual nutrition information for menu labelling. In *Hygiene and Nutrition in Foodservice and Catering*, pp. 3.
- Caroline Walker Trust (1993) Nutritional Guidelines for School Meals. Caroline Walker Trust, London.
- Caroline Walker Trust (1998) Eating Well for under 5s in child care. Caroline Walker Trust, London.
- Caroline Walker Trust (2000) CHOMP Menu Planner. *Leaflet and software*.
- Center for Food and Justice (2002) Healthy School Food Policies: A Checklist (Working paper). Center for Food and Justice Urban and Environmental Policy Institute, Los Angeles.
- Cowburn G & Stockley L. Consumer understanding and use of nutrition labelling: a systematic review. *Public Health Nutrition*, in press.
- Darmon N, Darmon M & Ferguson E. (2004) The use of linear programming to test the nutritional impact of existing food-based guidelines for school canteens in France. National Institute for Medical and Health Research (INSERM), Paris.
- Democratic Staff of the Senate Committee on Agriculture & Nutrition and Forestry (2004) Food Choices at School: Risks to Child Nutrition and Health: Call for Action. Washington DC.
- Department of Health (1991) Dietary Reference Values for Food Energy and Nutrients for the United Kingdom. In *Committee on Medical Aspects of Food Policy Report No 41*. The Stationery Office, London.
- Department of Health (1994) Weaning and the Weaning Diet. Committee on Medical Aspects of Food Policy, London.
- Department of Health: Committee on Medical Aspects of Food Policy (1989) Dietary Sugars and Human Disease. HMSO, London.

- Hawkes C (2004) *Marketing Food to Children: the Global Regulatory Environment*. World Health Organisation, Geneva.
- Health Canada (2004) *Nutrition Labelling Toolkit for Educators*. *Download from website*.
- Health Collaborative San Antonio (2004) *Healthy Vending Guidelines: Part of the Fit City/Fit Schools campaign in San Antonio Texas*.
- Ministere de l'Economie d'Fedl (2001) GPEMDA (Group Permenent d'Etude des Marches de Denrees Alimentaire): *Recommandation relative a la nutrition. Recommandation J3-99 du 6 Mai 1999: Collection Marches Publics: Nouvelle Edition*.
- National Assembly for Wales (2004) Welsh Statutory Instrument 2004 No. 314 (W.32) *The Processed Cereal-based Foods and Baby Foods for Infants and Young Children (Wales) Regulations 2004*.
- National Heart Forum (1995) *School Meals Assessment Pack: a guide for those involved in influencing, providing and monitoring school meals in secondary schools*. National Heart Forum, London.
- New South Wales Health (2004): *Canteen Menu Planning guide*.
- Orsi J (2004) *Manufacturing wholesome food for children: an industry opinion*. *BNF Nutrition Bulletin* **29**, 57-59.
- Scientific Advisory Committee on Nutrition (2003) *Salt and Health*. The Stationery Office, London.
- Scottish Executive (2002) *Hungry for Success: A Whole School Approach to School Meals in Scotland*. The Stationery Office, Edinburgh.
- Scottish Executive (2004) *A Menu Planner for School Meals in Scotland*. Nutmeg UK.
- Snyder P, Anliker J, Cunningham-Sabo L, Dixon L B, Altaha J, Chamberlain A, Davis S, Evans M, Hurley J & Weber J L (1999) *The pathways model: a model for lowering the fat in school meals*. *American Journal of Clinical Nutrition* **69S**, 810S- 5.
- Stockley L (2003) *Nutrition Profiles for foods to which nutrients could be added, or on which health claims could be made*. Report prepared for the Food Standards Agency, UK, London.
- US Dept of Health and Human Services (2001) *The Surgeon General's Call To Action To Prevent and Decrease Overweight and Obesity*. US Dept of Health and Human Services, Rockville.

Williams C & Poulter J (1991) Formative evaluation of a workplace menu labelling scheme. *Journal of Human Nutrition and Dietetics* **4**, 251-62.

## **SECTION 2. A THEORETICAL APPROACH TO DEVELOPING DEFINITIONS**

### **2.1 Summary**

This section outlines a theoretical approach to developing nutrient profiles for definitions of ‘foods high in fat, salt or sugar’ and ‘healthier food choices’ in relation to foods and promotions aimed at children. It sets out the range of options available when developing definitions for ‘foods high in fat, salt or sugar’ and ‘healthier food choices’<sup>3</sup>.

It notes, on the basis of the available literature (see Section 1), the options people have usually selected when developing nutrient profiles for such descriptors.

Using this theoretical approach, and having considered the various options, the Expert Group for this project recommended a number of different possible definitions for ‘foods high in fat, salt or sugar’ and ‘healthier food choices’ be developed.

#### ***Ages of children***

They agreed that the project should focus on the development and testing of definitions for ‘foods high in fat, salt or sugar’ and ‘healthier food choices’ for children aged 11-16. But noted that these should be applicable to children of any age between 5 and 16 and also to adults.

#### ***The intended uses of definitions and models***

They agreed that the project should focus on developing and testing definitions of ‘foods high in fat, salt or sugar’ and ‘healthier food choices’ for the purpose of:

- Advice on the use of nutrition and health claims on foods aimed specifically at children; and
- Advice on the balance of TV advertising for foods during children’s TV programmes.

But the potential use in signposting on labels and menus would also be taken into account.

#### ***Choice of nutrients***

They agreed that simple definitions merely involving criteria for energy, saturated fat, non-milk extrinsic (NME) sugar and sodium should be developed and tested, but that more complex definitions involving these nutrients together with criteria for fruit and vegetables, long chain n-3 polyunsaturated fatty acids (n-3 fatty acids), calcium and iron should also be developed.

In addition they agreed that where definitions involved criteria for calcium, iron and n-3 fatty acids then those criteria should be for the levels of those nutrients prior to any discretionary fortification.

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<sup>3</sup> Throughout this report the terminology of the brief for this project i.e. ‘foods high in fat, salt or sugar’ and ‘healthier food choices’ has been used. These terms are cumbersome and in future it might be simpler to use ‘healthy’ and ‘unhealthy’ foods or ‘healthier’ and ‘less healthy’ foods.

### ***Choice of base***

They agreed that the base/denominators to be considered for definitions should be: per 100g, per 100kJ, per 100g AND/OR per serving, per 100kJ AND/OR per serving.

### ***Choice of model type***

They agreed that both threshold models and scoring systems should be investigated. They agreed that across-the-board rather than food category specific criteria should be investigated in the first instance.

### ***Choice of numbers***

They agreed that the numbers used for thresholds or points scored should bear a consistent and transparent relationship to public health recommendations.

## **2.2 Introduction**

The brief for the current project was to identify and assess options for a number of uses of definitions of 'foods high in fat, salt or sugar' and 'healthier food choices' in relation to the promotion of foods to children including:

- Advice on front of label and menu signposting
- Advice on the use of nutrition and health claims on foods aimed specifically at children
- Identification of healthier food and drink options for sale through vending machines in schools
- Advice on the balance of TV advertising for foods during children's TV programmes

### **2.2.1 Age groups**

The dietary recommendations for children of different age groups are different. In particular dietary recommendations for children aged 2-5 are quite different than for older children. So definitions of 'foods high in fat, salt or sugar' and 'healthier food choices' for the purposes of promoting foods to children aged 2-5 will be different from those for purposes in relation to older children.

However, from the age of 5 dietary recommendations set on an energy basis are the same as or similar to those for adults. This means that nutrient profiles for the purposes of promoting food to children older than 5, and indeed for the purposes of promoting food to adults, will be similar.

For many macronutrients (fat, saturated fat, non-milk extrinsic sugar, etc) dietary recommendations set on an energy basis are the same for children over 5 as for adults. This also means that when converted to a weight basis (e.g. to Guideline Daily Amounts) then the relationship between the recommendations is always the same for all age groups over 5.

The situation is similar for micronutrients (sodium, calcium, iron etc). In general the dietary recommendations for these nutrients are proportional to energy intake, but there are some exceptions. Most notably, dietary recommendations for some micronutrients such as calcium and iron are higher than would be expected for 11-16 year olds. This is due to the body's increased need for these nutrients during puberty.

Because of the link between dietary recommendations and energy intakes, whichever age group's dietary recommendations are used as the basis of a nutrient profile, the profile will be transferable to all other age groups (with the exception of under 5s).

**The Expert Group agreed that the project should focus on the development and testing of definitions for 'foods high in fat, salt or sugar' and 'healthier food choices' for children aged 11-16, in order to be sure that definitions involving micronutrients are relevant to the group with the greatest requirement for these nutrients. But the Expert Group noted that these definitions are likely to be applicable to children of any age between 5 and 16 and also to adults.**

### 2.2.2 The intended uses of definitions

Different definitions are likely to be needed depending on the use for which they are required. For instance: for advice on the balance of TV advertising for foods during children's TV programmes it might only be necessary to develop a definition of 'foods high in fat, salt or sugar'; whereas for advice on front of label signposting a definition of 'foods high in fat, salt or sugar' is unlikely to be sufficient. Moreover a definition of 'foods high in fat, salt or sugar' for the two purposes need not necessarily be the same.

Moreover definitions will have different users with different requirements. For example, if school caterers were to be required to use nutrient profiles for deciding how to stock vending machines, they most likely would prefer simple definitions e.g. involving as few nutrients as possible. In contrast the children buying the products are only going to see the end result of the school caterers using nutrient profiles, and theoretically need nutrient profiles that are as nutritionally accurate as possible regardless of their complexity.

For the purposes of food and menu labelling it is possible that, instead of developing definitions of 'foods high in fat, salt or sugar' and 'healthier food choices', the nutritional properties of foods could be signposted though defining desirable and undesirable levels of different nutrients. Desirable and undesirable levels of different nutrients could be visually represented by the use of colour ('traffic lights'), graphically (e.g. though bar charts), in words (e.g. though use of verbal descriptors such as 'high' and 'low') or numerically (e.g. as percentages of Guideline Daily Amounts).

For this project new ways of defining desirable and undesirable levels of particular nutrients have **not** been developed. There are already two ways of doing so that could be used i.e. the Food Standards Agency (FSA) advice for what counts as 'a lot' or 'a little' of different nutrients (Food Standards Agency, 2002; Rayner et al, 2004) and the Coronary Prevention Group (CPG) Nutrition Banding Scheme (Coronary

Prevention Group, 1988; Appendix 2)<sup>4</sup>. However, before doing so, both schemes need to be revised in the light of recent thinking. For example neither scheme gives guidance on what constitutes a food with a ‘high’ energy density.

**The Expert Group for this project agreed that the project should focus on developing and testing definitions of ‘foods high in fat, salt or sugar’ and ‘healthier food choices’ for the purpose of:**

- **Advice on the use of nutrition and health claims on foods aimed specifically at children; and**
- **Advice on the balance of TV advertising for foods during children’s TV programmes.**

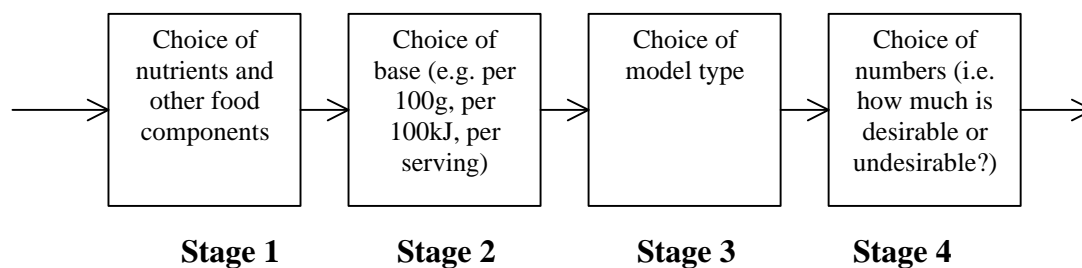
**But the potential use in signposting on labels and menus would also be taken into account.**

**It was agreed that the needs of all users of the definitions should be taken into consideration.**

### 2.2.3 Stages in developing nutrient profiles

Whatever the intended use of definitions of descriptors such as ‘foods high in fat, salt or sugar’ and ‘healthier food choices’ - it is suggested that their development necessarily involves four stages (Figure 1). These stages can be approached in any order and decisions at any one stage affect decisions at others. However the most logical order is shown in Figure 1.

**Figure 1. Stages in developing nutrient profiles**



## 2.3 Stage 1. Choice of nutrients and other food components

### 2.3.1 Prioritising nutrients and other food components

There are a number of different nutrients and other food components that could possibly be used for nutrient profiles. Intakes of most of these nutrients and other components have been assessed by the National Diet and Nutrition Surveys for

<sup>4</sup> Furthermore criteria for the use of nutrition claims – such as contained within the proposed EU Regulation on nutrition and health claims (European Commission, 2003) – define desirable levels of a number of nutrients.

children and young adults (Gregory et al, 1995; Gregory & Lowe, 2000). Table 1 shows the possible range of nutrients and other components, together with recommended intakes.

**Table 1. Possible nutrients and other components for nutrient profiles**

<b>Nutrient/Food</b>	<b>Recommended average intakes for 11-16 year olds</b>	<b>Source of dietary recommendation*</b>	<b>Comment</b>	<b>Nutrients/ components considered priorities by Expert Group</b>
Total fat	35% of food energy	1	Total fat includes poly-unsaturated fatty acids and mono-unsaturated fatty acids, which have health benefits. Definitions involving total fat as well as saturated fat involve double counting.	
Saturated fat	11% of food energy	1		<b>v</b>
Trans-fatty acids	2% of food energy	1	Population average intake currently meets population dietary goal	
Carbohydrates	50% of food energy	1	Glycemic Index has been used in some recent nutrient profiles but more research is needed in healthy subjects before the concept can be used more widely in public health (Laville, 2004)	
Total sugar	No recommendation		Relatively simple to measure but discriminates against fruit and milk products	
Non-milk extrinsic (NME) sugar	11% of food energy	1	No clear definition of NME sugar content, and no generally agreed method of measuring levels in foods	<b>v</b>
Added sugar	No recommendation		Added sugar is always extrinsic. Not all NME sugar is added. No way of knowing how much sugar has been added without info. from manufacturers	
Salt	6 g/day	3		<b>v</b>

<b>Nutrient/Food</b>	<b>Estimated Average Requirements (EARs) or, where no EAR, Reference Nutrient Intakes for 11-16 year olds</b>	<b>Source of dietary recommendation*</b>	<b>Comments</b>	<b>Nutrients/ components considered priorities by Expert Group</b>
Energy	1645-2755 kcal/day **	1	This could be energy per 100g (energy density) or energy per serving but not energy per 100kJ (see p x below).	<b>v</b>
Vitamin A	400-500 µg/day	1		
Thiamin	0.3 mg/1000kcal	1		
Riboflavin	0.9-1.0 mg/day	1		
Niacin	5.5 mg/1000kcal	1		
Vitamin B6	13 µg/g protein	1		
Vitamin B12	1.0-1.25 µg/day	1		
Folate	150 µg/day	1		
Vitamin C	22-25 mg/day	1		
Iron	8.7-11.4 mg/day	1	Main source: meat, fish and alternatives	<b>v</b>
Calcium	625-750 mg/day	1	Main source: milk and dairy foods	<b>v</b>
Phosphorus	15.6-18.6 mmol/day	1		
Magnesium	230-250 mg/day	1		
Potassium	3100-3500 mg/day §	1		
Zinc	5.5-7.3 mg/day	1		
Copper	0.8-1.0 mg/day §	1		
Iodine	130-140µg/day §	1		
Protein	11.7-46.1 g/day	1		
	<b>Recommended average intakes for whole population</b>			
Fibre (Non-Starch Polysaccharides)	18 g/day	1		
Long chain n-3 polyunsaturated fatty acids	0.45 g/day	4	Main source: oily fish	<b>v</b>
Fruit and vegetables	50% increase for whole population (equates to approximately 400g or 5 portions a day)	2		<b>v</b>
Fish	2 portions a week (one of oily fish)	4		

*\* Sources:*

1. Department of Health, *Dietary Reference Values for Food Energy and Nutrients for the United Kingdom. Report on Health and Social Subjects No 41.* London: HMSO, 1991;
2. Department of Health. *Nutritional Aspects of Cardiovascular Disease.* London: HMSO, 1994.
3. Scientific Advisory Committee on Nutrition. *Salt and Health.* London: The Stationery Office, 2003.
- 4 Scientific Advisory Committee on Nutrition. *Advice on Fish Consumption: Benefits and Risks.* London: The Stationery Office, 2004

*\*\* Where a range is given this is because Source 1 gives EARs and RNIs for 11-14 and 15-18 year olds and for males and females separately and no overall figure for 11-16 year olds or sexes combined.  
§ No EARs are given, so Reference Nutrient Intakes (RNIs) are given instead.*

Reductions in the intake of fat, saturated fat, NME sugar and sodium are priorities for current Government food and health policy, all of these nutrients are therefore obvious candidates for nutrient profiles.

The Expert Group noted that, whilst there were more difficulties in defining NME sugar and measuring its levels in foods, than with total sugar, it is a reduction in NME sugar intake rather than total sugar that is the Government's priority. Moreover they noted that including total sugar levels in nutrient profiles would tend to disadvantage fruit and some vegetables and dairy products.

The energy density of foods is increasingly recognised as an important cause for concern. Foods of high energy density (energy per unit weight) have been reported to undermine normal human satiety control mechanisms, leading to over-consumption of energy (Prentice & Jebb, 2003). The recent Select Committee Inquiry on Obesity recommended a food labelling scheme 'based on energy density' (House of Commons Health Committee, 2004).

The Expert Group felt that if energy levels (either energy density or energy per serving) were to be used in nutrient profiles it would be less important to include total fat levels and noted that on an international basis there was increasing uncertainty over recommended levels of total fat.

The literature review indicated that other nutrient-based definitions in relation to the promotion of foods to children almost always include total fat and sodium. Saturated fat is often included, and sugars are included less frequently. Energy (including energy density) is also sometimes included.

Previous work on nutrient profiles (O'Neill, 2004) has suggested that if they only involve criteria for fat, saturated fat, NME sugar and sodium then they are likely to classify foods such as fruit juices, fish, etc. in the same category as food such as high sugar carbonated drinks and confectionery. This seems anomalous. Accordingly the Expert Group felt that definitions of 'foods high in fat, salt or sugar' and 'healthier food choices' should be developed which include criteria for nutrients and foods that people are encouraged to eat more of and/or are necessary for a healthy diet.

The Expert Group noted that the Government recommended an increased consumption of fruit and vegetables and fish, particularly oily fish. Therefore they considered whether the definitions might involve criteria for levels of fruit and vegetables and fish. They noted that the increased consumption of fruit and vegetables is recommended for a variety of reasons but that the fish recommendation

is because of the high levels of n-3 fatty acids in fish and that there is also a specific Government recommendation for n-3 fatty acids. Accordingly the Expert Group selected fruit and vegetable levels and n-3 fatty acid levels as criteria for possible inclusion in the nutrient profiles.

Finally the Expert Group selected two nutrients - iron and calcium – in order to categorise foods as ‘healthier food choices’ that might otherwise be regarded as less healthy but for a redeeming feature e.g. iron in the case of lean meat, calcium in the case of low-fat dairy products. Other nutrients could have been chosen, such as fibre, zinc or vitamin C, but it was felt that calcium and iron were the most appropriate choices, as they would identify healthier food choices from the ‘milk and dairy foods’ and ‘meat, fish and alternatives’ groups of the Balance of Good Health. According to the Balance of Good Health, approximately one quarter of the diet should consist of foods from these categories, yet many could be labelled as ‘foods high in fat, salt or sugar’ by a nutrient profile which only considers fat (or energy) saturated fat, NME sugar and sodium levels.

The literature review indicates several of the schemes involving nutrient profiling include nutrients where children often eat less than the recommended intake. Fibre is probably the most frequently selected, followed by calcium. Some schemes, particularly those from North America include iron, vitamin C, vitamin A, and protein. Many schemes make specific provision to promote foods containing fruits and vegetables.

**The Expert Group agreed that the following nutrients (and other components of foods) be used in developing definitions for possible testing:**

- **energy, saturated fat, non-milk extrinsic (NME) sugar and sodium (henceforth called ‘A’ nutrients)**
- **fruit and vegetables and long chain n-3 polyunsaturated fatty acids (n-3 fatty acids) (‘B’ nutrients)**
- **calcium and iron (‘C’ nutrients)**

**It was agreed that they should be used in the following combinations:**

**Group A nutrients: just ‘A’ nutrients**

**Group B nutrients: ‘A’ nutrients + ‘B’ nutrients**

**Group C nutrients: ‘A’ nutrients + ‘B’ nutrients + ‘C’ nutrients**

### 2.3.2 Fortification

The Expert Group felt that nutrient criteria should exclude fortificants, except in the case of mandatory fortification. However they recognised that it might not be possible to test definitions using pre-fortification criteria because of lack of pre-fortification data for most products.

**It was agreed that where definitions involved criteria for calcium, iron and n-3 then those criteria should be for the levels of those nutrients prior to any discretionary fortification.**

### 2.3.3 Combining criteria for nutrients and other components

When a nutrient profile is being developed it is necessary to think not only of the individual nutrient criteria, but also how the criteria are combined. It is possible to combine criteria with any logical operator, but in all practical circumstances a combination of AND and OR will suffice.

Instinctively, we tend to think of healthier foods as ‘constrained’ or ‘bounded’ and less healthy foods as ‘unconstrained’ or ‘unbounded’. This means that we instinctively feel that definitions of ‘foods high in fat, salt *or* sugar’ should use the OR operator when combining the criteria for fat, salt and sugar. And similarly we instinctively feel that a ‘healthier food choice’ would be a food that is low in fat, salt AND sugar.

This however, is not the only way to proceed. For example even with nutrients such as fat, salt and sugar it might be necessary to limit either the sugar level OR the salt content when defining a ‘healthier food choice’, so long as the fat level is limited. And similarly when defining a ‘food high in fat, salt or sugar’ it might be appropriate to use the AND operator.

With increasing numbers of nutrients it is generally inappropriate to link all nutrients with just one operator. For example, although it might be felt that for a food to be a ‘healthier food choice’ it ought to be low in fat AND salt AND sugar, it would seem inappropriate to demand that it also had to be high in calcium AND iron AND n-3 fatty acids, since very few foods would be expected to contain significant levels of calcium and iron and n-3 fatty acids. The use of some OR operators in such a definition would seem to be required.

#### **The Expert Group agreed that for the purposes of this project:**

**‘Foods high in fat, salt or sugar’** would need to be

- above defined energy OR saturated fat OR NME sugar OR sodium levels
- below defined levels of fruit and vegetables AND n-3 fatty acids AND calcium AND iron (where the definition involved criteria for these nutrients/components)

**‘Healthier food choices’** would need to be:

- below defined energy AND saturated fat AND NME sugar AND sodium levels
- above defined levels of fruit and vegetable OR n-3 fatty acids OR calcium OR iron (where the definition involved criteria for these nutrients/components)

## 2.4 Stage 2. Choice of base

There are three basic ways of setting nutrient profiles: per 100g, per 100kJ and per serving.

### 2.4.1 Pros and cons of different bases

- **Per 100g**

Pros: The use of a per 100g basis for nutrient profiles is common because it is usual to give nutrient composition data on a per 100g basis, e.g. in food composition tables and in nutrition labelling. 100g of food is also relatively simple to conceptualise – particularly compared to 100kJ.

Cons: A food that is high in a nutrient on a per 100g basis may supply little of that nutrient because it is eaten in small servings and/or infrequently (e.g. fat in mustard). Conversely a food that may be low in a nutrient per 100g may supply a lot of that nutrient because it is eaten in large servings and/or frequently (e.g. NME sugar in soft drinks). One of the main reasons for this is that foods vary widely in their water content and foods that have low levels of nutrients on a per 100g basis tend both to contain high levels of water (on a per 100g basis) and to be eaten in large servings (e.g. beverages, stews, etc.). Of course there are other determinants of serving size and/or frequency of consumption besides the water content of foods. These include intensity of taste (cf. mustard) and many other properties of foods.

- **Per 100kJ**

Pros: Using a per 100kJ basis discounts the water content of foods, because foods that have a low water content and are therefore energy dense tend to be consumed in relatively small amounts, and conversely foods with a high water content/low energy density tend to be eaten in larger quantities. This is, in turn, because the amount of food that people eat is, in general, governed by their energy needs.

One of the consequences of this is that there is stronger correlation between nutrient per serving and nutrient per 100kJ than between nutrient per serving and nutrient per 100g. Using an energy basis therefore partially takes account of serving sizes.

Because the amount of food that people eat is governed by their energy needs recommendations for daily intake of nutrients tend to be set as a proportion of total or food energy. Therefore using a per 100kJ basis means that per 100kJ criteria can directly correspond with dietary recommendations unlike per 100g criteria which rely on recommendations being converted into g per day using an average energy intake figure.

Cons: There are still some energy dense foods, such as mustard, which appear high in a nutrient when measured per 100kJ, yet supply little of that nutrient because they are eaten in small servings. Conversely there are some foods, such as some fruits and vegetables, that have a very high water content and very small amount of energy (either per 100g or per serving). However, if this small amount of energy is from a small amount of fat, saturated fat or sugar (on a per serving basis), then the food will appear to have a large amount of this nutrient when measured per 100kJ.

- **Per serving**

Pros: The use of a per serving basis for nutrient profiles recognises that people consume irregular amounts of different foods and that foods that they eat in large amounts supply more of the nutrients they contain than foods eaten in small amounts. Serving size, together with frequency of consumption, are the main determinants of how much of a nutrient a food supplies to peoples' diets.

Cons: Serving sizes can vary considerably. For example, the serving size of milk depends on whether it is drunk by itself or with breakfast cereal or with coffee. Also, serving sizes partly depend on the energy needs of the consumer (e.g. children tend to eat smaller serving sizes than adults). Serving sizes for some foods are therefore difficult to define.

A per serving basis does not take account of frequency of consumption so some foods (such as fat spreads) may be eaten in small servings but if eaten frequently can contribute a lot of a nutrient to a person's diet. But neither a per 100g nor a per 100kJ basis take account of frequency of consumption either.

The choice of which base is used for nutrient profiles could be crucial as different bases will rank foods in different orders (e.g. Spaghetti Bolognese has less fat per 100g than mayonnaise, but more fat per serving).

The choice of which base to use becomes more important if 'across the board' criteria are used than if 'food category specific' criteria (see Section 2.5.2) are used because foods within categories tend to vary less in their serving sizes or their energy density than the whole range of possible foods. Therefore a choice of base is partially dependent on the choice of model to be used.

The literature review indicates that the most common choice of base for nutrient profiling is probably per serving although per 100g is also used frequently. A per 100kJ base is used infrequently.

**The Expert Group agreed that when developing models with their associated definitions for testing no possible bases should be ruled out.**

#### 2.4.2 Combining bases

It is possible to combine two bases for nutrient profiles so as to gain the advantages of both bases, and this technique can and has been used to introduce a judgement about how much nutrient a food actually delivers to a diet. An example of this is the Codex Alimentarius definition of 'low in saturated fat', which is that a food should have less than 1.5g saturated fat per 100g and less than 10kJ saturated fat per 100kJ.

The two bases which rank foods most similarly in order of their nutrient contents are the per 100g and per 100kJ bases<sup>5</sup>. Using a per 100g/per 100kJ in combination with a per serving basis would seem to be the most promising way of gaining the advantages of two bases.

If two bases are used, a decision must be made about how they are combined. There are two possibilities here, for example a definition might specify that a food meets a per serving AND a per 100g criteria or it might specify that a food meets a per serving OR a per 100g criteria.

Whether to combine the bases with AND or OR depends upon the bases that are being combined.

For example Figure 2a shows the fat levels of 100 foods selected at random from the McCance and Widdowson nutrient database, and plotted on a per 100g basis vs. a per serving basis. Figure 2b shows the fat levels of the same foods plotted on a per 100kJ vs a per serving basis. Thresholds for fat per 100g, per 100kJ and per serving have been added, which might be used as criteria for 'foods high in fat'.

For both graphs, it is clear that the foods in the top right quadrant would most likely be included in the definition of a 'food high in fat' and equally that the foods in the bottom left quadrant would most likely be excluded. It is not as clear, however, for foods in the remaining two quadrants.

The foods in the top left quadrant of Figure 2a are foods that provide a lot of fat per serving, but not much fat per 100g. Foods which are eaten in large quantities but have a high water content may fall into this quadrant (such as a Quarterpounder with cheese, where the bun and the salad provide a significant amount of water). In order to include such foods within the definition of 'foods high in fat', the OR operator must be used to connect the bases. Using this operator will also mean that all the foods in the bottom right quadrant of 2a are included i.e. foods high in fat on a per 100g basis but which are eaten in small amounts (such as chocolate éclairs, but also nuts and some fish products). Although some apparent anomalies are inevitable, per 100g OR per serving combines the bases in the only way that includes foods with high water content that might supply significant amounts of nutrients to the diet.

The water content is not taken into account when the fat is measured on a per 100kJ basis and to a less extent on a per serving basis. As a result of this, the foods in the top left quadrant of 2b are foods that are high in fat per serving, but are likely to be high in energy (since they are not high in fat per 100kJ). Because of this, they are likely to satisfy a consumer whilst not putting them over the recommended intake of fat. These foods should perhaps be excluded from the definition of 'foods high in fat' and hence per 100kJ AND per serving should be used.

It is not as clear for foods in the bottom right quadrant of 2b, which again includes foods such as nuts and fish products, but also high fat snacks such as éclairs and

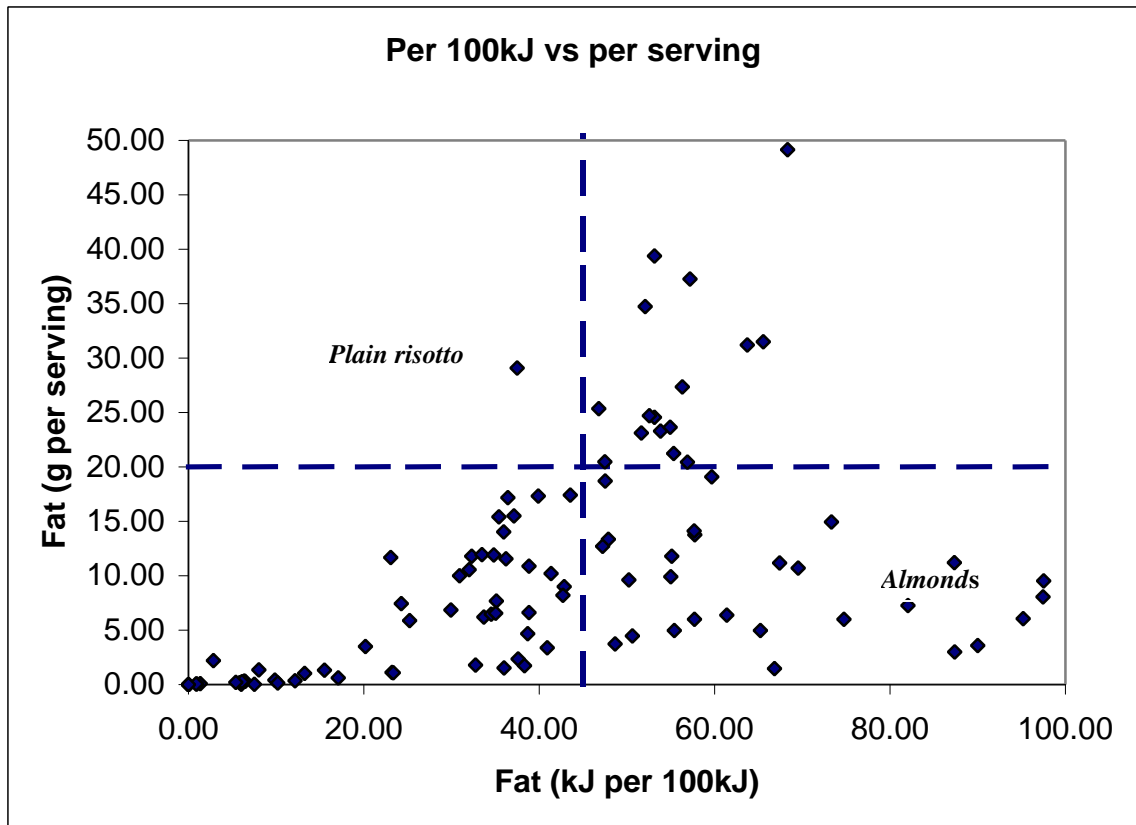
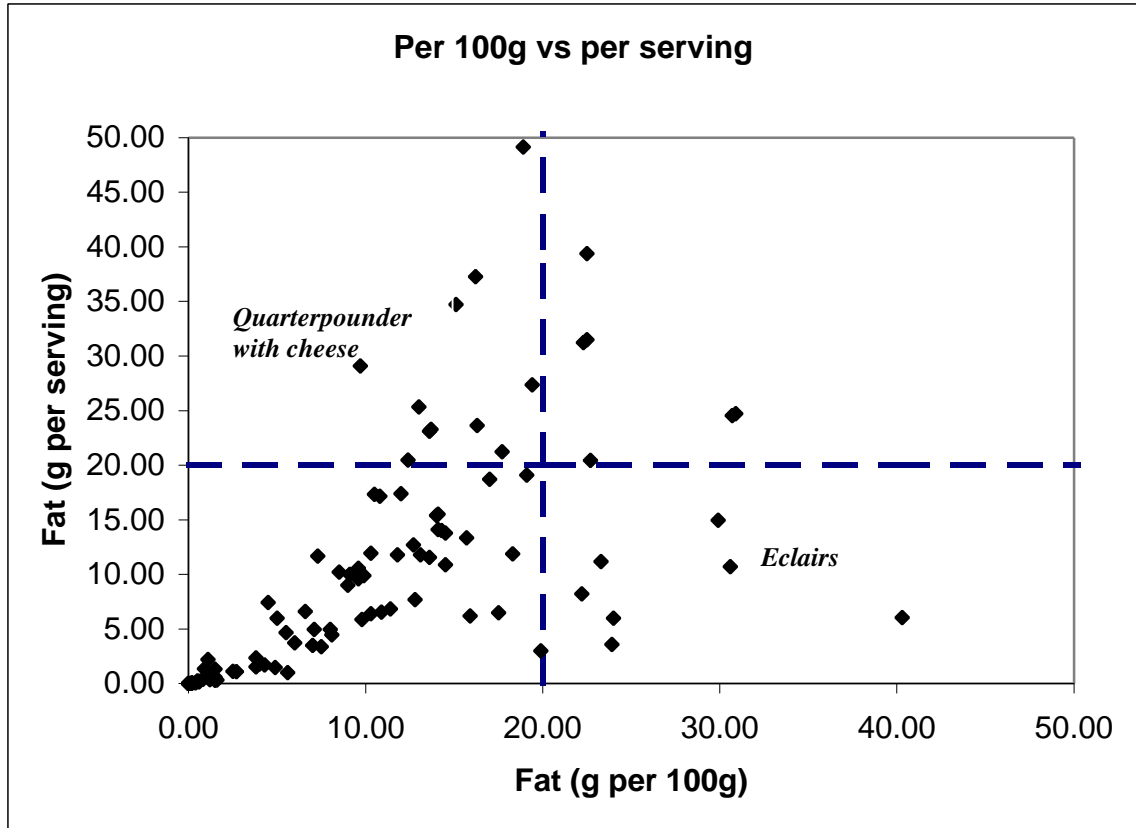
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<sup>5</sup> Using a database of foods derived from McCance and Widdowson's *The Composition of Foods* (see Section 3 below) the correlation ( $r^2$ ) between fat levels measured per 100g and per 100kJ was 0.63, whereas the correlation between the amount of fat per serving and the amount of fat per 100kJ was 0.34, and that between the amount of fat per serving and the amount of fat per 100g was 0.20.

biscuits. However, there are many more foods in this quadrant than in the corresponding quadrant of 2a, and these extra foods must all have been in the bottom left quadrant of 2a. It is therefore wise to exclude all the foods from this quadrant, in order to avoid these extra apparent anomalies.

Similar considerations will need to be made when drawing up definitions of 'healthier food choices' based on two bases. But in this case the conclusion would be that with a definition of a 'food low in fat' the food should be lower than a per 100g threshold AND a per serving threshold, or a per 100kJ OR a per serving threshold.

Figure 2a and 2b: Per 100g AND / OR per serving; Per 100kJ AND / OR per serving



The Expert Group agreed that when combining per 100g and per serving criteria the OR operator should be used for definitions of ‘foods high in fat, salt or sugar’ and the AND operator for ‘healthier food choices’ but conversely when combining per 100kJ and per serving criteria the AND operator should be used for definitions of ‘foods high in fat, salt or sugar’ and the OR operator should be used for foods for ‘healthier food choices’.

**Accordingly the Expert Group agreed that when the developing models with their associated definitions the following bases, or combinations of bases, should be used**

- per 100g
- per 100kJ
- per 100g AND/OR per serving
- per 100kJ AND/OR per serving

## **2.5 Stage 3. Choice of model type**

There are three different options of model type that can be used for nutrient profiling; threshold models, simple scoring systems, and complex scoring systems. Once the type of model is chosen it is necessary to choose between food category specific or across the board criteria.

2.5.1 Stage 3a: Thresholds models, simple scoring system or complex scoring systems?

### **2.5.1.1 Pros and cons of different types of model**

- **Threshold models**

A threshold model works by setting thresholds for the level of each of the selected nutrients. A food will be classified as a ‘food high in fat, salt or sugar’ or a ‘healthier food choice’ depending on whether the levels of its nutrients are above or below the thresholds.

Pros: Threshold models are relatively easy to understand. For example, with most conceivable threshold models, it would be easy to explain to a consumer the maximum amount of salt that a food defined as ‘a healthier food choice’ would contain. Justification of threshold models is also clearer since, as long as the thresholds are set in relation to justifiable targets, then the models are also justifiable.

Cons: They can often be over-simplistic, which can lead to apparent anomalies. For example, suppose a model used to define ‘healthier food choices’ contained the criterion ‘must contain less than 45kJ fat per 100kJ’, in line with the Coronary Prevention Group Nutrition Banding Scheme definition of high fat foods. Then nuts, grilled fish and tofu will all be excluded by the model.

Note that with threshold models an implicit judgment is made that crossing one threshold is equivalent to crossing another. So for example if a food is defined as 'a food high in fat, salt or sugar' if it contains more than  $x$  g/100g of fat OR more than  $y$  g/100g sodium then it is implied that  $x$  g of fat in 100g of a food is as undesirable as  $y$  g of sodium. Similar but more complex assumptions have to be made when developing scoring systems.

- **Simple scoring systems**

A simple scoring system works in a similar fashion to a threshold model, except that for each nutrient a series of thresholds are set. This creates a series of bands, and depending on which band the food lies in for each nutrient, a certain number of points are scored. The scores from each of the nutrient bands are added to give the food a total score. Then a threshold score is set, which defines whether a food is 'a food high in fat, salt or sugar' or a 'healthier food choice'.

Pros: A simple scoring system model is less likely to produce apparent anomalies, as, for example, foods that just cross the threshold for a nutrient such as fat under a threshold model will not necessarily be defined as 'a food high in fat, salt or sugar' using a definition based on a scoring system – particularly if their levels of nutrients such as calcium or iron are used to lower their scores.

The scores that foods are awarded by a simple scoring system can be used for a variety of purposes (for example, for comparison of foods in one particular food category), and different score thresholds can be used for different purposes (for example it might be agreed that there should be restrictions on the TV advertising of foods that score at least 5 points, whilst there should be restrictions on the use of health claims for foods that score at least 4 points).

Scoring systems give greater discrimination between different foods than threshold models. Therefore in some circumstances they could more readily be used to create incentives to industry to reformulate foods.

Cons: Scoring systems are necessarily more complex than threshold models, and their development relies on more subjective judgements (for example, the width of the nutrient bands, and the number of points required to be included in the definitions such as 'foods high in fat, salt or sugar').

- **Complex scoring systems**

Complex scoring systems are essentially scoring systems which use more complicated methods than a series of bands to score foods for each nutrient. The aim of a complex scoring system would be to rank foods by healthiness according to levels of the selected nutrients, in a way that most accurately fits a pre-described mathematical model.

Pros: Complex scoring systems are likely to produce the least amount of apparent anomalies of the three types of model, as they will take the most amount of

information into consideration. For this reason, they may be the most accurate and hence justifiable type of model.

Cons: These models could be very difficult to understand, and this may lead to manufacturers being unable to reformulate foods to comply with them. The models also require even more subjective judgements than simple scoring systems during their development.

### 2.5.1.2 Comparing different types of model

The three types of model will produce different groups of foods that are categorised as ‘healthier food choices’ or ‘foods high in fat, salt or sugar’, even when starting with the same nutrient criteria. This can be demonstrated with the following example.

