Public Health England

Protecting and improving the nation's health

Annex A
The 2018 review of the UK Nutrient Profiling Model

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Abbreviations and glossary

AOAC	Association of Official Analytical Chemists' method for total dietary fibre analysis. Determinations include resistant starch and lignin in the estimation of total fibre, rather than only the non-starch polysaccharides
CoFID	The Composition of Foods Integrated Dataset
DCMS	Department for Culture, Media and Sport
DEFRA	Department of Environment, Food and Rural Affairs
DHSC	Department of Health and Social Care. Previously known as the Department of Health (DH) until January 2018
Draft 2018 NPM	The proposed modified version of the UK Nutrient Profiling Model 2004/5 to be put forward for public consultation
DRVs	Dietary Reference Values Indicate the average or the maximum contribution that a particular nutrient should make to the population average intakes. DRVs for total fat, fatty acids, starch, sugars are set as a percentage of daily energy intake in addition to those for energy and some vitamins and minerals
Energy	Total metabolisable energy of food (given in kilojoules (kJ) or kilocalories (kcal)), calculated from energy producing food components (carbohydrates, fat, protein, fibre). Metabolisable energy from alcohol has been excluded in calculations for energy for the purposes of the review. This is termed as either food energy or total dietary energy in line with terminology used by current UK dietary recommendations
Free sugars	For the purpose of this review: sugars (monosaccharides and disaccharides) added to food in whatever form or those naturally present in honey, syrups and unsweetened fruit and vegetable juices or smoothies, but exclude lactose in milk and milk products. Also includes all sugars in fruit and vegetable purees/pastes and extruded fruit and vegetables. See **Appendix I** for PHE working definition of free sugars
GDA	Guideline Daily Amounts Guidelines for healthy adults and children on the approximate amount of calories, fat, saturated fat, carbohydrate, total sugars, protein, fibre, salt/sodium required for a healthy diet. Reference Intakes (RIs) replaced GDA in the Food Information for Consumers (EU FIC) as used in food labels
Intrinsic sugars	Those naturally incorporated into the cellular structure of foods
FSA	Food Standards Agency
FSANZ	Food Standards Australia New Zealand
FVN	Fruit, vegetables and nuts
kJ	Kilojoules
kcal	Kilocalories
n-3 fatty acids	Also known as omega 3 fatty acids
NDNS	National Diet and Nutrition Survey

	A dietary survey of the UK population designed to collect detailed, quantitative information on the food consumption, nutrient intake and nutritional status of the general population aged 1.5 years and over living in private households in the UK. Results are used by government to monitor the diet and nutritional status of the population, to provide the evidence base for policy development and to track progress towards public health nutrition objectives
NMES	Non-milk extrinsic sugars Sugars not contained within the cellular structure of a food except lactose in milk and milk products
NPM	Nutrient Profiling Model
NPSC	Nutrient Profiling Scoring Criterion
NSP	Non-starch polysaccharides Dietary fibre expressed as non-starch polysaccharides
MW7	McCance and Widdowson's, The Composition of Foods: 7th Summary Edition
Ofcom	Office of Communications
Percentage points	The differences between 2 percentages
Performance measure	Measurement of an outcome based on a set of metrics used to quantify the impact of modifications in the draft 2018 NPM when compared to the UK NPM 2004/5
PHE	Public Health England
RI	Reference Intake Set for an adult and based on the requirements for an average female with no special dietary requirements and an assumed energy intake of 2,000kcal as presented in the Food Information for Consumers (EU FIC) and used in food labels. RIs are guidelines to the approximate amount of kilocalories (energy), and the recommended maximum amount of sugars, fat, saturates (saturated fat), and salt should be consumed per day
SACN	Scientific Advisory Committee on Nutrition - a committee of independent experts that provide UK governments with advice on nutrition
Total sugars	All sugars from all sources in a food or drink, defined as all monosaccharides and disaccharides other than polyols
UK NPM 2004/5	The UK Nutrient Profiling Model developed by the Food Standards Agency in 2004-2005
WHO	World Health Organization
5-CNL	5-Colour National Labelling System. Now known as Nutri-Score

Executive summary

In August 2016, government set out its approach to tackle child obesity in *Childhood Obesity, A Plan for Action*[1]. A key commitment in the plan was to review the existing UK Nutrient Profiling Model[2] (UK NPM 2004/5) to ensure it reflects current UK dietary recommendations.

The UK NPM 2004/5 was developed by the Food Standards Agency (FSA) as a tool to enable the Office of Communications (Ofcom), the UK broadcast regulator, to identify 'less healthy'[3] foods and drinks that were to be subject to restrictions during children's television programming. Ofcom has been using this model for broadcast media since the restrictions came into force in April 2007[4] and for non-broadcast media (including print, cinema, online and in social media) since July 2017[5].

The UK NPM 2004/5 is over 10 years old and no longer reflects current UK dietary recommendations, in particular those for free sugars and fibre[6].

The UK NPM 2004/5 covers foods and non-alcoholic drinks, utilising a scoring system for 7 nutrient/food components based on per 100g as sold[a]. Points are allocated based on 4 'negative' nutrients/food components (ie energy; total sugars; saturated fat and sodium) and 3 'beneficial' nutrients/food components (ie fruit, vegetables and nuts; fibre and protein). Protein is used as a marker of iron, calcium and n-3 fatty acids.

This report sets out the approach taken and methodology used to review the UK NPM 2004/5, to ensure it reflects the current UK dietary recommendations. This included:

- establishment of an expert group to provide advice and make recommendations to Public Health England (PHE), and a reference group to provide practical information and insights to inform decisions about the revision of the UK NPM 2004/5
- consideration of other nutrient profiling models currently used in other countries, and by international organisations
- development of a Nutrient Profiling Model (NPM) test dataset containing foods and drinks commonly consumed by children

[a] Reconstituted foods and drinks are calculated based on 100g of the product as reconstituted according to the manufacturer's instructions

- development of performance measures to compare outcomes of modifications to the model against the UK NPM 2004/5
- modelling of modifications to the UK NPM 2004/5

This report does not cover the application of the NPM by UK advertising regulators. These will be the subject of further consultation.

The methods used to develop the draft 2018 NPM were consistent with the approach used to develop the original UK NPM 2004/5 while reflecting current UK dietary recommendations.

After considering models, including derivatives of the UK NPM 2004/5, developed by other countries and international organisations after 2005, it was agreed it would be most appropriate to revise the UK NPM 2004/5 in line with the current UK government dietary recommendations rather than developing a new model from first principles. Opportunities for changes to other nutrients/food components included in the UK NPM 2004/5 were also considered.

After testing and considering the impact of a number of possible changes to the UK NPM 2004/5, a draft 2018 NPM is recommended. When tested against foods and drinks in the NPM test dataset, fewer foods and drinks high in total sugars (4 percentage points) and free sugars (16 percentage points) passed the draft 2018 NPM compared to the UK NPM 2004/5. This was not the case for fibre where fewer ‘high fibre’ and ‘source of fibre’ foods passed the draft 2018 NPM compared to the UK NPM 2004/5. The change in performance was a result of amendments to the reference values to nutrients/food components (**Table 1**) and increments within scoring bands.

Table 1: Nutrient/food values used to derive a scoring system for the UK NPM 2004/5 and the draft 2018 NPM

Nutrient or food component	UK NPM 2004/5[b]	Draft 2018 NPM[c]
Energy	8,950kJ (2,130kcal)	8,400kJ (2,000kcal)
Total sugars	21% of food energy	n/a
Free sugars	n/a	5% of total dietary energy (based on 8,400kJ (2,000kcal))
Saturated fat	11% food energy	11% of food energy (based on 8,400kJ (2,000kcal))
Sodium	2.35g	n/a
Salt	n/a	6g
Fibre	24g AOAC[d] (18g NSP[e])	30g AOAC (22.5g NSP) adjusted as a proportional change from the existing UK NPM 2004/5 value (24g AOAC /18g NSP)
Fruit and vegetables[f]	400g	400g
Protein	42g	42g

The majority of the 2,620 foods and drinks in the NPM test dataset that did not pass the UK NPM 2004/5 also did not pass the modified draft 2018 NPM. The draft 2018 NPM resulted in fewer foods and drinks passing the model (difference of 8 percentage points)[g].

In particular, foods and drinks in certain categories within the NPM test dataset, for example: sweetened yoghurts; juices; desserts; some breakfast cereals and cereal bars, which previously passed the UK NPM 2004/5, were more likely not to pass the draft 2018 NPM, largely due to their high content of free sugars. Although, in these and in other foods and drinks both fibre and fruit can, for example, offset sugars content to some extent, in modifying the NPM in line with current UK dietary recommendations it was inevitable that fewer foods and drinks in the NPM test dataset would pass. This is because the magnitude of the change in dietary recommendation for sugars was greater than that made for fibre. The Scientific Advisory Committee on Nutrition (SACN) effectively halved the dietary recommendation for (free) sugars, while that for fibre was increased to a lesser extent (by a quarter).

The draft 2018 NPM, which is being put forward for consultation, reflects current UK dietary recommendations.

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[b] Derived from Dietary Reference Values (DRV)/ Guideline Daily Amounts (GDA)
[c] Derived from Dietary Reference Values (DRV)/ Recommended Intakes (RI)
[d] AOAC – Association of Official Analytical Chemists' method for total dietary fibre analysis
[e] NSP – Non-starch polysaccharides
[f] For the purpose of the NPM, the proportion allocated for fruit and vegetables includes nuts
[g] If a food scores 4 points or more, or a drink scores 1 point or more, it does 'not pass' the model. If a food scores less than 4 points or a drink scores less than 1 point, it would 'pass' the model

Introduction

1.1 Individual foods and drinks are composed of a mixture of nutrients and by nature of their nutrient content will be more, or less aligned with a healthy dietary pattern. There is no single, simple measurement that defines these foods as 'healthier' or 'less healthy'. In an attempt to help such considerations nutrient profile models have been developed.

1.2 In July 2015, SACN published its *Carbohydrates and Health* report[6] which concluded that the:

- recommended average population intake of free sugars should be no more than 5% of total dietary energy (compared to no more than 10% of total dietary energy for non-milk extrinsic sugars (NMES) as previously recommended)
- recommended average population intake of fibre should be increased to 30g AOAC fibre (compared to 18g non-starch polysaccharides (NSP); equivalent to 24g AOAC fibre[7]) with additional recommendations for children

1.3 These values have been incorporated into current UK dietary recommendations[8] and messaging tools such as the Eatwell Guide[9,h] which shows the types and proportions of foods that help achieve a healthy balanced diet.

1.4 In 2015, PHE identified a need to review and strengthen the NPM developed by the FSA in 2004-2005 (UK NPM 2004/5) as part of a potential programme of work to reduce sugar intakes in England[10], and to bring various nutrition policy instruments in line with the most recent advice from SACN.

1.5 In August 2016, the Childhood Obesity Plan[1] set out the government's commitment to tackling childhood obesity. In England, 22.6% of children are overweight or obese when they begin school and 34.2% of children are overweight or obese by the time they leave primary school[11]. Obesity is associated with poor psychological and emotional health, and many children experience bullying linked to their weight[12]. Obese children are also more likely to become obese adults and have a higher risk of morbidity, disability and premature mortality in adulthood[13]. Evidence also shows that on average children are consuming too much saturated fat, salt and sugars and too little fibre, oily fish and fruit and vegetables in comparison to recommendations[14,15].

[h] The Eatwell Guide replaced the eatwell plate as the UK healthy eating tool in 2016

1.6 One of PHE's contributions to the Childhood Obesity Plan is the review of the UK NPM 2004/5. The UK NPM 2004/5 is over 10 years old and does not reflect current dietary recommendations including those for sugar and fibre.

1.7 This report describes the approach taken and methodology used by PHE, working with academics, industry, non-governmental health organisations and other stakeholders, to review the UK NPM 2004/5 to ensure it reflects the current UK dietary recommendations. This report does not cover the application of the NPM by UK advertising` regulators. These will be the subject of further consultation.

The UK Nutrient Profiling Model 2004/5

The purpose of the UK Nutrient Profiling Model 2004/5

2.1 The UK NPM 2004/5 was developed by the FSA as a tool to help Ofcom identify 'less healthy' foods and drinks that were to be subject to restrictions during children's television programming. Ofcom has been using this model for broadcast media since the restrictions came into force from April 2007. It has also been adopted for non-broadcast media (including print, cinema, online and in social media) since July 2017. The history of the UK NPM 2004/5 is provided in **Appendix A.**

Summary of the UK Nutrient Profiling Model 2004/5

2.2 The UK NPM 2004/5 uses a scoring system, which attempts to balance the contribution made by 'beneficial' components/nutrients of food and drink to a child's overall diet alongside the negative contributions from nutrients where children's intakes are higher than recommended (paragraph 2.4). Each food and drink is assigned an overall score that determines whether it can be advertised during children's television programming. Supporting technical guidance was also developed to assist food manufacturers, retailers and advertisers to correctly calculate nutrient profiling scores for their products.

Development of the UK Nutrient Profiling Model 2004/5

2.3 Rayner *et al*[16] documented the theoretical approaches taken and decisions made in the development of the UK NPM 2004/5.

2.4 The UK NPM 2004/5 is a semi continuous model[17] with a simple scoring approach, based on the following:

- **number of categories**: 2 categories (one for foods and one for non-alcoholic drinks)
- **choice of nutrients and other food components:** 7 nutrients/food components:
    - three nutrients where children's intakes are higher than recommended: total sugars; saturated fat; sodium , as well as energy - so called 'negative' nutrients (or 'A' nutrients)
    - three 'beneficial' nutrients/food components (or 'C' nutrients/food components) to children's diets: fruit, vegetables and nuts; fibre; protein (as a

marker for iron, calcium and n-3 polyunsaturated fatty acids to encompass products such as meat, dairy and fish products)

- **protein cap*:*** a protein cap was also included in the model to safeguard against foods high in fat, salt and/or sugars being classified as 'healthier' due to their high protein content unless the food contained more than 80% fruit, vegetables or nuts
- **base amount:** the amount of nutrient/food component in a food per 100g (termed the 'base')
- **scoring system**: a scoring system was based on Dietary Reference Values (DRV) and Guideline Daily Amounts (GDA)[i] for children aged 11-16 years[16]. See **Appendices B** and **C** for details

2.5 Given the nature of nutrient profiling and the nutrient content of some foods and drinks, there may be apparent anomalies for individual foods and drinks that would be subject to advertising restrictions.