Suppose that a definition of ‘healthier food choices’ is being developed. Two nutrients are being considered: fat and sodium, and it is decided that the target levels for these nutrients are less than 300mg sodium per 100g and less than 15g fat per 100g. The three following models could be developed:

#### Threshold model:

A food is a ‘healthier food choice’ if it is:

- <300mg sodium per 100g
- AND
- <15g fat per 100g

#### Simple scoring system:

A food is a ‘healthier food choice’ if it scores 2 points or less

Where:

Sodium per 100g	Fat per 100g
0-100mg = 0 points	0-5g = 0 points
100-200mg = 1 point	5-10g = 1 point
200-300mg = 2 points	10-15g = 2 points
300mg+ = 3 points	15g+ = 3 points

#### Complex scoring system:

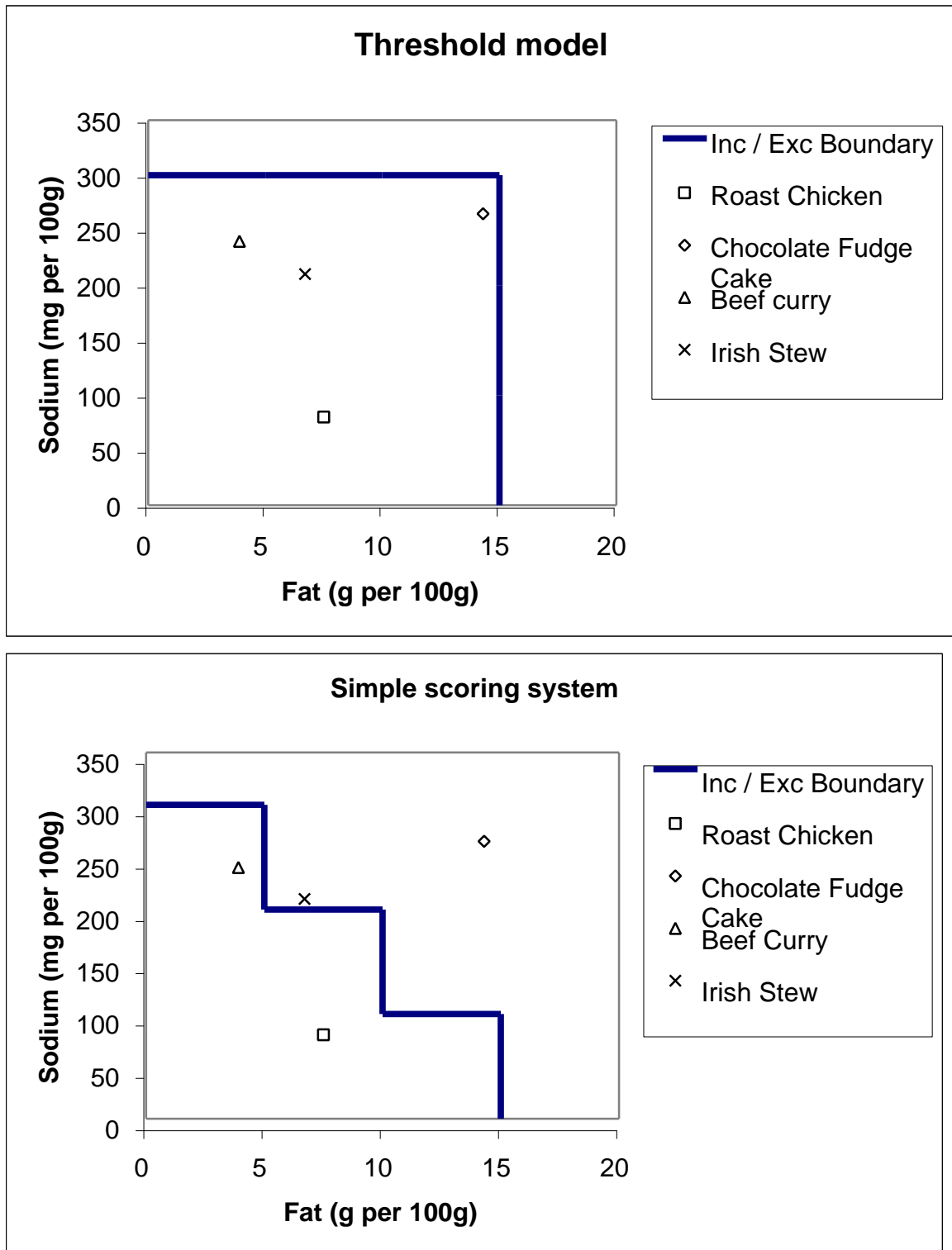
A food is a ‘healthier food choice’ if  $(\text{salt points})^2 + (\text{fat points})^2 < 9$

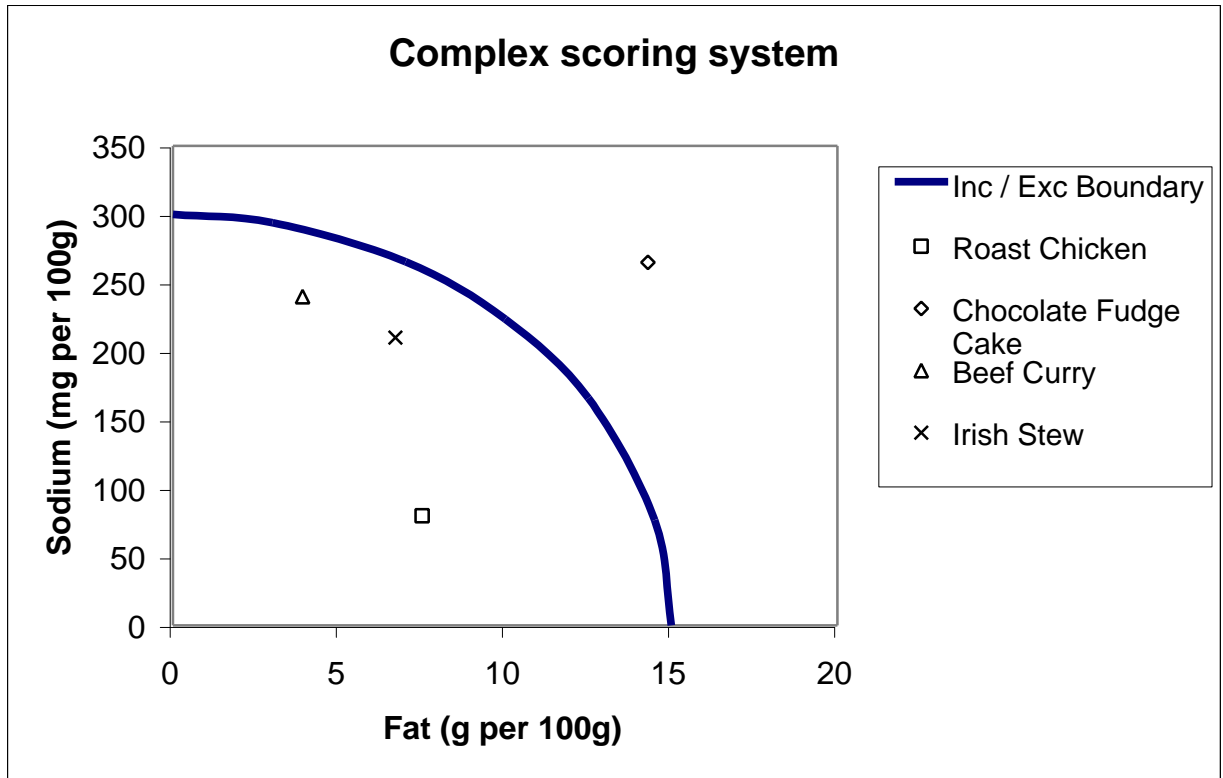
Where

Salt points:	Fat points:
$x/100$ , where $x$ = salt content in mg per 100g	$x/5$ , where $x$ = fat content in g per 100g

The boundaries for foods to be included in the definition of 'healthier food choice' for each model type are shown in Figure 3 on the following page.

**Figure 3. Boundaries for foods to be included in the definition of ‘healthier food choice’ for a threshold model, a simple scoring system model, and a complex scoring system model**





The figures show that all three models would define roast chicken and beef curry as ‘healthier food choices’, but that a threshold model would also include chocolate fudge cake and Irish stew within its definition of a ‘healthier food choice’, and a simple scoring system would exclude Irish stew.

The literature review shows that a threshold model is used most commonly for nutrient profiles, with one or two schemes attempting to use scoring systems.

**The Expert Group agreed that in the first place threshold models should be developed and tested but that scoring systems should also be considered.**

### 2.5.2 Stage 3b: Food category specific criteria or across the board criteria?

All three types of models can, in theory, involve food category specific criteria, or across the board criteria.

#### 2.5.2.1 Pros and cons of food category specific criteria and across the board criteria

##### Food category specific criteria

There are different ways of categorising foods e.g. on the basis of how they are eaten (e.g. ingredients, constituents of meals, whole meals) or by making assumptions about their composition (e.g. the ‘food groups’ of the Balance of Good Health or the categories of the Food Standards Agency’s Salt Model (FSA, 2003)).

Many existing examples of nutrient profiles involve food category specific criteria e.g. the Australian Heart Foundation’s Pick the Tick scheme, the Swedish Green Key Hole scheme (see Section 1).

Pros: Food category specific criteria take account of the fact that certain food categories are higher in certain nutrients than others. Using food category specific criteria would mean, for example, that it would be easier to ensure that a definition of ‘healthier food choices’ includes the healthier choices from each food category. This might increase the incentive to manufacturers to reformulate foods, in order for them to be included by the model.

Categorising foods for the purposes of developing nutrient profiles – albeit nutrient profiles involving only one nutrient – has already been done for the purpose of developing targets for sodium levels in foods with the Food Standards Agency’s Salt Model.

Cons: Without using the same criteria for all food categories consumers may believe that healthier food choices from each food category are as healthy as each other which would not necessarily be the case.

It is not clear whether the categories used elsewhere e.g. for the Balance of Good Health or the FSA’s Salt Model, would be appropriate for the purpose of defining ‘foods high in fat, salt or sugar’ or ‘healthier food choices’.

Furthermore the Expert Group noted that categorising foods is difficult. For example the ‘Balance of Good Health’ does not successfully split all foods into one and only one category: many composite foods, such as pizza, are clearly composed of foods from more than one group, and it is unclear where some relatively simple foods such as currant buns and baked beans belong.

### **Across the board criteria**

Many existing examples of nutrient profiles use across the board criteria (see Section 1). For example the US Nutrition Labelling and Education Act specifies that a claim that a food that helps reduce the risk of heart disease must be < 3g per serving of fat, < 1g per serving of saturated fat and < 480 mg per serving of sodium regardless of the type of food.

- Pros: Across the board criteria are simple and allow consumers to make comparisons across food categories.
- Cons: Across the board criteria – particularly if they only take into consideration a few nutrient levels - tend to generate more apparent anomalies.

The literature review found that nutrient profiling schemes are evenly split between those which use across the board criteria or food category specific criteria.

**The Expert Group agreed that across the board criteria should be developed and tested in the first instance.**

## **2.6 Stage 4. Choice of numbers**

The levels set for the thresholds of the individual nutrient criteria (or points scored for a particular level) can be pragmatically chosen, taken from respected sources, or linked to public health recommendations.

### **2.6.1 Pros and cons of different ways of choosing numbers**

#### **Pragmatically chosen levels**

As long as a database of foods to test potential models is available, it is possible to set the nutrient criteria so that a certain pre-selected proportion of foods is included within a definition.

- Pros: Pragmatically set thresholds can be set to achieve any objectives that are required. e.g. equal levels of inclusion/exclusion for each nutrient considered could be achieved, or the levels can be set to coincide with manufacturers' views of what are attainable targets.
- Cons: The model would be hard to justify on public health grounds. If equal levels of inclusion/exclusion for each nutrient is an aim when setting nutrient profiles, then it is unlikely that the criteria would deliver equal health benefits across nutrients.

#### **Levels derived from respected sources**

Nutrient profiles have been used around the world for a variety of purposes but mostly when making claims about the health benefits of foods (see Section 1). The originators are often government departments (e.g. in the process of setting criteria for the use of health or nutrition claims), public health organisations or charities (e.g. in developing health-related endorsement schemes such as the Swedish Green Key Hole and the Australian Pick the Tick schemes). Some retailers and manufacturers in the UK have developed their own schemes.

- Pros: The criteria are justifiable on the basis that they have been tried, and to some degree, tested elsewhere.
- Cons: The criteria do not normally bear any transparent or logical relationship with dietary recommendations. If a model is created which uses nutrient criteria

from different sources then it may lead to an unbalanced level of inclusion/exclusion across nutrients, and they may not deliver equal health benefits across nutrients.

### **Levels linked to public health recommendations**

Threshold levels or points scored can be explicitly and logically linked to public health recommendations in various ways.

Across the board criteria set on per 100kJ basis can be linked simply by taking specified proportions of population dietary goals if these are set on a per energy basis (as is generally the case with fat, saturated fat and NME sugar). This is the way the Coronary Prevention Group Nutrition Banding scheme is linked to public health recommendations.

Across the board criteria set on a per 100g or per serving basis can similarly be linked to population dietary goals by first converting these into Guideline Daily Amounts (GDAs) and then setting the levels as specified proportions of the GDAs. This was the approach used when developing the FSA's advice for what counts as 'a lot' or 'a little' of certain nutrients (Rayner et al, 2004).

Food category specific criteria can be linked to public health recommendations by deriving targets for desirable levels in food categories from modelling what needs to be achieved to reach desirable intake levels from current intake levels (as with the FSA Salt model).

- Pros: The criteria are justifiable since they are transparently related to dietary recommendations. If the same method of linking to the dietary recommendation is used for each nutrient, then the same health benefits should be achieved across each nutrient. Linking to public health recommendations is surprisingly flexible, since any proportion of/relation to the recommendation can be used so long as the same proportion is used for each nutrient.
- Cons: If the health benefits for each nutrient are equal, then it is likely that there will be an unbalanced inclusion/exclusion of foods across nutrients.

**The Expert Group agreed that threshold levels and points scored should bear a transparent relationship to agreed public health recommendations but that the numbers chosen in this way should be checked against those used by respected sources.**

## 2.7 References

- Coronary Prevention Group (1988) Nutritional Labelling of Foods: A Rational Approach to Banding. London: CPG.
- European Commission (2003) Proposal for a regulation of the European Parliament and of the Council on nutrition and health claims made on foods. Brussels, 16.7.2003 COM(2003) 424 final.
- Food Standards Agency (2002) Labelling claims. London: FSA (and 'Salt', 'Sugar' and 'Fat' in this series.)
- Food Standards Agency (2003) Salt in processed food: modelling food and intake reductions. London: FSA.
- Gregory J, Collins D, Davies P, Hughes J, Clarke P (1995) National Diet and Nutrition Survey: children aged 1 ½ to 4 ½ years. Volume 1: Report of the diet and nutrition survey. London: HMSO.
- Gregory J, Lowe S (2000) National Diet and Nutrition Survey: young people aged 4 to 18 years. Volume 1: report of the diet and nutrition survey. London: HMSO.
- House of Commons Health Committee (2004) Obesity. Third Report of Session 2003-04. London: The Stationery Office.
- Laville, M. (2004) Could glycaemic index be the basis of simple nutritional recommendations? *British Journal of Nutrition* 91: 803-4
- O'Neill M. (2004) Traffic lights for food? How nutrient profiling can help make healthy choices become easy choices. London: National Consumer Council.
- Prentice A, Jebb S (2003) Fast foods, energy density and obesity: a possible mechanistic link. *Obesity Reviews* 4: 187-94.
- Rayner M, Scarborough P, Williams C (2004) The origin of Guideline Daily Amounts and the Food Standards Agency's guidance on what counts as a lot and a little, *Public Health Nutrition* 7 (4): 549-556.

## **SECTION 3. DEVELOPMENT AND TESTING OF POSSIBLE DEFINITIONS 1**

### **3.1 Summary**

This section describes the development and testing of possible definitions of ‘foods high in fat, salt or sugar’ and ‘healthier food choices’ for the purpose of advice on the use of nutrition and health claims on foods aimed specifically at children; and advice on the balance of TV advertising for foods during children’s TV programmes.

28 definitions of ‘foods high in fat, salt or sugar’ were developed on the basis of the recommendations of the Expert Group using the theoretical approach described in the previous section. On the basis of testing the 28 definitions, eight definitions were selected for development into complete models with definitions of ‘foods high in fat, salt or sugar’, ‘healthier food choices’ and ‘intermediate foods’.

On the basis of the testing of these 28 definitions and the eight complete models the Expert Group agreed that three models were worthy of further consideration and should be tested further and if possible refined i.e.

- **Model TAg (Threshold model, Group A nutrients (energy, saturated fat, non-milk extrinsic (NME) sugar and sodium) per 100g base)**
- **Model TCg (Threshold model, Group C nutrients (energy, saturated fat, NME sugar, sodium, fruit and vegetables, n-3 fatty acids, calcium and iron), per 100g base)**
- **Model SSCg (Scoring system, Group C nutrients, per 100g base) <sup>6</sup>**

**Model TAg was chosen because it is relatively simple but the Expert Group noted that it is not particularly accurate. Model TCg was chosen because, although slightly more complex than Model TAg, it is more accurate. Similarly Model SSCg was chosen because, although this specific model was no more accurate than Model TCg, scoring systems were generally found to improve the accuracy of models.**

### **3.2. Introduction**

#### **3.2.1 Recommendations of the Expert Group**

In Section 2 it was noted that, for the purposes of developing definitions of ‘foods high in fat, salt or sugar’ and ‘healthier food choices’ for testing, the Expert Group agreed that:

#### ***Ages of children***

The project should focus on the development and testing of definitions for ‘foods high in fat, salt or sugar’ and ‘healthier food choices’ for children aged 11-16. But noted

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<sup>6</sup> For the numbers see Appendix 6

that these should be applicable to children of any age between 5 and 16 and also to adults.

### ***The intended uses of definitions and models***

The project should focus on developing and testing definitions of ‘foods high in fat, salt or sugar’ and ‘healthier food choices’ for the purpose of:

- Advice on the use of nutrition and health claims on foods aimed specifically at children; and
- Advice on the balance of TV advertising for foods during children’s TV programmes.

### ***Choice of nutrients***

The nutrients (and other components of foods) for the criteria should be:

- Energy, saturated fat, non-milk extrinsic (NME) sugar and sodium (‘A’ nutrients)
- Fruit and vegetables and long chain n-3 polyunsaturated fatty acids (n-3 fatty acids) (‘B’ nutrients)
- Calcium and iron (‘C’ nutrients)

That these nutrients be used in the following combinations:

**Group A: just ‘A’ nutrients**

**Group B: ‘A’ nutrients + ‘B’ nutrients**

**Group C: ‘A’ nutrients + ‘B’ nutrients + ‘C’ nutrients**

That for the purposes of this project:

**‘Foods high in fat, salt or sugar’** would need to be

- above defined energy OR saturated fat OR NME sugar OR sodium levels
- below defined levels of fruit and vegetables AND n-3 fatty acids AND calcium AND iron (where the definition involved criteria for these nutrients/components)

**‘Healthier food choices’** would need to be:

- below defined energy AND saturated fat AND NME sugar AND sodium levels
- above defined levels of fruit and vegetable OR n-3 fatty acids OR calcium OR iron (where the definition involved criteria for these nutrients/components)

### ***Choice of base***

That the following bases should be used:

- per 100g
- per 100kJ
- per 100g AND/OR per serving
- per 100kJ AND/OR per serving

That when combining per 100g and per serving criteria the OR operator should be used for definitions of ‘foods high in fat, salt or sugar’ and the AND operator for ‘healthier food choices’ but conversely when combining per 100kJ and per serving

criteria the AND operator should be used for definitions of ‘foods high in fat, salt or sugar’ and the OR operator should be used for foods for ‘healthier food choices’.

### ***Choice of model***

That in the first place threshold models should be developed and tested but that scoring systems should also be considered. That across the board criteria should be tested in the first instance rather than food category specific criteria

### ***Choice of numbers***

That the levels set for the thresholds of the individual nutrient criteria (or points scored for a particular level) should bear a transparent relationship to agreed public health recommendations but that the numbers chosen in this way should be checked against those used by respected sources.

## 3.2.2 Consequences of the Expert Group’s recommendations

In view of the Expert Group’s recommendations it was necessary to select agreed population dietary goals and develop Guideline Daily Amounts (GDAs) for selected nutrients and other food components for children aged 11-16. The population dietary goals and the GDAs for this age-group are given in Table 2.

**Table 2. Population dietary goals and Guideline Daily Amounts for children aged 11 – 16**

<b>Nutrient</b>	<b>Source of population dietary goal</b>	<b>Population dietary goal</b>	<b>GDA</b>
<b>Energy</b>	<b>1 <sup>(a)</sup></b>	<b>2130 kcal</b>	<b>2130 kcal</b>
<b>Saturated fat</b>	<b>1 <sup>(b)</sup></b>	<b>11% food energy</b>	<b>26 g</b>
<b>NME sugar</b>	<b>1 <sup>(c)</sup></b>	<b>11% food energy</b>	<b>63 g</b>
<b>Sodium</b>	<b>2 <sup>(d)</sup></b>	<b>2.35 g/day</b>	<b>2.35 g</b>
<b>Fruit and vegetables</b>	<b>3 <sup>(e)</sup></b>	<b>380 g/day</b>	<b>380 g</b>
<b>Calcium</b>	<b>1 <sup>(f)</sup></b>	<b>690 mg/day</b>	<b>690 mg</b>
<b>Iron</b>	<b>1 <sup>(g)</sup></b>	<b>10 mg/day</b>	<b>10 mg</b>
<b>Long chain n-3 polyunsaturated fatty acids</b>	<b>4 <sup>(h)</sup></b>	<b>0.4 g/day</b>	<b>0.4 g</b>

#### *Sources:*

- 1. Department of Health, Dietary Reference Values for Food Energy and Nutrients for the United Kingdom. Report on Health and Social Subjects No 41. London: HMSO, 1991;*
- 2. Department of Health. Nutritional Aspects of Cardiovascular Disease. London: HMSO, 1994.*
- 3. Scientific Advisory Committee on Nutrition. Salt and Health. London: The Stationery Office, 2003.*
- 4. Scientific Advisory Committee on Nutrition. Advice on Fish Consumption: Benefits and Risks. London: The Stationery Office, 2004*

#### *Notes:*

*(a) Weighted average of 2220 kcal/day (Estimated Average Requirement (EAR) for boys aged 11-14); 1845 kcal/day (EAR for girls aged 11-14); 2755 kcal/day (EAR for boys aged 15-18); 2110 kcal/day (EAR for girls aged 15-18)*

*(b) GDA calculated using EARs for energy as in note (a) and a conversion factor of 9 kcal for 1 g fat.*

*(c) GDAs calculated using EARs for energy as in note (a) and a conversion factor of 3.75 kcal for 1 g sugar.*

*(d) The Scientific Advisory Committee on Nutrition (SACN) recommends; 6g/day for children aged 11 and over.*

*(e) The Committee on Medical Aspects of Food and Nutrition Policy (COMA) recommends a 50% increase in consumption of fruit and vegetables. This has been translated into 5 servings a day or 400g. Here this amount in g has been adjusted to take account of the lower energy needs of children.*

*(f) Weighted average of: 750 mg/day (EAR for boys aged 11-14); 625 mg/day (EAR for girls aged 11-14); 750 mg/day (EAR for boys aged 15-18); 625 mg/day (EAR for girls aged 15-18).*

*(g) Weighted average of 8.7 mg/day (EAR for boys aged 11-14); 11.4 mg/day (EAR for girls aged 11-14); 8.7 mg/day (EAR for boys aged 15-18); 11.4 mg/day (EAR for boys aged 15-18).*

*(h) SACN recommends that the average 'population' intake should be 0.45 g/day. Here this amount in g has been adjusted to take account of the lower energy needs of children.*

In establishing standard relations to dietary recommendations the three types of nutrients were treated differently.

For criteria for 'A' nutrients (energy, saturated fat, NME sugar and sodium) set per 100g, the advice of the Food Standards Agency (FSA) on what counts as 'a lot' or 'a little' was used as the starting point for thresholds (Food Standards Agency, 2002). 'A lot' (according to the FSA) is 20% of the GDA and 'a little' is 3.3% (Rayner et al, 2004). For a per 100kJ base the Coronary Prevention Group (CPG) Nutrition Banding Scheme definitions of 'high' and 'medium low' was used as the starting point (Coronary Prevention Group, 1988). 'High' (according to the CPG) is more than 150% of the population dietary goal, 'medium low' is less than 100% of the population dietary goal (see Appendix 2 for details of the scheme).

It was clear from previous work that these choices of numbers would not be optimum for definitions of 'foods high in fat, salt or sugar' or 'healthier food choices' (and see results below) so other standard proportions of GDAs and population dietary goals were also tested. It is also important to note that 'A' nutrients include energy. Neither the FSA nor the CPG give guidance on energy. In addition the CPG definitions are set on per 100kJ basis. This meant that definitions using just a per 100kJ basis did not include energy as a criterion.

The proportion of GDAs used as a threshold was kept the same for each 'A' nutrient, so that the health benefits suggested by the models would be the same for each nutrient. The same principle was also applied to the 'C' nutrients (i.e. calcium and iron). Calcium and iron, however, were included in order to identify foods which contain a high enough level of these nutrients to 'counterbalance' high amounts of 'A' nutrients, and it was considered that this level should be set at a higher proportion of the GDA than for the 'A' nutrients.

In order to decide which proportions of the GDAs were appropriate starting points for definitions involving per serving criteria for 'A' nutrients and for all criteria involving 'C' nutrients distribution graphs of the foods from the Balance of Good Health subsets of the database (see Section 3.2 below) were produced for each of the 'A' and 'C' nutrients, measured per 100g, per 100kJ and per serving. From studying these graphs, it was possible to estimate how many foods from each subset would be classified as 'healthier food choices' or 'foods high in fat, salt or sugar' depending on

where the thresholds were set and to make an initial judgement about where levels should be set.

For example, by using these distribution graphs, it was judged that one third of the GDA was a good starting point for thresholds for 'A' nutrients measured per serving for definitions of 'foods high in fat, salt or sugar' (and one sixth for 'healthier food choices' thresholds). For 'C' nutrients, 30% of the GDA per 100g, 6% per 100kJ, and 50% per serving were considered to be good starting point for thresholds for both definitions of 'foods high in fat, salt or sugar' and of 'healthier food choices'.

In essence the 'B' nutrients were selected in order to identify specific foods (i.e. oily fish, fruit and vegetables) and prevent them from being classified as 'foods high in fat, salt or sugar'. Because of this, the thresholds were set at a level that would include these foods and exclude all others. Therefore the starting point used for thresholds for definitions of both 'foods high in fat, salt or sugar' and of 'healthier food choices' for n-3 fatty acids was 25% of the GDA per 100g; 50% of the GDA per serving and 7.5 % of the GDA per 100kJ. Similarly the starting point used for fruit and vegetable thresholds was 25% of the GDA per 100g.

The Department of Health's advice is to eat at least five portions of fruit and vegetables a day. This is equivalent to the 400g per day recommended by COMA. 25% of the GDA per 100g therefore works out at 100g per 100g. Given the relatively crude methods of testing fruit and vegetable criteria (see below) no attempt was made to develop fruit and vegetable criteria on a per serving or per 100kJ basis.

Since there were three agreed options for combinations of nutrients, four agreed options for bases or combination of bases and two possibilities for type of model (threshold and scoring system) the process of developing different models with their associated definitions for testing was initiated by generating 24 (3 x 4 x 2) different definitions for 'foods high in fat, salt or sugar'.

For the four definitions involving Group A nutrients two different choices of numbers were tested. So in total 28 different definitions of 'foods high in fat, salt or sugar' were tested.

On the basis of the results of this testing eight definitions were selected for development into complete models with definitions of 'foods high in fat, salt or sugar', 'intermediate foods' and 'healthier food choices'.

The details of each of these models, and the abbreviations used to describe them in this section are shown in Appendix 4.

### **3.3 Methods for testing definitions**

The method used for testing definitions are based on previous work in developing criteria for use of the 5 A DAY logo on composite foods containing fruit and vegetables (Stockley et al, 2003) and on other earlier work (O'Neill, 2004).

### 3.3.1 Development of a database of foods

For the purpose of this project a database of foods using McCance and Widdowson's The Composition of Foods Sixth Summary Edition (Roe et al, 2003) was developed. This contains nutrient composition data for 1,235 foods but no information about serving sizes, NME sugars, fruit and vegetable levels in composite foods or n-3 fatty acids. Furthermore for many foods there is more than one entry. There is also often a duplication for the cooked and uncooked versions of a food.

In order to render the McCance and Widdowson database more suitable for testing definitions, firstly 205 foods were removed that were inedible (e.g. raw meat, raw fish and uncooked pasta, some raw vegetables such as aubergine but not carrots, and raw inedible ingredients such as flour and sunflower oil but not butter). This left 1,030 foods.

Secondly, for each food a serving size was calculated. Information about serving sizes was gathered from the following sources: the MAFF guide to food portion sizes (940 foods) (Ministry of Agriculture, Fisheries and Food, 1993); the Department of Health's guide to a portion of fruit or vegetables (62 fruits and vegetables for which the MAFF guide provides no details)<sup>7</sup>; Kellogg's website (one food); Tesco's website (14 foods); Sainsbury's website (eight foods); and NutritionData.com (four rare foods: chicken skin, turkey skin, pheasant and pumpkin).

All of these serving sizes were for adults, not children. It is unlikely that this would substantially alter the results, as the GDA for energy for children aged 11-16 (Table 2) is about 95% of the GDA for energy for adults.

Thirdly the NME sugar content for each food was calculated based on the FSA's methods for calculating the NME sugar content of foods (Buss et al, 1994). For raw and boiled fruits and vegetables (including nuts and potatoes): none of the sugars were counted as NME sugar. For canned, stewed, grilled, fried, baked, dried or preserved fruit or vegetables: half of all sugars were counted as NME sugar. For foods (excluding drinks) estimated to contain at least one portion of fruit or vegetables (i.e. fresh equivalent weight of 80g) per serving of the food: half of all sugars minus lactose were counted as NME sugar. (Foods were categorised as containing more or less than one portion of fruit and vegetables using data from an unpublished report from Leatherhead Food RA (Angus, 2003)). For all other foods (including fruit juices): all of the sugars minus lactose were counted as NME sugar.

Fourthly the percentage (by weight) of fruit and vegetables (excluding potatoes) for each food in the database was estimated. As there was no ingredient composition data for the vast majority of foods, each food was evaluated and assigned one of five values: 0% (for foods consisting of approximately 0-20% fruit or vegetables (excluding potatoes)); 30% (approximately 21-40%); 50% (approximately 41-60%); 70% (approximately 61-80%); and, 100% (approximately 81-100%).

0% foods consist of breads, cereals, potatoes, milk, most dairy products, meat, fish, nuts, most fatty and sugary foods, and some composite foods. 30% foods consist of

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<sup>7</sup> Department of Health website - <http://www.doh.gov.uk/fiveaday/portions.htm> (20/01/04)

some yoghurts, carbonated fruit juice drinks, jams, fruit pies, vegetable pasties, lasagne, takeaway burgers, etc. 50% foods consist of sauces, fruit crumbles, chutnies, etc. 70% foods consist of vegetable based dishes such as cauliflower cheese, vegetable soup or hummus. 100% foods consist of all fruit and vegetables (however they are cooked), beans and fruit juices.

Fifthly the n-3 fatty acid composition data was obtained from the 7<sup>th</sup> supplement of the 5<sup>th</sup> edition of the McCance and Widdowson series (Ministry of Agriculture, Fisheries and Food, 1998). This provides data on long chain n-3 polyunsaturated fatty acids for 522 different foods. For the purpose of this project long chain n-3 polyunsaturated fatty acids were defined as in the recent report of the Scientific Advisory Committee on Nutrition (i.e. C20:5, C22:5 and C22:6 fatty acids) (Scientific Advisory Committee on Nutrition, 2004). Data on n-3 fatty acid composition was transferred to the existing database by relating the foods from the 7<sup>th</sup> supplement to their closest equivalents in the existing database (e.g. 'Haddock, raw' from the 7<sup>th</sup> supplement was related to 'Haddock, steamed'). Of the 522 foods from the 7<sup>th</sup> supplement, 34 did not have an obvious equivalent in the existing database, and were hence excluded. This meant that 542 foods in the existing database had no equivalent foods in the 7<sup>th</sup> supplement for data to be transferred. These 542 foods were assumed to have 0g of n-3 fatty acids per 100g, per 100kJ and per serving, except for all fish or fish products, which were recorded as 'not sure'.

In testing definitions of 'foods high in fat, salt or sugar' or complete models with definitions of 'foods high in fat, salt or sugar', 'intermediate foods' and 'healthier food choices' firstly the numbers of foods that were categorised by the definitions were examined. It should be noted that since the modified McCance and Widdowson database bears no relation to current or desirable food purchasing or food intake patterns it is difficult to interpret the absolute numbers of foods classified by a definition or a complete model. This would be improved by developing more sophisticated databases for testing (see Section 5).

However, comparison between models suggests which models are most likely to be useful to consumers in different circumstances, e.g. consumers looking for the healthiest possible foods would be best served by models with fewer foods classified as 'healthier food choices'; but if they are just looking for generally healthier foods then they would be best served by models with more foods classified as 'healthier food choices'. Furthermore it is suggested that models which put very large numbers of foods into one category would seem to be less than optimal.

### 3.3.2 Categorisation of foods in the database into Balance of Good Health food groups and selection of indicators for food groups.

Using a Food Classification List (Gatenby et al, 1994) developed for use with the Balance of Good Health all foods in the database were classified into six categories: the five food groups of the Balance of Good Health and composite foods.

For each of the five food groups of the Balance of Good Health eight indicator foods were selected – representative of the variation of nutrient profiles for the foods in the

group. These indicator foods are listed below, as they appear in the results tables (with complete McCance and Widdowson titles in brackets, if different):

**Bread, other cereals and potatoes:**

Roast potatoes (*old potatoes, roast in blended oil*); fresh pasta (*pasta, plain, fresh, cooked*); wholemeal rolls; cream crackers; sugar puffs; corn flakes; oven chips (*oven chips, frozen, baked*); currant buns

**Milk and dairy foods:**

Half fat creme fraiche; semi-skimmed milk (*semi-skimmed milk, average*); whole milk (*whole milk, average*); low fat yoghurt (*yoghurt, low fat, fruit*); greek yoghurt (*greek yoghurt, sheep*); cheddar; camembert; cottage cheese (*cottage cheese, plain*)

**Fruit and vegetables**

Canned pineapple (*pineapple, canned in juice*); orange juice (*orange juice, unsweetened*); peaches (*peaches, raw*); currants; grilled tomato; avocado (*avocado, average*); celery (*celery, raw*); lettuce (*lettuce, raw*)

**Meat, fish and alternatives:**

Roast lamb (*lamb, leg, lean only, roast*); chicken leg (*chicken, leg quarter, roasted, meat and skin*); lentils (*lentils, red, split, dried, boiled in unsalted water*); cod (*cod, baked*); mackerel (*mackerel, grilled*); beefsteak (*beef, rump steak, lean and fat, fried*); walnuts; boiled egg (*egg, chicken, boiled*)

**Foods containing fat, foods containing sugar**

Choc chip cookies; Mars bar; cola; jam doughnuts; olive oil; butter; low fat spread (*fat spread (20-25% fat), polyunsaturated*); crisps (*potato crisps*)

**The classification of each of these indicators was assessed for each of the 28 definitions of ‘foods high in fat, salt or sugar’ and the eight complete models with definitions of ‘foods high in fat, salt or sugar’ and ‘healthier food choices’.**

### 3.3.3 Development of ‘healthier’ and ‘less healthy’ indicator foods

A set of ‘healthier’ and ‘less healthy’ indicator foods had previously been developed for the purpose of testing definitions of ‘unhealthy’ food (O’Neill, 2004). The aim was to develop two lists of foods: a list of foods that would be subjectively regarded, by most people, as ‘healthier’ and another list which would be regarded as ‘less healthy’. In order to identify the indicator foods, the foods in the modified McCance and Widdowson database were categorised by two researchers into three categories – ‘healthier’, ‘less healthy’ and ‘neither healthy nor unhealthy’. The categorisation was done solely on the basis of the names of the foods and prior knowledge, and without any further information such as the precise details of the nutrient composition.

The two researchers agreed on 143 'healthier' and 98 'less healthy' indicator foods, and that 630 foods were 'neither healthy nor unhealthy'. Inter-rater reliability was determined in the standard way and was 'good' ( $\kappa = 0.69$ ) (Altman, 1991).

Foods that were considered similar enough to others in the list to be duplicates (for example, 'Apples, eating, average, raw, peeled' was considered a duplicate of 'Apples, eating, average, raw') were then removed from the agreed lists of 'healthier' and 'less healthy' indicator foods. The researchers then discussed all disputed categorisations and agreement was reached on all of them, leaving 128 'healthier' indicators and 89 'less healthy' indicators. Finally, nine foods were removed for which there was insufficient compositional data in the database to test the models. This left 124 'healthy' indicators and 84 'unhealthy' indicators. (See Appendix 3 for lists of 'healthier' and 'less healthy' indicator foods.)

For the current project, the average percentage of 'healthier' and 'less healthy' indicators misclassified by the 28 definitions for 'foods high in fat, salt or sugar' definitions was calculated.

In testing the eight complete models a measure of the specificity of the model (the average percentage of correct classifications of 'healthier' and 'less healthy' indicators) and a measure of the sensitivity of the model (100 – the average percentage misclassification of 'healthier' and 'less healthy' indicators) were calculated.<sup>8</sup>

A high level of both specificity and sensitivity is needed if a definition or model can be said to be accurate. This is because high specificity can be achieved by reducing sensitivity and vice versa. For example a definition of a 'food high in fat, salt or sugar' which was highly specific – classifying 100% of the 'less healthy' indicators correctly – could easily be devised just by having very low thresholds for energy, saturated fat, NME sugars and sodium. But such a definition would be very insensitive because it would thereby classify a large proportion of the 'healthier' indicators as 'foods high in fat, salt or sugar.'

In testing the eight models we therefore assessed their overall sensitivity and specificity with an 'accuracy score'. This was defined as the average percentage of 'healthier' and 'less healthy' indicators correctly classified (a measure of the specificity of the model) minus the average of the percentage of 'healthier' indicators classified as 'less healthy' and of the percentage of 'less healthy' indicators classified as 'healthier' (a measure of its sensitivity).

It should be noted that our measures of specificity, sensitivity and overall accuracy are relatively crude and that the panels of 'healthier' and 'less healthy' indicators used here could be further refined. (For example many nutritionists would not agree with

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<sup>8</sup> Sensitivity is defined as 'the proportion of positives that are correctly identified by a test' specificity is defined as 'the proportion of negatives that are correctly identified by a test' (Altman. 1991). Normally sensitivity and specificity are applied when there is just one test for just one condition and where the prevalence of that condition is known (e.g. when screening for a disease in a population). The eight models, in effect, involve two tests one for 'healthiness' and one for 'unhealthiness'. Moreover we have no idea of the true numbers of 'healthy' and 'unhealthy' foods in the database. So our tests of specificity and sensitivity are somewhat different to those usually used.

the selections because, for instance the ‘healthier’ indicators include no dairy products and no meats.) This situation would be improved by developing more sophisticated panels of indicators (see Section 5).

It should also be noted that our specificity, sensitivity and overall accuracy scores take no account of how models or definitions classify foods in the database that have not been designated as ‘healthier’ or ‘less healthy’ indicators and no confidence limits to scores have been calculated.

Nevertheless, the scores probably provide a better indication of the accuracy of the models than inspecting how foods (such as the representative of the food groups of the Balance of Good Health) are classified. For example, suppose one model were to classify olive oil as a ‘food high in fat, salt or sugar’ and another model classified it as a ‘healthier food choice’. Which model would be more accurate? It would be hard to say because it is difficult to be definitive about the health benefits of olive oil. This is true of many foods of the selected representatives of the food groups of the Balance of Good Health, for example cheddar cheese, currant buns and boiled eggs. Making a judgement about the accuracy of models, based on inspecting the way a model classifies particular foods involves making subjective judgements. The use of specificity, sensitivity and accuracy scores reduces that subjectivity to some degree. This being said inspection of the ways models classify foods is sometimes useful for detecting how models might be improved (see Section 3.4 below).

### 3.4 Results

#### 3.4.1 Testing definitions of ‘foods high in fat, salt or sugar’

Appendix 5 gives the results of testing each of the 28 different definitions of ‘foods high in fat, salt or sugar’. Tables 3 and 4 summarise the results of the Tables in Appendix 5.

**Table 3. Percentage of foods classified as ‘foods high in fat, salt or sugar’ by 28 definitions**

	Group A nutrients	%	Group B nutrients	%	Group C nutrients	%
Threshold models						
per 100g	<b>TA</b> g 1 & 2	47 & 60	<b>TB</b> g	55	<b>TC</b> g	47
per 100g/serving	<b>TA</b> g/s	48	<b>TB</b> g/s	51	<b>TC</b> g/s	40
per 100kJ	<b>TA</b> kJ 1 & 2	70 & 46	<b>TB</b> kJ	59	<b>TC</b> kJ	50
per 100kJ/serving	<b>TA</b> kJ/s	41	<b>TB</b> kJ/s	54	<b>TC</b> kJ/s	42
Simple scoring systems						
per 100g	<b>SSA</b> g 1 & 2	38 & 47	<b>SSB</b> g	64	<b>SSC</b> g	57
per 100g/serving	<b>SSA</b> g/s 1 & 2	45 & 39	<b>SSB</b> g/s	49	<b>SSC</b> g/s	53
per 100kJ	<b>SSA</b> kJ	61	<b>SSB</b> kJ	47	<b>SSC</b> kJ	42
per 100kJ/serving	<b>SSA</b> kJ/s	48	<b>SSB</b> kJ/s	50	<b>SSC</b> kJ/s	50

**Table 4. Average percentage of indicator foods misclassified by 28 definitions of ‘foods high in fat, salt or sugar’**

	Group A nutrients	%	Group B nutrients	%	Group C nutrients	%
Threshold models						
per 100g	<b>TAg 1 &amp; 2</b>	13 & 10	TBg	7	<b>TCg</b>	6
per 100g/serving	TAg/s	10	<b>TBg/s</b>	8	TCg/s	14
per 100kJ	<b>TAkJ 1 &amp; 2</b>	13 & 22	TBkJ	6	TCkJ	7
per 100kJ/serving	TAkJ/s	14	<b>TBkJ/s</b>	4	TCkJ/s	7
Simple scoring systems						
per 100g	SSAg 1 & 2	13 & 9	<b>SSBg</b>	5	SSCg	8
per 100g/serving	SSAg/s 1 & 2	10 & 9	<b>SSBg/s</b>	5	SSCg/s	7
per 100kJ	SSAkJ	10	<b>SSBkJ</b>	10	SSCkJ	9
per 100kJ/serving	SSAkJ/s	13	<b>SSBkJ/s</b>	3	SSCkJ/s	3

The definitions that were selected for developing into complete models are highlighted in bold in both Tables 3 and 4.

### 3.4.1.1 Choice of nutrients

Table 3 shows that choice of nutrients makes little difference to the percentage of the foods in the database which are classified as ‘foods high in fat, salt or sugar’. The definitions developed classify between 40% and 70% of the foods in the database as ‘foods high in fat, salt or sugar’, but this would seem to be a function of the choice of numbers rather than the choice of nutrients (or base or model type).

Table 4 shows that choice of nutrients does tend to affect the extent to which definitions misclassify indicator foods. In general definitions involving ‘B’ nutrients and ‘C’ nutrients misclassify fewer indicator foods than definitions involving just ‘A’ nutrients.

This was to be expected. It had previously been observed that definitions of ‘foods high in fat, salt or sugar’ involving criteria for ‘A’ nutrients are likely to put some foods with high levels of desirable micronutrients into the same (‘less healthy’) category as foods with low levels of such nutrients. For example Definition TAg/2 – a threshold model based on FSA guidance for what counts as ‘a lot’ or ‘a little’ - classifies Mars bars, cheddar, crisps and currants as ‘foods high in fat, salt or sugar’. In contrast Definition TCg – a threshold model on a similar per 100g basis to Definition TAg/2 but with additional criteria for ‘B’ and ‘C’ nutrients’ - classifies Mars bars and crisps as ‘foods high in fat, salt or sugar’ but does not include cheddar and currants.