The 2007 review of the effectiveness of the UK Nutrient Profiling Model 2004/5

2.6 In 2007, the UK FSA established an independent review panel to assess the effectiveness of the UK NPM 2004/5 at differentiating foods and drinks on the basis of their nutrient profile.

2.7 The independent review panel recommended the removal of the protein cap[18] because the impact appeared minimal compared with the additional complexity it added to the calculations. SACN expressed reservations about the public health implications associated with removal of the protein cap, and advised that if the modification was made the impact would need to be monitored. In 2009, the FSA Board advised Ministers that the protein cap should remain and the UK NPM 2004/5 remained unchanged[18].

[i] GDAs have been replaced with Reference Intakes (RIs) in the EU (2011)

International Nutrient Profiling Models

2.8 The UK was one of the first countries to develop and use a nutrient profile model. Since then several different models have been introduced internationally (for more information see **Appendix D**). The following models are derivatives of the UK NPM 2004/5:

- Food Standards Australia New Zealand (FSANZ) Nutrient Profiling Scoring Criterion (NPSC)[19]
- South African Nutrient Profile Model[20]
- Health Star Rating System (Australia and New Zealand)[21]
- 5-Colour National Labelling (5-CNL) System[22], now named Nutri-Score (France)
- Adapted FSA NPM for use in Ireland[23]

2.9 The European Regional Office of the World Health Organization (WHO) developed an alternative model in 2015[24], based on 2 existing schemes developed to restrict food marketing to children by Norway and Denmark.

2.10 The main differences between these models relate to the subjective considerations of:

- choice of nutrients and other food components included
- number of food and drink categories
- base used (ie nutrient content per 100g; per 100kcal, or per portion)
- type of model (categorical [threshold]; levels set or continuous [scoring systems]; number of points scored for a particular nutrient content)
- reference values used to underpin the model

Approach used in the 2018 review of the UK Nutrient Profiling Model

Aim of this review

3.1 The aim of this review of the UK NPM 2004/5 was to ensure the NPM reflected current UK dietary recommendations.

Nutrient Profiling Model expert group and Nutrient Profiling Model reference group

3.2 In July 2016, PHE established a NPM expert group (expert group) and NPM reference group (reference group), under the same independent Chair, to oversee approaches and support progress of the NPM review to an agreed timeline[25]. The expert group was supported by and received technical support throughout the process from a secretariat provided by PHE.

3.3 The expert group consisted of invited representatives from academia, and non-governmental health organisations. Its remit was to provide technical guidance and scrutiny for the overall work and make recommendations to PHE. Government departments, the food industry and non-governmental health organisations were also involved as observers and included the Department of Health and Social Care (DHSC), Department for Culture, Media and Sport (DCMS), Department of Environment, Food and Rural Affairs (DEFRA) and the devolved administrations.

3.4 Differences of opinion were debated and a consensus was facilitated through the Chair.

3.5 The reference group consisted of invited representatives from academia, the UK advertising regulator, the food industry, and non-governmental health organisations. The expert group were also members of the reference group. The remit of the reference group was to represent a range of stakeholder views on matters relating to the NPM and provide advice and comment on modifications in relation to their potential applicability of the NPM in practice. Government departments were also involved as observers and included the DHSC, DCMS, DEFRA and the devolved administrations.

3.6 Terms of reference, detailed objectives, responsibilities, membership and ways of working for the expert and reference groups were published in October 2016[26,27].

Details of the terms of reference and membership are provided in **Appendices E** and **F**.

3.7 The agenda, minutes and action points from the expert and reference group meetings were also published[28] to ensure that advice, technical scrutiny and recommendations were delivered in an open and transparent manner.

3.8 The scope of this review focused on updating the UK NPM 2004/5 to reflect the current UK dietary recommendations. In particular, those for free sugars and fibre rather than developing a new model from first principles. The approach also considered opportunities for changes to other nutrients/food components included in the UK NPM 2004/5.

3.9 As such this review excludes consideration of:

- the use of NPM for any other use beyond that related to restricting advertising of foods and drinks high in fat (saturated), sugars and salt to children
- non-nutrient substances (covered by other voluntary and mandatory routes eg alcohol) or caffeine (considered outside the aims of the review)
- *trans* fatty acids given the average intake in the UK is now below the population maximum recommendation (0.5% of food energy versus 2%[29])

3.10 The review considered international nutrient profiling models, the majority of which were based on the UK NPM 2004/5. The changes introduced by other countries and organisations were reviewed against the specific elements of UK NPM 2004/5. See **Appendix D** for a summary of international nutrient profiling models.

Methods of the review

4.1 From July 2016 to February 2018, the expert and reference groups generally met every 2 months. In addition, telephone conference meetings were scheduled with the expert group as and when required. In total, there were 10 expert group meetings, 6 expert group teleconferences and 9 reference group meetings.

4.2 The expert group considered and made decisions on the development of:

- a NPM test dataset containing foods and drinks consumed by children to test the impact of modifications to the UK NPM 2004/5
- performance measures to compare outcomes of the modifications to the model against the UK NPM 2004/5
- modifications to the UK NPM 2004/5

In considering possible modifications the review of other models developed since 2005 was also taken into account (see **Appendix D**).

Development of the Nutrient Profiling Model test dataset

4.3 There was no known readily available dataset containing foods and drinks consumed by children. The National Diet and Nutrition Survey (NDNS) contained only limited data for branded products. Therefore, a bespoke NPM test dataset of food and drink products was developed to determine the impact of modifications to the UK NPM 2004/5.

4.4 Food and drink purchase data adjusted to reflect differences between adults' and children's average consumption was considered a reasonable proxy of foods and drinks commonly consumed by children.

4.5 The NPM test dataset was developed using a variety of data sources (ie Kantar Worldpanel (2014 and 2015), Brandbank and the Composition of Foods Integrated Dataset (CoFID[30])). A summary of the content, methodology and population descriptions of these data sources can be found in **Appendix G**.

4.6 In summary, the NPM test dataset consists of the most frequently purchased products at a household level after some adjustment for the likelihood of consumption of those products by children. The products within the Kantar Worldpanel were ranked according to sales. The ranking was then adjusted to reflect children's consumption using data from the NDNS. UK food composition

tables from CoFID[j] were also used to incorporate additional foods (including basic food commodities such as fruit and vegetables, eggs and milk). Ingredient and/or nutrient data for each product was obtained from the Brandbank database, manufacturers' and retailers' websites or UK food composition tables. For further details of the processes undertaken to construct the NPM test dataset including estimating free sugars, see **Appendices H** and **I**.

4.7 Two PHE nutritionists independently reviewed the resulting dataset to remove duplicates, discontinued or unidentifiable products and products with missing or implausible nutritional data.

4.8 The final NPM test dataset consisted of 2,620 food and drink products (2,249 foods and 371 drinks). The dataset was not intended to be representative of all foods and drinks or those advertised. However, it was considered adequate as it represented a range of products that covered a proportion of the foods and drinks which are purchased. Details of the foods and drinks contained within the final NPM test dataset are provided in **Appendix J**.

Assessing model performance

4.9 Performance measures were established to determine the impact of modifications when compared to the UK NPM 2004/5. The expert group considered setting a numerical objective. However, due to the arbitrary nature of this approach, chose to use performance measures.

4.10 A literature review was conducted to identify any established performance measures for adapting nutrient profile models. A search of Medline, Embase and Scopus for relevant literature published between 1991 and February 2017 was undertaken. No relevant papers in peer-reviewed journals specifically related to performance measures were identified.

4.11 It was agreed *a priori* that the draft 2018 NPM should allow fewer foods that are high in free sugars to pass the modified NPM. Alongside the primary performance for free sugars, an additional performance measure for total sugars was also included. Other performance measures included: saturated fat, salt and fibre in order to guard against unintended consequences of the modelling. It was recognised that the change in free sugars dietary recommendations was much greater than that for fibre and that it was likely that some apparent anomalies may arise, especially for foods that contain both of these.

[j] CoFID values were re-calculated in the format required for nutrition labelling

4.12 It was agreed that the primary performance measure would relate to sugars in the following manner:

- the same or fewer foods and drinks high in free sugars should pass the draft 2018 NPM
- the same or fewer foods and drinks high in total sugars should pass the draft 2018 NPM

4.13 Other performance measures were:

- the same or fewer foods and drinks high in saturated fat should pass the draft 2018 NPM
- the same or fewer foods and drinks high in salt should pass the draft 2018 NPM
- more foods that are 'high fibre' should pass the draft 2018 NPM
- more foods that are a 'source of fibre' should pass the draft 2018 NPM

4.14 Values for each nutrient needed to assess these performance measures (ie 'high in free sugars', 'high in total sugars' etc) are shown in **Table 2** and a full rationale provided in **Appendix K**. In summary, total sugars, saturated fat and salt were based on the front-of-pack nutrition labelling criteria[31] along with the thresholds set for the higher and lower rates used for total sugars in the soft drinks industry levy[32]. The free sugars performance measures were calculated using 25% of a derived reference intake (based on UK dietary recommendations), in keeping with the approach used in the UK NPM 2004/5 and front-of-pack nutrition labelling criteria[31]. The performance measure for fibre was based on the Nutrition Claims regulations (EC) 1924/2006[33].

Table 2: Performance measure values for the 2018 review of the UK NPM

Foods	Drinks
Primary performance measures	
Free sugars	**Free sugars**
High >6.25g/100g	High> 3.13g/100ml[k]
Total sugars	**Total sugars**
High >22.5g/100g	High >8g/100ml
Other performance measures	
Saturated fat	**Saturated fat**
High >5g/100g	High >2.5g/100ml
Salt	
High >1.5g/100g	High >0.75g/100ml
Fibre	
High fibre >6g/100g	
Source of fibre >3g/100g to ≤6.0g/100g	

Analysis of model modifications

4.15 A combination of objective data, quantitative analysis and expert judgement was utilised in analysing performance of modifications to the UK NPM 2004/5.

4.16 Modifications to the UK NPM 2004/5 were part of an iterative process and are presented as such in the *testing of modifications to the UK Nutrient Profiling Model 2004/5* section, so as not to bias the approach. To guard against unintended consequences of the modelling, further analysis within the NPM test dataset was conducted, looking at individual foods and drinks that were borderline for passing or not passing the NPM.

[k] For the purpose of the modelling, a value of 3.125g was used

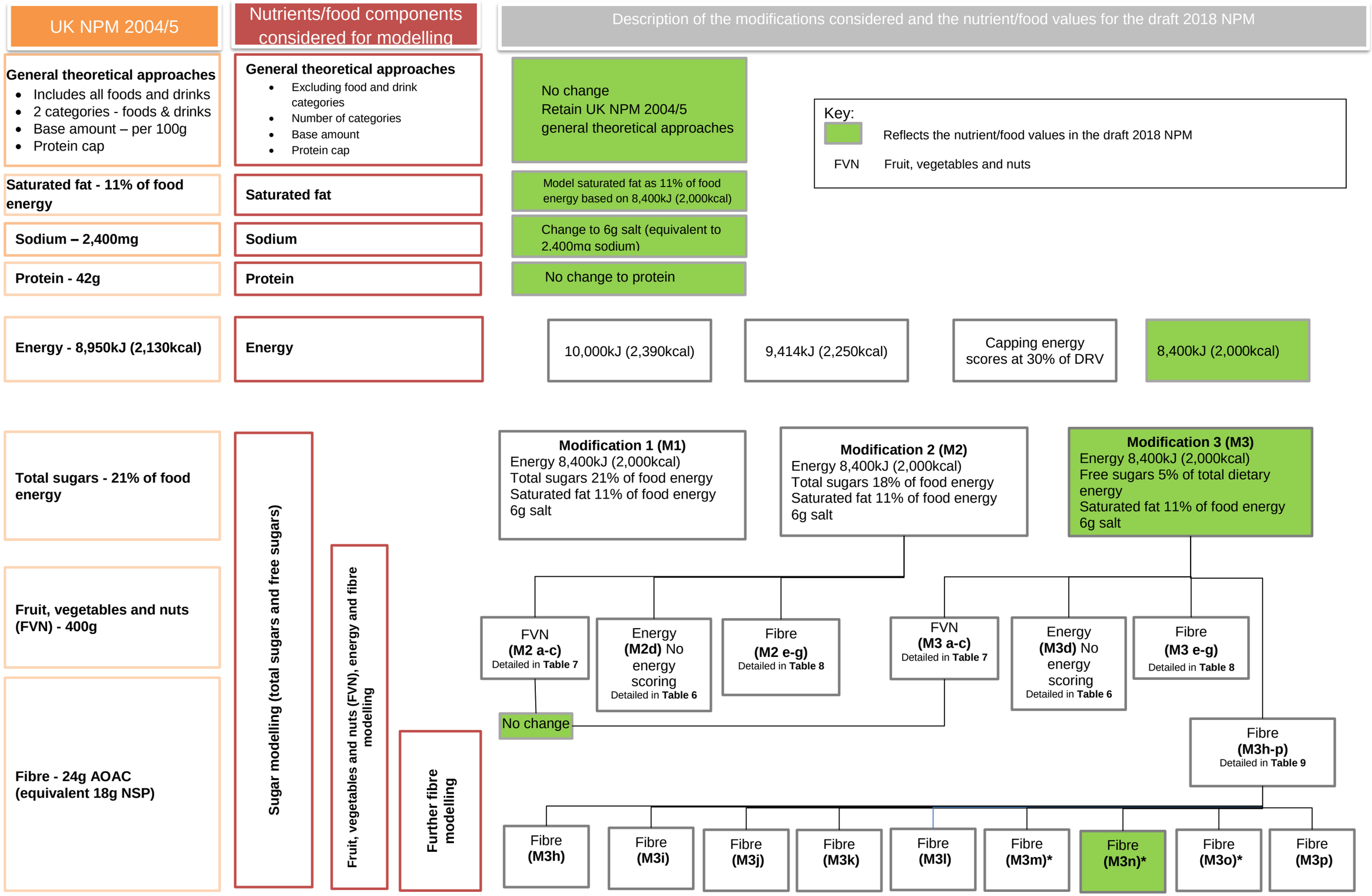
Testing of modifications to the UK Nutrient Profiling Model 2004/5

5.1 This section outlines modifications to the theoretical basis of the UK NPM 2004/5. Individual nutrients and food components were considered in a systematic manner while the basis of the modifications were developed iteratively.