### 3.4.1.2 Choice of base

Table 3 shows that choice of base makes little difference to the percentage of foods in the database that are classified as ‘foods high in fat, salt or sugar’.

Table 4 shows that choice of base also seems to make little difference to the extent to which definitions misclassify indicator foods.

Even using combinations of bases (per 100g and per serving; or per 100kJ and per serving) seems to make little difference to the extent to which definitions misclassify indicator foods. This can be seen by comparing pairs of definitions in Table 4 where the nutrient group is the same, and the type of model is the same, but the first member of each pair uses a single base (either per 100g or per 100kJ) and the second member of each pair uses a combination of bases (either per 100g and per serving; or per 100kJ per serving).

This was somewhat unexpected since when nutrients are treated individually the base has a substantial effect on whether a nutrient level is described as high/a lot or low/a little. For example, according to FSA advice raw chicory contains ‘a little’ saturated fat. But the CPG scheme categorises raw chicory as ‘high’ in saturated fat.

### 3.4.1.3 Choice of model

Table 3 shows that choice of model (whether threshold model or scoring system) makes little difference to the percentage of foods in the database which are classified as ‘foods high in fat, salt or sugar’.

However, Table 4 shows that the use of a scoring system leads to fewer misclassifications of ‘healthier’ and ‘less healthy’ indicators. For example, if pairs of definitions in Table 4, where the nutrient group and the base are the same, are compared<sup>9</sup> then in nine cases out of 12 the scoring system gives fewer misclassifications than the threshold model.

Definitions SSBkJ/s and SSCkJ/s have the fewest misclassifications (both 3%), and are both scoring systems. However there are some threshold models where misclassifications are low – e.g. Definition TBkJ/s which misclassifies only 4% of indicators.

### 3.4.2 Testing complete models including definitions of ‘foods high in fat, salt or sugar’, ‘intermediate foods’ and ‘healthier food choices’

On the basis of the testing of the 28 definitions, eight were selected for development into complete models and for further analysis. Both the simplest definition (TAg: Threshold model, Group A nutrients, per 100g base) that had been tested and the most complex (SSCkJ/s: Scoring system, Group C nutrients, per 100kJ/serving base) were selected. At least two definitions for each nutrient group were selected. Finally definitions that misclassified the fewest ‘healthier’ and ‘less healthy’ food indicators were selected.<sup>10</sup>

<sup>9</sup> Where there were two definitions using the same nutrient group, the same base and the same type of model the definition with the fewest misclassifications was used for the comparison.

<sup>10</sup> With the wisdom of hindsight it would have been better to have selected TAg1 (rather than TAg2) and SSCg (rather than SSCg/s) (See Section 3).

Appendix 6 gives the results of testing each of the eight models developed. Table 5 summarises the results of the Tables in Appendix 6:

**Table 5. Results of testing eight different models**

	% 'healthier food choices'	% intermediate	% 'high in fat, salt or sugar'	Sensitivity (% correct classifications)	Specificity (100 - % misclass- ifications)	Overall accuracy score *
TAg	11	42	47	66	96	62
TAkJ	19	11	70	83	90	73
TBg/s	36	13	51	92	96	88
TBkJ/s	40	7	53	95	99	94
TCg	21	34	45	81	96	76
SSBg	25	14	61	88	95	83
SSCg/s	31	17	52	88	96	83
SSCkJ/s	41	18	41	92	99	91

\* Note that the accuracy score is not a percentage but the maximum accuracy score a model could theoretically achieve is 100.

Table 5 shows that the eight models classify quite different numbers of foods as 'foods high in fat, salt or sugar' (range 41% - 70%), 'healthier food choices' (range 11% - 41%) and intermediate foods (range 7% to 42%). As explained earlier, it is difficult to know what the ideal percentages should be, but it seems likely that the extremes i.e. very small percentages (e.g. 7% for 'intermediate foods' with Model TBkJ/s) or very large percentages (e.g. 70% for 'foods high in fat, salt or sugar' with Model TAKJ) are inappropriate. This is particularly the case where three definitions rather than just one definition are required of a model.

Using this reasoning Model TAg (Threshold model, Group A nutrients, per 100g base and drawing on the FSA's advice on what counts as 'a lot' and a 'little') would seem to classify too few foods as 'healthier food choices' and Model TAKJ (Threshold model, Group A nutrients, per 100kJ base and drawing on the CPG Nutrition Banding Scheme) would seem to classify too many foods as 'foods high in fat, salt or sugar'.

Table 5 shows that different models have different degrees of sensitivity and specificity with respect to the 'healthier' and 'less healthy' food indicators. The overall accuracy scores range from 62 (Model TAg) to 94 (Model TBkJ).

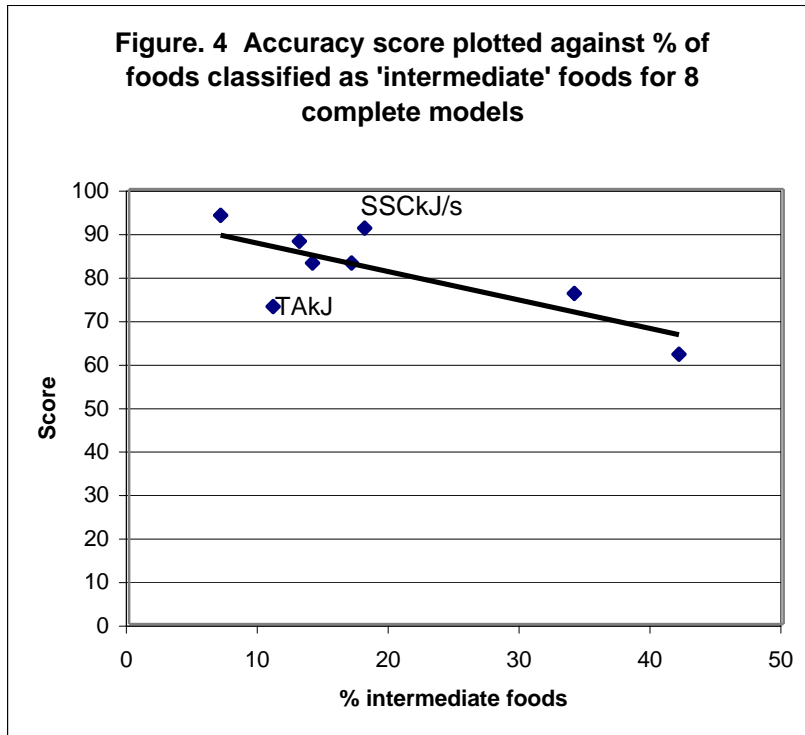


Figure 4 shows that there is a strong, inverse correlation between the number of intermediate foods classified by a model and accuracy scores. It might be expected that the fewer foods a model classifies as 'foods high in fat, salt or sugar' and 'healthier food choices' the greater the accuracy. However, some models (e.g. Model SSCKJ/s) have higher accuracy scores that might be expected on the basis of the number of foods they classify as 'intermediate' foods and some have worse (e.g. Model TAKJ).

Table 5 shows that some threshold models such as TCg (Threshold model, Group C nutrients, per 100g base) classify foods reasonably well. It has previously been noted (in Section 2.5.1) that threshold models are easier to understand than scoring systems. However, the threshold models that were developed (even when involving 'B' and 'C' nutrients) still led to some misclassifications of 'healthier' and 'less healthy' indicators. For example the TCg model classified bread and nuts as 'foods high in fat, salt or sugar'.

Table 5 also shows that scoring systems such as SSCKJ/s (Scoring system, Group C nutrients, per 100kJ/per serving base) can be better than threshold models at classifying foods. SSCKJ/s only misclassifies two of the 'healthier' and 'less healthy' indicator foods: porridge as a 'food high in fat, salt or sugar' and crispie cakes as 'healthier'. However, as previously noted, scoring systems are more difficult to understand than threshold models which may limit their use in some circumstances.

### 3.5 Conclusions and recommendations of the Expert Group

The Expert Group agreed that from this initial testing of 28 definitions of ‘foods high in fat, salt or sugar’ and eight complete models with definitions of ‘foods high in fat, salt or sugar’, ‘intermediate foods’ and ‘healthier food choices’ provided a useful basis for further work. They identified three models (and their associated definitions) for further consideration and possible refinement. The three models were:

- **Model TA<sub>g</sub> (Threshold model, Group A nutrients (energy, saturated fat, NME sugar and sodium) per 100g base**
- **Model TC<sub>g</sub> (Threshold model, Group C nutrients (energy, saturated fat, NME sugar, sodium, fruit and vegetables, n-3 fatty acids, calcium and iron), per 100g base)**
- **Model SSC<sub>g</sub> (Scoring system, Group C nutrients, per 100g base)**

The Expert Group noted that the initial testing of definitions described in this section indicated that base or denominator seemed to make little difference to the accuracy of models. Therefore the Expert Group felt that only models using a per 100g base should be explored further on the basis that serving sizes are difficult to define and that 100g is used as the basis of many other nutrient criteria (e.g. for criteria for the use of nutrition claims in the proposed EU Regulation of nutrition and health claims (European Commission, 2003)).

The initial testing found that using ‘A’ nutrients (energy, saturated fat, NME sugars and sodium) alone led to models with relatively low accuracy, but the Expert Group still thought that models using ‘A’ nutrients alone deserved further investigation on the grounds that they were simpler than models involving ‘B’ and ‘C’ nutrients. The Expert Group felt that models using ‘A’ nutrients alone might be made more accurate though moving the thresholds for these nutrients.

On the other hand the Expert Group agreed that involving ‘B’ and ‘C’ nutrients does improve the accuracy of models and so further testing of models involving C Group nutrients was warranted.

The Expert Group also revisited the question of the choice of an energy criterion rather than a total fat criterion. It was felt that the decision to calculate the energy criterion for different models on the same basis as the criteria for saturated fat, NME sugar and sodium criteria (i.e. as standard percentages of the GDA) might have led to the energy thresholds being too high. Two possible solutions were recommended. Firstly the energy criterion could be unlinked from the rest of the ‘A’ nutrients and set at a different level. Secondly the energy criterion could be replaced with a total fat criterion, which could be calculated on the same basis as the criteria for the other ‘A’ nutrients.

The Expert Group noted that scoring systems are more accurate than threshold models, but more complex. The Expert Group also noted that scoring systems are more flexible than threshold models. For example scoring systems can be used, not just for the purposes of defining ‘foods high in fat, salt or sugar’ etc., but to compare the ‘healthiness’ of foods within categories, whereas threshold models cannot be used

in this way. For these reasons it was agreed that scoring systems as well as threshold models deserved further testing.

The Expert Group also decided that any new models should be developed using an incremental approach. It agreed that this should be done by using the TAg1 model as a base model. TAg1 was felt to be the simplest model (as well as being in line with other government advice i.e. the FSA guidance on what counts as 'a lot' or 'a little').

The Expert Group felt that further models could then be developed from this base model, but the development of each further model should only involve a single change from the previous model. In this way, the direct affects of that change might be assessed.

The Expert Group also noted that the methods for testing definitions could be improved. They suggested that in further testing the range of indicator foods for the five food groups of the Balance of Good Health should be extended.

### **3.6 References**

Altman D G (1991). Practical Statistics for Medical Research. London: Chapman and Hall.

Angus F (2003) Assessment of portions for dried and processed fruits and vegetables to assist in establishing criteria for the 5-a-day message. Confidential Project Report for the Department of Health, London

Buss DH, Lewis J, Smithers G (1994). Non-milk extrinsic sugars. J Hum Nutr Dietetics 7: 87.

Coronary Prevention Group (1988) Nutritional Labelling of Foods: A Rational Approach to Banding. London: CPG.

European Commission (2003) Proposal for a regulation of the European Parliament and of the Council on nutrition and health claims made on foods. Brussels, 16.7.2003 COM(2003) 424 final.

Food Standards Agency (2002) Labelling claims. London: FSA (and 'Salt', 'Sugar' and 'Fat' in this series.)

Gatenby S, Hunt P, Rayner M (1994). Balance of Good Health, food classification list: extended version. Health Education Authority: London.

Ministry of Agriculture, Fisheries and Food (1993) Food portion sizes, second edition. London: HMSO.

Ministry of Agriculture, Fisheries and Food (1998). Fatty acids. Seventh supplement to the fifth edition of McCance and Widdowson's The Composition of Foods. London: Royal Society of Chemistry.

O'Neill M. (2004) Traffic lights for food? How nutrient profiling can make healthy choices the easy choices. London: National Consumer Council.

Rayner M, Scarborough P, Williams C (2004) The origin of Guideline Daily Amounts and the Food Standards Agency's guidance on what counts as a lot and a little, *Public Health Nutrition* 7 (4): 549-556.

Roe M, Finglas P, Church S (2003) McCance and Widdowson's *The Composition of Foods*. Sixth Summary Edition. London: Royal Society of Chemistry.

Stockley L, Rayner M, Scarborough P (2003). *Five a day: Development of compositional criteria for composite foods*. Report prepared for the Department of Health, London.

## **SECTION 4. DEVELOPMENT AND TESTING OF POSSIBLE DEFINITIONS II.**

### **4.1 Summary**

This section describes the development and testing of 12 further models with definitions of ‘foods high in fat, salt or sugar’ and ‘healthier food choices’. The 12 models were developed on the basis of the recommendations of the Expert Group following the previous round of testing. It also describes the development and testing of two possible modifications to these 12 models.

This new round of development and testing followed a more incremental approach than the previous round. The development and testing of models started with a threshold model – Model TAG1 - involving criteria for energy, saturated fat, NME sugar and sodium (and drawing on the FSA’s advice as to what counts as ‘a lot’ and ‘a little’ of those nutrients) and made sequential changes to that model.

The models tested in this round were judged by four ‘success’ criteria: simplicity and transparency; accuracy; distribution of foods between ‘high in fat, salt or sugar’ ‘intermediate’ and ‘healthier choice’ categories; and concurrence with government advice.

As a result of this round of testing one model was identified for further consideration i.e.:

#### **Model SSCg3d (Scoring system, Group C nutrients, a per 100g base, modification for drinks)**

The scoring bands for foods are as follows (to a maximum of 10 points per nutrient/food component):

- Energy: = 335kJ = 0; 335-670kJ = 1; 670-1005kJ = 2, etc.
- Saturated fat: = 1.0g = 0; 1.0-2.0g = 1; 1.0-2.0g = 2, etc.
- NME sugars: = 2.4g = 0; 2.4-4.8g = 1; 4.8-7.2g = 2, etc.
- Sodium: = 90mg = 0; 90-180mg = 1; 180-270mg = 2, etc.
- Calcium: = 105mg = 0; 105-210mg = 1; 210-315mg = 2, etc.
- Iron: = 1.5mg = 0; 1.5-3.0mg = 1; 3.0-4.5mg = 2, etc.
- n-3 fatty acids: = 0.05mg = 0; 0.05-0.10mg = 1; 0.10-0.15mg = 2, etc.
- Fruit and vegetables: 0-30% = 0; 50% = 2; 70% = 4; 100% = 10.

The scoring bands for drinks are half the width of these bands.

**Total score = A nutrients – B nutrients – C nutrients.**

The food is defined as a ‘healthier food choice’ if the score is 2 or less, as ‘intermediate’ if the score is 3-8, and as a ‘food high in fat, salt or sugar’ if the score is 9 or more.

Although scoring systems, such as Model SSCg3d, are seemingly more complex than threshold models they are also more accurate. Scoring systems are also more flexible

than threshold models so making them more adaptable to a variety of purposes. Scoring systems can more easily be used for comparing foods within categories.

## 4.2 Introduction

On the basis of the Expert Group's recommendations 12 new models were developed for further testing. All of the models were based on Model TAg1 (in this Section renamed as TAg6). Model TAg6 is a simple threshold model involving 'A' nutrients (energy, saturated fat, NME sugar and sodium) where the criteria are set on a per 100g basis. The thresholds for Model TAg6 were based on the FSA's advice for what counts as 'a lot' or 'a little' of saturated fat, NME sugars and sodium. 'A lot' is 20% of the GDA and 'a little' is 3.3%.

- **TAg models**

Six different TAg models were developed involving three changes to the basic TAg6 model.

Firstly the thresholds for saturated fat, NME sugars and sodium were changed. This meant that the thresholds for these nutrients were set in one of two ways:

- a. On the basis of the FSA guidance on what counts as 'a lot' or 'a little' i.e. 20% (one fifth) and one 3.3% (one thirtieth) of the GDAs respectively (Models TAg6, TAg7 and TAg8).
- b. At 15% (three twentieths) and 7.5% (three fortieths) of the GDAs (Models TAg3, TAg4 and TAg5).

It had already been noted that Model TAg6 defined too many foods as 'intermediate' foods (see above) so Model TAg3 was developed to ensure a more even distribution of foods between 'foods high in fat, salt or sugar', 'intermediate foods' and 'healthier food choices'. Hence, the high thresholds were set lower (15% of GDA compared to 20%) and the low thresholds were set higher (7.5% of GDA compared to 3.3%). 15% of the GDA had already been tested in model TCg (see Section 3), and the new low thresholds were set at half of the high thresholds.

Secondly the thresholds for energy were changed. This meant that two ways of setting the energy threshold were tested i.e.:

- a. Using the original method of calculating the energy criterion i.e. on the same basis as that of the other A nutrients (Models TAg6 and TAg3).
- b. At 525kJ per 100g and at 1030kJ per 100g. These new thresholds were chosen as the Expert Group agreed that the energy thresholds previously tested may have been too high. The new low threshold corresponds to the average energy density of the diet (excluding drinks) of women (16-64 years) who consumed no more than 35% energy from fat and at least 400g of fruit and vegetables a day. This figure was derived from the National Diet and Nutrition Survey and has been used as an example of a healthy Western diet (Prentice and Jebb, 2003). The high threshold was set twice as high as the low threshold (Models TAg7 and TAg4).

Thirdly, the energy criterion was substituted with a fat criterion calculated on the same basis as the other 'A' nutrients (Models TAg8 and TAg5). The GDA for fat for children aged 11-16, calculated in the same way as for the other nutrients, is 83g.

- **TCg models**

Three TAg models (i.e. Models TAg 3, TAg 4 and TAg 5) were then developed into TCg models (i.e. Models TCg 3, TCg 4 and TCg 5) by the addition of criteria for 'B' nutrients i.e. n-3 fatty acids and fruit and vegetables and 'C' nutrients i.e. calcium and iron. The thresholds for these nutrients were kept the same for all three models.

The thresholds for calcium and iron were set at 30% of the GDA. This amount had been tested in the SSCg and SSCg/s models, and was similar to the amount in the original TCg model. The threshold for n-3 fatty acids was set at 25% of the GDA, and the threshold for fruit and vegetable content was set at 80-100%. These are the same levels as tested in the original TCg model.

- **SSCg models**

The three TCg models were then developed into SSCg models (i.e. Models SSCg3, SSCg4 and SSCg5) by devising scoring bands and score thresholds based on the TCg thresholds.

For each of these models, the scoring bands started at 50% of the low threshold from the TCg models and were 50% of the low threshold wide. The maximum score for each nutrient was set at 10. The fruit and vegetable content score was set so that a food consisting of between 80% and 100% fruit or vegetables would score 10 points.

The maximum scores for each nutrient was set at 10 (rather than 5 or 6 as had been tested previously) in order to develop greater sensitivity when dealing with foods that contain a large amount of a particular nutrient. Maximum scores were necessary, however, in order to prevent one nutrient dominating the score of some foods (for example, if there were no maximum score for n-3 fatty acids, then canned pilchards would score 51 points for this nutrient alone).

The score thresholds were similar to the scores that would have been attained by a food that contained the threshold level of each nutrient in the equivalent TCg model.

In this way the scoring bands, maximum scores for individual nutrients and other components the score thresholds for each SSCg model were set so that the three SSCg models bore the closest possible resemblance to the corresponding TCg models.

### **Two modifications of two of the models**

In the light of testing the 12 models derived in an incremental way from Model TAg 6 (see below) one threshold model (Model TCg3) and one scoring system model (Model SSCg3) were then modified in two ways. Firstly different thresholds (or scoring

bands) were set for drinks (Models TCg3d and SSCg3d) and secondly criteria for fibre (Non Starch Polysaccharide) were introduced (Models TCg3f and SSCg3f).

A drink was defined to be any liquid food, excluding oils, soups, condiments (vinegar, salad cream etc.) and dressings. The alternative thresholds and scoring bands were set at exactly half the level for other foods, making the thresholds twice as stringent. Note that criteria for nutrition claims such as ‘low fat’ and ‘low salt’ for drinks are often set at half those for solid foods when they are set on a per 100g basis (e.g. European Commission, 2003) reflecting the fact that foods that have a high water content, such as drinks, are often eaten in large servings (see Section 2).

A GDA for fibre for children aged 11-16, calculated in the same way as for the other nutrients, is 17g. Thresholds and scoring bands for fibre were introduced at the same level as for calcium and iron on the basis that the reason for introducing a fibre criterion was principally to ensure that healthier options from the ‘Bread, other cereals and potatoes’ group of the Balance of Good Health were classified as ‘healthier food choices’ in the same way as the criteria for calcium and iron function for foods from the ‘Milk and dairy foods’ and the ‘Meat, fish and alternatives’ groups.

In total, the Expert Group’s recommendations led to the generation of 16 new models: 12 new models based on Model TAg6 (2 x 3 TAg models, 3 TCg models and 3 SSCg models), 2 modifications of Model TGg3 and 2 of Model SSg3.

### 4.3 Methods

The methods for this round of testing were the same as for the previous round (See Section 3). However in view of the Expert Group’s recommendation with respect to the Balance of Good Health group indicators and as a result of suggestions from members of the Expert Group, further example indicator foods were included in the tabulated results.

These example indicators were included to provide a better indication of how each model categorised a range of foods in each of the food groups on which healthy eating advice (i.e., the Balance of Good Health) is based. This allowed the Expert Group to check that each model categorised some ‘healthier’ foods in each of the important food groups. The foods chosen are typically minimally processed, to make it easier to estimate the likely nutritional contribution to the diet of each of them. It should also be noted that the nutrient content of some foods will be subject to significant variation depending on the recipe, or the way in which they have been prepared (e.g. roast potatoes, currant buns etc.) Appendix 3b gives the nutrient content listed in McCance and Widdowson for each of the example indicators.

#### McCance and Widdowson listing

#### Abbreviated term for results

#### Bread, other cereals and potatoes (19)

Chips, French Fries, retail  
Corn flakes

‘French fries’

Cream crackers	
Crispbread, rye	‘Crispbread’
Crunchy nut corn flakes	
Currant buns	
Malt bread, fruited	‘Malt loaf’
New potatoes, boiled in unsalted water	‘Boiled potatoes’
Old potatoes, roast in blended oil	‘Roast potatoes’
Oven chips, frozen, baked	‘Oven chips’
Pasta, plain, fresh, cooked	‘Fresh pasta’
Potato croquettes, fried in blended oil	‘Potato croquettes’
Sugar puffs	
Weetabix	
White bread, sliced	‘White bread’
White rice, easy cook, boiled	‘Boiled rice’
White rice, fried	‘Fried rice’
Wholemeal bread, average	‘Wholemeal bread’
Wholemeal rolls	

### **Milk and dairy foods (14)**

Camembert	
Cheddar cheese	‘Cheddar’
Cheddar type, half fat	‘Half fat cheddar’
Cottage cheese, plain	‘Cottage cheese’
Cream, fresh, single	‘Single cream’
Crème fraiche, half fat	‘Half fat crème fraiche’
Fromage frais, plain	‘Fromage frais’
Fromage frais, virtually fat free, natural	‘Low fat fromage frais’
Greek yoghurt, sheep	‘Greek yoghurt’
Semi-skimmed milk, average	‘Semi-skimmed milk’
Skimmed milk, average	‘Skimmed milk’
Whole milk, average	‘Whole milk’
Yoghurt, low fat, fruit	‘Low fat fruit yoghurt’
Yoghurt, low fat, plain	‘Low fat yoghurt’

### **Fruit and vegetables (8)**

Currants	
Orange juice, unsweetened	‘Orange juice’
Peaches, raw	‘Peaches’
Pineapple, canned in juice	‘Canned pineapple’
Avocado, average	‘Avocado’
Celery, raw	‘Celery’
Lettuce, average, raw	‘Lettuce’
Tomatoes, grilled	‘Grilled tomatoes’

### **Meat, fish and alternatives (20)**

Bacon rashers, streaky, fried	‘Streaky bacon’
Beef, mince, extra lean, stewed	‘Lean mince’

Beef, rump steak, lean only, grilled	'Grilled steak'
Beef, rump steak, lean and fat, fried	'Fried steak'
Beef, topside, roasted, well done, lean	'Roast beef'
Chicken nuggets, takeaway	'Chicken nuggets'
Chicken, breast, grilled without skin, meat only	'Chicken breast'
Chicken, leg quarter, roasted, meat and skin	'Chicken leg'
Cod, baked	'Cod'
Eggs, chicken, boiled	'Boiled egg'
Eggs, chicken, fried in vegetable oil	'Fried egg'
Fish fingers, cod, grilled	'Fish fingers'
Ham	
Lamb, leg, lean only, roasted	'Roast lamb'
Lentils, red, split, dried, boiled in unsalted water	'Lentils'
Mackerel, grilled	'Mackerel'
Pork sausages, chilled, fried	'Sausages'
Tofu, soya bean, steamed	'Tofu'
Tuna, canned in oil, drained	'Tinned tuna'
Walnuts	

#### **Foods high in fat, foods high in sugar (17)**

Chocolate chip cookies	'Choc chip cookies'
Cola	
Cola, diet	'Diet cola'
Digestive biscuits, plain	'Digestives'
Doughnuts, jam	'Jam doughnuts'
Jaffa cakes	
Kit kat	
Mars bar	
Milky way	
Sponge cake	
Butter	
Fat spread (20-25% fat), polyunsaturated	'Very low fat spread'
Fat spread (60% fat), polyunsaturated	'Low fat spread'
Margarine, soft, polyunsaturated	'Margarine'
Olive oil	
Potato crisps	'Crisps'
Potato crisps, low fat	'Low fat crisps'

In addition, a selection of composite foods was also added to the list.

#### **Composite foods (15)**

Baked beans, canned in tomato sauce, reheated	'Baked beans'
Celery, boiled in salted water	'Boiled celery'
Chilli con carne	
Cottage/Shepherd's pie, chilled/frozen, reheated	'Shepherd's pie'
Crumble, fruit	'Fruit crumble'
Fruit pie, pastry top and bottom	'Fruit pie'
Lasagne	

Mushrooms, common, fried in corn oil	‘Fried mushrooms’
Peanuts, roasted and salted	‘Salted peanuts’
Rhubarb, stewed with sugar	‘Stewed rhubarb’
Sardines, canned in tomato sauce	‘Tinned sardines’
Soya, non-dairy alternative to milk, unsweetened	‘Soya milk’
Strawberries, canned in syrup	‘Canned strawberries’
Mayonnaise	
Mayonnaise, reduced calorie	‘Low fat mayo’

## 4.4 Results

Appendix 7 gives the results of testing each of the 12 new models and 4 modifications Table 6 summarises the results of the Tables in Appendix 7.

**Table 6. Results of testing 12 new models and 4 modifications.**

Model	% 'healthier food choices'	% intermediate	% 'high in fat, salt or sugar'	Sensitivity (% correct classifications)	Specificity (100 - % misclassifications)	Overall accuracy score
TAg3	22	18	60	85	93	79
TAg4	20	19	61	83	93	76
TAg5	23	16	61	86	92	79
TAg6	11	42	47	66	95	62
TAg7	15	34	51	76	95	71
TAg8	16	35	49	77	95	72
TCg3	30	26	44	83	96	79
TCg4	26	30	44	81	96	77
TCg5	29	27	45	83	96	80
TCg3d	28	27	45	83	96	79
TCg3f	32	25	43	82	96	78
SSCg3	39	24	37	88	98	86
SSCg4	36	24	40	89	97	87
SSCg5	39	23	38	88	97	85
SSCg3d	36	26	38	89	98	87
SSCg3f	40	25	35	90	98	88

### 4.4.1 Choice of thresholds

The low threshold of 3.3% of the GDA and the high threshold of 20% of the GDA (used in Models TAg6, TAg7 and TAg8) were not tested past the TAg stage. This is because the other thresholds (7.5% and 15% of the GDA) used in Models TAg3, TAg4 and TAg5 produced more accurate models. For example, the 7.5%/15% threshold models all attained higher accuracy scores than their associated 3.3%/20% models.

This improved accuracy was because Models TAg3, TAg4 and TAg5 were more sensitive than Models TAg6, TAg7 and TAg8, i.e. they were more likely to classify 'healthier' and 'less healthy' indicators correctly. This is partly because Models TAg3, TAg4 and TAg5 classified more foods overall as either 'foods high in fat, salt or sugar' and 'healthier food choices' rather than 'intermediate foods' compared with Models TAg6, TAg7 and TAg8.

As the incremental development of models used in this round of developing and testing models involved introducing criteria for 'B' and 'C' nutrients whilst leaving the 'A' nutrient thresholds at the same level, foods could only be re-categorised to a lower (healthier) level than before by moving from TAg to TCg models. Therefore, it seemed more appropriate to continue with Models TAg3, TAg4 and TAg5, where a higher proportion of all foods in the database are categorised as 'foods high in fat, salt or sugar'.

#### 4.4.2 Choice of energy/fat criteria

The two different energy criteria and the fat criterion made little difference to either the accuracy scores or the distribution of foods between categories for the models in which they were used. This was surprising as the difference between the two different sets of energy thresholds was noticeable (5.9%/11.7% of the GDA compared with 7.5%/15% of the GDA), and the introduction of total fat would be expected to change the results of the models.

Inspection of the way that individual foods are categorised by the three models for each energy/fat criterion does not help choose between models either. For example Appendix 7 shows that Model TAg5 (with the fat criterion) is the only TAg model that categorises fresh pasta as 'healthier'. However, it is also the only TAg model that categorises single cream as 'healthier'. Similarly Model SSCg5 (with the fat criterion) is the only SSCg model to categorise all fruit and vegetables as 'healthier', and potato croquettes as 'less healthy', but again is the only SSCg model to categorise single cream as 'healthier'.

#### 4.4.3 Choice of nutrient group and of model type

The accuracy scores for the models are higher for TCg models than for TAg models (though only very slightly) and higher again for SSCg models. This again should have been expected, as the added complexity of the TCg and, particularly, SSCg models is designed to improve their accuracy.

Inspection of the way that individual foods are categorised by models indicates that both TCg and SSCg models classify foods more appropriately than TAg models. For example Appendix 7 shows that all but one of the TCg models and all of the SSCg models classify mackerel as a 'healthier food choice' but four of the TAg models classify mackerel as an 'intermediate food' and two as a 'food high in fat, salt or sugar'.

#### 4.4.4 Drink and fibre modifications

The two modifications of Models TCg3 and SSCg3 were introduced because inspection of the way that TCg models and SSCg models classify foods suggests that they might have a tendency to misclassify drinks and high fibre foods. For example Appendix 7 shows that all three SSCg models classify cola as an 'intermediate food' and all three TCG models classify wholemeal bread as 'a food high in fat, salt or sugar'.

Introducing different criteria for drinks made little difference to the accuracy scores or the proportions of foods that were defined as 'foods high in fat, salt or sugar' and 'healthier food choices' by, Models TCg3 and SSCg3. This was to be expected as only 94 (9%) of the foods in the database are classified as drinks.

However, the modification obviously does make a difference to the way individual drinks are categorised. For example Appendix 7 shows that Model TCg3d classifies whole milk and orange juice as 'intermediate foods' rather than 'healthier food choices'. Similarly Model SSCg3d model classifies whole milk and drinking chocolate as 'intermediate foods' rather than 'healthier food choices' and cola as a 'food high in fat, salt or sugar' rather than an 'intermediate food'.

The addition of fibre criteria to Models TCg3 and SSCg 3 also seemed to make little difference to their accuracy scores and the proportions of foods that were defined as 'foods high in fat, salt or sugar' and 'healthier food choices'. This is at least partly because only 46 (4%) of the foods in the database contained at least 30% of the GDA for fibre, when measured per 100g. This in turn may suggest that the threshold and scoring bands for fibre were set too high. But then again only 65 (6%) and 92 (8%) of the foods in the database contain equivalent levels of calcium and iron, respectively.

Appendix 7 shows that the fibre modification to TCg3 led to some breakfast cereals (e.g. Weetabix) along with some nuts (e.g. hazelnuts and almonds) being reclassified as 'healthier food choices' rather than 'intermediate foods'. However it also leads to crisps, low fat crisps, salted peanuts and peanut butter being reclassified as 'intermediate foods' rather than 'foods high in fat, salt or sugar'. The fibre modification to SSCg3f had less affect, only leading to a reclassification of dates as 'healthier food choices' rather than 'intermediate foods' and the reclassification of some cereals such as sugar puffs as 'intermediate foods' rather than 'foods high in fat, salt or sugar'. Neither of the fibre modifications made any difference to the classification of brown or wholemeal bread.

### 4.5 Conclusions and recommendations

The twelve further models developed compare favourably with the eight models tested in the previous round. For example all three new TCg models have higher accuracy scores than the TCg model tested previously, whilst leading to a similar distribution of foods between 'foods high in fat, salt or sugar', 'intermediate foods' and 'healthier food choices'. Although two models tested previously have accuracy scores in the 90s (higher than for all the 12 new models in this round) they both utilise a per 100kJ and a per serving base and the Expert Group considered that the base for definitions should be per 100g. Both these models also classify few foods in the 'intermediate' category.

Table 7 shows how the 12 models tested in this round compare to each other when judged by four ‘success’ criteria: simplicity and transparency; accuracy; distribution; and concurrence with other government advice. The table suggests that the best models are either SSCg or TCg models.

As mentioned above, the additional testing did not provide evidence to help choose which of the three energy/fat criteria is the most appropriate. However, in theory an energy density criterion is more justifiable than a total fat criterion for the reasons outlined in Section 3.5 and from the testing there seems no reason why this energy density criterion should not be linked to the GDA for energy in the same way as the saturated fat, NME sugar and sodium criteria. On this basis Models TCg3 and SSCg3 would seem most worthy of further consideration.

Introducing different criteria for drinks appears to make a slight improvement to the way foods are classified by Models TCg3 and SSCg3, without an appreciable increase in complexity. It is generally recognised that nutrient profiles set on a per 100g basis need to be different for foods and drinks. But if this modification is to be accepted, then the problems inherent in food category specific criteria (as laid out in Section 2.5.2) must also be accepted. It may also be hard to justify introducing different criteria for drinks but not other food categories (e.g. complete meals).

Introducing additional fibre criteria does not appear to improve the accuracy of Models TCg3 and SSCg3. It fails to recategorise brown and wholemeal bread and yet it does recategorise crisps and salted peanuts. A lowering of the threshold and scoring bands (so as to recategorise brown and wholemeal bread), would also result in other foods from the ‘foods high in fat, foods high in sugar’ group also being recategorised (such as biscuits and trail mix).

Of the two Models SSCg3 and TCg3, Model SSCg3 is more accurate than Model TCg3, but is also more complex. However Model SSCg3 has the added advantage inherent in scoring systems of flexibility. That is different score thresholds can be used for different purposes (e.g. advice on the use of nutrition and health claims or for advice on the balance of TV advertising for foods during children’s TV programmes) and foods within categories can be directly compared.

The Expert Group therefore recommends one model for further consideration i.e.

**Model SSCg3d (Scoring system, Group C nutrients, per 100g base, modification for drinks)**

**Table 7. Results of testing developed models against four success criteria.**

Model	Simplicity & transparency	Accuracy		Distribution	Concurrence with other government advice		
		Sensitivity	Specificity		5 A DAY	'a lot' and 'a little'	Oily fish
TA <sub>g3</sub>	**	*	*	*	-	-	*
TA <sub>g4</sub>	**	*	*	*	-	-	*
TA <sub>g5</sub>	**	*	*	*	-	-	-
TA <sub>g6</sub>	**	-	**	*	-	**	*
TA <sub>g7</sub>	**	-	**	*	-	**	*
TA <sub>g8</sub>	**	-	**	*	-	**	-
TC <sub>g3</sub>	**	*	**	**	*	-	**
TC <sub>g4</sub>	**	*	**	**	*	-	**
TC <sub>g5</sub>	**	*	**	**	*	-	**
SSC <sub>g3</sub>	*	*	**	**	**	-	**
SSC <sub>g4</sub>	*	*	**	**	**	-	**
SSC <sub>g5</sub>	*	*	**	**	**	-	**

**Notes:**

1) Simplicity & transparency: \*\* if threshold model and per 100g only, \* if scoring system or not per 100g only, - if scoring system and not per 100g only.

2) Accuracy sensitivity: \*\* if score is 90 or higher, \* if score is between 80 and 90, - otherwise.

3) Accuracy, specificity: \*\* if score is 95 or more, \* if score is between 90 and 95, - otherwise.

4) Distribution: \*\* if all three categories have 20% or more of foods, \* if one category has less than 20% of foods, - if two categories have less than 20% of foods OR one category has less than 10% of foods.

5) Concurrence with other government advice: 5 A DAY: \*\* if 95% or more of fruit and vegetables are classed as 'healthier', \* if less than 95% of fruit and vegetable are classed as 'healthier' AND less than 5% are classed as 'less healthy', - if more than 5% of fruit and vegetables are classed as 'less healthy'

6) Concurrence with other government advice: 'a lot' and 'a little': \*\* if uses FSA advice solely, \* if uses FSA advice partially, - if does not use FSA advice.

7) Concurrence with other government advice: oily fish: \*\* if n-3 fatty acids are considered, \* if n-3 are not considered but Mackerel is not 'less healthy', - if Mackerel is 'less healthy'.

**4.6 References**

Prentice AM, Jebb S (2003) Fast foods, energy density and obesity: a possible mechanistic link. *Obesity Reviews* 4: 187-194

## **SECTION 5. RECOMMENDATIONS FOR FURTHER TESTING OF DEFINITIONS**

It is recommended that further testing of definitions is carried out.

The specific recommendations made for future work are to:

- develop a wider database of food composition data with which to test the preferred models.
- devise a panel of ‘healthier’ and ‘less healthy’ foods, using experts in practical food and nutrition.
- consider what modifications to the proposed model would be necessary for its use for other age groups.
- assess the acceptability of the model to both experts and consumers.
- consider communication and support issues for consumers, health and other professionals, and the food industry as appropriate.

### **5.1 Development of databases of foods relevant to the purpose**

The database of foods used in testing the definitions developed for this project was not specifically targeted to the purposes for which the definitions might be used. It would be possible to develop databases of foods (with relevant compositional data) that could be used to assess the impact of using the definitions in practice. .

For example, if a definition of ‘foods high in fat, salt or sugar’ were to be used for advice on the balance of TV advertising for foods during children’s TV programmes it would be useful to test that definition using a database of foods currently advertised to children.

In developing the database for this project broad assumptions have been made about the fruit and vegetable composition of some composite foods in the database. Some of those assumptions could be refined or better compositional data might be collected. In addition the database could also be improved by the inclusion of data on nutrient levels pre-fortification.

It may be helpful if any new database could take account of food purchasing and intake data.

### **5.2 Further development of panels of indicator foods and of tests of sensitivity and specificity**

The tests of sensitivity and specificity of models could be improved by refining the panels of ‘healthier’ and ‘less healthy’ indicator foods. It is proposed that revised panels of indicators could be developed in one of two ways: either they could be developed through a survey of nutritionists or they could be developed by reference to recommended diets.

The first approach is based on the notion that the development of revised indicator panels could benefit from the input of a panel of nutritionists. The second (possibly complementary) approach would involve assessing the probability of a food being a constituent of healthy or unhealthy diets (and therefore indicators of healthy and unhealthy diets) by examining food consumption patterns of people currently attaining healthy and unhealthy diets. This approach is similar to that occasionally advocated for the development of food-based dietary guidelines (Food and Agriculture Organization/ World Health Organization, 1996).

It is also proposed that tests of the sensitivity and specificity of models and definitions be refined e.g. by involving panels of 'neither healthy nor unhealthy' food indicators.

### **5.3 Assessing the acceptability of schemes**

This study has judged possible criteria in terms of: simplicity and transparency; accuracy; distribution of foods between different 'nutrient profile' categories; and concurrence with other government advice. However, there may still be anomalies. Further refinement and testing against relevant databases and expert perception will seek to identify and tackle any such anomalies. In particular, it will be important to identify and address those apparent anomalies which could impact on the credibility of any schemes which use nutrient profiling.

### **5.4 References**

Food and Agriculture Organization/ World Health Organization (1996). Preparation and use of Food-Based Dietary Guidelines. Report of a joint FAO/WHO consultation. (WHO/NUT/96.6). Rome/Geneva: FAO/WHO.

## **Glossary**

<b>‘A’ nutrients</b>	Energy, saturated fat, NME sugar and sodium.
<b>‘B’ nutrients</b>	Fruit and vegetables, very long chain n-3 polyunsaturated fatty acids.
<b>‘C’ nutrients</b>	Calcium and iron.
<b>Across the board criteria</b>	A type of model for nutrient profiling where the thresholds or scoring bands are consistent for all foods.
<b>Complex scoring system</b>	A type of model for nutrient profiling where foods are given a score relating to the precise level of a number of nutrients. The formula to calculate the score is chosen to fit a mathematical model. The categorisation of individual foods depends upon their total score.
<b>EAR</b>	Estimated Average Requirement of a group of people for energy or protein or a vitamin and mineral. About half will usually need more than the EAR, and half less.
<b>Food category specific criteria</b>	A type of model for nutrient profiling where the thresholds or scoring bands vary according to the food category (e.g. different thresholds for ‘main meals’ and ‘snacks’).
<b>GDA</b>	Guideline Daily Amount. For ‘A’ nutrients: the maximum amount of nutrient that should ideally be consumed per day by people of a certain age group and sex. For ‘B’ and ‘C’ nutrients the minimum amount that should ideally be consumed per day. GDAs are calculated from public health recommendations (population dietary goals). In this project, proportions of the GDAs were used for deriving the thresholds and scoring bands of the models.
<b>Indicator foods</b>	a) A subset of foods that were subjectively designated as either ‘healthier’ or ‘less healthy’ foods (Indicator foods) b) A subset of foods selected to be representative of the food groups of the Balance of Good Health
<b>n-3 fatty acids</b>	Very long chain n-3 polyunsaturated fatty acids, mostly found in oily fish. Specifically C20:5, C22:5 and C22:6 fatty acids.