5.2 Where modifications are not outlined, all existing UK NPM 2004/5 rules apply. For example, calculating overall nutrient profiling scores and application of the protein cap. For further information for calculating a nutrient profiling model score, see **Appendix C**.

5.3 A summary map outlining the steps taken to reach the draft 2018 NPM is presented in **Figure 1**.

Figure 1: A summary map outlining the modifications made to the UK NPM 2004/5 and nutrient/food component values for the draft 2018 NPM



* A derived value calculated as a 'proportional change' by taking 24g (previous DRV for fibre) divided by 30g (current DRV for fibre) = 0.8. A multiplier of 0.8 was then applied to the fibre scoring increments

Considerations and modifications to the theoretical basis of the UK NPM 2004/5

Excluding food/drink categories:

5.4 Some food and drink categories, owing to their nutrient profiles, either tend to always or never pass the UK NPM 2004/5. For example, plain vegetables tend to pass while sugar sweetened drinks tend not to pass.

5.5 Excluding whole food and drink categories from the NPM would require starting from first principles and could introduce bias inconsistent with messages around a balanced diet. Therefore, it was agreed not to exclude whole categories of foods and drinks from the draft 2018 NPM, consistent with the UK NPM 2004/5.

Number of categories:

5.6 It was agreed that the classification of items as foods and drinks (non-alcoholic) used in the UK NPM 2004/5 would be retained.

Base amount:

5.7 The possible effects of changing the base to per portion were extensively considered in the 2007 review of the effectiveness of the UK NPM 2004/5[18]. At the time, retention of per 100g was agreed in order to avoid unnecessary complexity, as there are few UK dietary recommendations on portion sizes and a variety of sizes used on food/drink packs. The expert group agreed that these conclusions remained valid.

Protein cap:

5.8 It was agreed not to remove or modify the protein cap given comments previously considered as part of the 2007 review of the effectiveness of the UK NPM 2004/5[18] and SACN's recommendations[6].

Scoring bands:

5.9 The maximum range of scores within the model for individual nutrients/food components and the increments were considered systematically and are detailed in subsequent sections.

Nutrients/food components:

5.10 Several modifications to the UK NPM 2004/5 were tested. Changes made to the DRVs and derivatives of DRVs used for developing 'A' nutrients in comparison to the UK NPM 2004/5 are summarised in **Tables 3** and **4**. Changes to DRVs and derivatives of DRVs for 'C' nutrients were assessed as a second stage following discussion of 'A' nutrient modifications and are summarised in **Tables 5, 6** and **7**.

Table 3: Dietary Reference Values and derivatives of Dietary Reference Values used for developing the 'A' nutrients for the UK NPM 2004/5 and modifications 1, 2 and 3

Energy/ nutrient	**Baseline Model**	**Modifications**		
	UK NPM 2004/5	Modification 1 (Based on the UK NPM 2004/5 use of 21% of food energy from total sugars[7])	Modification 2 (Based on the Eatwell Guide non-linear modelling carried out as part of the refresh to the eatwell plate[34])	Modification 3 (Based on UK dietary recommendation for free sugars[6])
Energy[l] kJ (kcal)	8,950kJ (2,130kcal)	8,400kJ (2,000kcal)	8,400kJ (2,000kcal)	8,400kJ (2,000kcal)
Total sugars as % of energy (g)	21%	21% (103.8g)	18% (88.9g)	N/A
Free sugars as % of energy (g)	N/A	N/A	N/A	5 (24.7g)
Saturated fat as% of energy (g)	11%	11% (25g)	11% (25g)	11% (25g)
Sodium (g)	2.4	N/A	N/A	N/A
Salt (g)	N/A	6.0g	6.0g	6.0g

N/A = not applicable

[l] As a result of energy being recalculated for the 10 increment scale at 8,400kJ (equivalent to 2,000kcal) for modifications 1, 2 and 3, nutrients dependent on the proportion of energy have also been adjusted accordingly (ie saturated fat, total sugars and free sugars)

Modifications to 'A' nutrients (energy, saturated fat, sugars and sodium) in the UK NPM 2004/5

Energy

5.11 A number of approaches to review the energy reference value were considered:

- adopting an energy reference value in line with SACN's 2011 energy estimates[35] ie 10,000 kJ (2,390kcal) as an average for males and females aged 11-18 years. Retaining a 10 point scale starting at 3.75% of the reference value with increments of 3.75% of the reference value (in line with increments of the original UK NPM 2004/5)
- adopting the UK government recommendation for energy ie 9,414kJ (equivalent to 2,250kcal[8]) as an average for males and females aged 11-18 years[m]. Retaining a 10 point scale with score bands starting at 3.75% of the DRV with increments of 3.75% of the DRV
- adopting a derived energy reference value of 8,400kJ (equivalent to 2,000kcal) consistent with food labelling regulations[33] and government population advice for everyone over the age of 11 years, retaining a 10 point scale with score bands starting at 3.75% of the reference value with increments of 3.75% of the reference value
- capping the energy scores at 30% of the energy DRV in line with PHE catering guidance recommendations for a main lunch and evening eating occasion[36]

5.12 Following SACN's 2011 recommendations for energy reference values[35], the UK government decided not to adopt the higher revised energy values in light of the increasing prevalence of obesity. As a result, adjusting the model to reflect a reference value of 8,400kJ (equivalent to 2,000kcal) daily intake was recommended, consistent with food labelling regulations and government population advice for everyone over the age of 11 years. A 10 point scale was retained with score bands starting at 3.75% of the reference value with increments of 3.75% of the DRV.