<b>NME sugar</b>	Non-milk extrinsic sugar. Extrinsic sugars are those not naturally incorporated into the cellular structure of foods. Non-milk extrinsic sugars are all such sugars excluding lactose.
<b>Sensitivity test</b>	The proportion of indicator foods that are correctly assigned to either 'healthier food choices' or 'foods high in fat, salt or sugar'.
<b>Simple scoring system</b>	A type of model for nutrient profiling where a series of thresholds are set for each of the considered nutrients. These produce scoring bands, and a food collects points depending on which band it lies within for each nutrient. The categorisation of individual foods depends upon their total score.
<b>Specificity test</b>	100 minus the proportion of indicator foods that are incorrectly assigned to either 'healthier food choices' or 'foods high in fat, salt or sugar'.

**Threshold model**

A nutrient profile model in which thresholds are set for a number of nutrients. The categorisation of an individual food depends on whether it contains more or less than the threshold amount of a nutrient.

**Appendix 1. Literature review: Summary tables**

Table 1: Food and nutrition criteria that are applied to eligibility for health claims, addition of nutrients, and public health point of purchase schemes.

Listed alphabetically by country

Country	Name of organisation	Type of organisation	Type of scheme	Fat No more than....	Sat. Fat No more than....	Sodium No more than....	Sugars No more than....	Vitamins and Minerals	Notes
Australia/New Zealand	Australia and New Zealand Food Standards Authority	Government	Addn v&m						Currently in transition
Australia/New Zealand	Australia and New Zealand Food Standards Authority	Government	Health Claims	14g/serving	5g/serving	500mg /serving	none	At least 10% RNI of at least one listed vit or min/reference amount <u>after</u> fortification  noted that	These are the general criteria recc in Inquiry Report.  Specific criteria would also be applied to indiv claims

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Country	Name of organisation	Type of organisation	Type of scheme	Fat No more than....	Sat. Fat No more than....	Sodium No more than....	Sugars No more than....	Vitamins and Minerals	Notes
								controls already in regulations for addn v&m	
Australia	Australian Heart Foundation	Charity	Point of purchase scheme: Pick the Tick	see notes, generally 5g/100g	see notes	see notes from 120mg/100g to 450mg/100g	see notes from no added sugar to 15g/100g added sugar		Very detailed compositional criteria for different types of food. e.g <b>Cereal and Fruit Bars</b> Fat: 5g/100g or less Sodium: 350mg/100g or less Added sugar: 15g/100g or less Dietary fibre: 3g/100g or more <b>Canned vegetables</b> Fat: 5g/100g or less Sodium: 120mg/100g or less Canned vegetables in sauce Fat: 5g/100g or less Sodium: 300mg/100g or less
Australia	GI Symbol Program	Non profit company - Sydney University, Diabetes Australia and	Point of purchase	By Food Category - generally 5g/100g	None	No added sodium to 500mg/100g	List of foods which are generally excluded includes soft drinks, cordials,		Very detailed compositional criteria for different types of food.  Includes fibre criteria of

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Country	Name of organisation	Type of organisation	Type of scheme	Fat No more than....	Sat. Fat No more than....	Sodium No more than....	Sugars No more than....	Vitamins and Minerals	Notes
		Juvenile Diabetes Research foundation		or 5-10g if saturated fat is < 20% of total fat			confectionery, sugars and syrups – unless meet GI guidelines		3g/100g or more for some categories  Includes calcium criterion of 100mg/100g or more for some categories  Includes energy density criterion for some categories
Canada	Health Canada	Government	Addn v&m	None	2g sat + trans/reference amount  (see country data for further details)	480mg/reference amount	none	At least 10% RNI of at least one listed vit or min/reference amount <u>before</u> fortification (except Vitamin C added to non citrus fruit juices would count)	Proposed criteria  Also alcohol criterion
Canada	Health Canada	Government	Health Claims	see notes	see notes	see notes	see notes	see notes	Proposed that claims are not permitted on foods which fall into the 'other foods' section of the Food Guide.
Canada	Heart and Stroke Foundation	Charity	Point of purchase scheme: Health Check	see notes	see notes	see notes	none		6 categories of food. In each there is detail of which legal requirement must be met e.g. salads must qualify as 'low

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Country	Name of organisation	Type of organisation	Type of scheme	Fat No more than....	Sat. Fat No more than....	Sodium No more than....	Sugars No more than....	Vitamins and Minerals	Notes
									saturated fat', soups must be 'low fat' and 'reduced sodium'.
Finland	Finnish Heart Association	Charity	Point of purchase scheme: the 'Heart' symbol	see notes	see notes (criteria for 'solid fat')	see notes from 280mg/100g to 700mg/100g (for cheeses)	none		Criteria for foods in different categories e.g.  Breakfast cereals fat <5g/100g If fat is 5.1-10g/100g, saturated fat must be <33% of the total fat Sodium<400mg/100g (i.e. salt <1000mg/100g)  Ready to eat foods Fat<30%calories Solid fat<33%total fat sodium <300mg/100g (i.e. 750mg/100g) and cholesterol criterion
Germany	Government	Government	Point of purchase:5 am Tag	3g/100g	none	none	30% of the energy content from extra sugar		Voluntary scheme.
Japan	Government	Government	Health claims	none – see notes	none – see notes	none – see notes	none – see notes	none – see notes	The labels of FOSHU products must include, amongst other things: the recommended daily intake of the food; nutrition information;and

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Country	Name of organisation	Type of organisation	Type of scheme	Fat No more than....	Sat. Fat No more than....	Sodium No more than....	Sugars No more than....	Vitamins and Minerals	Notes
									guidance on healthy eating.  The food must typically be included in a diet, and the food cannot be in the shape of a medicinal tablet or capsule or be used as a medicine
Netherlands	Netherlands Heart Foundation	Charity	Point of purchase scheme: Health Check		e.g. 2g/100g for starchy staples and bf cereals  0.5g/100g for liquid milk products  16g/100g for spreads and oils				
Sweden	National Food Administration	Government	Addn v&m	<i>see notes</i>	see notes	see notes	see notes	none	Generally foods are not fortified if they have a high sugar content, contain alcohol, or from a general nutritional standpoint should only be eaten in small quantities
Sweden	National Food Administration	Government	Health Claims	<i>None</i>	none	none	none	none	Food products should be part of a normal diet and

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Country	Name of organisation	Type of organisation	Type of scheme	Fat No more than....	Sat. Fat No more than....	Sodium No more than....	Sugars No more than....	Vitamins and Minerals	Notes
									not dietary supplements or other substances.
Sweden	National Food Administration	Government	Point of purchase scheme: Green Keyhole	<i>Varies with food category e.g.</i>  0.5g/100g for fruit yogurt  30% of calories for 'Prepared food'	none	none	none		In certain categories - requirement for wholegrain version
UK	Health Education Authority	Public Health	Point of purchase scheme: Look After Your Heart	35% calories	15% calories	260mg /100kcal	5 g total sugars/100kcal		OR 25% less fat and saturated fat than standard foods and no more salt or sugar than standard foods
UK [This entry needs updating]	Coronary Prevention Group	Charity	Information provision banding scheme	Low <15% energy  Medium-Low 15.0-29.9% energy  Medium-High 30-45%	Low <5% energy  Medium-Low 5.0-9.9% energy  Medium-High 10-15% energy	Low <1g/10MJ  Medium -Low 1.0-1.9g/10MJ  Medium - High	Low <6% energy  Medium-Low 6.0-11.9% energy  Medium-High 12-18% energy		Based on limits between LOW and HIGH being + or - 50% RDA  Sugars = total sugars  CPG scheme based on WHO/FAO recommendations [

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Country	Name of organisation	Type of organisation	Type of scheme	Fat No more than....	Sat. Fat No more than....	Sodium No more than....	Sugars No more than....	Vitamins and Minerals	Notes
				energy High >45% energy	High >15% energy	2.0-3.0g/10MJ High >3.0/10MJ	High >18% energy		
USA	Food and Drug Administration	Government	Addn v&m	see notes	see notes	see notes	see notes	see notes	It is not considered appropriate to fortify fresh produce; meat, poultry, or fish products; sugars; or snack foods such as candies and carbonated beverages.
USA	Food and Drug Administration	Government	Health Claims	13g/reference amount	4g/reference amounts	480mg/reference amount	None	At least 10% Daily Value of at least one listed vit or min/reference amount <u>before</u> fortification	+ different disqualifying levels for main dishes and meal products
USA	American Heart Association	Charity	Point of purchase scheme: AHA Certification	3g/serving	1g/serving	480mg/serving	None		
USA	National Cancer Institute	Charity, but scheme based on partnership including	Point of purchase scheme: 5 a day	3g /serving 3g/100g for	1g/serving and 15percent calories 1g/100g for	480mg/serving 600mg for meals	No added sugars in the product		Also criteria for cholesterol  The food is not processed to the extent

<b>Country</b>	<b>Name of organisation</b>	<b>Type of organisation</b>	<b>Type of scheme</b>	<b>Fat No more than....</b>	<b>Sat. Fat No more than....</b>	<b>Sodium No more than....</b>	<b>Sugars No more than....</b>	<b>Vitamins and Minerals</b>	<b>Notes</b>
		charities, government, industry		meals and main dishes	meals and main dishes and 10percent calories	and main dishes			that it no longer resembles fruit or veg e.g. tofu, soy based hamburger patties, popcorn or powders

Table 2: Specific work identified in Review, in the context of the theoretical approach to developing nutrient profiles outlined in Section 2.

<b>Scheme</b>	<b>Context for use of profile</b>	<b>Choice of nutrients</b>	<b>Choice of base</b>	<b>Choice of Model</b>	<b>Across the board/categories</b>	<b>Base for choice of numbers</b>	<b>Comments</b>
USA definition of 'healthy food' and labelling	Labelling	Fat Sat Fat Cholesterol Sodium  Vit A Vit C Fe Ca Fibre	Per serving (reference amount)	Threshold	Discriminates between individual foods and 'meal-type' products	Public health (DRVs)	
Canada	Labelling	All on label Sat fat + trans	?Per serving (reference amount)	Threshold	Across the board	Public health (DRVs)	
USA – Utah	Vending machines	Fat Energy  Vit A Vit C Fe Ca Fibre	Per serving	Scoring	Across the board		Includes all fruit
USA – San Antonio	Vending machines	Fat Carbohydrate Energy (in relation to drinks only)	Per serving	Threshold	Discriminates between foods and drinks		Includes all fruit  Foods assigned to 3 categories:  1. Healthiest 2. Healthier 3. Excluded

<b>Scheme</b>	<b>Context for use of profile</b>	<b>Choice of nutrients</b>	<b>Choice of base</b>	<b>Choice of Model</b>	<b>Across the board/categories</b>	<b>Base for choice of numbers</b>	<b>Comments</b>
UK Balfour research paper	Catering	Sat Fat NME sugars  Fibre	Per meal	Scoring	Only applicable to meals	Public health	
UK Williams research paper	Catering	Fat  Fibre	Per 100g	Threshold for each nutrient individually	Only applicable to meals	? Pragmatic	
Australia – New South Wales	School meals – smart card	Food list					
Australia – Western Australia Star Choice scheme	School meals	Recommended core foods  + Star choice products  Fat Salt Sugars  Calcium	? Per 100g	?Threshold	Categories	?Pragmatic	
Australia – New South Wales – Canteen Menu planning guide	School meals	Fat Energy Sodium  Fibre	Per 100g	Threshold	Discriminates between hot food items and snack foods/drinks	?Pragmatic	Three categories: Green – ‘Fill the menu’; Amber – ‘Select carefully’; and Red – ‘Occasional foods’
USA regulations for school meals	School Meals	List of foods of minimal nutritional value					

<b>Scheme</b>	<b>Context for use of profile</b>	<b>Choice of nutrients</b>	<b>Choice of base</b>	<b>Choice of Model</b>	<b>Across the board/categories</b>	<b>Base for choice of numbers</b>	<b>Comments</b>
USA Snyder research paper	School meals	Fat	Per serving	Threshold	Categories	Public Health	
WHO review	Advertising for children	If there are restrictions these generally apply to a list of foods.					
Point of purchase schemes ( see Table 1 for detail)	Point of purchase – usual symbols	Usually fat or sat fat  Usually sodium  Sometimes added sugars  One scheme – Glycemic Index  Sometimes Ca, Fe, protein, fibre, Vit A, Vit C.	Per serving or per 100g	Threshold	Both across the board and categories	?Pragmatic with positive nutrients more likely to be related to public health recommendations.  CPG banding also related to public health recommendations.	
UK retailers and manufacturers – children’s ranges	Point of purchase	Fat Sometimes Sat Fat Sugars (? Added) Sodium	Per serving or per 100g	Threshold	Both across the board and categories	? Pragmatic	

## **Appendix 2. The Coronary Prevention Group Nutrition Banding Scheme**

In the mid 1980s the Coronary Prevention Group (CPG) convened an expert committee chaired by Professor Philip James to examine possible ways of setting nutritional criteria for foods – including criteria for nutrition claims - and to develop some rational criteria of their own.

The CPG came to the conclusion that for most purposes nutritional criteria should be set on a per 100kJ basis. Its arguments for doing so were similar to those discussed in Section 2 of this report

The CPG also concluded that the criteria should be related to population dietary goals. Whilst it is possible to relate criteria set on a per 100g or per serving basis to population dietary goals it is much simpler to do so for criteria set on a per 100kJ basis. This is because population dietary goals – at least for macronutrients - have generally been set on a per energy basis. This is because populations consist of individuals with variable energy requirements depending on their age, height, weight and the amount of physical activity they are engaged in. Population goals set on a per energy basis can be applied to most individuals in the population for which they are recommended – for example a goal of say 33% energy from fat would be appropriate for most individuals in the UK regardless of their energy intake. (There are of course exceptions: the very young and old, certain sick individuals, etc).

Population goals for nutrients that have no energy content – fibre, cholesterol, minerals including sodium, and vitamins have generally been set on a weight per day basis. This means that they cannot be applied to all the individuals in the population for which they are recommended. So for example the Committee on Medical Aspects of Food Policy (COMA) goal for salt of 6g per day has been ‘translated’ into different, lower amounts for children by the Scientific Advisory Committee on Nutrition (SACN, 2003). Instead of doing this the Committee could have set the goal on a per energy basis e.g. to indicate that the population dietary goal for salt should be 0.6g per 1MJ energy intake (assuming for the sake of argument that the average energy intake for adults is 10MJ (2400 kcal) per day).

The criteria for the CPG’s Nutrition Banding Scheme were linked directly to population dietary goals set on a per energy basis. The expert committee decided that the threshold between the ‘medium high’ and ‘medium low’ bands should be the population dietary goal. This means, for example, that if people only eat what the model categorizes as ‘medium low’ and ‘low’ fat foods they will automatically meet the COMA population goal of 33% energy from fat. They decided that the thresholds between ‘medium high’ and ‘high’ and between ‘medium low’ and ‘low’ should be, respectively, 50% above and 50% below the population dietary goal set on a per 100kJ basis.

Between 1986 and 1992 the Group revised and published its Nutrition Banding Scheme several times (CPG, 1986; CPG, 1990; Black and Rayner, 1992). A variant of the scheme was published in a World Health Organization report (WHO, 1990).

Following a campaign to persuade food manufacturers and retailers of the value of the scheme, the Co-op Wholesale Society adopted the scheme for the purposes of labelling its own brand goods in 1992. The Co-op continues to use the model to give supplementary information about the nutrient content of foods within the nutrition labelling panel. The final version of the scheme that was adopted by the Co-op has never been published but is shown below.

### Coronary Prevention Group Nutrition Banding Scheme. Revised version of 12.2.92

Nutrient	Population dietary goal	Low	Medium Low (5)	Medium High	High
	<i>% energy (kJ/100kJ)</i>				
Protein	15 (2)	<7.5	7.5-15	15-22.5	>22.5
Carbohydrate	44 (1)	<23.5	23.5-47	47-70.5	>70.5
Total sugar	17 (3)	<8.5	8.5-17	17-25.5	>25.5
Non-milk extrinsic sugar	10 (1)	<5	5-10	10-15	>15
Total fat	33 (1)	<16.5	16.5-33	33-49.5	>49.5
Saturated fat	10 (1)	<5	5-10	10-15	>15
Polyunsaturated fat	6 (1)	<3	3-6	6-9	>9
Monounsaturated fat	12 (1)	<6	6-12	12-18	>18
	<i>g/10MJ (4)</i>				
Cholesterol	0.3 (1)	<0.15	0.15-0.3	0.3-0.45	>0.45
Total salt	6 (2)	<3	3-6	6-9	>9
Total sodium	2.4 (2)	<1.2	1.2-2.4	2.4-3.5	>3.5
Total fibre	30 (3)	<15	15-30	30-45	>45
Non-starch polysaccharide	18 (1)	<9	9-18	18-27	>27

*Notes on the basis to this model:*

(1) Goals from the COMA report on dietary reference values (Department of Health, 1991).

(2) Goals from the World Health Organisation's report on diet, nutrition and the prevention of chronic disease (WHO, 1990).

(3) The population dietary goal was derived as described as suggested could be done in a previous paper (Rayner, Williams and Scarborough, 2004).

(4) Note that even where nutrients have little or no energy content: i.e. cholesterol, fibre and sodium, the nutrient content levels are set on a per energy basis. The bandings for these nutrients are given per 10 MJ – being an estimate of average daily dietary energy intake. They could of course be given in g/100kJ by dividing by 100.

### References

Black A, Rayner M (1992) *Just read the label*. London: HMSO.

Coronary Prevention Group (1986) Nutritional labelling of foods: a rational approach to banding. *Lancet* 1986, (ii): 469.

Coronary Prevention Group (1990). *Nutrition banding. A scientific system for labelling the nutrient content of foods*. London : CPG.

Department of Health (1991) *Dietary Reference Values for Food Energy and Nutrients for the United Kingdom*. Report on Health and Social Subjects No 41. London: HMSO.

Rayner M, Scarborough P, Williams C (2004) The origin of Guideline Daily Amounts and the Food Standards Agency's guidance on what counts as a lot and a little. *Public Health Nutrition*, 7 (4): 549-556.

Scientific Advisory Committee on Nutrition (2003) *Salt and health*. London: The Stationery Office.

World Health Organization (1990). *Diet, nutrition and the prevention of chronic diseases, Report of a joint WHO/FAO Expert Consultation*. World Technical Report Series 797. Geneva: WHO,.

### Appendix 3a. Lists of ‘Healthier’ and ‘Less healthy’ food indicators

#### ‘Healthier’ indicators

Aduki beans, dried, boiled in unsalted water; Almonds; Apple juice, unsweetened; Apples, cooking, stewed without sugar; Apples, eating, average, raw; Apricots, canned in juice; Apricots, raw; Baked beans, canned in tomato sauce, reduced salt, reduced sugar; Bananas; Beetroot, raw; Black gram, urad gram, dried, boiled in unsalted water; Blackberries, raw; Blackcurrants, raw; Blackeye beans, dried, boiled in unsalted water; Brazil nuts; Broad beans, frozen, boiled in unsalted water; Broccoli, green, boiled in unsalted water; Brown bread, average; Brown rice, boiled; Brussels sprouts, boiled in unsalted water; Cabbage, boiled in unsalted water, average; Carrots, old, raw; Carrots, young, boiled in unsalted water; Cauliflower, boiled in unsalted water; Celery, raw; Cherries, raw; Chestnuts; Chick peas, whole, dried, boiled in unsalted water; Chicory, raw; Clementines; Cod, frozen, grilled; Coley, steamed; Courgette, boiled in unsalted water; Crispbread, rye; Cucumber, raw; Curly kale, raw; Currants; Damsons, raw; Dates, raw; Fennel, Florence, raw; Figs, dried; Granary bread; Grape juice, unsweetened; Grapefruit, canned in juice; Grapefruit juice, unsweetened; Grapefruit, raw; Grapes, average; Green beans/French beans, frozen, boiled in unsalted water; Haddock, steamed; Halibut, grilled; Hazelnuts; Herring, grilled; Kiwi fruit; Leeks, boiled in unsalted water; Lemon sole, steamed; Lemons, whole, without pips; Lentils, red, split, dried, boiled in unsalted water; Lettuce, average, raw; Lychees, raw; Macaroni, boiled; Mackerel, grilled; Mandarin oranges, canned in juice; Mangoes, ripe, raw; Marrow, boiled in unsalted water; Melon, canteloupe-type; Mung beans, whole, dried, boiled in unsalted water; Mushrooms, common, raw; Nectarines; New potatoes, boiled in unsalted water; Okra, boiled in unsalted water; Old potatoes, baked, flesh and skin; Orange juice, unsweetened; Oranges; Parsnip, boiled in unsalted water; Passion fruit; Pasta, plain, fresh, cooked; Paw-paw, canned in juice; Paw-paw, raw; Peaches, canned in juice; Peaches, raw; Peanuts, plain; Pears, average, raw; Pears, canned in juice; Peas, boiled in unsalted water; Pecan nuts; Peppers, capsicum, green, raw; Peppers, capsicum, red, raw; Pineapple, canned in juice; Pineapple juice, unsweetened; Pineapple, raw; Plaice, frozen, steamed; Plantain, boiled in unsalted water; Plums, average, raw; Porridge, made with water; Prunes, canned in juice; Radish, red, raw; Raisins; Raspberries, raw; Red kidney beans, dried, boiled in unsalted water; Runner beans, boiled in unsalted water; Salmon, grilled; Satsumas; Soya beans, dried, boiled in unsalted water; Spaghetti, wholemeal, boiled; Spinach, boiled in unsalted water; Spinach, raw; Spring greens, boiled in unsalted water; Spring onions, bulbs and tops, raw; Strawberries, raw; Sultanas; Swede, boiled in unsalted water; Sweetcorn, on-the-cob, whole, boiled in unsalted water; Swordfish, grilled; Tangerines; Tofu, soya bean, steamed; Tomato juice; Tomatoes, grilled; Tomatoes, raw; Trout, rainbow, grilled; Turnip, boiled in unsalted water; Walnuts; Whiting, steamed; Wholemeal bread, average; Yam, boiled in unsalted water.

**‘Less healthy’ indicators**

Bacon rashers, streaky, fried; Battenburg cake; Beefburgers, chilled/frozen, fried; Big Mac; Black pudding, dry fried; Boiled sweets; Bombay mix; Bounty bar; Cake mix, made up; Cheesecake, fruit, individual; Chew sweets; Chicken burger takeaway; Chicken chow mein, takeaway; Chicken nuggets, takeaway; Chips, French fried, retail; Choc ice; Chocolate chip cookies; Chocolate dairy desserts; Chocolate fudge cake; Chocolate nut sundae; Chocolate, fancy and filled; Chocolate, milk; Coco Pops; Cod, in batter, fried in blended oil; Cola; Corn snacks; Cornetto type ice cream; Crème caramel; Crème egg; Crispie cakes; Crunch biscuits, cream filled; Curry, prawn, takeaway; Custard tarts, individual; Danish pastries; Digestive biscuits, chocolate; Dream topping, made up with semi-skimmed milk; Drinking chocolate powder, made up with whole milk; Doughnuts, jam; Eclairs, frozen; Fancy iced cakes, individual; Frosties; Frozen ice cream desserts; Fruit pastilles; Fudge; Gateau, chocolate based, frozen; Ice cream, dairy, vanilla; Jam tarts, retail; Jaffa cakes; Kit Kat; Liquorice allsorts; Lollies, containing ice cream; Mars bar; Meat samosas, takeaway; Meringue, with cream; Milkshake, thick, takeaway; Milky Way; Mousse, chocolate; Muffins, American style, chocolate chip; Peppermints; Pizza, meat topped; Pork sausages, chilled, fried; Popcorn, candied; Pot savouries, made up; Potato crisps; Potato fritters, battered, cooked; Profiteroles with sauce; Quarterpounder with cheese, takeaway; Ricicles; Sausage rolls, puff pastry; Sherbert sweets; Shortbread; Smartie-type sweets; Snickers; Sponge pudding, canned; Spring rolls, meat, takeaway; Sugar Puffs; Sunny Delight; Sweet and sour chicken, takeaway; Toffees, mixed; Trifle; Turkish delight, without nuts; Twiglets; Twix; Whopper Burger;

### Appendix 3b: Nutritional composition of Balance of Good Health indicators

Food	Energy (kJ per 100g)	Saturated fat (g per 100g)	NME sugar (g per 100g)	Sodium (mg per 100g)	Calcium (mg per 100g)	Iron (mg per 100g)	n-3 fatty acids (g per 100g)	Fruit and vegetable content*
<b>Bread, other cereals and potatoes</b>								
French fries	1174	5.8	1.3	310	14	1.0	0	10
Corn flakes	1601	0.2	8.2	1000	5	7.9	0	10
Cream crackers	1746	5.4	0.0	610	110	1.7	0	10
Crispbread	1312	0.1	3.2	220	45	3.5	0	10
Crunchy nut corn flakes	1721	0.7	37.7	600	15	7.9	0	10
Currant buns	1185	1.9	16.0	317	110	1.9	0	10
Malt loaf	1256	0.5	21.9	246	104	1.7	0	10
Boiled potatoes	321	0.1	1.1	9	5	0.3	0	10
Roast potatoes	630	0.4	0.6	9	8	0.7	0	10
Oven chips	687	1.8	0.7	53	12	0.8	0	10
Fresh pasta	677	0.3	0.6	16	37	0.8	0	10
Potato croquettes	893	1.7	0.5	420	44	0.9	0	10
Sugar puffs	1623	0.2	51.5	9	14	8	0	10
Weetabix	1498	0.6	4.9	270	35	11.9	0	10
White bread	931	0.3	3.4	461	177	1.6	0	10
Boiled rice	587	0.3	0.0	1	18	0.2	0	10
Fried rice	609	0.6	1.4	111	21	0.3	0	10
Wholemeal bread	922	0.5	2.8	487	106	2.4	0	10
Wholemeal rolls	1037	0.8	2.6	526	87	2.4	0	10
<b>Milk and dairy foods</b>	<b>Energy</b>	<b>Sats</b>	<b>NME sugar</b>	<b>Sodium</b>	<b>Calcium</b>	<b>Iron</b>	<b>n-3 fatty acids</b>	<b>F&amp;V</b>
Camembert	1205	14.2	0.0	605	235	0.0	0	10
Cheddar	1725	21.7	0.0	723	739	0.3	0	10
Half fat cheddar	1141	9.9	0.0	670	840	0.2	0	10
Cottage cheese	423	2.3	0.0	300	127	0.0	0	10
Single cream	872	0.9	3.8	28	89	0.0	0	10
Half fat crème fraîche	671	10.2	0.0	36	95	0.1	0	10
Fromage frais	470	5.5	0.1	36	110	0.1	0	10
Low fat fromage frais	208	0.1	0.3	37	127	0.1	0	10
Greek yoghurt	384	4.2	0.5	150	150	0.0	0	10
Semi-skimmed milk	195	1.1	0.0	43	120	0.0	0	10
Skimmed milk	136	0.1	0.0	44	122	0.0	0	10
Whole milk	274	2.5	0.0	43	118	0.0	0	10
Low fat fruit yoghurt	331	0.8	8.3	62	140	0.1	0	30
Low fat	237	0.7	7.1	63	162	0.1	0	10

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yoghurt								
<b>Fruit and vegetables</b>	<b>Energy</b>	<b>Sats</b>	<b>NME sugar</b>	<b>Sodium</b>	<b>Calcium</b>	<b>Iron</b>	<b>n-3 fatty acids</b>	<b>F&amp;V</b>
Currants**	1139	N/A	33.9	14	93	1.3	0	90
Orange juice	153	0.0	8.8	10	10	0.2	0	90
Peaches	142	0.0	0.0	1	7	0.4	0	90
Canned pineapple	200	0.0	0.0	1	8	0.5	0	90
Avocado	784	4.1	0.0	6	11	0.4	0	90
Celery	30	0.0	0.0	60	41	0.4	0	90
Lettuce	59	0.1	0.0	3	28	0.7	0	90
Grilled tomatoes	83	1.1	0.0	10	20	0.6	0	90
<b>Meat, fish and alternatives</b>	<b>Energy</b>	<b>Sats</b>	<b>NME sugar</b>	<b>Sodium</b>	<b>Calcium</b>	<b>Iron</b>	<b>n-3 fatty acids</b>	<b>F&amp;V</b>
Streaky bacon	1389	9.1	0.0	1880	7	0.7	0	10
Lean mince	742	3.8	0.0	75	14	2.3	0	10
Grilled steak	745	2.5	0.0	74	7	3.6	0	10
Fried steak	953	4.9	0.0	71	5	2.7	0	10
Roast beef	849	2.6	0.0	62	8	2.9	0	10
Chicken nuggets	1111	3.3	1.1	510	25	0.6	0	10
Chicken breast	626	0.6	0.0	5.5	6	0.4	0.1	10
Chicken leg	981	4.6	0.0	95	12	0.8	0	10
Cod	408	0.3	0.0	340	11	0.1	0.3	10
Boiled egg	612	3.1	0.0	140	57	1.9	0	10
Fried egg	745	4.0	0.0	160	65	2.2	0	10
Fish fingers**	838	2.8	0.0	440	92	0.8	N/A	10
Ham	451	1.1	1.0	1200	7	0.7	0	10
Roast lamb	853	3.8	0.0	63	7	1.8	0.1	10
Lentils	424	0.0	0.4	12	16	2.4	0	90
Mackerel	994	3.5	0.0	63	12	1.2	1.9	10
Sausages	1279	8.5	1.5	1070	110	1.1	0	10
Tofu	304	0.5	0.3	4	510	1.2	0	10
Tinned tuna	794	1.5	0.0	290	12	1.6	0.4	10
Walnuts	2837	5.6	0.0	7	94	2.9	0	10
<b>Foods high in fat, foods high in sugar</b>	<b>Energy</b>	<b>Sats</b>	<b>NME sugar</b>	<b>Sodium</b>	<b>Calcium</b>	<b>Iron</b>	<b>n-3 fatty acids</b>	<b>F&amp;V</b>
Choc chip cookies	1989	10.7	31.5	350	83	1.3	0	10
Cola	174	0.0	10.9	5	6	0.0	0	10
Diet cola	2	0.0	0.0	5	6	0.0	0	10
Digestives	1956	9.0	13.6	600	92	3.2	0	10
Jam doughnuts	1414	4.3	18.6	180	72	1.2	0	10
Jaffa cakes	1598	4.2	53.9	130	55	1.5	0	10
Kit kat	2098	16.2	42.5	120	200	1.5	0	10
Mars bar	1990	10.3	59.6	150	95	1.2	0	10
Milky way	1874	9.5	61.4	100	90	1.1	0	10
Sponge cake	1951	5.8	30.3	326	69	1.3	0	10
Butter	3059	52.1	0.0	606	18	0.0	0.1	10
Very low fat spread**	753	3.7	0.0	500	N/A	0.0	0	10
Low fat spread**	2274	11.3	0.0	710	N/A	0.0	0	10
Margarine	3067	17.0	0.0	680	4	0.3	0	10

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Olive oil	3696	14.3	0.0	0	0	0.4	0	10
Crisps	2215	14.0	0.7	800	29	1.4	0	10
Low fat crisps	1924	9.3	1.0	730	36	0.8	0	10
<b>Composite foods</b>	<b>Energy</b>	<b>Sats</b>	<b>NME sugar</b>	<b>Sodium</b>	<b>Calcium</b>	<b>Iron</b>	<b>n-3 fatty acids</b>	<b>F&amp;V</b>
Baked beans	355	0.1	3.0	530	53	1.4	0	90
Boiled celery	34	0.1	0.4	160	45	0.3	0	90
Chilli con carne	504	2.9	1.4	303	20	1.1	0	50
Shepherd's pie	467	2.4	0.4	420	20	0.7	0	10
Fruit crumble	924	4.0	11.0	82	41	0.3	0	50
Fruit pie	1096	4.2	6.0	193	58	0.8	0	30
Lasagne	800	4.5	0.7	340	100	0.8	0	30
Fried mushrooms	645	2.1	0.1	4	8	1.0	0	90
Salted peanuts	2491	9.5	0.0	400	37	1.3	0	10
Stewed rhubarb	203	0.0	5.75	1	33	0.1	0	90
Tinned sardines	678	2.8	0.7	350	430	2.9	1.7	10
Soya milk	108	0.2	0.0	32	13	0.4	0	90
Canned strawberries	279	0.0	8.5	9	11	1.1	0	90
Mayonnaise	2843	11.4	0.7	450	8	0.3	0	10
Low fat mayo**	1188	4.2	2.3	940	N/A	N/A	0	10

Notes:

\* Fruit and vegetable content has been estimated due to lack of recipe information. The foods in the database were assigned one of the following five values:

10%	Between 0 and 20% fruit and vegetables (by weight)
30%	Between 20 and 40%
50%	Between 40 and 60%
70%	Between 60 and 80%
90%	Between 80 and 100%

\*\* These foods are omitted from some of the tables in Appendix 7, as their nutritional composition data are incomplete.

## Appendix 4. Details of models and definitions

Definition	Description
TAg/1	<b>Threshold model, Group A nutrients, per 100g:</b> >1790kJ energy per 100g OR >5.2g saturated fat per 100g OR >12.6g NME sugar per 100g OR 470mg sodium per 100g
TAg/2	<b>Threshold model, Group A nutrients, per 100g:</b> >1340kJ energy per 100g OR >3.9g saturated fat per 100g OR >9.5g NME sugar per 100g OR >350mg sodium per 100g
TAg/s	<b>Threshold model, Group A nutrients, per 100g/serving:</b> Less healthy if >2100kJ energy per 100g OR >2800kJ energy per serving OR >6g saturated fat per 100g OR >8g saturated fat per serving OR >14.3g NME sugar per 100g OR >19g NME sugar per serving OR >550mg sodium per 100g OR >735mg sodium per serving.
TAkJ/1	<b>Threshold model, Group A nutrients, per 100kJ:</b> Less healthy if >16.5kJ saturated fat per 100kJ OR >16.5kJ NME sugar per 100kJ OR >40mg sodium per 100kJ
TAkJ/2	<b>Threshold model, Group A nutrients, per 100kJ:</b> Less healthy if >27.7kJ saturated fat per 100kJ OR >27.7kJ NME sugar per 100kJ OR >66mg sodium per 100kJ
TAkJ/s	<b>Threshold model, Group A nutrients, per 100kJ/serving:</b> Less healthy if >2980kJ energy per serving OR (>16.5kJ saturated fat per 100kJ AND >4.3g saturated fat per serving) OR (>16.5kJ NMES per 100kJ AND >10.5g NMES per serving) OR (>40mg sodium per 100kJ AND >390mg sodium per serving).
TBg	<b>Threshold model, Group B nutrients, per 100g:</b> Less healthy if >1260kJ energy per 100g OR >3.6g saturated fat per 100g OR >8.6g NME sugar per 100g OR >330mg sodium per 100g AND <0.1g n-3 fatty acids per 100g AND <100% fruit or vegetable content
TBg/s	<b>Threshold model, Group B nutrients, per 100g/serving:</b> Less healthy if >1790kJ energy per 100g OR >2980kJ energy per serving OR >5.2g saturated fat per 100g OR >8.7g saturated fat per serving OR >12.6g NME sugar per 100g OR >21g NME sugar per serving OR >470mg sodium per 100g OR >785mg sodium per 100g AND <100% fruit and vegetable content AND <0.1g n-3 fatty acids per 100g AND <0.2g n-3 fatty acids per serving
TBkJ	<b>Threshold model, Group B nutrients, per 100kJ:</b> Less healthy if >16.5kJ saturated fat per 100kJ OR >16.5kJ NME sugar per 100kJ OR >40mg sodium per 100kJ AND <100% Fruit and veg content AND <0.02g n-3 fatty acids per 100kJ
TBkJ/s	<b>Threshold model, Group B nutrients, per 100kJ/serving:</b> Less healthy if >2800kJ energy per serving OR (>16.5kJ saturated fat per 100kJ AND >1.9g saturated fat per serving) OR (>16.5kJ NMES per 100kJ AND >4.6g NMES per 100g) OR (>40mg sodium per 100kJ AND >175mg sodium per serving) AND <100% fruit and veg content AND <0.02g n-3 per 100kJ AND <0.2g n-3 per serving
TCg	<b>Threshold model, Group C nutrients, per 100g:</b> Less healthy if >1340kJ energy per 100g OR >3.9g saturated fat per 100g OR >9.5g NME sugar per 100g OR >350mg sodium per 100g AND <0.1g n-3 fatty acids per 100g AND <100% fruit or vegetable content AND <5mg iron per 100g AND <345mg calcium per 100g
TCg/s	<b>Threshold model, Group C nutrients, per 100g/serving:</b> Less healthy if >1790kJ energy per 100g OR >2980kJ energy per serving OR >5.2g saturated fat per 100g OR >8.7g saturated fat per serving OR >12.6g NMES per 100g OR >21g NMES per serving OR >470mg sodium per 100g OR >785mg sodium per 100g AND <100% fruit and vegetable content AND <0.1g n-3 per 100g AND <0.2g n-3 per serving AND <345mg calcium per 100g AND <345mg per serving AND <5mg iron per 100g AND <5mg iron per serving
TCKJ	<b>Threshold model, Group C nutrients, per 100kJ:</b> Less healthy if >16.5kJ saturated fat per 100kJ OR >16.5kJ NMES per 100kJ OR >40mg sodium per 100kJ AND <100% Fruit and veg content AND <0.02g n-3 per 100kJ AND

	<0.6mg iron per 100kJ AND <40mg calcium per 100kJ
TCKJ/s	<b>Threshold model, Group C nutrients, per 100kj/serving:</b> Less healthy if >2800kJ energy per serving OR (>16.5kJ saturated fat per 100kJ AND >1.9g saturated fat per serving) OR (>16.5kJ NMES per 100kJ AND >4.6g NMES per 100g) OR (>40mg sodium per 100kJ AND >175mg sodium per serving) AND <100% fruit and veg content AND <0.02g n-3 per 100kJ AND <0.2g n-3 per serving AND <0.5mg iron per 100kJ AND <4.2mg iron per serving AND <35mg calcium per 100kJ AND <275mg calcium per serving.
SSAg/1	<b>Simple scoring system, Group A nutrients, per 100g:</b> Scoring bands as follows: Energy, 0-895kJ = 0; 895-1790kJ = 1; 1790-2685kJ = 2, etc. Saturated fat, 0-2.6g = 0; 2.6-5.2g = 1; 5.2-7.8g = 2, etc. NMES, 0-6.3g = 0; 6.3-12.6g = 1; 12.6-18.9g = 2, etc. Sodium, 0-235mg = 0; 235-470mg = 1; 470-705mg = 2, etc. Final score = energy + saturated fat + NMES + sodium. Less healthy if score is 4 or more.
SSAg/2	<b>Simple scoring system, Group A nutrients, per 100g:</b> Scoring bands as follows: Energy, 0-1250kJ = 0; 1250-1875kJ = 1; 1875-2500kJ = 2, etc. (max 5). Saturated fat, 0-3.6g = 0; 3.6-4.9g = 1; 4.9-7.2g = 2, etc. (max 5). NMES, 0-8.8g = 0; 8.8-13.2g = 1; 13.2-17.6g = 2, etc. (max 5). Sodium, 0-330mg = 0; 330-445mg = 1; 445-660mg = 2, etc. (max 5). Final score = energy + saturated fat + NMES + sodium. 2 or more for less healthy.
SSAg/s/1	<b>Simple scoring system, Group A nutrients, per 100g/serving:</b> Per 100g scoring bands as follows: Energy, 0-1790kJ = 0; 1790-2685kJ = 1; 2685-3580kJ = 2, etc. (max 5). Saturated fat, 0-5.2g = 0; 5.2-7.8g = 1; 7.8-10.4g = 2, etc. (max 5). NMES, 0-12.6g = 0; 12.6-18.9g = 1; 18.9-25.2g = 2, etc. (max 5). Sodium, 0-470mg = 0; 470-705mg = 1; 705-940mg = 2, etc. (max 5). Per serving scoring bands as follows: Energy, 0-2980kJ = 0; 2980-4470kJ = 2; 4470-5960 = 4, etc. (max 10). Saturated fat, 0-8.7g = 0; 8.7-13.1g = 2; 13.1-17.4g = 4, etc. (max 10). NMES, 0-21g = 0; 21-31.5g = 2; 31.5-42g = 4, etc. (max 10). Sodium, 0-785mg = 0; 785-1175mg = 2; 1175-1570mg = 4, etc. (max 10). Final score = energy + saturated fat + NMES + sodium. 2 or more for less healthy.
SSAg/s/2	<b>Simple scoring system, Group A nutrients, per 100g/serving:</b> Per 100g scoring bands as follows: Energy, 0-895kJ = 0; 895-1790kJ = 1; 1790-2685kJ = 2, etc. (max 6). Saturated fat, 0-2.6g = 0; 2.6-5.2g = 1; 5.2-7.8g = 2, etc. (max 6). NMES, 0-6.3g = 0; 6.3-12.6g = 1; 12.6-18.9g = 2, etc. (max 6). Sodium, 0-235mg = 0; 235-470mg = 1; 470-705mg = 2, etc (max 6). Per serving bands as follows: Energy, 0-1790kJ = 0; 1790-3580kJ = 2; 3580-5370kJ = 4, etc. (max 12). Saturated fat, 0-5.2g = 0; 5.2-10.4 = 2; 10.4-15.6g = 4, etc. (max 12). NMES, 0-12.6g = 0; 12.6-25.2g = 2; 25.2-37.8g = 4, etc. (max 12). Sodium, 0-470mg = 0; 470-940mg = 2; 940-1410mg = 4, etc. (max 12). Final score = energy + saturated fat + NMES + sodium. 6 or more for less healthy.
SSAkJ	<b>Simple scoring system, Group A nutrients, per 100kJ:</b> Score bands are as follows: Saturated fat, 0-11kJ = 0; 11-16.5kJ = 1; 16.5-22kJ = 2, etc. (max 5). NMES, 0-11kJ = 0; 11-16.5kJ = 1; 16.5-22kJ = 2, etc. (max 5). Sodium, 0-26mg = 0; 26-40mg = 1; 40-54mg = 2, etc. (max 5). Final score = saturated fat + NMES + sodium. Less healthy if score of 3 or more.
SSAkJ/s	<b>Simple scoring system, Group A nutrients, per 100kJ/serving:</b> Per 100kJ scoring bands as follows: Saturated fat, 0-19.7kJ = 0; 19.7-39.4kJ = 1; 39.4-59.1kJ = 2, etc. (max 6). NMES, 0-19.7kJ = 0; 19.7-39.4kJ = 1; 39.4-59.1kJ = 2, etc. (max 6). Sodium, 0-45mg = 0; 45-90mg = 1; 90-135mg = 2, etc. (max 6). Per serving bands as follows: Energy, 0-1340kJ = 0; 1340-2680kJ = 1, 2680-4020kJ = 2, etc. (max 6). Saturated fat, 0-3.9g = 0; 3.9-7.8g = 1; 7.8-11.7g = 2, etc. (max 6). NMES, 0-9.5g = 0; 9.5-19g = 1; 19-28.5g = 2, etc. (max 6). Sodium, 0-350mg = 0; 350-700mg = 1; 700-1050mg = 2, etc. (max 6). Final score = energy + min(saturated fat per 100kJ, saturated fat per serv) + min(NMES per 100kJ, NMES per serv) + min(sodium per 100kJ, sodium per serv). 1 or more for less healthy.
SSBg	<b>Scoring system, Group B nutrients, per 100g:</b> Scoring bands as follows: Energy, 0-450kJ = 0; 450-890kJ = 1; 890-1350kJ = 2, etc. (max 5). Saturated fat, 0-1.3g = 0; 1.3-2.6g = 1; 2.6-3.9g = 2, etc. (max 5). NMES, 0-3.2g = 0; 3.2-