[m] Energy reference values for 11 - 18 year olds have been capped at 10.5 MJ (2,500kcal)/day for males and 8.4MJ (2,000kcal)/day for females to help address issues of overweight and obesity (on average 9,414kJ (2,250kcal))

Energy modelling (removing the energy component)

5.13 In order to ascertain whether the combination of energy, and energy producing nutrients such as saturated fat and total sugars in the model was leading to a potential overestimation of points awarded for 'A' nutrients, modelling without scores for energy was conducted. The details of these modifications and rationale are described in **Table 4.**

Table 4: Details of removing the energy component of modification 2d and modification 3d

Energy modification	Based on	Scoring (scale and increments)	Rationale
Baseline Model: UK NPM 2004/5	Previous DRVs[7,37]: 8,950kJ (2,130kcal) 21% of food energy from total sugars 11% of food energy from saturated fat 2.4g sodium	0-10 point scale (with 10 increments starting at 3.75% of the previous DRV and at 3.75% increments)	
Modification 2d (M2d)	8,400kJ (2,000kcal)[38] 18% of food energy from total sugars[34] 11% of food energy from saturated fat[7] 6g salt[37]	Energy component removed from scoring	To ascertain whether the combination of the energy, saturated fat and sugars scores effectively duplicates contributions
Modification 3d (M3d)	8,400kJ (2,000kcal)[38] 5% of total dietary energy from free sugars[6] 11% of food energy from saturated fat[7] 6g salt[37]	Energy component removed from scoring	To ascertain whether the combination of the energy, saturated fat and sugars scores effectively duplicates contributions

Results of energy modelling (removing the energy component)

5.14 Removing the energy component from the scoring reduced the performance of the model, particularly in relation to saturated fat and salt. See **Table 10** M2d (no energy scoring) and M3d (no energy scoring) for the results. This related to specific categories for example crisps and savoury snacks (data not presented). Retaining the energy component within the model was considered to reflect the balance of decisions made when developing the original model.

Agreed outcome for energy: 8,400kJ (equivalent to 2,000kcal)

Sugars

5.15 The UK NPM 2004/5 initially included non-milk extrinsic sugars (NMES) as the determinant of sugar content. The term NMES was replaced with total sugars in the UK NPM 2004/5 following consultation feedback suggesting that this addressed the practical difficulties associated with estimating NMES. Since then a UK dietary recommendation for free sugars has been adopted.

Sugar modelling

5.16 Approaches based on total sugars or free sugars, using derived reference values, were explored. The 3 approaches (also outlined in **Table 3**) were:

- modification 1 - total sugars: 21% of food energy intake, in line with the UK NPM 2004/5. Retaining a 10 point scale commencing at 3.75% of the reference value, with increments of 3.75% of the reference value
- modification 2 - a derivation representing total sugars modelled within the refreshed Eatwell Guide, which reflects government recommendations including those for free sugars (equivalent to total sugars: 18% of food energy intake[34]). Retaining a 10 point scale commencing at 3.75% of the reference value, with increments of 3.75% of the reference value
- modification 3 - a derivation of a free sugars DRV (free sugars: no more than 5% of total dietary energy[6]). Retaining a 10 point scale commencing at 3.75% of the reference value, with increments of 3.75% of the DRV (see **Appendix I** for details of the free sugars assumptions)

Results of sugar modelling (modifications 1, 2 and 3)

5.17 When comparing modifications 1, 2 and 3 with the UK NPM 2004/5, all modifications allowed fewer foods and drinks that were high in free and total sugars to pass the draft 2018 NPM. Modification 3 performed better than modifications 1 and 2 and allowed fewer foods and drinks high in free and total sugars to pass the model compared with the UK NPM 2004/5. 176 (18%) foods and drinks high in free sugars passed the UK NPM 2004/5 model (results presented in **Table 10**), whilst for:

- modification 1, 36 fewer foods and drinks high in free sugars (a difference of 4 percentage points) passed the model compared to the UK NPM 2004/5

- modification 2, 60 fewer foods and drinks high in free sugars (a difference of 6 percentage points) passed the model compared to the UK NPM 2004/5
- modification 3, 155 fewer foods and drinks high in free sugars (a difference of 16 percentage points) passed the model compared to the UK NPM 2004/5

5.18 38 (6%) foods and drinks high in total sugars passed the UK NPM 2004/5 model (results presented in **Table 10**), whilst for:

- modification 1, 6 fewer foods and drinks high in total sugars (a difference of 1 percentage point) passed the model compared to the UK NPM 2004/5
- modification 2, 8 fewer foods and drinks high in total sugars (a difference of 1 percentage point) passed the model compared to the UK NPM 2004/5
- modification 3, 25 fewer foods and drinks high in total sugars (a difference of 4 percentage points) passed the model compared to the UK NPM 2004/5

Decisions on sugar modelling (modifications 1, 2 and 3)

5.19 Given the limited impact of modification 1 compared to modifications 2 and 3, no further discussion or modelling utilising modification 1 was considered appropriate.

5.20 Given the current UK dietary recommendation for free sugars (no more than 5% free sugars from total dietary energy) has halved from previous advice (<10% total dietary energy from NMES) it was not surprising that more foods and drinks high in free sugars did not pass modification 3 compared to modification 2 (based on total sugars). For example, most fruit juices, vegetable juices and smoothies would pass modification 2 whereas most would not pass modification 3. The increase in free sugars was not offset by increasing scoring for fibre as nutrient composition data shows that fruit juice is not a ‘source of fibre’ and government recommends limiting fruit juice/smoothie intake to a combined total of 150ml a day.

5.21 Other food and drink products in certain categories, for example: sugar sweetened drinks, yoghurts, desserts, some breakfast cereals and cereal bars, which currently pass UK NPM 2004/5 and can be advertised, also did not pass modification 3 due to their free sugars content.

5.22 The contribution of foods naturally high in sugars to a balanced diet was addressed through the inclusion of scoring for fruit, vegetables and nuts in the UK NPM 2004/5.

5.23 While there was a preference to utilise modification 3 (based on a free sugars criterion) it was agreed that further revisions to modification 2 and modification 3 would be conducted before agreeing on the approach to be used in the draft 2018 NPM.

5.24 After further testing on fruit, vegetables and nuts, and fibre (paragraphs 5.30 – 5.36), it was agreed that free sugars should be adopted at 5% of total dietary energy in line with UK dietary recommendations (equivalent to 24.7g based on 8,400kJ (equivalent to 2,000kcal) diet). **Appendix L** provides a free sugars decision tree to help decide whether a food or drink contains free sugars. It may be necessary to produce revised technical guidance to support how free sugars is estimated.

Agreed outcome for sugars: Free sugars at 5% of total dietary energy (calculated reference value of 24.7g based on 8,400kJ (equivalent to 2,000kcal) diet) retaining a 10 point scale commencing at 3.75% of the reference value, with increments of 3.75% of the DRV.

Saturated Fat

5.25 As the UK dietary recommendation for saturated fat had not changed since the UK NPM 2004/5 was developed, it was agreed that saturated fat would remain at 11% of food energy[7] (equivalent to 25g calculated based on an 8,400kJ (2,000kcal) diet and a conversion factor of 37kJ for 1g fat).

5.26 The reference value for saturated fat (11% of food energy based on 8,400kJ (2,000kcal) diet) applied to modifications 1, 2 and 3, showed that no change was observed between the percentage of foods and drinks high in saturated fat which passed modifications 1, 2 and 3. In comparison to the UK NPM 2004/2005, approximately a difference of 10 products (1 percentage point) was observed.

Agreed outcome for saturated fat: Retain the DRV for saturated fat at 11% of food energy (based on 8,400kJ (equivalent to 2,000kcal)) with a corresponding reference value of 25g.

Sodium

5.27 UK dietary recommendations are that, the maximum salt intake should be no more than 6g a day (equivalent to 2,400mg sodium) for everyone over 11 years of age[37] and the UK NPM 2004/5 sodium criterion is based on these values. Adopting a revised salt reference value was considered given the population were not currently consuming a diet at or below the UK dietary recommendation. However, for consistency it was agreed to retain the values used in the UK NPM 2004/5.

5.28 It was agreed that the use of salt rather than sodium would be consistent with the mandatory nutrition declaration as presented in the Food Information for Consumers (EU FIC) Regulation (EU) No 1169/2011[38].

5.29 Extending the scale for salt/sodium was initially considered as it was suggested that extending the scales could be a driver to reduce population salt intakes. However, the expert group considered that the approach used should be consistent with that for the other 'A' nutrients and therefore agreed not to extend the scale.

Agreed outcome for sodium: Replace sodium criterion with salt criterion in the draft 2018 NPM. Retain the maximum salt intake reference value used in the UK NPM 2004/5 at 6g/day.

Modifications to ‘C’ nutrients/food components (fruit, vegetables and nuts, fibre and protein) in the UK NPM 2004/5

Fruit, vegetables and nuts modelling

5.30 Options of extending the UK NPM 2004/5 scoring scale for fruit, vegetables and nuts (FVN) were considered, given the change in public health advice on sugars and fibre recommended by SACN. It was decided that this modification might bias the outcome and mask the overall score for foods and drinks high in salt, sugar and fat.

5.31 It was agreed to retain the 5 A Day recommendation of 400g, consistent with the UK NPM 2004/5 and model extending the scale to allow for a product containing 100% FVN to score more points.

5.32 Modifications to fruit, vegetables and nuts (ie a, b, and c in modification 2 and modification 3) are shown in **Table 5**.

Table 5: Modification to fruit, vegetables and nuts modelling (modifications 2 and 3: a, b, c) and rationale

Fruit, vegetables and nuts (FVN) modification	**Based on**	**Scoring[n] (Scale and increments)**	**Rationale**
Baseline Model: UK NPM 2004/5	400g fruit and vegetables	0-5 point scale (with 3 increments) >40% of product FVN (1 point), >60% (2 points) and >80% (5 points)	400g based on advice from WHO[39], which recommends eating a minimum of 400g of fruit and vegetables a day. The UK 5 A Day messaging for consumption of fruit and vegetables is based on this[40] The criterion also includes nuts, because at the time there was emerging evidence around the possible health benefits of nuts[41] The UK NPM 2004/5 scoring system was based on a bimodal distribution, where the majority of foods and drinks contain either 0% or 100% FVN with a few foods and drinks in the middle
Modifications 2 and 3 a (M2a and M3a)	400g fruit and vegetables	0-5 point scale (with 5 increments) Each increment is equal to a 10% step: >40% of product FVN (1 point), >50% (2 points), >60% (3 points), >70% (4 points), >80% (5 points)	UK dietary recommendations for fruit and vegetable consumption - unchanged (ie 400g) Consistent with the UK NPM 2004/5 0-5 point scale for other 'C' nutrients/food components
Modifications 2 and 3 b (M2b and M3b)	400g fruit and vegetables	0-8 point scale (with 4 increments) >40% of product FVN (1 point), >60% (2 points), >80% (5 points) and 100% (8 points)	UK dietary recommendations for fruit and vegetable consumption - unchanged (ie 400g) Consistent with the UK NPM 2004/5 scoring for FVN with scale then extended to 8 points awarded for products that are 100% FVN. In line with the Food Standards Australia New Zealand (FSANZ) FVN scoring model
Modifications 2 and 3 c (M2c and M3c)	400g fruit and vegetables	0-7 point scale for (with 7 increments) Each increment is equal to a 10% step: >40% of product FVN (1 point), >50% (2 points), >60% (3 points), >70% (4 points), >80% (5 points), >90% (6 points) and 100% (7 points)	UK dietary recommendations for fruit and vegetable consumption - unchanged (ie 400g) Scoring aimed to award maximum points for products that are 100% FVN. 0-7 point scale starting at 40% with 10% increments

[n] See **Appendix M** for the scoring bands for the fruit, vegetables and nuts modifications (a, b, c)

Results of fruit, vegetables and nuts modelling (a, b & c for modification 2 and modification 3)

5.33 The UK NPM 2004/5 scoring system for FVN was based on a bimodal distribution. The majority of foods and drinks used during testing of the UK NPM 2004/5 contained either 0% or 100% of FVN with a few foods and drinks in the middle.

5.34 Other performance measures for 'source of fibre' and 'high fibre' were used to compare outcomes of the FVN modifications against the UK NPM 2004/5. Adjustments to extend the FVN scoring within the model made little difference to the performance of the model (see paragraph 4.13 for the other performance measures).

5.35 Of 2,620 food and drink products in the NPM test dataset, there was a very small/no difference in the overall number of foods and drinks passing the model in modifications 2 and 3 with FVN scoring modifications a, b and c in comparison to modifications 2 and 3 (**Table 10**).

5.36 It was concluded that there was no justification for making amendments to FVN component of the UK NPM 2004/5.

Agreed outcome for fruit, vegetables and nuts: No change to the UK NPM 2004/5 approach and to retain at 400g/day[o].

Fibre

5.37 The current UK fibre recommendation of 30g AOAC fibre was considered to represent an increased relevance for fibre in the NPM. While fruit, vegetables and nuts were recognised within the UK NPM 2004/5 as acknowledging some fibre content, the major 'source of fibre' in the UK diet is from cereals and cereal products[14]. Different approaches to recognising the fibre content of foods and drinks were therefore considered.

Fibre modelling

5.38 Approaches to adjusting the UK NPM 2004/5 to take into account the revised UK dietary fibre recommendations were:

[o] The 400g/day relates to dietary guidance around 5 A Day. There are no dietary recommendations for nut consumption

- extending the maximum range of fibre content for which points are awarded
- adjusting the UK NPM 2004/5 proportionally to reflect the increase in fibre
- adopting a maximum achievable score of 20% of the 30g reference value for fibre, consistent with the approach used for other 'C' nutrients/food components (protein, fruit, vegetables and nuts)
- adopting a fibre reference value of 30g AOAC (equivalent NSP 22.5g) to reflect the current fibre recommendations
- adopting a reference value related to a nutrition claims definition of 'high' (6g AOAC fibre/100g) or 'source' (3g AOAC fibre/100g) of fibre
- awarding additional points for a given content of fibre within the UK NPM 2004/5

5.39 The aim of these modifications was to assess whether it would be possible to promote the intake of fibre without encouraging high intake of free sugars. The modified models looked at the impact on the number of foods that are considered a 'source of fibre' or 'high fibre' that passed the UK NPM 2004/5.

5.40 Modifications 2 and 3 were undertaken iteratively to assess the impact of:

- adopting the 30g reference value while retaining a 5 point scale
- retaining a 24g reference value with a 10 point scale
- adopting the 30g reference value with a 10 point scale (modifications M2e-g and M3e-g)

5.41 This initial modelling indicated that modification 3 performed better than modification 2 at promoting fibre without encouraging high intake of free sugars. Subsequent additional fibre adaptations were applied to modification 3 (modifications h-p). The details of these fibre modifications and rationale are described in **Tables 6** and **7**. For details of the points scale and scoring bands see **Appendix M**.