	6.4g = 1; 6.4-9.6g = 2, etc. (max 5). Sodium, 0-120mg = 0; 120-240mg = 1; 240-360mg = 2, etc. (max 5). F&V, 0 or 30% = 0; 50 or 70% = 1; 100% = 2. n-3, 0-30mg = 0; 30-60mg = 1; 60-90mg = 2, etc. (max 5). Final score = energy + saturated fat + NMES + sodium – F&V – n-3. Less healthy if score is 3 or more.
SSBg/s	<b>Simple scoring system, Group B nutrients, per 100g/serving:</b> Per 100g bands as follows: Energy, 0-450kJ = 0; 450-890kJ = 1; 890-1350kJ = 2, etc. (max 5). Saturated fat, 0-1.3g = 0; 1.3-2.6g = 1; 2.6-3.9g = 2, etc. (max 5). NMES, 0-3.2g = 0; 3.2-6.4g = 1; 6.4-9.6g = 2, etc. (max 5). Sodium, 0-120mg = 0; 120-240mg = 1; 240-360mg = 2, etc. (max 5). n-3, 0-30mg = 0; 30-60mg = 1; 60-90mg = 2, etc. (max 5). Per serving bands as follows: Energy, 0-895kJ = 0; 895-1790kJ = 1; 1790-2685kJ = 2, etc. (max 5). Saturated fat, 0-2.6g = 0; 2.6-5.2g = 1; 5.2-7.8g = 2, etc. (max 5). NMES, 0-6.3g = 0; 6.3-12.6g = 1; 12.6-18.9g = 2, etc. (max 5). Sodium, 0-235mg = 0; 235-470mg = 1; 470-705mg = 2, etc. (max 5). N-3, 0-60mg = 0; 60-120mg = 1; 120-180mg = 2, etc. (max 5). F&V, 0-30% = 0; 50% = 1; 70% = 2; 100% = 5. Final score = A nutrients per 100g + A nutrients per serving – B nutrients per 100g – B nutrients per serving. Less healthy if score is 8 or more.
SSBkJ	<b>Simple scoring system, Group B nutrients, per 100kJ:</b> Scoring bands as follows: For saturated fat and NMES, 0-16.5kJ = 0; 16.5-24.8kJ = 1; 24.8-33kJ = 2, etc. (max 5). For sodium, 0-40mg = 0; 40-50mg = 1; 50-60mg = 2, etc. (max 5). For n-3, 0-0.01g = 0; 0.01-0.02g = 1; 0.02-0.03g = 3; 0.03+g = 5. Fruit and vegetable content scores as follows: 0-30% = 0; 50% = 1; 70% = 2; 100% = 5. Final score = saturated fat + NMES + sodium. Less healthy if 2 or more.
SSBkJ/s	<b>Simple scoring system, Group B nutrients, per 100kJ/serving:</b> Maximum for each nutrient is 5 points. Score for each nutrient is minimum of per 100kJ and per serving score. For energy, only per serving bands. 0-1340kJ = 0; 1340-2010kJ = 1; 2010-2680kJ = 2, etc. For saturated fat per 100kJ, 0-11kJ = 0; 11-16.5kJ = 1; 16.5-22kJ = 2, etc. For saturated fat per serving, 0-1.8g = 0; 1.8-2.7g = 1; 2.7-3.6g = 2, etc. For NMES per 100kJ, 0-11kJ = 0; 11-16.5kJ = 1; 16.5-22kJ = 2, etc. For NMES per serving, 0-4.4g = 0; 4.4-6.6g = 1; 6.6-8.8g = 2, etc. For sodium per 100kJ, 0-26mg = 0; 26-40mg = 1; 40 – 52mg = 2, etc. For sodium per serving, 0-165mg = 0; 165-248mg = 1; 248-330mg = 2, etc. For n-3 per 100kJ, 0-0.02g = 0; 0.02-0.04g = 1, 0.04-0.06g = 3, 0.06+ = 5. For n-3 per serving, 0-0.2g = 0; 0.2-0.4g = 1; 0.4-0.6g = 2, etc. For fruit and veg, 0-30% = 0 points, 50% = 1 point, 70% = 2 points, 100% = 5 points. Less healthy if score is 2 or more.
SSCg	<b>Simple scoring system, Group C nutrients, per 100g:</b> Scoring bands as follows: Energy, 0-450kJ = 0; 450-890kJ = 1; 890-1350kJ = 2, etc. (max 5). Saturated fat, 0-1.3g = 0; 1.3-2.6g = 1; 2.6-3.9g = 2, etc. (max 5). NMES, 0-3.2g = 0; 3.2-6.4g = 1; 6.4-9.6g = 2, etc. (max 5). Sodium, 0-120mg = 0; 120-240mg = 1; 240-360mg = 2, etc. (max 5). n-3, 0-30mg = 0; 30-60mg = 1; 60-90mg = 2, etc. (max 5). Calcium, 0-105mg = 0; 105-210mg = 1, 210-315mg = 2, etc. (max 5). Iron, 0-1.5mg = 0; 1.5-3mg = 1, 3-4.5mg = 2, etc. (max 5). For fruit and vegetable content, 0 or 30% = 0 points, 50% = 1 point, 70% = 2 points, 100% = 5 points. Final score = energy + saturated fat + NMES + sodium – F&V – n-3 – calcium – iron. Less healthy if score is 3 or more.
SSCg/s	<b>Simple scoring system, Group C nutrients, per 100g/serving:</b> Per 100g bands as follows: Energy, 0-450kJ = 0; 450-890kJ = 1; 890-1350kJ = 2, etc. (max 5). Saturated fat, 0-1.3g = 0; 1.3-2.6g = 1; 2.6-3.9g = 2, etc. (max 5). NMES, 0-3.2g = 0; 3.2-6.4g = 1; 6.4-9.6g = 2, etc. (max 5). Sodium, 0-120mg = 0; 120-240mg = 1; 240-360mg = 2, etc. (max 5). n-3, 0-30mg = 0; 30-60mg = 1; 60-90mg = 2, etc. (max 5). Calcium, 0-105mg = 0; 105-210mg = 1, 210-315mg = 2, etc. (max 5). Iron, 0-1.5mg = 0; 1.5-3mg = 1, 3-4.5mg = 2, etc. (max 5). Per serving bands as follows: Energy, 0-895kJ = 0; 895-1790kJ = 1; 1790-2685kJ = 2, etc. (max 5). Saturated fat, 0-2.6g = 0; 2.6-5.2g = 1; 5.2-7.8g = 2, etc. (max 5). NMES, 0-6.3g = 0; 6.3-12.6g = 1; 12.6-18.9g = 2, etc. (max 5). Sodium, 0-235mg = 0; 235-470mg = 1; 470-705mg = 2, etc. (max 5). N-3, 0-60mg = 0; 60-120mg = 1; 120-180mg = 2, etc. (max 5). Calcium, 0-105mg = 0;

	105-210mg = 1, 210-315mg = 2, etc. (max 5). Iron, 0-1.5mg = 0; 1.5-3mg = 1, 3-4.5mg = 2, etc. (max 5). F&V, 0-30% = 0; 50% = 1; 70% = 2; 100% = 5. Final score = A nutrients – B nutrients – C nutrients. Less healthy if score is 5 or over.
SSckJ	<b>Simple scoring system, Group C nutrients, per 100kJ:</b> For saturated fat and NMES, 0-16.5kJ = 0; 16.5-24.8kJ = 1; 24.8-33kJ = 2, etc. (max 5). For sodium, 0-40mg = 0; 40-50mg = 1; 50-60mg = 2, etc. (max 5). For n-3, 0-0.01g = 0; 0.01-0.02g = 1; 0.02-0.03g = 3, 0.03+g = 5. Fruit and vegetable content scores as follows: 0-30% = 0; 50% = 1; 70% = 2; 100% = 5. For calcium, 0-40mg = 0; 40-60mg = 1; 60-80mg = 2, etc. (max 5). For iron, 0-0.6mg = 0; 0.6-0.9mg = 1; 0.9-1.2mg = 2, etc. (max 5). Final score = A nutrients – B nutrients – C nutrients. Less healthy if score is 2 or more.
SSckJ/s	<b>Simple scoring system, Group C nutrients, per 100kJ/serving:</b> Maximum for each nutrient is 5 points. Score for each nutrient is minimum of per 100kJ and per serving score. For energy, only per serving bands. 0-1340kJ = 0; 1340-2010kJ = 1; 2010-2680kJ = 2, etc. For saturated fat per 100kJ, 0-11kJ = 0; 11-16.5kJ = 1; 16.5-22kJ = 2, etc. For saturated fat per serving, 0-1.8g = 0; 1.8-2.7g = 1; 2.7-3.6g = 2, etc. For NMES per 100kJ, 0-11kJ = 0; 11-16.5kJ = 1; 16.5-22kJ = 2, etc. For NMES per serving, 0-4.4g = 0; 4.4-6.6g = 1; 6.6-8.8g = 2, etc. For sodium per 100kJ, 0-26mg = 0; 26-40mg = 1; 40 – 52mg = 2, etc. For sodium per serving, 0-165mg = 0, 165-248mg = 1; 248-330mg = 2, etc. For n-3 per 100kJ, 0-0.02g = 0, 0.02-0.04g = 1, 0.04-0.06g = 3, 0.06+ = 5. For n-3, 0-0.2g = 0; 0.2-0.4g = 1; 0.4-0.6g = 2, etc. For fruit and veg, 0-30% = 0, 50% = 1, 70% = 2, 100% = 5. For calcium per 100kJ, 0-40mg = 0; 40-60mg = 1; 60-80mg = 2 etc. For calcium per serving, 0-207mg = 0, 207-310mg = 1; 310-414mg = 2, etc. For iron per 100kJ, 0-0.6mg = 0; 0.6-0.9mg = 1; 0.9-1.2mg = 2, etc. For iron per serving, 0-3mg = 0; 3-4.5mg = 1; 4.5-6mg = 2, etc. Less healthy if score is 2 or more.
<b>Model</b>	
TAg/1	<b>Threshold model, Group A nutrients, per 100g:</b> ‘healthier food choices’ if <300kJ energy per 100g AND <0.9g saturated fat per 100g AND <2.1g NME sugar AND <80mg sodium per 100g. ‘foods high in fat, salt or sugar’ if >1790kJ energy per 100g OR >5.2g saturated fat per 100g OR >12.6g NME sugar per 100g OR 470mg sodium per 100g
TAKJ/1	<b>Threshold model, Group A nutrients, per 100kJ:</b> ‘healthier food choices’ if <11kJ saturated fat per 100kJ AND <11kJ NME sugar per 100kJ AND <26mg sodium per 100kJ. ‘foods high in fat, salt or sugar’ if >16.5kJ saturated fat per 100kJ OR >16.5kJ NME sugar per 100kJ OR >40mg sodium per 100kJ.
TCg	<b>Threshold model, Group C nutrients, per 100g:</b> ‘healthier food choices’ if <1340kJ energy AND <3.9g saturated fat AND <9.5g NMES AND <350mg sodium AND (100% fruit or vegetable OR >0.1g n-3 OR >230mg calcium OR >3.4mg iron). ‘foods high in fat, salt or sugar’ if >1340kJ energy OR >3.9g saturated fat OR >9.5g NMES OR >350mg sodium AND <0.1g n-3 AND <100% fruit or vegetable AND <5mg iron AND <345mg calcium.
TBg/s	<b>Threshold model, Group B nutrients, per 100g/per serving:</b> ‘healthier food choices’ if (<895kJ energy per 100g AND <1490kJ energy per serving AND <2.6g saturated fat per 100g AND <4.3g saturated fat per serving AND <6.3g NMES per 100g AND <10.5g NMES per serving AND <235mg sodium per 100g AND <390mg sodium per serving) OR 100% fruit or vegetable OR >0.1g n-3 per 100g OR >0.2g n-3 per serving. ‘foods high in fat, salt or sugar’ if >1790kJ energy per 100g OR >2980kJ energy per serving OR >5.2g saturated fat per 100g OR >8.7g saturated fat per serving OR >12.6g NMES per 100g OR >21g NMES per serving OR >470mg sodium per 100g OR >785mg sodium per 100g AND <100% fruit and vegetable content AND <0.1g n-3 fatty acids per 100g AND <0.2g n-3 fatty acids per serving.
TBkJ/s	<b>Threshold model, Group B nutrient, per 100kJ/per serving:</b> ‘healthier food choices’ if <1490kJ energy per serving AND (<11kJ saturated fat per 100kJ OR <1.8g saturated fat per serving) AND (<11kJ NMES per 100kJ OR <4.4g NMES per serving) AND (<26mg sodium per 100kJ OR <165mg sodium per serving) OR 100% fruit and vegetables OR (<0.02g n-3 per 100kJ AND <0.2g

	n-3 per serving). 'foods high in fat, salt or sugar' if >2980kJ energy per serving OR (>16.5kJ saturated fat per 100kJ AND >1.8g saturated fat per serving) OR (>16.5kJ NMES per 100kJ AND >4.4g NMES per serving) OR (>40mg sodium per 100kJ AND >165mg sodium per serving) AND <100% fruit and veg content AND (<0.02g n-3 fatty acids per 100kJ OR <0.2g n-3 fatty acid per serving)
SSBg	<b>Simple scoring system, Group B nutrients, per 100g:</b> Scoring bands as follows: Energy, 0-450kJ = 0; 450-900kJ = 1; 900-1350kJ = 2, etc. to maximum of 5 points. Saturated fat, 0-1.3g = 0; 1.3-2.6g = 1; 2.6-3.9g = 2, etc. to maximum of 5 points. NMES, 0-3.2g = 0; 3.2-6.4g = 1; 6.4-9.6g = 2, etc. to maximum of 5 points. Sodium, 0-120mg = 0; 120-240mg = 1; 240-360mg = 2, etc. to a maximum of 5 points. N-3, 0-30mg = 0; 30-60mg = 1; 60-90mg = 2, etc. to a maximum of 5 points. Fruit and vegetables, 0 or 30% = 0; 50 or 70% = 1, 100% = 2. Final score = energy + saturated fat + NMES + sodium – F&V – n-3. 'healthier food choices' if score is 0 or less, 'foods high in fat, salt or sugar' if score is 3 or more.
SSCg/s	<b>Simple scoring system, Group C nutrients, per 100g/serving:</b> Per 100g score bands as follows: Energy, 0-450kJ = 0; 450-900kJ = 1; 900-1350kJ = 2, etc. (max 5). Saturated fat, 0-1.3g = 0; 1.3-2.6g = 1; 2.6-3.9g = 2, etc. (max 5). NMES, 0-3.2g = 0; 3.2-6.4g = 1; 6.4-9.6g = 2, etc. (max 5). Sodium, 0-120mg = 0; 120-240mg = 1; 240-360mg = 2, etc. (max 5). N-3, 0-30mg = 0; 30-60mg = 1; 60-90mg = 2, etc. (max 5). Calcium, 0-105mg = 0; 105-210mg = 1; 210-315mg = 2, etc. (max 5). Iron, 0-1.5mg = 0; 1.5-3mg = 1; 3-4.5mg = 2, etc. (max 5). Fruit and vegetables, 0 or 30% = 0; 50% = 1; 70% = 2; 100% = 5. Per serving score bands as follows: Energy, 0-895kJ = 0; 895-1790kJ = 1; 1790-2685kJ = 2, etc. (max 5). Saturated fat, 0-2.6g = 0; 2.6-5.2g = 1; 5.2-7.8g = 2, etc. (max 5). NMES, 0-6.3g = 0; 6.3-12.6g = 1; 12.6-18.9g = 2, etc. (max 5). Sodium, 0-235mg = 0; 235-470mg = 1; 470-705mg = 2, etc. (max 5). N-3, 0-60mg = 0; 60-120mg = 1; 120-180mg = 2, etc. (max 5). Calcium, 0-105mg = 0; 105-210mg = 1; 210-315mg = 2, etc. (max 5). Iron, 0-1.5mg = 0; 1.5-3mg = 1; 3-4.5mg = 2, etc. (max 5). Final score = energy + saturated fat + NMES + sodium – calcium – iron – n-3 – F&V. 'healthier food choices' if score is 0 or less, 'foods high in fat, salt or sugar' if score is 5 or over.
SSCkJ/s	<b>Simple scoring system, Group C nutrients per 100kJ/serving:</b> Per 100kJ score bands as follows: Saturated fat, 0-11kJ = 0; 11-16.5kJ = 1; 16.5-22kJ = 2, etc. (max 5). NMES, 0-11kJ = 0; 11-16.5kJ = 1; 16.5-22kJ = 2, etc. (max 5). Sodium, 0-26mg = 0; 26-40mg = 1; 40-52mg = 2, etc. (max 5). N-3, 0-20mg = 0; 20-40mg = 1; 40-60mg = 3; >60mg = 5. Calcium, 0-40mg = 0; 40-60mg = 1; 60-80mg = 2, etc. (max 5). Iron, 0-0.6mg = 0; 0.6-0.9mg = 1; 0.9-1.2mg = 2, etc. (max 5). Per serving score bands as follows: Energy, 0-1340kJ = 0; 1340-2010kJ = 1; 2010-2680kJ = 2, etc. (max 5). Saturated fat, 0-1.8g = 0; 1.8-2.7g = 1; 2.7-3.6g = 2, etc. (max 5). NMES, 0-4.4g = 0; 4.4-6.6g = 1; 6.6-8.8g = 2, etc. (max 5). Sodium, 0-165mg = 0; 165-248mg = 1; 248-330mg = 2, etc. (max 5). N-3, 0-0.2g = 0; 0.2-0.3g = 1; 0.3-0.4g = 2, etc. (max 5). Calcium, 0-207mg = 0; 207-310mg = 1; 310-414mg = 2, etc. (max 5). Iron, 0-3mg = 0; 3-4.5mg = 1; 4.5-6mg = 2, etc. (max 5). For fruit and veg, 0-30% = 0 points, 50% = 1 point, 70% = 2 points, 100% = 5 points. Final score = energy + min(saturated fat per 100kJ, saturated fat per serv) + min(NMES per 100kJ, NMES per serv) + min(sodium per 100kJ, sodium per serv) – min(calcium per 100kJ, calcium per serv) – min(iron per 100kJ, iron per serv) – min(n-3 per 100kJ, n-3 per serv) – F&V. 'healthier food choices' if score is zero or less, 'foods high in fat, salt or sugar' if score is 3 or more.
TAg3	<b>Threshold model, Group A nutrients, per 100g:</b> 'healthier food choices' if =670kJ energy per 100g AND =2.0g saturated fat per 100g AND =4.7g NMES per 100g AND =175mg sodium per 100g. 'foods high in fat, salt or sugar' if >1340kJ energy per 100g OR >3.9g saturated fat per 100g OR >9.5g NMES per 100g OR >350mg sodium per 100g
TAg4	<b>Threshold model, Group A nutrients, per 100g:</b> 'healthier food choices' if =525kJ energy per 100g AND =2.0g saturated fat per 100g AND =4.7g NMES per 100g AND =175mg sodium per 100g. 'foods high in fat, salt or sugar' if

	>1050kJ energy per 100g OR >3.9g saturated fat per 100g OR >9.5g NMES per 100g OR >350mg sodium per 100g
TAg5	<b>Threshold model, Group A nutrients, per 100g:</b> 'healthier food choices' if =6.2g fat per 100g AND =2.0g saturated fat per 100g AND =4.7g NMES per 100g AND =175mg sodium per 100g. 'foods high in fat, salt or sugar' if >12.5g fat per 100g OR >3.9g saturated fat per 100g OR >9.5g NMES per 100g OR >350mg sodium per 100g
TAg6	<b>Threshold model, Group A nutrients, per 100g:</b> 'healthier food choices' if <300kJ energy per 100g AND <0.9g saturated fat per 100g AND <2.1g NME sugar AND <80mg sodium per 100g. 'foods high in fat, salt or sugar' if >1790kJ energy per 100g OR >5.2g saturated fat per 100g OR >12.6g NME sugar per 100g OR 470mg sodium per 100g
TAg7	<b>Threshold model, Group A nutrients, per 100g:</b> 'healthier food choices' if <525kJ energy per 100g AND <0.9g saturated fat per 100g AND <2.1g NME sugar AND <80mg sodium per 100g. 'foods high in fat, salt or sugar' if >1050kJ energy per 100g OR >5.2g saturated fat per 100g OR >12.6g NME sugar per 100g OR 470mg sodium per 100g
TAg8	<b>Threshold model, Group A nutrients, per 100g:</b> 'healthier food choices' if <2.8g fat per 100g AND <0.9g saturated fat per 100g AND <2.1g NME sugar AND <80mg sodium per 100g. 'foods high in fat, salt or sugar' if >16.6g fat per 100g OR >5.2g saturated fat per 100g OR >12.6g NME sugar per 100g OR 470mg sodium per 100g
TCg3	<b>Threshold model, Group C nutrients, per 100g:</b> 'healthier food choices' if (=670kJ energy per 100g AND =2.0g saturated fat per 100g AND =4.7g NMES per 100g AND =175mg sodium per 100g) OR (=1340kJ energy per 100g AND =3.9g saturated fat per 100g AND =9.5g NMES per 100g AND =350mg sodium per 100g AND (>207mg calcium per 100g OR >3mg iron per 100g OR >0.1g n-3 per 100g OR 100% fruit and veg). 'foods high in fat, salt or sugar' if (>1340kJ energy per 100g OR >3.9g saturated fat per 100g OR >9.5g NMES per 100g OR >350mg sodium per 100g) AND =207mg calcium per 100g AND =3mg iron per 100g AND =0.1g n-3 per 100g AND <100% fruit and veg.
TCg4	<b>Threshold model, Group C nutrients, per 100g:</b> 'healthier food choices' if (=525kJ energy per 100g AND =2.0g saturated fat per 100g AND =4.7g NMES per 100g AND =175mg sodium per 100g) OR (=1050kJ energy per 100g AND =3.9g saturated fat per 100g AND =9.5g NMES per 100g AND =350mg sodium per 100g AND (>207mg calcium per 100g OR >3mg iron per 100g OR >0.1g n-3 per 100g OR 100% fruit and veg). 'foods high in fat, salt or sugar' if (>1050kJ energy per 100g OR >3.9g saturated fat per 100g OR >9.5g NMES per 100g OR >350mg sodium per 100g) AND =207mg calcium per 100g AND =3mg iron per 100g AND =0.1g n-3 per 100g AND <100% fruit and veg.
TCg5	<b>Threshold model, Group C nutrients, per 100g:</b> 'healthier food choices' if (=6.2g fat per 100g AND =2.0g saturated fat per 100g AND =4.7g NMES per 100g AND =175mg sodium per 100g) OR (=12.5g fat per 100g AND =3.9g saturated fat per 100g AND =9.5g NMES per 100g AND =350mg sodium per 100g AND (>207mg calcium per 100g OR >3mg iron per 100g OR >0.1g n-3 per 100g OR 100% fruit and veg). 'foods high in fat, salt or sugar' if (>12.5g fat per 100g OR >3.9g saturated fat per 100g OR >9.5g NMES per 100g OR >350mg sodium per 100g) AND =207mg calcium per 100g AND =3mg iron per 100g AND =0.1g n-3 per 100g AND <100% fruit and veg.
TCg3d	<b>Threshold model, Group C nutrients, per 100g:</b> FOR NON-DRINKS: 'healthier food choices' if (=670kJ energy per 100g AND =2.0g saturated fat per 100g AND =4.7g NMES per 100g AND =175mg sodium per 100g) OR (=1340kJ energy per 100g AND =3.9g saturated fat per 100g AND =9.5g NMES per 100g AND =350mg sodium per 100g AND (>207mg calcium per 100g OR >3mg iron per 100g OR >0.1g n-3 per 100g OR 100% fruit and veg). 'foods high in fat, salt or sugar' if (>1340kJ energy per 100g OR >3.9g saturated fat per 100g OR >9.5g NMES per 100g OR >350mg sodium per 100g) AND =207mg calcium per 100g AND =3mg iron per 100g AND =0.1g n-3 per 100g AND <100% fruit and veg. FOR DRINKS: All thresholds set at 50% of non-drink thresholds (apart from fruit and vegetable content threshold,

	which is kept the same).
TCg3f	<b>Threshold model, Group C nutrients, per 100g:</b> ‘healthier food choices’ if (=670kJ energy per 100g AND =2.0g saturated fat per 100g AND =4.7g NMES per 100g AND =175mg sodium per 100g) OR (=1340kJ energy per 100g AND =3.9g saturated fat per 100g AND =9.5g NMES per 100g AND =350mg sodium per 100g AND (>207mg calcium per 100g OR >3mg iron per 100g OR >0.1g n-3 per 100g OR 100% fruit and veg OR >5.1g fibre per 100g). ‘foods high in fat, salt or sugar’ if (>1340kJ energy per 100g OR >3.9g saturated fat per 100g OR >9.5g NMES per 100g OR >350mg sodium per 100g) AND =207mg calcium per 100g AND =3mg iron per 100g AND =0.1g n-3 per 100g AND <100% fruit and veg AND =5.1g fibre per 100g.
SSCg3	<b>Simple scoring system, Group C nutrients, per 100g:</b> Per 100g scoring bands as follows (to maximum of 10 points per nutrient/food component): Energy, =335kJ = 0; 335-670kJ = 1; 670-1005kJ = 2, etc. Saturated fat, =1.0g = 0; 1.0-2.0g = 1; 1.0-2.0g = 2, etc. NMES, =2.4g = 0; 2.4-4.8g = 1; 4.8-7.2g = 2, etc. Sodium, =90mg = 0; 90-180mg = 1; 180-270mg = 2, etc. Calcium, =105mg = 0; 105-210mg = 1; 210-315mg = 2, etc. Iron, =1.5mg = 0; 1.5-3.0mg = 1; 3.0-4.5mg = 2, etc. n-3, =0.05mg = 0; 0.05-0.10mg = 1; 0.10-0.15mg = 2, etc. Fruit and vegetable, 0-30% = 0; 50% = 2; 70% = 4; 100% = 10. Total score = A nutrients – B nutrients – C nutrients. ‘healthier food choices’ if score is 2 or less. ‘foods high in fat, salt or sugar’ if score is 9 or more.
SSCg4	<b>Simple scoring system, Group C nutrients, per 100g:</b> Per 100g scoring bands as follows (to maximum of 10 points per nutrient/food component): Energy, =265kJ = 0; 265-530kJ = 1; 530-795kJ = 2, etc. Saturated fat, =1.0g = 0; 1.0-2.0g = 1; 1.0-2.0g = 2, etc. NMES, =2.4g = 0; 2.4-4.8g = 1; 4.8-7.2g = 2, etc. Sodium, =90mg = 0; 90-180mg = 1; 180-270mg = 2, etc. Calcium, =105mg = 0; 105-210mg = 1; 210-315mg = 2, etc. Iron, =1.5mg = 0; 1.5-3.0mg = 1; 3.0-4.5mg = 2, etc. n-3, =0.05mg = 0; 0.05-0.10mg = 1; 0.10-0.15mg = 2, etc. Fruit and vegetable, 0-30% = 0; 50% = 2; 70% = 4; 100% = 10. Total score = A nutrients – B nutrients – C nutrients. ‘healthier food choices’ if score is 2 or less. ‘foods high in fat, salt or sugar’ if score is 9 or more.
SSCg5	<b>Simple scoring system, Group C nutrients, per 100g:</b> Per 100g scoring bands as follows (to maximum of 10 points per nutrient/food component): Fat, =3.1g = 0; 3.1-6.2g = 1; 6.2-9.3g = 2, etc. Saturated fat, =1.0g = 0; 1.0-2.0g = 1; 1.0-2.0g = 2, etc. NMES, =2.4g = 0; 2.4-4.8g = 1; 4.8-7.2g = 2, etc. Sodium, =90mg = 0; 90-180mg = 1; 180-270mg = 2, etc. Calcium, =105mg = 0; 105-210mg = 1; 210-315mg = 2, etc. Iron, =1.5mg = 0; 1.5-3.0mg = 1; 3.0-4.5mg = 2, etc. n-3, =0.05mg = 0; 0.05-0.10mg = 1; 0.10-0.15mg = 2, etc. Fruit and vegetable, 0-30% = 0; 50% = 2; 70% = 4; 100% = 10. Total score = A nutrients – B nutrients – C nutrients. ‘healthier food choices’ if score is 2 or less. ‘foods high in fat, salt or sugar’ if score is 9 or more.
SSCg3d	<b>Simple scoring system, Group C nutrients, per 100g:</b> FOR NON-DRINKS: Per 100g scoring bands as follows (to maximum of 10 points per nutrient/food component): Energy, =335kJ = 0; 335-670kJ = 1; 670-1005kJ = 2, etc. Saturated fat, =1.0g = 0; 1.0-2.0g = 1; 1.0-2.0g = 2, etc. NMES, =2.4g = 0; 2.4-4.8g = 1; 4.8-7.2g = 2, etc. Sodium, =90mg = 0; 90-180mg = 1; 180-270mg = 2, etc. Calcium, =105mg = 0; 105-210mg = 1; 210-315mg = 2, etc. Iron, =1.5mg = 0; 1.5-3.0mg = 1; 3.0-4.5mg = 2, etc. n-3, =0.05mg = 0; 0.05-0.10mg = 1; 0.10-0.15mg = 2, etc. Fruit and vegetable, 0-30% = 0; 50% = 2; 70% = 4; 100% = 10. FOR DRINKS: All thresholds set at 50% of non-drink thresholds (apart from fruit and vegetable content threshold, which is kept the same). Total score = A nutrients – B nutrients – C nutrients. ‘healthier food choices’ if score is 2 or less. ‘foods high in fat, salt or sugar’ if score is 9 or more.
SSCg3f	<b>Simple scoring system, Group C nutrients, per 100g:</b> Per 100g scoring bands as follows (to maximum of 10 points per nutrient/food component): Energy, =335kJ = 0; 335-670kJ = 1; 670-1005kJ = 2, etc. Saturated fat, =1.0g = 0; 1.0-2.0g = 1; 1.0-2.0g = 2, etc. NMES, =2.4g = 0; 2.4-4.8g = 1; 4.8-7.2g = 2, etc. Sodium, =90mg = 0; 90-180mg = 1; 180-270mg = 2, etc. Calcium, =105mg = 0; 105-210mg = 1; 210-315mg = 2, etc. Iron, =1.5mg = 0; 1.5-3.0mg = 1; 3.0-4.5mg = 2, etc. n-3, =0.05mg = 0; 0.05-0.10mg = 1; 0.10-0.15mg = 2, etc.

	Fibre, =2.6g = 0; 2.6-5.1g = 1; 5.1-7.7g = 2, etc. Fruit and vegetable, 0-30% = 0; 50% = 2; 70% = 4; 100% = 10. Total score = A nutrients – B nutrients – C nutrients. 'healthier food choices' if score is 2 or less. 'foods high in fat, salt or sugar' if score is 9 or more.
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### Appendix 5 - results of testing 28 definitions of 'foods high in fat, salt or sugar'

<b>Model 1 TA<sub>g</sub>/1</b>	<b>Simple threshold model, Group A nutrients, per 100g:</b> >1790kJ energy per 100g OR >5.2g saturated fat per 100g OR >12.6g NME sugar per 100g OR 470mg sodium per 100g			
<b>Rationale for numbers</b>	20% of GDAs per 100g – FSA advice on what counts as 'a lot'			
<b>Subset of foods</b>	<b>N</b>	<b>% classified as 'foods high in fat, salt or sugar'</b>	<b>Examples of foods classified as 'foods high in fat, salt or sugar'</b>	<b>Examples of foods not classified as 'foods high in fat, salt or sugar'</b>
Abridged M&W database	998	47.3		
Bread, cereals and potatoes	148	66.9	Sugar puffs, corn flakes, wholemeal rolls, cream crackers, currant buns	Oven chips, roast potatoes, fresh pasta
Milk and dairy foods	102	50.0	Half fat crème fraiche, cheddar, camembert	Yoghurt, cottage cheese, semi-skimmed milk, whole milk
Fruit and vegetables	134	7.5	Currants, avocado	Orange juice, canned pineapple, peaches, grilled tomato, lettuce, celery
Meat, fish and alternatives	235	48.1	Walnuts	Cod, boiled egg, chicken leg, beefsteak, roast lamb, mackerel, lentils
Foods high in fat, foods high in sugar	91	92.3	Mars bar, choc chip cookies, jam doughnuts, crisps, butter, olive oil, low fat spread	Cola
'Healthier' indicators	123	9.8	Nuts, dried fruit, bread	
'Less healthy' indicators	84	83.3		Whopper burger, Big Mac, Sunny delight, cola

<b>Model 2 TA<sub>g</sub>/2</b>	<b>Simple threshold model, Group A nutrients, per 100g:</b> >1340kJ energy per 100g OR >3.9g saturated fat per 100g OR >9.5g NME sugar per 100g OR >350mg sodium per 100g			
<b>Rationale for numbers</b>	15% of GDAs per 100g – modification of Model 1			
<b>Subset of foods</b>	<b>N</b>	<b>% classified as ‘foods high in fat, salt or sugar’</b>	<b>Examples of foods classified as ‘foods high in fat, salt or sugar’</b>	<b>Examples of foods not classified as ‘foods high in fat, salt or sugar’</b>
Abridged M&W database	1004	59.8		
Bread, cereals and potatoes	153	79.7	Sugar puffs, corn flakes, wholemeal rolls, cream crackers, currant buns	Oven chips, roast potatoes, fresh pasta
Milk and dairy foods	103	58.3	Greek yoghurt, half fat crème fraiche, camembert, cheddar	Low fat yoghurt, cottage cheese, semi-skimmed milk, whole milk
Fruit and vegetables	134	14.2	Currants, avocado	Orange juice, canned pineapple, peaches
Meat, fish and alternatives	233	62.7	Walnuts, chicken leg, beef steak	Cod, boiled egg, roast lamb, mackerel, lentils
Foods high in fat, foods high in sugar	91	95.6	Jam doughnuts, Mars bar, crisps, butter, olive oil, cola, choc chip cookies, low fat spread	
‘Healthier’ indicators	123	13.8	Fruit juice, dried fruit, bread, nuts	
‘Less healthy’ indicators	84	92.9		Thick takeaway milkshake

<b>Model 3 TAg/s</b>	<b>Simple threshold model, Group A nutrients, per 100g/serving:</b> 'foods high in fat, salt or sugar' if >2100kJ energy per 100g OR >2800kJ energy per serving OR >6g saturated fat per 100g OR >8g saturated fat per serving OR >14.3g NME sugar per 100g OR >19g NME sugar per serving OR >550mg sodium per 100g OR >735mg sodium per serving.			
<b>Rationale for numbers</b>	Thresholds set at 23.5% (approximately a quarter) of the GDAs for per 100g and 31% (approximately one third) of the GDAs for per serving.			
<b>Subset of foods</b>	<b>N</b>	<b>% classified as 'foods high in fat, salt or sugar'</b>	<b>Examples of foods classified as 'foods high in fat, salt or sugar'</b>	<b>Examples of foods not classified as 'foods high in fat, salt or sugar'</b>
Abridged M&W database	993	48.0		
Bread, cereals and potatoes	146	58.2	Cream crackers, corn flakes, sugar puffs, currant buns	Wholemeal rolls, oven chips, roast potatoes, fresh pasta
Milk and dairy foods	103	45.6	Half fat crème fraiche, cheddar, camembert	Yoghurt, cottage cheese, semi-skimmed milk, whole milk
Fruit and vegetables	134	8.2	Currants	Orange juice, canned pineapple, peaches
Meat, fish and alternatives	233	47.6	Chicken leg, walnuts	Beefsteak, cod, boiled egg, roast lamb, lentils, mackerel
Foods high in fat, foods high in sugar	90	87.8	Choc chip cookies, Mars bar, cola, jam doughnuts, olive oil, butter, crisps	Low fat spread
'Healthier' indicators	123	8.1	Nuts, dried fruit	
'Less healthy' indicators	84	88.1		Sunny delight, potato fritters, pizza, samosas

<b>Model 4 TakJ/1</b>	<b>Simple threshold model, Group A nutrients, per 100kJ:</b> 'foods high in fat, salt or sugar' if >16.5kJ saturated fat per 100kJ OR >16.5kJ NME sugar per 100kJ OR >40mg sodium per 100kJ			
<b>Rationale for numbers</b>	150% of recommendations - CPG advice as to what counts as high			
<b>Subset of foods</b>	<b>N</b>	<b>% classified as 'foods high in fat, salt or sugar'</b>	<b>Examples of foods classified as 'foods high in fat, salt or sugar'</b>	<b>Examples of foods not classified as 'foods high in fat, salt or sugar'</b>
Abridged M&W database	991	70.1		
Bread, cereals and potatoes	147	73.5	Wholemeal rolls, corn flakes, sugar puffs, currant buns	Fresh pasta, roast potatoes, oven chips, cream crackers
Milk and dairy foods	103	92.2	Camembert, cheddar, semi-skimmed milk, whole milk, half fat crème fraiche, yoghurt, cottage cheese	
Fruit and vegetables	131	29.0	Currants, orange juice, avocado, celery, grilled tomato	Canned pineapple, peaches, lettuce
Meat, fish and alternatives	231	62.8	Roast lamb, chicken leg, beefsteak, cod, boiled egg	Mackerel, walnuts, lentils
Foods high in fat, foods high in sugar	90	94.4	Choc chip cookies, Mars bar, cola, butter, crisps, jam doughnuts, low fat spread	Olive oil
'Healthier' indicators	123	18.7	Bread, dried fruit, fruit juices, some vegetables	
'Less healthy' indicators	84	92.9		Pizza, samosas, Whopper burger, Bombay mix

<b>Model 5 TAkJ/2</b>	<b>Simple threshold model, Group A nutrients, per 100kJ:</b> 'foods high in fat, salt or sugar' if >27.7kJ saturated fat per 100kJ OR >27.7kJ NME sugar per 100kJ OR >66mg sodium per 100kJ			
<b>Rationale for numbers</b>	CPG banding scheme threshold for high is at 1.8% of GDA for each nutrient. Thresholds for this model set at 2.8% of GDAs.			
<b>Subset of foods</b>	<b>N</b>	<b>% classified as 'foods high in fat, salt or sugar'</b>	<b>Examples of foods classified as 'foods high in fat, salt or sugar'</b>	<b>Examples of foods not classified as 'foods high in fat, salt or sugar'</b>
Abridged M&W database	992	45.5		
Bread, cereals and potatoes	150	25.3	Sugar puffs	Wholemeal rolls, fresh pasta, roast potatoes, oven chips, cream crackers, currant buns, corn flakes
Milk and dairy foods	103	77.7	Camembert, cheddar, half fat crème fraiche, whole milk, yoghurt, cottage cheese	Semi-skimmed milk
Fruit and vegetables	134	22.4	Orange juice, currants	Canned pineapple, peaches
Meat, fish and alternatives	231	38.1	Cod	Mackerel, lentils, boiled egg, beefsteak, chicken leg, roast lamb, walnuts
Foods high in fat, foods high in sugar	89	75.3	Mars bar, cola, butter, low fat spread	Choc chip cookies, jam doughnuts, crisps, olive oil
'Healthier' indicators	123	13.0	Baked beans, dried fruit, fruit juice, celery, spinach	
'Less healthy' indicators	83	69.9		Takeaway food, including Big Mac, Whopper Burger, pizza and jam tarts

<b>Model 6 TakJ/s</b>	Simple threshold model, Group A nutrients, per 100kJ/serving: 'foods high in fat, salt or sugar' if >2980kJ energy per serving OR (>16.5kJ sats per 100kJ AND >4.3g sats per serving) OR (>16.5kJ NMES per 100kJ AND >10.5g NMES per serving) OR (>40mg sodium per 100kJ AND >390mg sodium per serving).			
<b>Rationale for numbers</b>	Energy threshold is one third of the GDA. Remaining thresholds are 150% of the recommendations for per 100kJ, and one sixth of the GDA for per serving.			
<b>Subset of foods</b>	<b>N</b>	<b>% classified as 'foods high in fat, salt or sugar'</b>	<b>Examples of foods classified as 'foods high in fat, salt or sugar'</b>	<b>Examples of foods not classified as 'foods high in fat, salt or sugar'</b>
Abridged M&W database	990	40.7		
Bread, cereals and potatoes	109	23.9	Sugar puffs	Currant buns, corn flakes, fresh pasta, wholemeal rolls, roast potatoes, oven chips, cream crackers
Milk and dairy foods	85	45.9	Whole milk, cheddar, camembert	Yoghurt, semi-skimmed milk, half fat crème fraiche, cottage cheese
Fruit and vegetables	122	5.7	Orange juice	Currants, canned pineapple, peaches
Meat, fish and alternatives	185	41.1	Beefsteak, chicken leg, cod	Lentils, walnuts, mackerel, boiled egg, roast lamb
Foods high in fat, foods high in sugar	140	57.9	Cola, mars bar, jam doughnuts, crisps	Choc chip cookies, butter, low fat spread, olive oil
'Healthier' indicators	123	5.7	Fruit juice, baked beans	
'Less healthy' indicators	84	77.4		Biscuits, small sweets, takeaway food, whopper burger

<b>Model 7 TBg</b>	<b>Simple threshold model, Group B nutrients, per 100g:</b> ‘foods high in fat, salt or sugar’ if >1260kJ energy per 100g OR >3.6g saturated fat per 100g OR >8.6g NME sugar per 100g OR >330mg sodium per 100g AND <0.1g n-3 fatty acids per 100g AND <100% fruit or vegetable content			
<b>Rationale for numbers</b>	For A nutrients, threshold is 14% of GDA. For n-3 fatty acids, the threshold is 50% of the GDA. Fruit and vegetable criteria can be anything from 80-100%.			
<b>Subset of foods</b>	<b>N</b>	<b>% classified as ‘foods high in fat, salt or sugar’</b>	<b>Examples of foods classified as ‘foods high in fat, salt or sugar’</b>	<b>Examples of foods not classified as ‘foods high in fat, salt or sugar’</b>
Abridged M&W database	988	55.3		
Bread, cereals and potatoes	153	81.0	Cream crackers, wholemeal rolls, corn flakes, sugar puffs, currant buns	Oven chips, roast potatoes, fresh pasta
Milk and dairy foods	103	58.3	Cheddar, half fat crème fraiche, camembert, greek yoghurt	Cottage cheese, low fat yoghurt, semi-skimmed milk, whole milk
Fruit and vegetables	137	0.0		All fruit and vegetables
Meat, fish and alternatives	214	55.6	Roast lamb, beefsteak, chicken leg, walnuts	Cod, boiled egg, mackerel, lentils
Foods high in fat, foods high in sugar	90	95.6	Cola, jam doughnuts, choc chip cookies, Mars bar, olive oil, crisps, low fat spread	Butter
‘Healthier’ indicators	124	8.9	Bread and nuts	
‘Less healthy’ indicators	84	94.0		Milkshake, drinking chocolate

<b>Model 8 TBg/s</b>	<b>Simple threshold model, Group B nutrients, per 100g/serving:</b> 'foods high in fat, salt or sugar' if >1790kJ energy per 100g OR >2980kJ energy per serving OR >5.2g saturated fat per 100g OR >8.7g saturated fat per serving OR >12.6g NME sugar per 100g OR >21g NME sugar per serving OR >470mg sodium per 100g OR >785mg sodium per 100g AND <100% fruit and vegetable content AND <0.1g n-3 fatty acids per 100g AND <0.2g n-3 fatty acids per serving			
<b>Rationale for numbers</b>	A nutrient thresholds set at 20% of the GDA per 100g and one third of the GDA per serving. N-3 threshold set at 50% of GDA per 100g and 100% of GDA per serving. Fruit and vegetable criteria can be anything from 80-100%.			
<b>Subset of foods</b>	<b>N</b>	<b>% classified as 'foods high in fat, salt or sugar'</b>	<b>Examples of foods classified as 'foods high in fat, salt or sugar'</b>	<b>Examples of foods not classified as 'foods high in fat, salt or sugar'</b>
Abridged M&W database	986	50.6		
Bread, cereals and potatoes	148	70.3	Sugar puffs, corn flakes, cream crackers, wholemeal rolls, currant buns	Fresh pasta, oven chips, roast potatoes
Milk and dairy foods	103	55.3	Cheddar, camembert, half fat crème fraiche	Yoghurt, cottage cheese, whole milk, semi-skimmed milk
Fruit and vegetables	137	0.0		All fruit and vegetables
Meat, fish and alternatives	220	48.6	Walnuts, chicken leg, beefsteak	Roast lamb, boiled egg, cod, mackerel, lentils
Foods high in fat, foods high in sugar	90	92.2	Choc chip cookies, Mars bar, cola, jam doughnuts, crisps, olive oil, low fat spread	Butter
'Healthier' indicators	124	8.1	Bread and nuts	
'Less healthy' indicators	84	92.9		Pizza, Sunny delight, drinking chocolate,

<b>Model 9 TBkJ</b>	<b>Simple threshold model, Group B nutrients, per 100kJ:</b> 'foods high in fat, salt or sugar' if >16.5kJ saturated fat per 100kJ OR >16.5kJ NME sugar per 100kJ OR >40mg sodium per 100kJ AND <100% Fruit and veg content AND <0.02g n-3 fatty acids per 100kJ			
<b>Rationale for numbers</b>	A nutrient thresholds set at 150% of the recommendation. Fruit and veg criterion can vary between 80 and 100%. n-3 threshold set at 6% of the GDA.			
<b>Subset of foods</b>	<b>N</b>	<b>% classified as 'foods high in fat, salt or sugar'</b>	<b>Examples of foods classified as 'foods high in fat, salt or sugar'</b>	<b>Examples of foods not classified as 'foods high in fat, salt or sugar'</b>
Abridged M&W database	979	58.5		
Bread, cereals and potatoes	147	73.5	Wholemeal rolls, corn flakes, sugar puffs, currant buns	Cream crackers, fresh pasta, oven chips, roast potatoes
Milk and dairy foods	103	92.2	Camembert, cheddar, half fat crème fraiche, whole milk, semi-skimmed milk, yoghurt, cottage cheese	
Fruit and vegetables	137	0.0		All fruit and vegetables
Meat, fish and alternatives	214	51.9	Chicken leg, roast lamb, beefsteak, boiled egg	Walnuts, cod, mackerel, lentils
Foods high in fat, foods high in sugar	89	94.4	Jam doughnuts, choc chip cookies, Mars bar, cola, butter, crisps, low fat spread	Olive oil
'Healthier' indicators	124	4.0	Bread and brazil nuts	
'Less healthy' indicators	84	92.9		Pizza, whopper burger, Bombay mix

<b>Model 10 TBkJ/s</b>	<b>Simple threshold model, Group B nutrients, per 100kJ/serving:</b> 'foods high in fat, salt or sugar' if >2800kJ energy per serving OR (>16.5kJ sats per 100kJ AND >1.9g sats per serving) OR (>16.5kJ NMES per 100kJ AND >4.6g NMES per 100g) OR (>40mg sodium per 100kJ AND >175mg sodium per serving) AND <100% fruit and veg content AND <0.02g n-3 per 100kJ AND <0.2g n-3 per serving			
<b>Rationale for numbers</b>	Energy threshold set at 30% of GDA. Sats, NMES and sodium thresholds set at 150% of recommendation per 100kJ and 7% of GDA per serving. N-3 threshold set at 6% of GDA per 100kJ and 100% of GDA per serving. Fruit and veg criterion can vary between 80-100%.			
<b>Subset of foods</b>	<b>N</b>	<b>% classified as 'foods high in fat, salt or sugar'</b>	<b>Examples of foods classified as 'foods high in fat, salt or sugar'</b>	<b>Examples of foods not classified as 'foods high in fat, salt or sugar'</b>
Abridged M&W database	936	54.1		
Bread, cereals and potatoes	134	65.7	Wholemeal rolls, corn flakes, sugar puffs, currant buns	Fresh pasta, cream crackers, oven chips, roast potatoes
Milk and dairy foods	103	82.5	Camembert, half fat crème fraiche, yoghurt, whole milk, semi-skimmed milk, cheddar	Cottage cheese
Fruit and vegetables	137	0.0		All fruit and vegetables
Meat, fish and alternatives	202	52.0	Beefsteak, chicken leg, roast lamb	Boiled egg, walnuts, cod, mackerel, lentils
Foods high in fat, foods high in sugar	77	87.0	Choc chip cookies, cola, jam doughnuts, Mars bar, crisps, butter, olive oil, low fat spread	
'Healthier' indicators	118	1.7	Wholemeal bread	
'Less healthy' indicators	82	93.9		Pizza, whopper burger, cod in batter

<b>Model 11 TCg</b>	<b>Simple threshold model, Group C nutrients, per 100g:</b> 'foods high in fat, salt or sugar' if >1340kJ energy per 100g OR >3.9g saturated fat per 100g OR >9.5g NME sugar per 100g OR >350mg sodium per 100g AND <0.1g n-3 fatty acids per 100g AND <100% fruit or vegetable content AND <5mg iron per 100g AND <345mg calcium per 100g			
<b>Rationale for numbers</b>	For A nutrients, threshold is 15% of GDA. For C nutrients and n-3, the threshold is 50% of the GDA. Fruit and vegetable criteria can be anything from 80-100%.			
<b>Subset of foods</b>	<b>N</b>	<b>% classified as 'foods high in fat, salt or sugar'</b>	<b>Examples of foods classified as 'foods high in fat, salt or sugar'</b>	<b>Examples of foods not classified as 'foods high in fat, salt or sugar'</b>
Abridged M&W database	977	46.9		
Bread, cereals and potatoes	149	65.8	Cream crackers, wholemeal rolls, currant buns	Sugar puffs, corn flakes, fresh pasta, oven chips, roast potatoes
Milk and dairy foods	103	42.7	Half fat crème fraiche, greek yoghurt	Camembert, cheddar, low fat yoghurt, whole milk, semi-skimmed milk, cottage cheese
Fruit and vegetables	137	0.0		All fruit and vegetables
Meat, fish and alternatives	222	46.8	Chicken leg, beefsteak, walnuts	Lentils, mackerel, cod, boiled egg, roast lamb
Foods high in fat, foods high in sugar	78	91.0	Cola, jam doughnuts, choc chip cookies, Mars bar, olive oil, crisps, low fat spread	Butter
'Healthier' indicators	124	8.1	Bread and nuts	
'Less healthy' indicators	83	85.5		Breakfast cereals, thick milkshake, drinking chocolate

<b>Model 12 TCg/s</b>	<b>Simple threshold model, Group C nutrients, per 100g/serving:</b> 'foods high in fat, salt or sugar' if >1790kJ energy per 100g OR >2980kJ energy per serving OR >5.2g sats per 100g OR >8.7g sats per serving OR >12.6g NMES per 100g OR >21g NMES per serving OR >470mg sodium per 100g OR >785mg sodium per 100g AND <100% fruit and vegetable content AND <0.1g n-3 per 100g AND <0.2g n-3 per serving AND <345mg calcium per 100g AND <345mg per serving AND <5mg iron per 100g AND <5mg iron per serving			
<b>Rationale for numbers</b>	For A nutrients, threshold set at 20% of GDA per 100g and one third of GDA per serving. Fruit and veg content criterion can vary between 80 and 100%. 50% GDA for n-3 per 100g, 100% per serving. For C nutrients the thresholds are set at 50% of GDA per 100g and serving.			
<b>Subset of foods</b>	<b>N</b>	<b>% classified as 'foods high in fat, salt or sugar'</b>	<b>Examples of foods classified as 'foods high in fat, salt or sugar'</b>	<b>Examples of foods not classified as 'foods high in fat, salt or sugar'</b>
Abridged M&W database	986	40.4		
Bread, cereals and potatoes	147	55.1	Cream crackers, wholemeal rolls, currant buns	Roast potatoes, oven chips, fresh pasta, sugar puffs, corn flakes
Milk and dairy foods	103	35.0	Camembert, half fat crème fraiche,	Cottage cheese, semi-skimmed milk, whole milk, yoghurt, cheddar
Fruit and vegetables	137	0.0		All fruit and vegetables
Meat, fish and alternatives	230	38.7	Chicken leg, beefsteak, walnuts	Lentils, mackerel, cod, boiled egg, roast lamb
Foods high in fat, foods high in sugar	78	88.5	Choc chip cookies, jam doughnuts, Mars bar, cola, olive oil, crisps, low fat spread	Butter
'Healthier' indicators	124	8.1	Bread and nuts	
'Less healthy' indicators	83	79.5		Breakfast cereals, some takeaway food, Whopper burger

<b>Model 13 TCKJ</b>	<b>Simple threshold model, Group C nutrients, per 100kJ:</b> ‘foods high in fat, salt or sugar’ if >16.5kJ sats per 100kJ OR >16.5kJ NMES per 100kJ OR >40mg sodium per 100kJ AND <100% Fruit and veg content AND <0.02g n-3 per 100kJ AND <0.6mg iron per 100kJ AND <40mg calcium per 100kJ			
<b>Rationale for numbers</b>	For A nutrients, threshold set at 150% of the recommendation (as in the CPG scheme), for fruit and veg criterion can vary between 80 and 100%; for n-3 fatty acids, and C nutrients, threshold set at 6% of the GDA.			
<b>Subset of foods</b>	<b>N</b>	<b>% classified as ‘foods high in fat, salt or sugar’</b>	<b>Examples of foods classified as ‘foods high in fat, salt or sugar’</b>	<b>Examples of foods not classified as ‘foods high in fat, salt or sugar’</b>
Abridged M&W database	973	50.1		
Bread, cereals and potatoes	145	67.6	Wholemeal rolls, sugar puffs, corn flakes, currant buns	Cream crackers, fresh pasta, roast potatoes, oven chips
Milk and dairy foods	103	48.5	Camembert, half fat crème fraiche, cottage cheese	Semi-skimmed milk, whole milk, yoghurt, cheddar,
Fruit and vegetables	137	0.0		All fruit and vegetables
Meat, fish and alternatives	224	46.0	Chicken leg, roast lamb, beefsteak, boiled egg	Lentils, mackerel, cod, walnuts
Foods high in fat, foods high in sugar	78	89.7	Cola, Mars bar, choc chip cookies, jam doughnuts, butter, crisps, low fat spread	Olive oil
‘Healthier’ indicators	124	4.0	Bread and Brazil nuts	
‘Less healthy’ indicators	83	90.4		Pizza, Whopper burger, cod in batter

<b>Model 14 TCKJ/s</b>	<b>Simple threshold model, Group C nutrients, per 100kJ/serving:</b> 'foods high in fat, salt or sugar' if >2800kJ energy per serving OR (>16.5kJ sats per 100kJ AND >1.9g sats per serving) OR (>16.5kJ NMES per 100kJ AND >4.6g NMES per 100g) OR (>40mg sodium per 100kJ AND >175mg sodium per serving) AND <100% fruit and veg content AND <0.02g n-3 per 100kJ AND <0.2g n-3 per serving AND <0.5mg iron per 100kJ AND <4.2mg iron per serving AND <35mg calcium per 100kJ AND <275mg calcium per serving.			
<b>Rationale for numbers</b>	Energy threshold set at 30% of GDA. Other A nutrient thresholds set at 150% of recommendation per 100kJ and 7% of GDA per serving. Fruit and veg criterion can vary between 80 and 100%. N-3 threshold set at 6% of GDA per 100kJ and 100% of GDA per serving. C nutrient thresholds set at 5% of GDA per 100kJ and 40% of GDA per serving.			
<b>Subset of foods</b>	<b>N</b>	<b>% classified as 'foods high in fat, salt or sugar'</b>	<b>Examples of foods classified as 'foods high in fat, salt or sugar'</b>	<b>Examples of foods not classified as 'foods high in fat, salt or sugar'</b>
Abridged M&W database	989	41.5		
Bread, cereals and potatoes	146	52.7	Wholemeal rolls, corn flakes, sugar puffs, currant buns	Roast potatoes, fresh pasta, cream crackers, oven chips
Milk and dairy foods	103	40.8	Camembert, half fat crème fraiche	Semi-skimmed milk, whole milk, cheddar, yoghurt, cottage cheese
Fruit and vegetables	137	0.0		All fruit and vegetables
Meat, fish and alternatives	226	39.8	Chicken leg, roast lamb, beefsteak	Lentils, mackerel, cod, walnuts, boiled egg
Foods high in fat, foods high in sugar	86	73.3	Choc chip cookies, jam doughnuts, cola, mars bar, butter, crisps	Olive oil, low fat spread
'Healthier' indicators	124	1.6	Wholemeal bread	
'Less healthy' indicators	83	88.0		Whopper burger, cod in batter, some takeaway

<b>Model 15 SSAg/1</b>	<b>Scoring system, Group A nutrients, per 100g:</b> Scoring bands as follows: Energy, 0-895kJ = 0; 895-1790kJ = 1; 1790-2685kJ = 2, etc. Sats, 0-2.6g = 0; 2.6-5.2g = 1; 5.2-7.8g = 2, etc. NMES, 0-6.3g = 0; 6.3-12.6g = 1; 12.6-18.9g = 2, etc. Sodium, 0-235mg = 0; 235-470mg = 1; 470-705mg = 2, etc. Final score = energy + sats + NMES + sodium. 'foods high in fat, salt or sugar' if score is 4 or more.			
<b>Rationale for numbers</b>	For each A nutrient, bands start at 10% of the GDA, and are 10% of GDA wide.			
<b>Subset of foods</b>	<b>N</b>	<b>% classified as 'foods high in fat, salt or sugar'</b>	<b>Examples of foods classified as 'foods high in fat, salt or sugar'</b>	<b>Examples of foods not classified as 'foods high in fat, salt or sugar'</b>
Abridged M&W database	926	37.7		
Bread, cereals and potatoes	140	47.9	Cream crackers, corn flakes, sugar puffs, currant buns	Wholemeal rolls, fresh pasta, oven chips, roast potatoes
Milk and dairy foods	99	45.5	Half fat crème fraiche, camembert, cheddar	Semi-skimmed milk, whole milk, yoghurt, cottage cheese
Fruit and vegetables	122	4.1		Canned pineapple, peaches, orange juice, lettuce, grilled tomato, celery, avocado
Meat, fish and alternatives	219	37.9	Walnuts	Lentils, cod, mackerel, boiled egg, roast lamb, chicken leg, beefsteak
Foods high in fat, foods high in sugar	85	83.5	Jam doughnuts, choc chip cookies, Mars bar, olive oil, crisps, butter	Cola, low fat spread
'Healthier' indicators	118	5.1	Nuts	
'Less healthy' indicators	78	80.1		Cola, trifle, chocolate mousse

<b>Model 16</b> <b>SSAg/2</b>	<b>Scoring system, Group A nutrients, per 100g:</b> Scoring bands as follows: Energy, 0-1250kJ = 0; 1250-1875kJ = 1; 1875-2500kJ = 2, etc. (max 5). Sats, 0-3.6g = 0; 3.6-4.9g = 1; 4.9-7.2g = 2, etc. (max 5). NMES, 0-8.8g = 0; 8.8-13.2g = 1; 13.2-17.6g = 2, etc. (max 5). Sodium, 0-330mg = 0; 330-445mg = 1; 445-660mg = 2, etc. (max 5). Final score = energy + sats + NMES + sodium. 2 or more for 'foods high in fat, salt or sugar'.			
<b>Rationale for numbers</b>	For all A nutrients, score bands begin at 14% of the GDA and are 7% of the GDA wide.			
<b>Subset of foods</b>	<b>N</b>	<b>% classified as 'foods high in fat, salt or sugar'</b>	<b>Examples of foods classified as 'foods high in fat, salt or sugar'</b>	<b>Examples of foods not classified as 'foods high in fat, salt or sugar'</b>
Abridged M&W database	926	46.8		
Bread, cereals and potatoes	140	64.3	Wholemeal rolls, cream crackers, sugar puffs, corn flakes, currant buns	Roast potatoes, oven chips, fresh pasta,
Milk and dairy foods	99	52.5	Half fat crème fraiche, cheddar, camembert	Semi-skimmed milk, whole milk, yoghurt, cottage cheese
Fruit and vegetables	122	4.1		Orange juice, canned pineapple, peaches
Meat, fish and alternatives	219	47.5	Walnuts	Lentils, boiled egg, mackerel, cod, roast lamb, chicken leg, beefsteak
Foods high in fat, foods high in sugar	85	91.8	Jam doughnuts, Mars bar, choc chip cookies, olive oil, crisps, butter, low fat spread	Cola
'Healthier' indicators	118	6.8		Nuts, granary bread
'Less healthy' indicators	78	88.5		Sunny delight, cola, thick milkshake, some takeaway food

<b>Model 17 SSAg/s/1</b>	<b>Simple scoring system, Group A nutrients, per 100g/serving:</b> Per 100g scoring bands as follows: Energy, 0-1790kJ = 0; 1790-2685kJ = 1; 2685-3580kJ = 2, etc. (max 5). Sats, 0-5.2g = 0; 5.2-7.8g = 1; 7.8-10.4g = 2, etc. (max 5). NMES, 0-12.6g = 0; 12.6-18.9g = 1; 18.9-25.2g = 2, etc. (max 5). Sodium, 0-470mg = 0; 470-705mg = 1; 705-940mg = 2, etc. (max 5). Per serving scoring bands as follows: Energy, 0-2980kJ = 0; 2980-4470kJ = 2; 4470-5960 = 4, etc. (max 10). Sats, 0-8.7g = 0; 8.7-13.1g = 2; 13.1-17.4g = 4, etc. (max 10). NMES, 0-21g = 0; 21-31.5g = 2; 31.5-42g = 4, etc. (max 10). Sodium, 0-785mg = 0; 785-1175mg = 2; 1175-1570mg = 4, etc. (max 10). Final score = energy + sats + NMES + sodium. 2 or more for 'foods high in fat, salt or sugar'.			
<b>Rationale for numbers</b>	For all A nutrients, band start at 20% of GDA and are 10% of GDA wide for per 100g. Per serving, bands start at one third of GDA and are one sixth of GDA wide.			
<b>Subset of foods</b>	<b>N</b>	<b>% classified as 'foods high in fat, salt or sugar'</b>	<b>Examples of foods classified as 'foods high in fat, salt or sugar'</b>	<b>Examples of foods not classified as 'foods high in fat, salt or sugar'</b>
Abridged M&W database	926	44.6		
Bread, cereals and potatoes	140	49.3	Cream crackers, corn flakes, sugar puffs	Roast potatoes, oven chips, fresh pasta, wholemeal rolls, currant buns
Milk and dairy foods	99	48.5	Half fat crème fraîche, cheddar, camembert	Semi-skimmed milk, whole milk, yoghurt, cottage cheese
Fruit and vegetables	122	4.9		Canned pineapple, peaches, orange juice, lettuce, grilled tomatoes, celery
Meat, fish and alternatives	219	45.2	Chicken leg, walnuts	Lentils, boiled egg, mackerel, cod, roast lamb, beefsteak
Foods high in fat, foods high in sugar	85	85.9	Jam doughnuts, cola, choc chip cookies, Mars bar, crisps, olive oil, butter	Low fat spread
'Healthier' indicators	118	5.9	Nuts	
'Less healthy' indicators	78	85.9		Takeaway food, pizza, drinking chocolate, chocolate mousse, crème caramel

<b>Model 18 SSAg/s/2</b>	<b>Simple scoring system, Group A nutrients, per 100g/serving:</b> Per 100g scoring bands as follows: Energy, 0-895kJ = 0; 895-1790kJ = 1; 1790-2685kJ = 2, etc. (max 6). Sats, 0-2.6g = 0; 2.6-5.2g = 1; 5.2-7.8g = 2, etc. (max 6). NMES, 0-6.3g = 0; 6.3-12.6g = 1; 12.6-18.9g = 2, etc. (max 6). Sodium, 0-235mg = 0; 235-470mg = 1; 470-705mg = 2, etc (max 6). Per serving bands as follows: Energy, 0-1790kJ = 0; 1790-3580kJ = 2; 3580-5370kJ = 4, etc. (max 12). Sats, 0-5.2g = 0; 5.2-10.4 = 2; 10.4-15.6g = 4, etc. (max 12). NMES, 0-12.6g = 0; 12.6-25.2g = 2; 25.2-37.8g = 4, etc. (max 12). Sodium, 0-470mg = 0; 470-940mg = 2; 940-1410mg = 4, etc. (max 12). Final score = energy + sats + NMES + sodium. 6 or more for 'foods high in fat, salt or sugar'.			
<b>Rationale for numbers</b>	For all A nutrients, bands start at 10% of GDA and are 10% of GDA wide per 100g. Per serving, bands start at 20% of GDA and are 20% of GDA wide.			
<b>Subset of foods</b>	<b>N</b>	<b>% classified as 'foods high in fat, salt or sugar'</b>	<b>Examples of foods classified as 'foods high in fat, salt or sugar'</b>	<b>Examples of foods not classified as 'foods high in fat, salt or sugar'</b>
Abridged M&W database	926	39.1		
Bread, cereals and potatoes	140	44.3	Cream crackers, corn flakes, sugar puffs	Fresh pasta, roast potatoes, oven chips, wholemeal rolls, currant buns
Milk and dairy foods	99	38.4	Camembert, cheddar	Semi-skimmed milk, yoghurt, cottage cheese, whole milk, half fat crème fraiche
Fruit and vegetables	122	4.1		Canned pineapples, peaches, orange juice, avocado, grilled tomato, celery, lettuce
Meat, fish and alternatives	219	39.3	Chicken leg	Lentils, boiled egg, cod, roast lamb, mackerel, beefsteak, walnuts
Foods high in fat, foods high in sugar	85	83.5	Jam doughnuts, cola Mars bar, olive oil, butter, crisps, choc chip cookies	Low fat spread
'Healthier' indicators	118	1.7	Brazil nuts	
'Less healthy' indicators	78	84.6		Chocolate mousse, thick milkshake, some takeaway foods

<b>Model 19 SSAkJ</b>	Simple scoring system, Group A nutrients, per 100kJ: Score bands are as follows: Sats, 0-11kJ = 0; 11-16.5kJ = 1; 16.5-22kJ = 2, etc. (max 5). NMES, 0-11kJ = 0; 11-16.5kJ = 1; 16.5-22kJ = 2, etc. (max 5). Sodium, 0-26mg = 0; 26-40mg = 1; 40-54mg = 2, etc. (max 5). Final score = sats + NMES + sodium. 'foods high in fat, salt or sugar' if score of 3 or more.			
<b>Rationale for numbers</b>	All bands start at the recommendation and are 50% of recommendation wide.			
<b>Subset of foods</b>	<b>N</b>	<b>% classified as 'foods high in fat, salt or sugar'</b>	<b>Examples of foods classified as 'foods high in fat, salt or sugar'</b>	<b>Examples of foods not classified as 'foods high in fat, salt or sugar'</b>
Abridged M&W database	926	60.7		
Bread, cereals and potatoes	104	41.3	Corn flakes, currant buns, sugar puffs	Wholemeal rolls, cream crackers, oven chips, roast potatoes, fresh pasta
Milk and dairy foods	81	85.2	Whole milk, yoghurt, camembert, cheddar, half fat crème fraiche, cottage cheese	Semi-skimmed milk
Fruit and vegetables	110	16.4	Orange juice, grilled tomato, celery	Currants, canned pineapple, peaches, avocado, lettuce
Meat, fish and alternatives	178	50.0	Cod	Boiled egg, chicken leg, beefsteak, roast lamb, mackerel, lentils, walnuts
Foods high in fat, foods high in sugar	134	91.0	Jam doughnuts, cola, mars bar, choc chip cookies, crisps, butter, low fat spread	Olive oil
'Healthier' indicators	118	13.6	Brazil nuts, fruit juice, some vegetables	
'Less healthy' indicators	78	93.6		Cod in batter, takeaway food, Bombay mix

<b>Model 20 SSAkJ/s</b>	<b>Simple scoring system, Group A nutrients, per 100kJ/serving:</b> Per 100kJ scoring bands as follows: Sats, 0-19.7kJ = 0; 19.7-39.4kJ = 1; 39.4-59.1kJ = 2, etc. (max 6). NMES, 0-19.7kJ = 0; 19.7-39.4kJ = 1; 39.4-59.1kJ = 2, etc. (max 6). Sodium, 0-45mg = 0; 45-90mg = 1; 90-135mg = 2, etc. (max 6). Per serving bands as follows: Energy, 0-1340kJ = 0; 1340-2680kJ = 1, 2680-4020kJ = 2, etc. (max 6). Sats, 0-3.9g = 0; 3.9-7.8g = 1; 7.8-11.7g = 2, etc. (max 6). NMES, 0-9.5g = 0; 9.5-19g = 1; 19-28.5g = 2, etc. (max 6). Sodium, 0-350mg = 0; 350-700mg = 1; 700-1050mg = 2, etc. (max 6). Final score = energy + min(sats per 100kJ, sats per serv) + min(NMES per 100kJ, NMES per serv) + min(sodium per 100kJ, sodium per serv). 1 or more for 'foods high in fat, salt or sugar'.			
<b>Rationale for numbers</b>	For sats, NMES and sodium, per 100kJ bands start at 2% of GDA and are 2% of GDA wide. For all A nutrients, per serving bands start at 15% of GDA and are 15% of GDA wide.			
<b>Subset of foods</b>	<b>N</b>	<b>% classified as 'foods high in fat, salt or sugar'</b>	<b>Examples of foods classified as 'foods high in fat, salt or sugar'</b>	<b>Examples of foods not classified as 'foods high in fat, salt or sugar'</b>
Abridged M&W database	926	48.4		
Bread, cereals and potatoes	140	47.9	Fresh pasta, sugar puffs, currant buns	Roast potatoes, oven chips, wholemeal rolls, cream crackers, corn flakes
Milk and dairy foods	99	57.6	Low fat yoghurt, whole milk, cheddar, camembert	Greek yoghurt, semi-skimmed milk, cottage cheese, half fat crème fraiche
Fruit and vegetables	122	9.8	Orange juice	Canned pineapple, peaches, avocado, lettuce, celery, grilled tomato
Meat, fish and alternatives	219	54.8	Mackerel, cod, beefsteak, chicken leg	Lentils, walnuts, roast lamb, boiled egg
Foods high in fat, foods high in sugar	85	62.4	Jam doughnuts, cola, Mars bar, crisps, butter	Choc chip cookies, olive oil, low fat spread
'Healthier' indicators	118	8.5	Fresh pasta, mackerel, fruit juice	
'Less healthy' indicators	78	83.3		Biscuits and small cakes (jam tarts etc.)

<b>Model 21 SSBg</b>	<b>Scoring system, Group B nutrients, per 100g:</b> Scoring bands as follows: Energy, 0-450kJ = 0; 450-890kJ = 1; 890-1350kJ = 2, etc. (max 5). Sats, 0-1.3g = 0; 1.3-2.6g = 1; 2.6-3.9g = 2, etc. (max 5). NMES, 0-3.2g = 0; 3.2-6.4g = 1; 6.4-9.6g = 2, etc. (max 5). Sodium, 0-120mg = 0; 120-240mg = 1; 240-360mg = 2, etc. (max 5). F&V, 0 or 30% = 0; 50 or 70% = 1; 100% = 2. n-3, 0-30mg = 0; 30-60mg = 1; 60-90mg = 2, etc. (max 5). Final score = energy + sats + NMES + sodium – F&V – n-3. 'foods high in fat, salt or sugar' if score is 3 or more.			
<b>Rationale for numbers</b>	For A nutrients, bands start at 5% of GDA and are 5% of GDA wide. For n-3, bands start at 15% of GDA and are 15% of GDA wide. F&V bands are arbitrary.			
<b>Subset of foods</b>	<b>N</b>	<b>% classified as 'foods high in fat, salt or sugar'</b>	<b>Examples of foods classified as 'foods high in fat, salt or sugar'</b>	<b>Examples of foods not classified as 'foods high in fat, salt or sugar'</b>
Abridged M&W database	892	63.6		
Bread, cereals and potatoes	140	83.6	Wholemeal rolls, sugar puffs, corn flakes, cream crackers, currant buns	Roast potatoes, fresh pasta, oven chips
Milk and dairy foods	99	65.7	Greek yoghurt, half fat crème fraiche, camembert, cheddar, cottage cheese	Semi-skimmed milk, whole milk, low fat yoghurt
Fruit and vegetables	122	4.1		Orange juice, canned pineapple, peaches, avocado, grilled tomati, lettuce, celery
Meat, fish and alternatives	186	72.6	Chicken leg, beefsteak, walnuts, boiled egg	Cod, lentils, mackerel, roast lamb
Foods high in fat, foods high in sugar	84	96.4	Cola, jam doughnuts, mars bar, choc chip cookies, olive oil, butter, crisps, low fat spreads	
'Healthier' indicators	112	9.8	Bread and nuts	
'Less healthy' indicators	77	100.0		None

<b>Model 22 SSBg/s</b>	<b>Scoring system, Group B nutrients, per 100g/serving:</b> Per 100g bands as follows: Energy, 0-450kJ = 0; 450-890kJ = 1; 890-1350kJ = 2, etc. (max 5). Sats, 0-1.3g = 0; 1.3-2.6g = 1; 2.6-3.9g = 2, etc. (max 5). NMES, 0-3.2g = 0; 3.2-6.4g = 1; 6.4-9.6g = 2, etc. (max 5). Sodium, 0-120mg = 0; 120-240mg = 1; 240-360mg = 2, etc. (max 5). n-3, 0-30mg = 0; 30-60mg = 1; 60-90mg = 2, etc. (max 5). Per serving bands as follows: Energy, 0-895kJ = 0; 895-1790kJ = 1; 1790-2685kJ = 2, etc. (max 5). Sats, 0-2.6g = 0; 2.6-5.2g = 1; 5.2-7.8g = 2, etc. (max 5). NMES, 0-6.3g = 0; 6.3-12.6g = 1; 12.6-18.9g = 2, etc. (max 5). Sodium, 0-235mg = 0; 235-470mg = 1; 470-705mg = 2, etc. (max 5). N-3, 0-60mg = 0; 60-120mg = 1; 120-180mg = 2, etc. (max 5). F&V, 0-30% = 0; 50% = 1; 70% = 2; 100% = 5. Final score = A nutrients per 100g + A nutrients per serving – B nutrients per 100g – B nutrients per serving. ‘foods high in fat, salt or sugar’ if score is 8 or more.			
<b>Rationale for numbers</b>	For all A nutrients, per 100g bands start at 5% of GDA and are 5% of GDA wide. Per serving, bands start at 10% of GDA and are 10% of GDA wide. N-3 bands per 100g start at 15% of GDA and are 15% of GDA wide. Per serving, start at 30% of GDA and are 30% of GDA wide. F&V criteria are arbitrary.			
<b>Subset of foods</b>	<b>N</b>	<b>% classified as ‘foods high in fat, salt or sugar’</b>	<b>Examples of foods classified as ‘foods high in fat, salt or sugar’</b>	<b>Examples of foods not classified as ‘foods high in fat, salt or sugar’</b>
Abridged M&W database	892	49.1		
Bread, cereals and potatoes	140	61.4	Sugar puffs, corn flakes, cream crackers, currant buns	Roast potatoes, fresh pasta, oven chips, wholemeal rolls
Milk and dairy foods	99	44.4	Camembert, cheddar	Semi-skimmed milk, whole milk, yoghurt, half fat crème fraiche, cottage cheese
Fruit and vegetables	122	0.0		All fruit and vegetables
Meat, fish and alternatives	186	57.5	Chicken leg, beefsteak, walnuts	Cod, lentils, mackerel, roast lamb, boiled egg
Foods high in fat, foods high in sugar	84	91.7	Cola, jam doughnuts, mars bar, choc chip cookies, olive oil, butter, crisps	Low fat spread
‘Healthier’ indicators	112	6.3	Nuts	
‘Less healthy’ indicators	77	96.1		Sunny delight, drinking chocolate,

				crème caramel
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<b>Model 23 SSBkJ</b>	<b>Scoring system, Group B nutrients, per 100kJ:</b> Scoring bands as follows: For sats and NMES, 0-16.5kJ = 0; 16.5-24.8kJ = 1; 24.8-33kJ = 2, etc. (max 5). For sodium, 0-40mg = 0; 40-50mg = 1; 50-60mg = 2, etc. (max 5). For n-3, 0-0.01g = 0; 0.01-0.02g = 1; 0.02-0.03g = 3; 0.03+g = 5. Fruit and vegetable content scores as follows: 0-30% = 0; 50% = 1; 70% = 2; 100% = 5. Final score = sats + NMES + sodium. 'foods high in fat, salt or sugar' if 2 or more.			
<b>Rationale for numbers</b>	For A nutrients, bands start at 150% of recommendation and band widths are 50% of starting point. For n-3 fatty acids, bands start at 6% of GDA, and band widths are 100% of start point. Jumps are in twos, as band widths are twice as wide as A nutrients.			
<b>Subset of foods</b>	<b>N</b>	<b>% classified as 'foods high in fat, salt or sugar'</b>	<b>Examples of foods classified as 'foods high in fat, salt or sugar'</b>	<b>Examples of foods not classified as 'foods high in fat, salt or sugar'</b>
Abridged M&W database	892	46.9		
Bread, cereals and potatoes	140	50.7	Wholemeal rolls, sugar puffs, corn flakes	Currant buns, cream crackers, fresh pasta, roast potatoes, oven chips
Milk and dairy foods	99	78.8	Whole milk, camembert, cheddar, half fat crème fraiche, yoghurt, cottage cheese	Semi-skimmed milk
Fruit and vegetables	122	1.6	Tomato juice	All others
Meat, fish and alternatives	186	40.3		Boiled egg, lentils, beefsteak, chicken leg, roast lamb, walnuts, cod, mackerel
Foods high in fat, foods high in sugar	84	82.1	Cola, mars bar, choc chip cookies, butter, low fat spread	Jam doughnuts, olive oil, crisps
'Healthier' indicators	112	4.5	Bread	
'Less healthy' indicators	77	84.4		Take away food, chips, jam doughnuts, crisps

<b>Model 24 SSBkJ/s</b>	<b>Scoring system, Group B nutrients, per 100kJ/serving:</b> Maximum for each nutrient is 5 points. Score for each nutrient is minimum of per 100kJ and per serving score. For energy, only per serving bands. 0-1340kJ = 0; 1340-2010kJ = 1; 2010-2680kJ = 2, etc. For sats per 100kJ, 0-11kJ = 0; 11-16.5kJ = 1; 16.5-22kJ = 2, etc. For sats per serving, 0-1.8g = 0; 1.8-2.7g = 1; 2.7-3.6g = 2, etc. For NMES per 100kJ, 0-11kJ = 0; 11-16.5kJ = 1; 16.5-22kJ = 2, etc. For NMES per serving, 0-4.4g = 0; 4.4-6.6g = 1; 6.6-8.8g = 2, etc. For sodium per 100kJ, 0-26mg = 0; 26-40mg = 1; 40 – 52mg = 2, etc. For sodium per serving, 0-165mg = 0; 165-248mg = 1; 248-330mg = 2, etc. For n-3 per 100kJ, 0-0.02g = 0; 0.02-0.04g = 1, 0.04-0.06g = 3, 0.06g+ = 5. For n-3 per serving, 0-0.2g = 0; 0.2-0.4g = 1; 0.4-0.6g = 2, etc. For fruit and veg, 0-30% = 0 points, 50% = 1 point, 70% = 2 points, 100% = 5 points. ‘foods high in fat, salt or sugar’ if score is 2 or more.			
<b>Rationale for numbers</b>	All band widths are 50% of start point. Per 100kJ bands start at recommendation, n-3 starts at 6% of GDA. Per serving bands start at 7% of GDA, apart from energy, which starts at 15% (as there is no per 100kJ for energy). N-3 per serving starts at 100% of GDA.			
<b>Subset of foods</b>	<b>N</b>	<b>% classified as ‘foods high in fat, salt or sugar’</b>	<b>Examples of foods classified as ‘foods high in fat, salt or sugar’</b>	<b>Examples of foods not classified as ‘foods high in fat, salt or sugar’</b>
Abridged M&W database	892	50.3		
Bread, cereals and potatoes	140	55.0	Wholemeal rolls, corn flakes, sugar puffs	Fresh pasta, cream crackers, oven chips, roast potatoes
Milk and dairy foods	99	68.7	Half fat crème fraiche, whole milk, camembert, cheddar, low fat yoghurt	Cottage cheese, semi-skimmed milk, greek yoghurt
Fruit and vegetables	122	0.0		All fruit and vegetables
Meat, fish and alternatives	186	58.6	Roast lamb, cod, chicken leg, beefsteak	Lentils, mackerel, walnuts, boiled egg
Foods high in fat, foods high in sugar	84	71.4	Choc chip cookies, Mars bar, cola, butter, crisps, jam doughnuts	Olive oil, low fat spread
‘Healthier’ indicators	112	0.9	Porridge	
‘Less healthy’ indicators	77	94.8		Biscuits, crispie cakes, Bombay mix

<b>Model 25 SSCg</b>	<b>Scoring system, Group C nutrients, per 100g:</b> Scoring bands as follows: Energy, 0-450kJ = 0; 450-890kJ = 1; 890-1350kJ = 2, etc. (max 5). Sats, 0-1.3g = 0; 1.3-2.6g = 1; 2.6-3.9g = 2, etc. (max 5). NMES, 0-3.2g = 0; 3.2-6.4g = 1; 6.4-9.6g = 2, etc. (max 5). Sodium, 0-120mg = 0; 120-240mg = 1; 240-360mg = 2, etc. (max 5). n-3, 0-30mg = 0; 30-60mg = 1; 60-90mg = 2, etc. (max 5). Calcium, 0-105mg = 0; 105-210mg = 1; 210-315mg = 2, etc. (max 5). Iron, 0-1.5mg = 0; 1.5-3mg = 1; 3-4.5mg = 2, etc. (max 5). For fruit and vegetable content, 0 or 30% = 0 points, 50% = 1 point, 70% = 2 points, 100% = 5 points. Final score = energy + sats + NMES + sodium – F&V – n-3 – calcium – iron. ‘foods high in fat, salt or sugar’ if score is 3 or more.			
<b>Rationale for numbers</b>	For A nutrients, bands start at 5% of GDA and are 5% of GDA wide. For C nutrients and n-3, bands start at 15% of GDA and are 15% of GDA wide. F&V criteria are arbitrary.			
<b>Subset of foods</b>	<b>N</b>	<b>% classified as ‘foods high in fat, salt or sugar’</b>	<b>Examples of foods classified as ‘foods high in fat, salt or sugar’</b>	<b>Examples of foods not classified as ‘foods high in fat, salt or sugar’</b>
Abridged M&W database	872	57.3		
Bread, cereals and potatoes	138	76.8	Sugar puffs, wholemeal rolls, corn flakes, cream crackers, currant buns	Oven chips, fresh pasta, roast potatoes
Milk and dairy foods	99	59.6	Greek yoghurt, half fat crème fraiche, camembert, cheddar, cottage cheese	Semi-skimmed milk, low fat yoghurt, whole milk
Fruit and vegetables	122	0.0		All fruit and vegetables
Meat, fish and alternatives	182	65.9	Chicken leg, beefsteak, walnuts, boiled egg	Lentils, cod, mackerel, roast lamb
Foods high in fat, foods high in sugar	73	94.5	Cola, jamdoughnuts Mars bar, choc chip cookies, olive oil, butter, crisps, low fat spread	
‘Healthier’ indicators	112	9.8	Bread and nuts	
‘Less healthy’ indicators	76	94.7		Coco pops, thick milkshake, prawn curry, drinking chocolate

<b>Model 26 SSCg/s</b>	<p><b>Scoring system, Group C nutrients, per 100g/serving:</b>  Per 100g bands as follows: Energy, 0-450kJ = 0; 450-890kJ = 1; 890-1350kJ = 2, etc. (max 5). Sats, 0-1.3g = 0; 1.3-2.6g = 1; 2.6-3.9g = 2, etc. (max 5). NMES, 0-3.2g = 0; 3.2-6.4g = 1; 6.4-9.6g = 2, etc. (max 5). Sodium, 0-120mg = 0; 120-240mg = 1; 240-360mg = 2, etc. (max 5). n-3, 0-30mg = 0; 30-60mg = 1; 60-90mg = 2, etc. (max 5). Calcium, 0-105mg = 0; 105-210mg = 1, 210-315mg = 2, etc. (max 5). Iron, 0-1.5mg = 0; 1.5-3mg = 1, 3-4.5mg = 2, etc. (max 5). Per serving bands as follows: Energy, 0-895kJ = 0; 895-1790kJ = 1; 1790-2685kJ = 2, etc. (max 5). Sats, 0-2.6g = 0; 2.6-5.2g = 1; 5.2-7.8g = 2, etc. (max 5). NMES, 0-6.3g = 0; 6.3-12.6g = 1; 12.6-18.9g = 2, etc. (max 5). Sodium, 0-235mg = 0; 235-470mg = 1; 470-705mg = 2, etc. (max 5). N-3, 0-60mg = 0; 60-120mg = 1; 120-180mg = 2, etc. (max 5). Calcium, 0-105mg = 0; 105-210mg = 1, 210-315mg = 2, etc. (max 5). Iron, 0-1.5mg = 0; 1.5-3mg = 1, 3-4.5mg = 2, etc. (max 5). F&amp;V, 0-30% = 0; 50% = 1; 70% = 2; 100% = 5. Final score = A nutrients – B nutrients – C nutrients. ‘foods high in fat, salt or sugar’ if score is 5 or over.</p>			
<b>Rationale for numbers</b>	<p>A nutrients bands start at 5% of GDA and are 5% of GDA wide per 100g. Per serving, bands start at 10% of GDA and are 10% of GDA wide. C nutrient bands start at 15% of GDA and are 15% of GDA wide for per 100g and per serving. N-3 bands start at 15% of GDA and are 15% pf GDA wide per 100g. Per serving, bands start at 30% of GDA and are 30% of GDA wide. Fruit and vegetables criteria are arbitrary.</p>			
<b>Subset of foods</b>	<b>N</b>	<b>% classified as ‘foods high in fat, salt or sugar’</b>	<b>Examples of foods classified as ‘foods high in fat, salt or sugar’</b>	<b>Examples of foods not classified as ‘foods high in fat, salt or sugar’</b>
Abridged M&W database	872	52.9		
Bread, cereals and potatoes	138	63.8	Wholemeal rolls, corn flakes, cream crackers, currant buns	Fresh pasta, roast potatoes, oven chips, sugar puffs
Milk and dairy foods	99	52.5	Camembert, cheddar, half fat crème fraiche	Semi-skimmed milk, whole milk, yoghurt, cottage cheese
Fruit and vegetables	122	0.0		All fruit and vegetables
Meat, fish and alternatives	182	58.2	Chicken leg, beefsteak, walnuts	Roast lamb, boiled egg, lentils, cod, mackerel
Foods high in fat, foods high in sugar	73	94.5	Cola, jam doughnuts, Mars bar, choc chip cookies, olive oil, butter, crisps, low	

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			fat spread	
'Healthier' indicators	112	5.4	Nuts	
'Less healthy' indicators	76	90.8		Coco pops, frosties, sugar puffs, drinking chocolate, thick milkshake

<b>Model 27 SSCkJ</b>	<b>Scoring system, Group C nutrients, per 100kJ:</b> For sats and NMES, 0-16.5kJ = 0; 16.5-24.8kJ = 1; 24.8-33kJ = 2, etc. (max 5). For sodium, 0-40mg = 0; 40-50mg = 1; 50-60mg = 2, etc. (max 5). For n-3, 0-0.01g = 0; 0.01-0.02g = 1; 0.02-0.03g = 3, 0.03+g = 5. Fruit and vegetable content scores as follows: 0-30% = 0; 50% = 1; 70% = 2; 100% = 5. For calcium, 0-40mg = 0; 40-60mg = 1; 60-80mg = 2, etc. (max 5). For iron, 0-0.6mg = 0; 0.6-0.9mg = 1; 0.9-1.2mg = 2, etc. (max 5). Final score = A nutrients – B nutrients – C nutrients. ‘foods high in fat, salt or sugar’ of score is 2 or more.			
<b>Rationale for numbers</b>	Bands start at 150% of recommendation for A nutrients and band widths are 50% of starting point. For n-3 fatty acids, bands start at 6% of GDA, and band widths are 100% of start point. Jumps are in twos, as band widths are twice as wide as undesirable nutrients. Calcium and iron bands start at 6% of GDA and band widths are 50% of start point.			
<b>Subset of foods</b>	<b>N</b>	<b>% classified as ‘foods high in fat, salt or sugar’</b>	<b>Examples of foods classified as ‘foods high in fat, salt or sugar’</b>	<b>Examples of foods not classified as ‘foods high in fat, salt or sugar’</b>
Abridged M&W database	872	42.1		
Bread, cereals and potatoes	138	37.0	Corn flakes, sugar puffs	Cream crackers, fresh pasta, roast potatoes, oven chips, currant buns, wholemeal rolls
Milk and dairy foods	99	75.8	Whole milk, half fat crème fraiche, camembert, cheddar, yoghurt, cottage cheese	Semi-skimmed milk
Fruit and vegetables	122	1.6	Tomato juice	All others
Meat, fish and alternatives	182	37.9		Chicken leg, roast lamb, beefsteak, cod, mackerel, lentils, walnuts, boiled egg
Foods high in fat, foods high in sugar	73	82.2	Choc chip cookies, Mars bar, cola, butter, low fat spread	Jam doughnuts, olive oil, crisps
‘Healthier’ indicators	112	1.8	Tomato juice	
‘Less healthy’ indicators	76	82.9		Crisps, jam donuts, Bombay mix, some takeaway food

<b>Model 28</b> <b>SSCkJ/s</b>	<b>Scoring system, Group C nutrients, per 100kJ/serving:</b> Maximum for each nutrient is 5 points. Score for each nutrient is minimum of per 100kJ and per serving score. For energy, only per serving bands. 0-1340kJ = 0; 1340-2010kJ = 1; 2010-2680kJ = 2, etc. For sats per 100kJ, 0-11kJ = 0; 11-16.5kJ = 1; 16.5-22kJ = 2, etc. For sats per serving, 0-1.8g = 0; 1.8-2.7g = 1; 2.7-3.6g = 2, etc. For NMES per 100kJ, 0-11kJ = 0; 11-16.5kJ = 1; 16.5-22kJ = 2, etc. For NMES per serving, 0-4.4g = 0; 4.4-6.6g = 1; 6.6-8.8g = 2, etc. For sodium per 100kJ, 0-26mg = 0; 26-40mg = 1; 40 – 52mg = 2, etc. For sodium per serving, 0-165mg = 0, 165-248mg = 1; 248-330mg = 2, etc. For n-3 per 100kJ, 0-0.02g = 0, 0.02-0.04g = 1, 0.04-0.06g = 3, 0.06g+ = 5. For n-3, 0-0.2g = 0; 0.2-0.4g = 1; 0.4-0.6g = 2, etc. For fruit and veg, 0-30% = 0, 50% = 1, 70% = 2, 100% = 5. For calcium per 100kJ, 0-40mg = 0; 40-60mg = 1; 60-80mg = 2 etc. For calcium per serving, 0-207mg = 0, 207-310mg = 1; 310-414mg = 2, etc. For iron per 100kJ, 0-0.6mg = 0; 0.6-0.9mg = 1; 0.9-1.2mg = 2, etc. For iron per serving, 0-3mg = 0; 3-4.5mg = 1; 4.5-6mg = 2, etc. ‘foods high in fat, salt or sugar’ if score is 2 or more.			
<b>Rationale for numbers</b>	All band widths are 50% of start point. Per 100kJ bands start at recommendation, n-3 starts at 6% of GDA. Per serving bands start at 7% of GDA, apart from energy, which starts at 15% (as there is no per 100kJ for energy). N-3 per serving starts at 100% of GDA. For iron and calcium per 100kJ bands start at 6% of GDA, per serving bands start at 30% of GDA.			
<b>Subset of foods</b>	<b>N</b>	<b>% classified as ‘foods high in fat, salt or sugar’</b>	<b>Examples of foods classified as ‘foods high in fat, salt or sugar’</b>	<b>Examples of foods not classified as ‘foods high in fat, salt or sugar’</b>
Abridged M&W database	872	50.3		
Bread, cereals and potatoes	138	52.9	Wholemeal rolls, corn flakes, sugar puffs, currant buns	Fresh pasta, cream crackers, oven chips, roast potatoes
Milk and dairy foods	99	68.7	Half fat crème fraiche, whole milk, camembert, cheddar, low fat yoghurt	Semi-skimmed milk, cottage cheese, Greek yoghurt
Fruit and vegetables	122	0.0		All fruit and vegetables
Meat, fish and alternatives	182	58.2	Lamb leg, chicken leg, beefsteak, cod	Lentils, mackerel, walnuts, boiled egg
Foods high in fat, foods high in sugar	73	80.8	Choc chip cookies, Mars bar, cola, butter, crisps, jam doughnuts	Olive oil

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'Healthier' indicators	112	0.9	Porridge	
'Less healthy' indicators	76	94.7		Biscuits, crispie cakes, Bombay mix

### Appendix 6 – Results of eight models testing definitions of ‘foods high in fat, salt or sugar’, ‘intermediate foods’ and ‘healthier food choices’

<b>Model 1 TAg/1</b>	Simple threshold, per 100g, group A: ‘healthier food choices’ if <300kJ energy per 100g AND <0.9g saturated fat per 100g AND <2.1g NME sugar AND <80mg sodium per 100g. ‘foods high in fat, salt or sugar’ if >1790kJ energy per 100g OR >5.2g saturated fat per 100g OR >12.6g NME sugar per 100g OR 470mg sodium per 100g					
<b>Rationale</b>	One thirtieth of GDAs and one fifth of GDAs – FSA advice on what counts as ‘a little’ and ‘a lot’					
<b>Score</b>	<b>61.6</b>					
<b>Subset of foods</b>	<b>N</b>	<b>% ‘healthier food choices’</b>	<b>% ‘foods high in fat, salt or sugar’</b>	<b>Examples of ‘healthier food choices’</b>	<b>Examples of intermediate foods</b>	<b>Examples of ‘foods high in fat, salt or sugar’</b>
Abridged M&W database	995	11.1	47.4			
Bread, cereals and potatoes	108	1.9	58.3		Oven chips, fresh pasta, roast potatoes	Cream crackers, wholemeal rolls, corn flakes, currant buns, sugar puffs
Milk and dairy products	84	8.3	47.6		Yoghurt, semi-skimmed milk, whole milk, cottage cheese	Camembert, cheddar, half fat crème fraiche
Fruit and vegetables	119	70.6	5.0	Canned pineapple, raw peaches, lettuce	Orange juice, avocado, celery, grilled tomato	Currants
Meat, fish and alternatives	189	0.0	51.3		Lentils, cod, boiled egg, chicken leg, beefsteak, roast lamb, mackerel	Walnuts
Foods high in fat, foods high in sugar	144	0.0	92.4		Cola	Jam doughnuts, choc chip cookies, mars bar, olive oil, butter, low fat spread,

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						crisps
'Healthier' indicators	123	49.6	9.8			Bread, dried fruit and nuts
'Less healthy' indicators	84	0.0	83.3	None		

<b>Model 4 TakJ/1</b>	Simple threshold, per 100kJ, group A: 'healthier food choices' if <11kJ saturated fat per 100kJ AND <11kJ NME sugar per 100kJ AND <26mg sodium per 100kJ. 'foods high in fat, salt or sugar' if >16.5kJ saturated fat per 100kJ OR >16.5kJ NME sugar per 100kJ OR >40mg sodium per 100kJ.					
<b>Rationale</b>	'healthier food choices' thresholds are set at the CPG recommendation level (i.e. between medium low and medium high). 'foods high in fat, salt or sugar' thresholds are set at CPG high.					
<b>Score</b>	<b>73.1</b>					
<b>Subset of foods</b>	<b>N</b>	<b>% 'healthier food choices'</b>	<b>% 'foods high in fat, salt or sugar'</b>	<b>Examples of 'healthier food choices'</b>	<b>Examples of intermediate foods</b>	<b>Examples of 'foods high in fat, salt or sugar'</b>
Abridged M&W database	989	19.3	70.3			
Bread, cereals and potatoes	106	30.2	65.1	Oven chips, fresh pasta, roast potatoes	Cream crackers	Wholemeal rolls, currant buns, corn flakes, sugar puffs
Milk and dairy products	85	3.5	90.6			Semi-skimmed milk, whole milk, yoghurt, half fat crème fraiche, cheddar, camembert, cottage cheese
Fruit and vegetables	119	70.6	24.4	Canned pineapple, raw peaches, lettuce		Orange juice, currants, celery, grilled tomato, avocado
Meat, fish and alternatives	184	21.7	62.0	Walnuts, lentils	Mackerel	Cod, boiled egg, roast lamb, chicken leg, beefsteak
Foods high in fat, foods high in sugar	143	0.7	95.1		Olive oil	Mars bar, choc chip cookies, cola, jam doughnuts, butter, low fat

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						spread, crisps
'Healthier' indicators	123	73.2	18.7			Bread, fruit juice, dried fruit, some vegetables
'Less healthy' indicators	84	1.2	92.9	Cod in batter		

<b>Model 11 TCg</b>	Simple threshold, per 100g, group C: 'healthier food choices' if <1340kJ energy AND <3.9g sats AND <9.5g NMES AND <350mg sodium AND (100% fruit or vegetable OR >0.1g n-3 OR >230mg calcium OR >3.4mg iron). 'foods high in fat, salt or sugar' if >1340kJ energy OR >3.9g sats OR >9.5g NMES OR >350mg sodium AND <0.1g n-3 AND <100% fruit or vegetable AND <5mg iron AND <345mg calcium.					
<b>Rationale</b>	For energy, sats, NMES and sodium, thresholds are 15% of GDA. For n-3, the threshold is 25% of the GDA. For calcium and iron, the threshold is 33.3% of GDA. Fruit and vegetable criteria can vary between 80-100%.					
<b>Score</b>	<b>76.1</b>					
<b>Subset of foods</b>	<b>N</b>	<b>% 'healthier food choices'</b>	<b>% 'foods high in fat, salt or sugar'</b>	<b>Examples of 'healthier food choices'</b>	<b>Examples of intermediate foods</b>	<b>Examples of 'foods high in fat, salt or sugar'</b>
Abridged M&W database	943	20.6	45.4			
Bread, cereals and potatoes	107	0.9	51.4		Sugar puffs, corn flakes, oven chips, fresh pasta, roast potatoes	Cream crackers, wholemeal rolls, currant buns
Milk and dairy products	85	0.0	34.1		Cheddar, camembert, low fat yoghurt, semi-skimmed milk, whole milk, cottage cheese	Half fat crème fraiche, greek yoghurt
Fruit and vegetables	122	89.3	0.0	Orange juice, canned pineapple, peaches, grilled tomatoes, lettuce, celery	Currants, avocado	
Meat, fish and alternatives	160	14.4	50.0	Lentils, mackerel, cod	Roast lamb, boiled egg	Chicken leg, beefsteak, walnuts
Foods high in fat, foods high in sugar	131	0.8	86.3		Butter	Cola, jam doughnuts, choc chip cookies, mars bar, olive oil, crisps, low fat

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						spread
'Healthier' indicators	117	76.9	7.7			Bread and nuts
'Less healthy' indicators	82	1.2	84.1	Takeaway prawn curry		

<b>Model 8 TBg/s</b>	Simple threshold, per 100g/per serving, group B: ‘healthier food choices’ if (<895kJ energy per 100g AND <1490kJ energy per serving AND <2.6g sats per 100g AND <4.3g sats per serving AND <6.3g NMES per 100g AND <10.5g NMES per serving AND <235mg sodium per 100g AND <390mg sodium per serving) OR 100% fruit or vegetable OR >0.1g n-3 per 100g OR >0.2g n-3 per serving. ‘foods high in fat, salt or sugar’ if >1790kJ energy per 100g OR >2980kJ energy per serving OR >5.2g sats per 100g OR >8.7g sats per serving OR >12.6g NMES per 100g OR >21g NMES per serving OR >470mg sodium per 100g OR >785mg sodium per 100g AND <100% fruit and vegetable content AND <0.1g n-3 fatty acids per 100g AND <0.2g n-3 fatty acids per serving.					
<b>Rationale</b>	‘healthier food choices’ thresholds set at 10% of GDAs for energy, sats, NMES and sodium per 100g, and one sixth of GDAs per serving; 25% of GDA for n-3 per 100g and 50% of GDA per serving. ‘foods high in fat, salt or sugar’ thresholds set at 20% of GDAs for energy, sats, NMES and sodium per 100g, and one third of GDAs per serving. Fruit and vegetable criteria can vary between 80-100%.					
<b>Score</b>	<b>88.1</b>					
<b>Subset of foods</b>	<b>N</b>	<b>% ‘healthier food choices’</b>	<b>% ‘foods high in fat, salt or sugar’</b>	<b>Examples of ‘healthier food choices’</b>	<b>Examples of intermediate foods</b>	<b>Examples of ‘foods high in fat, salt or sugar’</b>
Abridged M&W database	972	35.6	51.3			
Bread, cereals and potatoes	108	18.5	61.1	Oven chips, roast potatoes	Fresh pasta	Cream crackers, wholemeal rolls, corn flakes, sugar puffs, currant buns
Milk and dairy products	85	22.4	52.9	Semi-skimmed milk	Yoghurt, whole milk, cottage cheese	Camembert, cheddar, half fat crème fraiche
Fruit and vegetables	125	100.0	0.0	All fruit and vegetables		
Meat, fish and alternatives	169	39.1	49.7	Mackerel, cod, lentils	Roast lamb, boiled egg	Beefsteak, chicken leg, walnuts

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Foods high in fat, foods high in sugar	143	3.5	93.7	Butter		Choc chip cookies, cola, mars bar, jam doughnuts, olive oil, low fat spread, crisps
'Healthier' indicators	123	90.2	8.1			Bread and nuts
'Less healthy' indicators	83	0.0	94.0	None		

<b>Model 10 TBkJ/s</b>	Simple threshold, per 100kJ/per serving, group B: ‘healthier food choices’ if <1490kJ energy per serving AND (<11kJ sats per 100kJ OR <1.8g sats per serving) AND (<11kJ NMES per 100kJ OR <4.4g NMES per serving) AND (<26mg sodium per 100kJ OR <165mg sodium per serving) OR 100% fruit and vegetables OR (<0.02g n-3 per 100kJ AND <0.2g n-3 per serving). ‘foods high in fat, salt or sugar’ if >2980kJ energy per serving OR (>16.5kJ sats per 100kJ AND >1.8g sats per serving) OR (>16.5kJ NMES per 100kJ AND >4.4g NMES per serving) OR (>40mg sodium per 100kJ AND >165mg sodium per serving) AND <100% fruit and veg content AND (<0.02g n-3 fatty acids per 100kJ OR <0.2g n-3 fatty acid per serving)					
<b>Rationale</b>	‘healthier food choices’ thresholds set at one sixth of GDA for energy; 150% of recommendation for sats, NMES and sodium per 100kJ; 7% of GDA for sats, NMES and sodium per serving; 5% of GDA for n-3 per 100kJ and 50% of GDA per serving. ‘foods high in fat, salt or sugar’ thresholds set at one third of GDA for energy; recommendations for sats, NMES and sodium per 100kJ; 7% of GDA for sats, NMES and sodium per serving; 6% of GDA for n-3 per 100kJ and 100% of GDA per serving. Fruit and vegetable criteria can vary between 80-100%.					
<b>Score</b>	<b>93.8</b>					
<b>Subset of foods</b>	<b>N</b>	<b>% ‘healthier food choices’</b>	<b>% ‘foods high in fat, salt or sugar’</b>	<b>Examples of ‘healthier food choices’</b>	<b>Examples of intermediate foods</b>	<b>Examples of ‘foods high in fat, salt or sugar’</b>
Abridged M&W database	968	40.0	52.8			
Bread, cereals and potatoes	107	34.6	55.1	Oven chips, roast potatoes, cream crackers	Fresh pasta	Wholemeal rolls, corn flakes, sugar puffs, currant buns
Milk and dairy products	85	17.6	82.4	Cottage cheese		Camembert, cheddar, yoghurt, semi-skimmed milk, whole milk, half fat crème fraiche
Fruit and vegetables	125	100.0	0.0	All fruit and vegetables		
Meat, fish and	167	40.1	49.1	Cod, mackerel, lentils,		Beefsteak, chicken leg,

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alternatives				walnuts, boiled egg		roast lamb
Foods high in fat, foods high in sugar	141	19.9	77.3	Olive oil, low fat spread		Jam doughnuts, cola, mars bar, choc chip cookies, butter, crisps
'Healthier' indicators	122	97.5	1.6			Porridge, wholemeal bread
'Less healthy' indicators	83	1.2	92.8	Crispie cakes		

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<b>Model 21 SSBg</b>	Scoring system, per 100g, group B: Scoring bands as follows: Energy, 0-450kJ = 0; 450-900kJ = 1; 900-1350kJ = 2, etc. to maximum of 5 points. Sats, 0-1.3g = 0; 1.3-2.6g = 1; 2.6-3.9g = 2, etc. to maximum of 5 points. NMES, 0-3.2g = 0; 3.2-6.4g = 1; 6.4-9.6g = 2, etc. to maximum of 5 points. Sodium, 0-120mg = 0; 120-240mg = 1; 240-360mg = 2, etc. to a maximum of 5 points. N-3, 0-30g = 0; 30-60g = 1; 60-90g = 2, etc. to a maximum of 5 points. Fruit and vegetables, 0 or 30% = 0; 50 or 70% = 1, 100% = 2. Final score = energy + sats + NMES + sodium – F&V – n-3. ‘healthier food choices’ if score is 0 or less, ‘foods high in fat, salt or sugar’ if score is 3 or more.					
<b>Rationale</b>	Energy, sats, NMES and sodium bands start at 0 and are each 5% of the GDA wide. The n-3 bands start at zero and are 7.5% of the GDA wide. The fruit and vegetable scores are arbitrary.					
<b>Score</b>	<b>82.9</b>					
<b>Subset of foods</b>	<b>N</b>	<b>% ‘healthier food choices’</b>	<b>% ‘foods high in fat, salt or sugar’</b>	<b>Examples of ‘healthier food choices’</b>	<b>Examples of intermediate foods</b>	<b>Examples of ‘foods high in fat, salt or sugar’</b>
Abridged M&W database	892	25.2	60.9			
Bread, cereals and potatoes	104	6.7	76.0		Fresh pasta, roast potatoes, oven chips	Wholemeal rolls, sugar puffs, currant buns, corn flakes, cream crackers
Milk and dairy products	81	16.0	59.3	Semi-skimmed milk	Whole milk, low fat yoghurt	Cottage cheese, greek yoghurt, half fat crème fraiche, camembert, cheddar
Fruit and vegetables	110	91.8	0.9	Orange juice, peaches, canned pineapple, lettuce, celery, grilled tomato	Avocado	
Meat, fish and alternatives	154	16.9	67.5	Cod, mackerel, lentils	Roast lamb	Boiled egg, beefsteak, chicken leg, walnuts
Foods high in	133	1.5	94.0			Cola, mars bar, choc chip

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fat, foods high in sugar						cookies, jam doughnuts, low fat spread, butter, olive oil, crisps
'Healthier' indicators	112	79.5	9.8			Bread and nuts
'Less healthy' indicators	77	0.0	96.1	Drinking chocolate, sunny delight, milkshake		

<b>Model 26 SSCg/s</b>	Scoring system, per 100g/per serving, group C: Per 100g score bands as follows: Energy, 0-450kJ = 0; 450-900kJ = 1; 900-1350kJ = 2, etc. (max 5). Sats, 0-1.3g = 0; 1.3-2.6g = 1; 2.6-3.9g = 2, etc. (max 5). NMES, 0-3.2g = 0; 3.2-6.4g = 1; 6.4-9.6g = 2, etc. (max 5). Sodium, 0-120mg = 0; 120-240mg = 1; 240-360mg = 2, etc. (max 5). N-3, 0-30mg = 0; 30-60mg = 1; 60-90mg = 2, etc. (max 5). Calcium, 0-105mg = 0; 105-210mg = 1; 210-315mg = 2, etc. (max 5). Iron, 0-1.5mg = 0; 1.5-3mg = 1; 3-4.5mg = 2, etc. (max 5). Fruit and vegetables, 0 or 30% = 0; 50% = 1; 70% = 2; 100% = 5. Per serving score bands as follows: Energy, 0-895kJ = 0; 895-1790kJ = 1; 1790-2685kJ = 2, etc. (max 5). Sats, 0-2.6g = 0; 2.6-5.2g = 1; 5.2-7.8g = 2, etc. (max 5). NMES, 0-6.3g = 0; 6.3-12.6g = 1; 12.6-18.9g = 2, etc. (max 5). Sodium, 0-235mg = 0; 235-470mg = 1; 470-705mg = 2, etc. (max 5). N-3, 0-60g = 0; 60-120g = 1; 120-180g = 2, etc. (max 5). Calcium, 0-105mg = 0; 105-210mg = 1; 210-315mg = 2, etc. (max 5). Iron, 0-1.5mg = 0; 1.5-3mg = 1; 3-4.5mg = 2, etc. (max 5). Final score = energy + sats + NMES + sodium – calcium – iron – n-3 – F&V. ‘healthier food choices’ if score is 0 or less, ‘foods high in fat, salt or sugar’ if score is 5 or over.					
<b>Rationale</b>	All bands start at zero. Energy, sats, NMES and sodium band widths are 5% of GDA per 100g and 10% of GDA per serving. Calcium and iron band widths are 15% of GDA per 100g and per serving. N-3 band widths are 7.5% of GDA per 100g and 15% of GDA per serving. The fruit and vegetable scores are arbitrary.					
<b>Score</b>	<b>83.4</b>					
<b>Subset of foods</b>	<b>N</b>	<b>% ‘healthier food choices’</b>	<b>% ‘foods high in fat, salt or sugar’</b>	<b>Examples of ‘healthier food choices’</b>	<b>Examples of intermediate foods</b>	<b>Examples of ‘foods high in fat, salt or sugar’</b>
Abridged M&W database	872	31.2	52.2			
Bread, cereals and potatoes	103	12.6	50.5		Fresh pasta, roast potatoes, sugar puffs, oven chips	Corn flakes, wholemeal rolls, currant buns, cream crackers
Milk and dairy products	81	30.9	51.9	Semi-skimmed milk, whole milk	Cottage cheese, low fat yoghurt, greek yoghurt	Half fat crème fraiche, cheddar, camembert
Fruit and vegetables	110	99.1	0.0	Orange juice, canned pineapple, peaches, avocado, lettuce, celery,		

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				grilled tomato		
Meat, fish and alternatives	153	24.8	55.6	Roast lamb, mackerel, cod, lentils	Boiled egg	Beefsteak, chicken leg, walnuts
Foods high in fat, foods high in sugar	122	4.1	91.0			Cola, mars bar, choc chip cookies, jam doughnuts, low fat spread, butter, olive oil, crisps
'Healthier' indicators	112	84.8	6.3			Nuts
'Less healthy' indicators	76	2.6	90.8	Drinking chocolate, takeaway prawn curry		

<b>Model 28 SSckJ/s</b>	Scoring system, per 100kJ/per serving, group C: Per 100kJ score bands as follows: Sats, 0-11kJ = 0; 11-16.5kJ = 1; 16.5-22kJ = 2, etc. (max 5). NMES, 0-11kJ = 0; 11-16.5kJ = 1; 16.5-22kJ = 2, etc. (max 5). Sodium, 0-26mg = 0; 26-40mg = 1; 40-52mg = 2, etc. (max 5). N-3, 0-20g = 0; 20-40g = 1; 40-60g = 3; >60g = 5. Calcium, 0-40mg = 0; 40-60mg = 1; 60-80mg = 2, etc. (max 5). Iron, 0-0.6mg = 0; 0.6-0.9mg = 1; 0.9-1.2mg = 2, etc. (max 5). Per serving score bands as follows: Energy, 0-1340kJ = 0; 1340-2010kJ = 1; 2010-2680kJ = 2, etc. (max 5). Sats, 0-1.8g = 0; 1.8-2.7g = 1; 2.7-3.6g = 2, etc. (max 5). NMES, 0-4.4g = 0; 4.4-6.6g = 1; 6.6-8.8g = 2, etc. (max 5). Sodium, 0-165mg = 0; 165-248mg = 1; 248-330mg = 2, etc. (max 5). N-3, 0-0.2g = 0; 0.2-0.3g = 1; 0.3-0.4g = 2, etc. (max 5). Calcium, 0-207mg = 0; 207-310mg = 1; 310-414mg = 2, etc. (max 5). Iron, 0-3mg = 0; 3-4.5mg = 1; 4.5-6mg = 2, etc. (max 5). For fruit and veg, 0-30% = 0 points, 50% = 1 point, 70% = 2 points, 100% = 5 points. Final score = energy + min(sats per 100kJ, sats per serv) + min(NMES per 100kJ, NMES per serv) + min (sodium per 100kJ, sodium per serv) – min(calcium per 100kJ, calcium per serv) – min(iron per 100kJ, iron per serv) – min(n-3 per 100kJ, n-3 per serv) – F&V. ‘healthier food choices’ if score is zero or less, ‘foods high in fat, salt or sugar’ if score is 3 or more.					
<b>Rationale</b>	All band widths are 50% of start point. Per 100kJ bands start at recommendation for sats, NMES and sodium. Calcium and iron start at 6% of GDA. N-3 start at 5% of GDA. Per serving bands for sats, NMES and sodium start at 7% of GDA, energy at 15%, n-3 at 50% of GDA, calcium and iron at 30% of GDA.					
<b>Score</b>	<b>91.0</b>					
<b>Subset of foods</b>	<b>N</b>	<b>% ‘healthier food choices’</b>	<b>% ‘foods high in fat, salt or sugar’</b>	<b>Examples of ‘healthier food choices’</b>	<b>Examples of intermediate foods</b>	<b>Examples of ‘foods high in fat, salt or sugar’</b>
Abridged M&W database	872	40.6	40.4			
Bread, cereals and potatoes	103	36.9	27.2	Cream crackers, oven chips, roast potatoes	Fresh pasta, corn flakes, wholemeal rolls	Currant buns, sugar puffs
Milk and dairy products	81	25.9	54.3	Semi-skimmed milk, cottage cheese	Greek yoghurt, half fat crème fraiche	Whole milk, low fat yoghurt, cheddar, camembert
Fruit and vegetables	110	100.0	0.0	All fruit and vegetables		

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Meat, fish and alternatives	153	34.0	42.5	Boiled egg, walnuts, mackerel, lentils	Cod, roast lamb	Beefsteak, chicken leg
Foods high in fat, foods high in sugar	122	15.6	68.9	Olive oil		Choc chip cookies, mars bar, cola, jam doughnuts, butter, crisps, low fat spread
'Healthier' indicators	112	97.3	0.9			Porridge
'Less healthy' indicators	76	1.3	86.8	Crispie cakes		

**Appendix 7. Results of testing twelve further models and possible modifications (NB. All data is collected *post* fortification. It has not been possible to acquire *pre* fortification data).**

<b>Model TAg3</b>	<b>Simple threshold model, Group A nutrients, per 100g:</b> 'healthier food choices' if =670kJ energy per 100g AND =2.0g sats per 100g AND =4.7g NMES per 100g AND =175mg sodium per 100g. 'foods high in fat, salt or sugar' if >1340kJ energy per 100g OR >3.9g sats per 100g OR >9.5g NMES per 100g OR >350mg sodium per 100g					
<b>Rationale</b>	Thresholds for 'healthier food choices' set at 7.5% of GDA. For 'foods high in fat, salt or sugar', set at 15% of GDA					
<b>Score</b>	<b>78.5</b>					
<b>Subset of foods</b>	<b>N</b>	<b>% 'healthier food choices'</b>	<b>% 'foods high in fat, salt or sugar'</b>	<b>Examples of 'healthier food choices'</b>	<b>Examples of intermediate foods</b>	<b>Examples of 'foods high in fat, salt or sugar'</b>
Abridged M&W database	1001	21.7	59.9			
Bread, cereals and potatoes	112	14.3	73.2	Roast potatoes, boiled potatoes, boiled rice, fried rice	Fresh pasta, oven chips, crispbread	Cream crackers, wholemeal rolls, corn flakes, sugar puffs, currant buns, French fries, crunchy nut corn flakes, malt loaf, potato croquettes, weetabix, white bread, wholemeal bread
Milk and dairy products	85	21.2	57.6	Semi-skimmed milk, low fat fromage frais, skimmed milk,	Cottage cheese, whole milk, low fat yoghurt, single cream, low fat fruit yoghurt	Camembert, cheddar, half fat crème fraiche, greek yoghurt, half fat cheddar, fromage frais
Fruit and vegetables	122	83.6	10.7	Peaches, canned pineapple, celery, lettuce, grilled	Orange juice	Currants, avocado

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				tomatoes		
Meat, fish and alternatives	186	12.9	64.0	Lentils, chicken breast, tofu	Mackerel, roast lamb, boiled egg, cod, lean mince, grilled steak, roast beef, tinned tuna	Chicken leg, walnuts, streaky bacon, chicken nuggets, fried egg, fish fingers, ham, sausages, fried steak
Foods high in fat, foods high in sugar	145	1.4	95.2	Diet cola		Cola, jam doughnuts, choc chip cookies, mars bar, olive oil, low fat spread, butter, crisps, digestives, jaffa cakes, kit kat, milky way, sponge cake, very low fat spread, margarine, low fat crisps
Composite foods	-	-	-	Soya milk, boiled celery	Chilli con carne, tinned sardines, canned strawberries, fried mushrooms, stewed rhubarb	Baked beans, shepherd's pie, fruit crumble, lasagne, salted peanuts, mayonnaise, low fat mayo, fruit pie
'Healthier' indicators	123	78.0	13.8			Bread, juices, nuts and dried fruit
'Less healthy' indicators	84	0.0	92.9			

<b>Model Tag4</b>	<b>Simple threshold model, Group A nutrients, per 100g:</b> 'healthier food choices' if =525kJ energy per 100g AND =2.0g sats per 100g AND =4.7g NMES per 100g AND =175mg sodium per 100g. 'foods high in fat, salt or sugar' if >1050kJ energy per 100g OR >3.9g sats per 100g OR >9.5g NMES per 100g OR >350mg sodium per 100g					
<b>Rationale</b>	Thresholds for 'healthier food choices' set at 7.5% of GDA. For 'foods high in fat, salt or sugar', set at 15% of GDA. Energy density 'healthier food choices' threshold set at 'healthier Western diet' <sup>11</sup> . 'foods high in fat, salt or sugar' level set at twice this.					
<b>Score</b>	<b>75.9</b>					
<b>Subset of foods</b>	<b>N</b>	<b>% 'healthier food choices'</b>	<b>% 'foods high in fat, salt or sugar'</b>	<b>Examples of 'healthier food choices'</b>	<b>Examples of intermediate foods</b>	<b>Examples of 'foods high in fat, salt or sugar'</b>
Abridged M&W database	1008	19.7	61.3			
Bread, cereals and potatoes	112	7.1	75.9	Boiled potatoes	Roast potatoes, oven chips, fresh pasta, boiled rice, fried rice	Corn flakes, sugar puffs, cream crackers, currant buns, wholemeal rolls, crispbread, crunchy nut corn flakes, malt loaf, potato croquettes, weetabix, white bread, wholemeal bread, wholemeal rolls
Milk and dairy products	85	21.2	57.6	Low fat fromage frais, skimmed milk, semi-skimmed milk	Cottage cheese, single cream, whole milk, low fat yoghurt, low fat fruit yoghurt	Camembert, cheddar, half fat cheddar, half fat crème fraiche, fromage frais, Greek yoghurt,
Fruit and	123	81.3	11.4	Peaches, canned pineapple,	Orange juice	Currants, avocado

<sup>11</sup> Prentice A.M., Jebb S. Fast foods, energy density and obesity: a possible mechanistic link. *Obesity reviews*, 2003; 4, 187-194.

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vegetables				celery, lettuce, grilled tomatoes		
Meat, fish and alternatives	188	9.0	64.4	Lentils, tofu	Lean mice, grilled steak, roast beef, chicken breast, cod, boiled egg, roast lamb, mackerel, tinned tuna	Streaky bacon, chicken nuggets, chicken leg, fried egg, fish fingers, ham, sausages, walnuts, fried steak
Foods high in fat, foods high in sugar	146	1.4	95.2	Diet cola		Choc chip cookies, cola, digestives, jam doughnuts, jaffa cakes, kit kat, mars bar, milky way, sponge cake, butter, very low fat spread, low fat spread, margarine, olive oil, crisps, low fat crisps
Composite foods	-	-	-	Soya milk, boiled celery	Chilli con carne, canned sardines, canned strawberries, fried mushrooms, stewed rhubarb	Baked beans, shepherd's pie, fruit crumble, lasagne, salted peanuts, mayonnaise, low fat mayo, fruit pie
'Healthier' indicators	123	72.4	14.6			Bread, fruit juice, dried fruit and nuts
'Less healthy' indicators	84	0.0	94.0			

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<b>Model TAg5</b>	<b>Simple threshold model, Group A nutrients, per 100g:</b> 'healthier food choices' if =6.2g fat per 100g AND =2.0g sats per 100g AND =4.7g NMES per 100g AND =175mg sodium per 100g. 'foods high in fat, salt or sugar' if >12.5g fat per 100g OR >3.9g sats per 100g OR >9.5g NMES per 100g OR >350mg sodium per 100g					
<b>Rationale</b>	Thresholds for 'healthier food choices' set at 7.5% of GDA. For 'foods high in fat, salt or sugar', set at 15% of GDA					
<b>Score</b>	<b>78.7</b>					
<b>Subset of foods</b>	<b>N</b>	<b>% 'healthier food choices'</b>	<b>% 'foods high in fat, salt or sugar'</b>	<b>Examples of 'healthier food choices'</b>	<b>Examples of intermediate foods</b>	<b>Examples of 'foods high in fat, salt or sugar'</b>
Abridged M&W database	1006	22.8	61.3			
Bread, cereals and potatoes	110	19.1	70.9	Boiled potatoes, roast potatoes, oven chips, fresh pasta, boiled rice, fried rice	Crispbread, weetabix	French fries, corn flakes, cream crackers, crunchy nut corn flakes, currant buns, malt loaf, potato croquettes, sugar puffs, white bread, wholemeal bread, wholemeal rolls
Milk and dairy products	85	22.4	57.6	Low fat fromage frais, skimmed milk, semi-skimmed milk, single cream	Cottage cheese, whole milk, low fat yoghurt, low fat fruit yoghurt	Camembert, cheddar, half fat cheddar, half fat crème fraiche, fromage frais, greek yoghurt
Fruit and vegetables	122	84.4	10.7	Peaches, canned pineapple, celery, lettuce, grilled tomatoes	Orange juice	Currants, avocado
Meat, fish and alternatives	191	15.7	67.5	Lentils, tofu, chicken breast	Lean mince, grilled steak, roast beef, cod, boiled egg, roast lamb, tinned tuna	Mackerel, streaky bacon, chicken nuggets, chicken leg, fried egg, fish fingers,

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						ham, sausages, walnuts, fried steak
Foods high in fat, foods high in sugar	145	2.1	94.5	Diet cola		Choc chip cookies, cola, digestives, jam doughnuts, jaffa cakes, kit kat, mars bar, milky way, sponge cake, butter, very low fat spread, low fat spread, margarine, olive oil, crisps, low fat crisps
Composite foods	-	-	-	Soya milk, boiled celery	Chilli con carne, canned strawberries, canned sardines, stewed rhubarb	Baked beans, shepherd's pie, fruit crumble, lasagne, salted peanuts, mayonnaise, low fat mayo, fruit pie, fried mushrooms
'Healthier' indicators	123	78.9	15.4			Oily fish, bread, fruit juice, dried fruit, nuts
'Less healthy' indicators	84	0.0	94.0			

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<b>Model TAg6 (previously TAg1)</b>	<b>Simple threshold model, Group A nutrients, per 100g:</b> ‘healthier food choices’ if <300kJ energy per 100g AND <0.9g saturated fat per 100g AND <2.1g NME sugar AND <80mg sodium per 100g. ‘foods high in fat, salt or sugar’ if >1790kJ energy per 100g OR >5.2g saturated fat per 100g OR >12.6g NME sugar per 100g OR 470mg sodium per 100g					
<b>Rationale</b>	‘healthier food choices’ thresholds set at one thirtieth of GDAs. ‘foods high in fat, salt or sugar’ thresholds set at one fifth of GDAs – FSA advice on what counts as ‘a little’ and ‘a lot’					
<b>Score</b>	<b>61.6</b>					
<b>Subset of foods</b>	<b>N</b>	<b>% ‘healthier food choices’</b>	<b>% ‘foods high in fat, salt or sugar’</b>	<b>Examples of ‘healthier food choices’</b>	<b>Examples of intermediate foods</b>	<b>Examples of ‘foods high in fat, salt or sugar’</b>
Abridged M&W database	995	11.1	47.4			
Bread, cereals and potatoes	108	1.9	58.3		Crispbread, boiled potatoes, roast potatoes, oven chips, fresh pasta, potato croquettes, weetabix, white bread, boiled rice, fried rice	French fries, corn flakes, cream crackers, crunchy nut corn flakes, currant buns, malt loaf, sugar puffs, wholemeal rolls, wholemeal bread
Milk and dairy products	84	8.3	47.6	Low fat fromage frais, skimmed milk	Cottage cheese, single cream, greek yoghurt, semi-skimmed milk, whole milk, low fat yoghurt, low fat fruit yoghurt	Camembert, cheddar, half fat cheddar, half fat crème fraiche, fromage frais
Fruit and vegetables	119	70.6	5.0	Peaches, canned pineapple, lettuce	Orange juice, avocado, celery, grilled tomato	Currants
Meat, fish and alternatives	189	0.0	51.3		Lean mince, fried steak, grilled steak, roast beef,	Streaky bacon, chicken nuggets, ham, sausages,

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					chicken breast, chicken leg, cod, boiled egg, fried egg, fish fingers, roast lamb, lentils, mackerel, tofu, tinned tuna	walnuts
Foods high in fat, foods high in sugar	144	0.0	92.4		Cola, diet cola	Choc chip cookies, digestives, jam doughnuts, jaffa cakes, kit kat, mars bar, milky way, sponge cake, butter, very low fat spread, low fat spread, margarine, olive oil, crisps, low fat crisps
Composite foods	-	-	-	Soya milk	Boiled celery, chilli con carne, shepherd's pie, fruit crumble, fruit pie, lasagne, fried mushrooms, stewed rhubarb, canned sardines, canned strawberries	Baked beans, mayonnaise, low fat mayo, salted peanuts
'Healthier' indicators	123	49.6	9.8			Bread, dried fruit and nuts
'Less healthy' indicators	84	0.0	83.3			

<b>Model TAg7</b>	<b>Simple threshold model, Group A nutrients, per 100g:</b> ‘healthier food choices’ if <525kJ energy per 100g AND <0.9g saturated fat per 100g AND <2.1g NME sugar AND <80mg sodium per 100g. ‘foods high in fat, salt or sugar’ if >1050kJ energy per 100g OR >5.2g saturated fat per 100g OR >12.6g NME sugar per 100g OR 470mg sodium per 100g					
<b>Rationale</b>	‘healthier food choices’ thresholds set at one thirtieth of GDAs. ‘foods high in fat, salt or sugar’ thresholds set at one fifth of GDAs – FSA advice on what counts as ‘a little’ and ‘a lot’. Energy thresholds set at level for ‘healthier Western diet’ <sup>12</sup> and twice this level.					
<b>Score</b>	<b>70.5</b>					
<b>Subset of foods</b>	<b>N</b>	<b>% ‘healthier food choices’</b>	<b>% ‘foods high in fat, salt or sugar’</b>	<b>Examples of ‘healthier food choices’</b>	<b>Examples of intermediate foods</b>	<b>Examples of ‘foods high in fat, salt or sugar’</b>
Abridged M&W database	1010	14.9	50.9			
Bread, cereals and potatoes	112	7.1	68.8	Boiled potatoes	Boiled rice, potato croquettes, roast potatoes, fresh pasta, oven chips, fried rice, white bread	Cream crackers, French fries, wholemeal rolls, wholemeal bread, crispbread, weetabix, corn flakes, currant buns, malt loaf, crunchy nut corn flakes, sugar puffs
Milk and dairy products	84	8.3	47.6	Low fat fromage frais, skimmed milk	Cottage cheese, whole milk, semi-skimmed milk, greek yoghurt, single cream, low fat yoghurt, low fat fruit yoghurt	Camembert, half fat cheddar, cheddar, half fat crème fraiche, fromage frais
Fruit and	123	78.0	5.7	Peaches, canned pineapple,	Orange juice, avocado,	Currants

<sup>12</sup> Prentice A.M., Jebb S. Fast foods, energy density and obesity: a possible mechanistic link. *Obesity reviews*, 2003; 4, 187-194.

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vegetables				celery, lettuce	grilled tomato	
Meat, fish and alternatives	191	5.2	53.4	Tofu, lentils	Chicken breast, roast beef, mackerel, roast lamb, fried steak, grilled steak, lean mince, chicken leg, boiled egg, fried egg, tinned tuna, cod, fish fingers	Streaky bacon, walnuts, ham, chicken nuggets, sausages
Foods high in fat, foods high in sugar	146	0.7	93.2	Diet cola	Cola	Digestives, jam doughnuts, sponge cake, choc chip cookies, kit kat, jaffa cakes, mars bar, milky way, olive oil, very low fat spread, low fat spread, margarine, butter, crisps, low fat crisps
Composite foods	-	-	-	Soya milk	Fried mushrooms, boiled celery, shepherd's pie, canned sardines, lasagne, chilli con carne, stewed rhubarb, canned strawberries, fruit crumble	Salted peanuts, mayonnaise, low fat mayo, baked beans, fruit pie
'Healthier' indicators	123	65.9	10.6			Bread, dried fruit and nuts
'Less healthy' indicators	84	0.0	85.7			

<b>Model Tag8</b>	<b>Simple threshold model, Group A nutrients, per 100g:</b> 'healthier food choices' if <2.8g fat per 100g AND <0.9g saturated fat per 100g AND <2.1g NME sugar AND <80mg sodium per 100g. 'foods high in fat, salt or sugar' if >16.6g fat per 100g OR >5.2g saturated fat per 100g OR >12.6g NME sugar per 100g OR 470mg sodium per 100g					
<b>Rationale</b>	'healthier food choices' thresholds set at one thirtieth of GDAs. 'foods high in fat, salt or sugar' thresholds set at one fifth of GDAs – FSA advice on what counts as 'a little' and 'a lot'					
<b>Score</b>	<b>71.9</b>					
<b>Subset of foods</b>	<b>N</b>	<b>% 'healthier food choices'</b>	<b>% 'foods high in fat, salt or sugar'</b>	<b>Examples of 'healthier food choices'</b>	<b>Examples of intermediate foods</b>	<b>Examples of 'foods high in fat, salt or sugar'</b>
Abridged M&W database	1001	15.6	49.3			
Bread, cereals and potatoes	107	14.0	59.8	Boiled potatoes, boiled rice, fresh pasta	Crispbread, white bread, weetabix, fried rice, oven chips, roast potatoes, potato croquettes	Corn flakes, sugar puffs, malt loaf, wholemeal bread, wholemeal rolls, crunchy nut corn flakes, currant buns, cream crackers, French fries
Milk and dairy products	84	8.3	47.6	Skimmed milk, low fat fromage frais	Low fat yoghurt, low fat fruit yoghurt, semi-skimmed milk, whole milk, cottage cheese, single cream, greek yoghurt	Fromage frais, half fat crème fraiche, half fat cheddar, camembert, cheddar
Fruit and vegetables	121	81.0	5.8	Canned pineapple, peaches, celery, lettuce	Orange juice, grilled tomato	Currants, avocado
Meat, fish and alternatives	190	6.3	54.2	Lentils, chicken breast	Cod, tofu, grilled steak, roast beef, lean mince, fish singers, tinned tuna, roast	Ham, chicken nuggets, chicken leg, mackerel, sausages, streaky bacon,

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					lamb, boiled egg, fried steak, fried egg	walnuts
Foods high in fat, foods high in sugar	145	0.7	92.4	Diet cola	Cola	Jaffa cakes, jam doughnuts, milky way, mars bar digestives, choc chip cookies, kit kat, sponge cake, very low fat spread, low fat spread, margarine, butter, olive oil, crisps, low fat crisps
Composite foods	-	-	-	Soya milk	Canned strawberries, stewed rhubarb, boiled celery, shepherd's pie, chilli con carne, fruit crumble, canned sardines, lasagne, fruit pie, fried mushrooms	Baked beans, mayonnaise, low fat mayo, salted peanuts
'Healthier' indicators	123	69.9	10.6			Bread, nuts, dried fruit and mackerel
'Less healthy' indicators	84	0.0	84.5			

<b>Model TCg3</b>	<b>Simple threshold, Group C nutrients, per 100g:</b> ‘healthier food choices’ if (=670kJ energy per 100g AND =2.0g sats per 100g AND =4.7g NMES per 100g AND =175mg sodium per 100g) OR (=1340kJ energy per 100g AND =3.9g sats per 100g AND =9.5g NMES per 100g AND =350mg sodium per 100g AND (>207mg calcium per 100g OR >3mg iron per 100g OR >0.1g n-3 per 100g OR 100% fruit and veg). ‘foods high in fat, salt or sugar’ if (>1340kJ energy per 100g OR >3.9g sats per 100g OR >9.5g NMES per 100g OR >350mg sodium per 100g) AND =207mg calcium per 100g AND =3mg iron per 100g AND =0.1g n-3 per 100g AND <100% fruit and veg.					
<b>Rationale</b>	Low thresholds set at 7.5% of GDAs for A nutrients, high thresholds at 15%. Thresholds set at 25% of GDA for n-3, 30% of GDA for C nutrients, and between 80 and 100% for fruit and vegetable content.					
<b>Score</b>	<b>78.5</b>					
<b>Subset of foods</b>	<b>N</b>	<b>% ‘healthier food choices’</b>	<b>% ‘foods high in fat, salt or sugar’</b>	<b>Examples of ‘healthier food choices’</b>	<b>Examples of intermediate foods</b>	<b>Examples of ‘foods high in fat, salt or sugar’</b>
Abridged M&W database	948	30.2	44.1			
Bread, cereals and potatoes	110	16.4	46.4	Boiled potatoes, crispbread, roast potatoes, boiled rice, fried rice	Fresh pasta, sugar puffs, oven chips, weetabix, corn flakes, crunchy nut corn flakes	Wholemeal bread, French fries, cream crackers, currant buns, malt loaf, potato croquettes, white bread, wholemeal rolls
Milk and dairy products	85	35.3	34.1	Low fat fromage frais, skimmed milk, semi-skimmed milk, whole milk	Single cream, cottage cheese, low fat yoghurt, low fat fruit yoghurt, camembert, cheddar, half fat cheddar	Half fat crème fraiche, fromage frais, greek yoghurt
Fruit and vegetables	122	89.3	0.0	Peaches, canned pineapple, orange juice, celery, lettuce, grilled tomato	Currants, avocado	

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Meat, fish and alternatives	161	19.3	49.7	Lentils, tofu, mackerel, chicken breast, grilled steak, cod, boiled egg, tinned tuna	Lean mice, roast beef, roast lamb	Walnuts, streaky bacon, chicken nuggets, sausages, chicken leg, fried egg, ham, fried steak
Foods high in fat, foods high in sugar	132	3.0	83.3	Diet cola	Digestives, butter	Choc chip cookies, cola, jam doughnuts, jaffa cakes, kit kat, mars bar, milky way, sponge cake, crisps, margarine, olive oil, low fat crisps
Composite foods	-	-	-	Soya milk, canned sardines, canned strawberries, boiled celery, fried mushrooms, stewed rhubarb	Chilli con carne, baked beans	Shepherd's pie, fruit crumble, lasagne, salted peanuts, mayonnaise, fruit pie
'Healthier' indicators	117	83.8	6.0			Bread and nuts
'Less healthy' indicators	82	2.4	81.7	Prawn curry, drinking chocolate		

<b>Model TCg4</b>	<b>Simple threshold, Group C nutrients, per 100g:</b> ‘healthier food choices’ if (=525kJ energy per 100g AND =2.0g sats per 100g AND =4.7g NMES per 100g AND =175mg sodium per 100g) OR (=1050kJ energy per 100g AND =3.9g sats per 100g AND =9.5g NMES per 100g AND =350mg sodium per 100g AND (>207mg calcium per 100g OR >3mg iron per 100g OR >0.1g n-3 per 100g OR 100% fruit and veg). ‘foods high in fat, salt or sugar’ if (>1050kJ energy per 100g OR >3.9g sats per 100g OR >9.5g NMES per 100g OR >350mg sodium per 100g) AND =207mg calcium per 100g AND =3mg iron per 100g AND =0.1g n-3 per 100g AND <100% fruit and veg.					
<b>Rationale</b>	Energy thresholds set at ‘healthier Western diet’ level <sup>13</sup> and twice this. Low thresholds set at 7.5% of GDAs for other A nutrients, high thresholds at 15%. Thresholds set at 25% of GDA for n-3, 30% of GDA for C nutrients, and between 80 and 100% for fruit and vegetable content.					
<b>Score</b>	<b>77.4</b>					
<b>Subset of foods</b>	<b>N</b>	<b>% ‘healthier food choices’</b>	<b>% ‘foods high in fat, salt or sugar’</b>	<b>Examples of ‘healthier food choices’</b>	<b>Examples of intermediate foods</b>	<b>Examples of ‘foods high in fat, salt or sugar’</b>
Abridged M&W database	954	25.9	44.2			
Bread, cereals and potatoes	110	7.3	48.2	Boiled potatoes	Corn flakes, sugar puffs, crunchy nut corn flakes, weetabix, crispbread, roast potatoes, oven chips, boiled rice, fried rice, fresh pasta	French fries, potato croquettes, wholemeal rolls, malt loaf, wholemeal bread, currant buns, cream crackers, white bread
Milk and dairy products	85	21.2	34.1	Skimmed milk, semi-skimmed milk, low fat fromage frais	Camembert, cheddar, half fat cheddar, single cream, whole milk, cottage cheese, low fat yoghurt, low fat	Half fat crème fraiche, fromage frais, greek yoghurt

<sup>13</sup> Prentice A.M., Jebb S. Fast foods, energy density and obesity: a possible mechanistic link. *Obesity reviews*, 2003; 4, 187-194.

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					fruit yoghurt	
Fruit and vegetables	123	88.6	0.0	Peaches, canned pineapple, orange juice, celery, lettuce, grilled tomatoes	Currants, avocado	
Meat, fish and alternatives	163	15.3	49.1	Grilled steak, cod, tinned tuna, mackerel, lentils, tofu	Chicken breast, roast lamb, roast beef, lean mince, boiled egg	Chicken leg, fried egg, ham, streaky bacon, chicken nuggets, walnuts, sausages, fried steak
Foods high in fat, foods high in sugar	132	2.3	83.3	Diet cola	Digestives, butter	Cola, jaffa cakes, sponge cake, jam doughnuts, choc chip cookies, milky way, mars bar, kit kat, olive oil, margarine, crisps, low fat crisps
Composite foods	-	-	-	Soya milk, canned strawberries, canned sardines, boiled celery, fried mushrooms, stewed rhubarb	Baked beans, chilli con carne	Lasagne, mayonnaise, shepherd's pie, salted peanuts, fruit crumble, fruit pie
'Healthier' indicators	117	80.3	6.0			Bread and nuts
'Less healthy' indicators	82	1.2	81.7	Prawn curry		

<b>Model TCg5</b>	<b>Simple threshold, Group C nutrients, per 100g:</b> ‘healthier food choices’ if (=6.2g fat per 100g AND =2.0g sats per 100g AND =4.7g NMES per 100g AND =175mg sodium per 100g) OR (=12.5g fat per 100g AND =3.9g sats per 100g AND =9.5g NMES per 100g AND =350mg sodium per 100g AND (>207mg calcium per 100g OR >3mg iron per 100g OR >0.1g n-3 per 100g OR 100% fruit and veg). ‘foods high in fat, salt or sugar’ if (>12.5g fat per 100g OR >3.9g sats per 100g OR >9.5g NMES per 100g OR >350mg sodium per 100g) AND =207mg calcium per 100g AND =3mg iron per 100g AND =0.1g n-3 per 100g AND <100% fruit and veg.					
<b>Rationale</b>	Low thresholds set at 7.5% of GDAs for A nutrients, high thresholds at 15%. Thresholds set at 25% of GDA for n-3, 30% of GDA for C nutrients, and between 80 and 100% for fruit and vegetable content.					
<b>Score</b>	<b>79.6</b>					
<b>Subset of foods</b>	<b>N</b>	<b>% ‘healthier food choices’</b>	<b>% ‘foods high in fat, salt or sugar’</b>	<b>Examples of ‘healthier food choices’</b>	<b>Examples of intermediate foods</b>	<b>Examples of ‘foods high in fat, salt or sugar’</b>
Abridged M&W database	953	29.0	44.5			
Bread, cereals and potatoes	109	22.0	48.6	Crispbread, weetabix, boiled potatoes, boiled rice, fresh pasta, fried rice, oven chips, roast potatoes	Corn flakes, sugar puffs, crunchy nut corn flakes	White bread, malt loaf, wholemeal bread, wholemeal rolls, currant buns, potato croquettes, cream crackers, French fries
Milk and dairy products	85	22.4	34.1	Low fat fromage frais, skimmed milk, semi-skimmed milk, single cream	Camembert, cheddar, half fat cheddar, low fat yoghurt, low fat fruit yoghurt, whole milk, cottage cheese	Greek yoghurt, fromage frais, half fat crème fraiche
Fruit and vegetables	122	89.3	0.0	Canned pineapple, peaches, orange juice,	Currants, avocado	

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				celery, lettuce, grilled tomatoes		
Meat, fish and alternatives	166	20.5	48.8	Lentils, cod, tofu, grilled steak, tinned tuna, chicken breast	Mackerel, roast beef, lean mince, roast lamb, boiled egg	Ham, chicken nuggets, fried egg, chicken leg, sausages, streaky bacon, walnuts, fried steak
Foods high in fat, foods high in sugar	132	3.0	82.6	Diet cola	Digestives, butter	Cola, jaffa cakes, jam doughnuts, milky way, mars bar, choc chip cookies, kit kat, sponge cake, crisps, low fat crisps, margarine, olive oil
Composite foods	-	-	-	Canned strawberries, soya milk, canned sardines, boiled celery, stewed rhubarb	Baked beans, chilli con carne, fried mushrooms	Shepherd's pie, fruit crumble, lasagne, salted peanuts, mayonnaise, fruit pie
'Healthier' indicators	117	84.6	6.0			Bread and nuts
'Less healthy' indicators	82	1.2	81.7	Prawn curry		

<b>Model TCg3d</b>	<b>Simple threshold, Group C nutrients, per 100g:</b> FOR NON-DRINKS: ‘healthier food choices’ if (=670kJ energy per 100g AND =2.0g sats per 100g AND =4.7g NMES per 100g AND =175mg sodium per 100g) OR (=1340kJ energy per 100g AND =3.9g sats per 100g AND =9.5g NMES per 100g AND =350mg sodium per 100g AND (>207mg calcium per 100g OR >3mg iron per 100g OR >0.1g n-3 per 100g OR 100% fruit and veg). ‘foods high in fat, salt or sugar’ if (>1340kJ energy per 100g OR >3.9g sats per 100g OR >9.5g NMES per 100g OR >350mg sodium per 100g) AND =207mg calcium per 100g AND =3mg iron per 100g AND =0.1g n-3 per 100g AND <100% fruit and veg. FOR DRINKS: All thresholds set at 50% of non-drink thresholds (apart from fruit and vegetable content threshold, which is kept the same).					
<b>Rationale</b>	Low thresholds set at 7.5% of GDAs for A nutrients, high thresholds at 15%. Thresholds set at 25% of GDA for n-3, 30% of GDA for C nutrients, and between 80 and 100% for fruit and vegetable content.					
<b>Score</b>	<b>78.9</b>					
<b>Subset of foods</b>	<b>N</b>	<b>% ‘healthier food choices’</b>	<b>% ‘foods high in fat, salt or sugar’</b>	<b>Examples of ‘healthier food choices’</b>	<b>Examples of intermediate foods</b>	<b>Examples of ‘foods high in fat, salt or sugar’</b>
Abridged M&W database	948	27.5	45.4			
Bread, cereals and potatoes	110	16.4	46.4	Boiled potatoes, crispbread, roast potatoes, boiled rice, fried rice	Fresh pasta, sugar puffs, oven chips, weetabix, corn flakes, crunchy nut corn flakes	Wholemeal bread, French fries, cream crackers, currant buns, malt loaf, potato croquettes, white bread, wholemeal rolls
Milk and dairy products	85	21.2	36.5	Low fat fromage frais, skimmed milk, semi-skimmed milk	Cottage cheese, low fat yoghurt, low fat fruit yoghurt, camembert, cheddar, half fat cheddar, whole milk	Half fat crème fraiche, fromage frais, greek yoghurt, single cream
Fruit and vegetables	122	87.7	0.0	Peaches, canned pineapple, celery, lettuce,	Currants, avocado, orange juice	

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				grilled tomato		
Meat, fish and alternatives	161	19.3	49.7	Lentils, tofu, mackerel, chicken breast, grilled steak, cod, boiled egg, tinned tuna	Lean mice, roast beef, roast lamb	Walnuts, streaky bacon, chicken nuggets, sausages, chicken leg, fried egg, ham, fried steak
Foods high in fat, foods high in sugar	132	1.5	84.1	Diet cola	Digestives, butter	Choc chip cookies, cola, jam doughnuts, jaffa cakes, kit kat, mars bar, milky way, sponge cake, crisps, margarine, olive oil, low fat crisps
Composite foods	-	-	-	Soya milk, canned sardines, canned strawberries, boiled celery, fried mushrooms, stewed rhubarb	Chilli con carne, baked beans	Shepherd's pie, fruit crumble, lasagne, salted peanuts, mayonnaise, fruit pie
'Healthier' indicators	117	82.1	6.0			Bread and nuts
'Less healthy' indicators	82	1.2	82.9	Prawn curry, drinking chocolate		

<b>Model TCg3f</b>	<b>Simple threshold, Group C nutrients, per 100g:</b> ‘healthier food choices’ if (=670kJ energy per 100g AND =2.0g sats per 100g AND =4.7g NMES per 100g AND =175mg sodium per 100g) OR (=1340kJ energy per 100g AND =3.9g sats per 100g AND =9.5g NMES per 100g AND =350mg sodium per 100g AND (>207mg calcium per 100g OR >3mg iron per 100g OR >0.1g n-3 per 100g OR 100% fruit and veg OR >5.1g fibre per 100g). ‘foods high in fat, salt or sugar’ if (>1340kJ energy per 100g OR >3.9g sats per 100g OR >9.5g NMES per 100g OR >350mg sodium per 100g) AND =207mg calcium per 100g AND =3mg iron per 100g AND =0.1g n-3 per 100g AND <100% fruit and veg AND =5.1g fibre per 100g.					
<b>Rationale</b>	Low thresholds set at 7.5% of GDAs for A nutrients, high thresholds at 15%. Thresholds set at 25% of GDA for n-3, 30% of GDA for C nutrients (and fibre), and between 80 and 100% for fruit and vegetable content.					
<b>Score</b>	<b>78.0</b>					
<b>Subset of foods</b>	<b>N</b>	<b>% ‘healthier food choices’</b>	<b>% ‘foods high in fat, salt or sugar’</b>	<b>Examples of ‘healthier food choices’</b>	<b>Examples of intermediate foods</b>	<b>Examples of ‘foods high in fat, salt or sugar’</b>
Abridged M&W database	948	32.4	42.7			
Bread, cereals and potatoes	110	30.0	45.5	Boiled potatoes, crispbread, roast potatoes, boiled rice, fried rice, weetabix	Fresh pasta, sugar puffs, oven chips, corn flakes, crunchy nut corn flakes	Wholemeal bread, French fries, cream crackers, currant buns, malt loaf, potato croquettes, white bread, wholemeal rolls
Milk and dairy products	85	35.3	34.1	Low fat fromage frais, skimmed milk, semi-skimmed milk, whole milk	Single cream, cottage cheese, low fat yoghurt, low fat fruit yoghurt, camembert, cheddar, half fat cheddar	Half fat crème fraiche, fromage frais, greek yoghurt
Fruit and vegetables	122	90.2	0.0	Peaches, canned pineapple, orange juice, celery, lettuce, grilled tomato	Currants, avocado	

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Meat, fish and alternatives	161	21.1	47.8	Lentils, tofu, mackerel, chicken breast, grilled steak, cod, boiled egg, tinned tuna	Lean mice, roast beef, roast lamb	Walnuts, streaky bacon, chicken nuggets, sausages, chicken leg, fried egg, ham, fried steak
Foods high in fat, foods high in sugar	132	3.8	78.8	Diet cola	Digestives, butter, crisps, low fat crisps	Choc chip cookies, cola, jam doughnuts, jaffa cakes, kit kat, mars bar, milky way, sponge cake, margarine, olive oil
Composite foods	-	-	-	Soya milk, canned sardines, canned strawberries, boiled celery, fried mushrooms, stewed rhubarb	Chilli con carne, baked beans, salted peanuts	Shepherd's pie, fruit crumble, lasagne, mayonnaise, fruit pie
'Healthier' indicators	117	85.5	5.1			Bread and nuts
'Less healthy' indicators	82	3.7	79.3	Prawn curry, drinking chocolate		

<b>Model SSCg3</b>	<b>Simple scoring system, group C nutrients, per 100g:</b> Per 100g scoring bands as follows (to maximum of 10 points per nutrient/food component): Energy, =335kJ = 0; 335-670kJ = 1; 670-1005kJ = 2, etc. Sats, =1.0g = 0; 1.0-2.0g = 1; 1.0-2.0g = 2, etc. NMES, =2.4g = 0; 2.4-4.8g = 1; 4.8-7.2g = 2, etc. Sodium, =90mg = 0; 90-180mg = 1; 180-270mg = 2, etc. Calcium, =105mg = 0; 105-210mg = 1; 210-315mg = 2, etc. Iron, =1.5mg = 0; 1.5-3.0mg = 1; 3.0-4.5mg = 2, etc. n-3, =0.05g = 0; 0.05-0.10g = 1; 0.10-0.15g = 2, etc. Fruit and vegetable, 0-30% = 0; 50% = 2; 70% = 4; 100% = 10. Total score = A nutrients – B nutrients – C nutrients. ‘healthier food choices’ if score is 2 or less. ‘foods high in fat, salt or sugar’ if score is 9 or more.					
<b>Rationale</b>	For A nutrients, score bands start at 3.75% of GDA and are 3.75% of GDA wide. For calcium and iron, bands start at 15% of GDA and are 15% wide. For n-3 fatty acids, bands start at 12.5% of GDA and are 12.5% wide. Fruit and vegetable scores are arbitrary.					
<b>Score</b>	<b>86.2</b>					
<b>Subset of foods</b>	<b>N</b>	<b>% ‘healthier food choices’</b>	<b>% ‘foods high in fat, salt or sugar’</b>	<b>Examples of ‘healthier food choices’</b>	<b>Examples of intermediate foods</b>	<b>Examples of ‘foods high in fat, salt or sugar’</b>
Abridged M&W database	895	38.7	36.9			
Bread, cereals and potatoes	103	24.3	35.9	Boiled potatoes, boiled rice, roast potatoes, weetabix, fresh pasta, fried rice	Oven chips, crispbread, wholemeal bread, white bread, potato croquettes, wholemeal rolls	Sugar puffs, French fries, currant buns, corn flakes, malt loaf, cream crackers, crunchy nut corn flakes
Milk and dairy products	82	39.0	45.1	Skimmed milk, low fat fromage frais, semi-skimmed milk, whole milk, low fat yoghurt, low fat fruit yoghurt	Single cream, cottage cheese, fromage frais, Greek yoghurt	Half fat cheddar, half fat crème fraiche, cheddar, camembert
Fruit and vegetables	121	98.3	0.0	Peaches, canned pineapple, orange juice, celery, lettuce, grilled tomato,	Currants	

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				avocado		
Meat, fish and alternatives	154	25.3	43.5	Lentils, mackerel, tofu, tinned tuna, chicken breast, cod, grilled steak	Roast beef, roast lamb, boiled egg, lean mince, fried egg, chicken leg, fried steak	Chicken nuggets, walnuts, ham, sausages, streaky bacon
Foods high in fat, foods high in sugar	125	4.8	85.6	Diet cola	Cola	Jam doughnuts, jaffa cakes, digestives, sponge cake, milky way, kit kat, mars bar, choc chip cookies, olive oil, low fat crisps, crisps, butter, margarine
Composite foods	-	-	-	Soya milk, canned sardines, canned strawberries, baked beans, boiled celery, fried mushrooms, stewed rhubarb	Chilli con carne, shepherd's pie, fruit crumble	Lasagne, salted peanuts, mayonnaise, fruit pie
'Healthier' indicators	117	89.7	4.3			Nuts
'Less healthy' indicators	77	0.0	87.0			

<b>Model SSCg4</b>	<b>Simple scoring system, group C nutrients, per 100g:</b> Per 100g scoring bands as follows (to maximum of 10 points per nutrient/food component): Energy, =265kJ = 0; 265-530kJ = 1; 530-795kJ = 2, etc. Sats, =1.0g = 0; 1.0-2.0g = 1; 1.0-2.0g = 2, etc. NMES, =2.4g = 0; 2.4-4.8g = 1; 4.8-7.2g = 2, etc. Sodium, =90mg = 0; 90-180mg = 1; 180-270mg = 2, etc. Calcium, =105mg = 0; 105-210mg = 1; 210-315mg = 2, etc. Iron, =1.5mg = 0; 1.5-3.0mg = 1; 3.0-4.5mg = 2, etc. n-3, =0.05g = 0; 0.05-0.10g = 1; 0.10-0.15g = 2, etc. Fruit and vegetable, 0-30% = 0; 50% = 2; 70% = 4; 100% = 10. Total score = A nutrients – B nutrients – C nutrients. ‘healthier food choices’ if score is 2 or less. ‘foods high in fat, salt or sugar’ if score is 9 or more.					
<b>Rationale</b>	For sats, NMES and sodium, score bands start at 3.75% of GDA and are 3.75% of GDA wide. For energy, score bands start at (and have width of) half the ‘healthier Western diet’ level <sup>14</sup> . For calcium and iron, bands start at 15% of GDA and are 15% wide. For n-3 fatty acids, bands start at 12.5% of GDA and are 12.5% wide. Fruit and vegetable scores are arbitrary.					
<b>Score</b>	<b>86.7</b>					
<b>Subset of foods</b>	<b>N</b>	<b>% ‘healthier food choices’</b>	<b>% ‘foods high in fat, salt or sugar’</b>	<b>Examples of ‘healthier food choices’</b>	<b>Examples of intermediate foods</b>	<b>Examples of ‘foods high in fat, salt or sugar’</b>
Abridged M&W database	895	36.1	40.2			
Bread, cereals and potatoes	103	17.5	45.6	Boiled potatoes, boiled rice, roast potatoes, weetabix, fresh pasta	Oven chips, crispbread, wholemeal bread, white bread, potato croquettes, wholemeal rolls, fried rice	Sugar puffs, French fries, currant buns, corn flakes, malt loaf, cream crackers, crunchy nut corn flakes
Milk and dairy products	82	32.9	45.1	Skimmed milk, low fat fromage frais, semi-skimmed milk, whole milk, low fat yoghurt	Single cream, cottage cheese, fromage frais, Greek yoghurt, low fat fruit yoghurt	Half fat cheddar, half fat crème fraiche, cheddar, camembert
Fruit and vegetables	121	97.5	0.0	Peaches, canned pineapple, orange juice, celery,	Currants	

<sup>14</sup> Prentice A.M., Jebb S. Fast foods, energy density and obesity: a possible mechanistic link. *Obesity reviews*, 2003; 4, 187-194.

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				lettuce, grilled tomato, avocado		
Meat, fish and alternatives	154	24.7	47.4	Lentils, mackerel, tofu, tinned tuna, chicken breast, cod, grilled steak	Roast beef, roast lamb, boiled egg, lean mince, fried egg, chicken leg, fried steak	Chicken nuggets, walnuts, ham, sausages, streaky bacon
Foods high in fat, foods high in sugar	125	4.8	86.4	Diet cola	Cola	Jam doughnuts, jaffa cakes, digestives, sponge cake, milky way, kit kat, mars bar, choc chip cookies, olive oil, low fat crisps, crisps, butter, margarine
Composite foods	-	-	-	Soya milk, canned sardines, canned strawberries, baked beans, boiled celery, fried mushrooms, stewed rhubarb	Chilli con carne, shepherd's pie, fruit crumble	Lasagne, salted peanuts, mayonnaise, fruit pie
'Healthier' indicators	117	88.9	5.1			Nuts
'Less healthy' indicators	77	0.0	89.6			

<b>Model SSCg5</b>	<b>Simple scoring system, group C nutrients, per 100g:</b> Per 100g scoring bands as follows (to maximum of 10 points per nutrient/food component): Fat, =3.1g = 0; 3.1-6.2g = 1; 6.2-9.3g = 2, etc. Sats, =1.0g = 0; 1.0-2.0g = 1; 1.0-2.0g = 2, etc. NMES, =2.4g = 0; 2.4-4.8g = 1; 4.8-7.2g = 2, etc. Sodium, =90mg = 0; 90-180mg = 1; 180-270mg = 2, etc. Calcium, =105mg = 0; 105-210mg = 1; 210-315mg = 2, etc. Iron, =1.5mg = 0; 1.5-3.0mg = 1; 3.0-4.5mg = 2, etc. n-3, =0.05g = 0; 0.05-0.10g = 1; 0.10-0.15g = 2, etc. Fruit and vegetable, 0-30% = 0; 50% = 2; 70% = 4; 100% = 10. Total score = A nutrients – B nutrients – C nutrients. ‘healthier food choices’ if score is 2 or less. ‘foods high in fat, salt or sugar’ if score is 9 or more.					
<b>Rationale</b>	For sats, NMES and sodium and fat, score bands start at 3.75% of GDA and are 3.75% of GDA wide. For calcium and iron, bands start at 15% of GDA and are 15% wide. For n-3 fatty acids, bands start at 12.5% of GDA and are 12.5% wide. Fruit and vegetable scores are arbitrary.					
<b>Score</b>	<b>84.7</b>					
<b>Subset of foods</b>	<b>N</b>	<b>% ‘healthier food choices’</b>	<b>% ‘foods high in fat, salt or sugar’</b>	<b>Examples of ‘healthier food choices’</b>	<b>Examples of intermediate foods</b>	<b>Examples of ‘foods high in fat, salt or sugar’</b>
Abridged M&W database	895	39.2	38.3			
Bread, cereals and potatoes	103	27.2	27.2	Weetabix, boiled rice, fresh pasta, boiled potatoes, crispbread, roast potatoes, fried rice, oven chips	White bread, wholemeal bread, sugar puffs, wholemeal rolls, corn flakes	Currant buns, potato croquettes, malt loaf, crunchy nut corn flakes, French fries, cream crackers
Milk and dairy products	82	35.4	43.9	Low fat fromage frais, skimmed milk, semi-skimmed milk, whole milk, low fat yoghurt, low fat fruit yoghurt, single cream	Cottage cheese, greek yoghurt, fromage frais	Half fat cheddar, half fat crème fraiche, camembert, cheddar
Fruit and vegetables	121	100.0	0.0	All fruit and vegetables		

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Meat, fish and alternatives	154	27.3	50.0	Lentils, tofu, tinned tuna, mackerel, chicken breast, cod, grilled steak	Roast beef, lean mince, roast lamb, boiled egg, fried egg, fried steak	Chicken leg, ham, chicken nuggets, walnuts, sausages, streaky bacon
Foods high in fat, foods high in sugar	125	6.4	86.4	Diet cola	Cola	Jam doughnuts, jaffa cakes, digestives, milky way, mars bar, sponge cake, kit kat, choc chip cookies, olive oil, crisps, low fat crisps, butter, margarine
Composite foods	-	-	-	Soya milk, canned strawberries, canned sardines, baked beans, boiled celery, fried mushrooms, stewed rhubarb	Chilli con carne, fruit crumble, shepherd's pie	Lasagne, salted peanuts, mayonnaise, fruit pie
'Healthier' indicators	117	91.5	5.1			Nuts
'Less healthy' indicators	77	1.3	84.4	Thick takeaway milkshake		

<b>Model SSCg3d</b>	<b>Simple scoring system, group C nutrients, per 100g:</b> FOR NON-DRINKS: Per 100g scoring bands as follows (to maximum of 10 points per nutrient/food component): Energy, =335kJ = 0; 335-670kJ = 1; 670-1005kJ = 2, etc. Sats, =1.0g = 0; 1.0-2.0g = 1; 1.0-2.0g = 2, etc. NMES, =2.4g = 0; 2.4-4.8g = 1; 4.8-7.2g = 2, etc. Sodium, =90mg = 0; 90-180mg = 1; 180-270mg = 2, etc. Calcium, =105mg = 0; 105-210mg = 1; 210-315mg = 2, etc. Iron, =1.5mg = 0; 1.5-3.0mg = 1; 3.0-4.5mg = 2, etc. n-3, =0.05g = 0; 0.05-0.10g = 1; 0.10-0.15g = 2, etc. Fruit and vegetable, 0-30% = 0; 50% = 2; 70% = 4; 100% = 10. FOR DRINKS: All thresholds set at 50% of non-drink thresholds (apart from fruit and vegetable content threshold, which is kept the same). Total score = A nutrients – B nutrients – C nutrients. ‘healthier food choices’ if score is 2 or less. ‘foods high in fat, salt or sugar’ if score is 9 or more.					
<b>Rationale</b>	For A nutrients, score bands start at 3.75% of GDA and are 3.75% of GDA wide. For calcium and iron, bands start at 15% of GDA and are 15% wide. For n-3 fatty acids, bands start at 12.5% of GDA and are 12.5% wide. Fruit and vegetable scores are arbitrary.					
<b>Score</b>	<b>86.9</b>					
<b>Subset of foods</b>	<b>N</b>	<b>% ‘healthier food choices’</b>	<b>% ‘foods high in fat, salt or sugar’</b>	<b>Examples of ‘healthier food choices’</b>	<b>Examples of intermediate foods</b>	<b>Examples of ‘foods high in fat, salt or sugar’</b>
Abridged M&W database	895	36.1	37.5			
Bread, cereals and potatoes	103	24.3	35.9	Boiled potatoes, boiled rice, roast potatoes, weetabix, fresh pasta, fried rice	Oven chips, crispbread, wholemeal bread, white bread, potato croquettes, wholemeal rolls	Sugar puffs, French fries, currant buns, corn flakes, malt loaf, cream crackers, crunchy nut corn flakes
Milk and dairy products	82	23.2	45.1	Skimmed milk, low fat fromage frais, semi-skimmed milk, low fat yoghurt, low fat fruit yoghurt	Single cream, cottage cheese, fromage frais, Greek yoghurt, whole milk	Half fat cheddar, half fat crème fraiche, cheddar, camembert
Fruit and	121	98.3	0.0	Peaches, canned	Currants	

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vegetables				pineapple, orange juice, celery, lettuce, grilled tomato, avocado		
Meat, fish and alternatives	154	25.3	43.5	Lentils, mackerel, tofu, tinned tuna, chicken breast, cod, grilled steak	Roast beef, roast lamb, boiled egg, lean mince, fried egg, chicken leg, fried steak	Chicken nuggets, walnuts, ham, sausages, streaky bacon
Foods high in fat, foods high in sugar	125	2.4	88.8	Diet cola		Jam doughnuts, jaffa cakes, digestives, sponge cake, milky way, kit kat, mars bar, choc chip cookies, olive oil, low fat crisps, crisps, butter, margarine, cola
Composite foods	-	-	-	Soya milk, canned sardines, canned strawberries, baked beans, boiled celery, fried mushrooms, stewed rhubarb	Chilli con carne, shepherd's pie, fruit crumble	Lasagne, salted peanuts, mayonnaise, fruit pie
'Healthier' indicators	117	89.7	4.3			Nuts
'Less healthy' indicators	77	0.0	88.3			

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<b>Model SSCg3f</b>	<b>Simple scoring system, group C nutrients, per 100g:</b> Per 100g scoring bands as follows (to maximum of 10 points per nutrient/food component): Energy, =335kJ = 0; 335-670kJ = 1; 670-1005kJ = 2, etc. Sats, =1.0g = 0; 1.0-2.0g = 1; 1.0-2.0g = 2, etc. NMES, =2.4g = 0; 2.4-4.8g = 1; 4.8-7.2g = 2, etc. Sodium, =90mg = 0; 90-180mg = 1; 180-270mg = 2, etc. Calcium, =105mg = 0; 105-210mg = 1; 210-315mg = 2, etc. Iron, =1.5mg = 0; 1.5-3.0mg = 1; 3.0-4.5mg = 2, etc. n-3, =0.05g = 0; 0.05-0.10g = 1; 0.10-0.15g = 2, etc. Fibre, =2.6g = 0; 2.6-5.1g = 1; 5.1-7.7g = 2, etc. Fruit and vegetable, 0-30% = 0; 50% = 2; 70% = 4; 100% = 10. Total score = A nutrients – B nutrients – C nutrients. ‘healthier food choices’ if score is 2 or less. ‘foods high in fat, salt or sugar’ if score is 9 or more.					
<b>Rationale</b>	For A nutrients, score bands start at 3.75% of GDA and are 3.75% of GDA wide. For calcium, iron and fibre, bands start at 15% of GDA and are 15% wide. For n-3 fatty acids, bands start at 12.5% of GDA and are 12.5% wide. Fruit and vegetable scores are arbitrary.					
<b>Score</b>	<b>87.9</b>					
<b>Subset of foods</b>	<b>N</b>	<b>% ‘healthier food choices’</b>	<b>% ‘foods high in fat, salt or sugar’</b>	<b>Examples of ‘healthier food choices’</b>	<b>Examples of intermediate foods</b>	<b>Examples of ‘foods high in fat, salt or sugar’</b>
Abridged M&W database	828	40.1	34.7			
Bread, cereals and potatoes	98	25.5	26.5	Boiled potatoes, boiled rice, roast potatoes, weetabix, fresh pasta, fried rice	Oven chips, crispbread, wholemeal bread, white bread, potato croquettes, wholemeal rolls, sugar puffs	French fries, currant buns, corn flakes, malt loaf, cream crackers, crunchy nut corn flakes
Milk and dairy products	79	38.0	46.8	Skimmed milk, low fat fromage frais, semi-skimmed milk, whole milk, low fat yoghurt, low fat fruit yoghurt	Single cream, cottage cheese, fromage frais, Greek yoghurt	Half fat cheddar, half fat crème fraiche, cheddar, camembert
Fruit and	118	99.2	0.0	Peaches, canned pineapple,	Currants	

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vegetables				orange juice, celery, lettuce, grilled tomato, avocado		
Meat, fish and alternatives	148	25.0	42.6	Lentils, mackerel, tofu, tinned tuna, chicken breast, cod, grilled steak	Roast beef, roast lamb, boiled egg, lean mince, fried egg, chicken leg, fried steak	Chicken nuggets, walnuts, ham, sausages, streaky bacon
Foods high in fat, foods high in sugar	105	5.7	86.7	Diet cola	Cola	Jam doughnuts, jaffa cakes, digestives, sponge cake, milky way, kit kat, mars bar, choc chip cookies, olive oil, low fat crisps, crisps, butter, margarine
Composite foods	-	-	-	Soya milk, canned sardines, canned strawberries, baked beans, boiled celery, fried mushrooms, stewed rhubarb	Chilli con carne, shepherd's pie, fruit crumble	Lasagne, salted peanuts, mayonnaise, fruit pie
'Healthier' indicators	114	90.4	3.5			Nuts
'Less healthy' indicators	63	0.0	88.9			