Table 6: Details of fibre modifications (modifications 2 and 3: e, f, g) and rationale

Fibre Modification	Based on	Scoring (Scale and increments)	Rationale
Baseline Model: UK NPM 2004/5	Previous DRV: 24g/day AOAC (18g/day NSP)	0-5 point scale (with 5 increments) starting at 3.75% of the previous DRV (and at 3.75% increments)	
Modifications 2 and 3 e (M2e and M3e)	Current DRV: 30g/day AOAC (22.5g/day NSP)[6]	0-5 point scale (with 5 increments) starting at 3.75% of the current DRV (and at 3.75% increments)	Based on current DRV for adults (30g/day AOAC) Increments consistent with UK NPM 2004/5
Modifications 2 and 3 f (M2f and M3f)	Previous DRV: 24g/day AOAC (18g/day NSP)[7]	0-10 point scale (with 10 increments) starting at 3.75% of the previous DRV (and at 3.75% increments)	Based on previous DRV of 24g/day AOAC (18g/day NSP). In line with UK NPM 2004/5 and close to the current DRV for those aged 11-16 years (25g AOAC/day) Increments consistent with UK NPM 2004/5 Extended from 0-5 to 0-10 point scale to help enable foods 'high in fibre' (at least 6g/100g) to score more points
Modifications 2 and 3 g (M2g and M3g)	Current DRV: 30g/day AOAC (22.5g/day NSP)[6]	0-10 point scale (with 10 increments) starting at 3.75% of the current DRV (and at 3.75% increments)	Based on current DRV for adults (30g/day AOAC) Increments consistent with UK NPM 2004/5 Extended from 0-5 to 0-10 point scale to help enable foods 'high in fibre' (at least 6g/100g) to score more points

Table 7: Details of fibre modifications (modification 3: h, i, j, k, l, m, n, o, p) and rationale

Fibre Modification	Based on	Scoring (Scale and increments)	Rationale
Baseline Model: UK NPM 2004/5	Previous DRV: 24g/day AOAC (18g/day NSP)	0-5 point scale (with 5 increments) starting at 3.75% of the previous DRV (and at 3.75% increments)	
Modification 3 h (M3h)	Current DRV: 30g/day AOAC (22.5g/day NSP)[6]	0-10 point scale (with 5 increments) starting at 3.75% of the current DRV (and 3.75% increments) Double points awarded compared with modification 'e' above	Based on current DRV for adults (30g/day AOAC) Increments consistent with the approach taken for the UK NPM 2004/5 As for modification 'e' above, but point scale extended from 0-5 to 0-10 to enable double the number of points awarded for each increment
Modification 3 i (M3i)	Current DRV: 30g/day AOAC (22.5g/day NSP)[6]	0-6.25 point scale (with 5 increments) starting at 3.75% of the current DRV (and 3.75% increments) Points awarded in increments of 1.25	Based on current DRV for adults (30g/day AOAC) Increments consistent with the approach taken for the UK NPM 2004/5. As for modification 'e' above, but point scale extended from 0-5 to 0-6.25 point scale using increments of 1.25. (1.25 calculated as ratio of 30g of AOAC fibre (SACN 2015) and 24g AOAC fibre[7]: 30/24 = 1.25)
Modification 3 j (M3j)	Previous DRV: 24g/day AOAC (18g/day NSP) [7]	0-13 point scale (with 13 increments) starting at 3.75 of the previous DRV (and at 3.75% increments) Point scale extended to 13 to reach 11.3g fibre (37.5% of the current DRV[6])	Based on previous DRV of 24g/day AOAC (18g/day NSP). In line with UK NPM 2004/5 and close to the current DRV for those aged 11-16 years (25g/day AOAC) Increments consistent with UK NPM 2004/5 Extended to 0-13 point scale to enable maximum score at 37.5% of current DRV[6] and to help enable foods 'high in fibre' (at least 6g/100g) to score more points
Modification 3 k (M3k)	Nutrition claim requirement[33]: 'high fibre' (at least 6g per 100g) and 'source of fibre' (at least 3g per 100g)	0-10 point scale (with 4 increments): • 10 points for products with 'high fibre' claim • 5 points for products with a 'source of fibre' claim • scoring system below 5 points agreed by the expert group)	Based on the EU FIC definitions for 'source of fibre' and 'high fibre' consistent with nutrition claims regulations Extended from 0-5 to 0-10 point scale to help enable foods 'high in fibre' (at least 6g/100g) to score more points

Fibre modification	Based on	Scoring (Scale and increments)	Rationale
Modification 3 l (M3l)	Derived value based on DRVs: 'Proportional change' in fibre DRV from 24g[7] to 30g[6] AOAC/day (18g to 22.5g NSP/day)[p]	0-5 point scale (with 5 increments) starting at 3.75% of the derived value (and at 3.75% increments)	Derived value based on DRVs used to proportionally reflect current fibre recommendations for adults (30g/day AOAC[6]) Increments consistent with UK NPM 2004/5
Modification 3 m (M3m)	Derived value based on DRVs: (as above)	0-7 point scale (with 7 increments) starting at 3.75% of the derived value (and at 3.75% increments)	Derived value based on DRVs used to proportionally reflect current fibre recommendations for adults (30g/day AOAC[6]) Increments consistent with UK NPM 2004/5 Extended to 0-7 point scale to help enable foods higher in fibre to score more points
Modification 3 n (M3n)	Derived value based on DRVs: (as above)	0-8 point scale (with 8 increments) starting at 3.75% of the derived value (and at 3.75% increments)	Derived value based on DRVs used to proportionally reflect current fibre recommendations for adults (30g/day AOAC[6]) Increments consistent with UK NPM 2004/5 Extended to 0-8 point scale to help enable foods higher in fibre to score more points and to also enable maximum score at 20% of current DRV[6] in line with other 'C' nutrients (that is, fruit, vegetables and nuts, and protein)
Modification 3 o (M3o)	Derived value based on DRVs: (as above)	0-10 point scale (with 10 increments) starting at 3.75% of the derived value (and at 3.75% increments)	Derived value based on DRVs used to proportionally reflect current fibre recommendations for adults (30g/day AOAC[6]) Increments consistent with UK NPM 2004/5 Extended to 0-10 point scale to help enable foods higher in fibre to score more points
Modification 3 p (M3p)	Current DRV: 30g/day AOAC (22.5g/day NSP)[6]	0-6 point scale (with increments starting at 3.75% of the current DRV (and at 3.75% increments) Scoring extended to reach 6g fibre culminating in a 6 point scale	Based on current DRV for adults (30g/day AOAC) Increments consistent with UK NPM 2004/5 Extended to 0-6 point scale to help enable foods higher in fibre to score more points and to also enable maximum score at 20% of current DRV[6] in line with other 'C' nutrients (that is, fruit, vegetables and nuts, and protein)

[p] The 'derived value' based on DRVs for modifications 'l', 'm', 'n' and 'o' was calculated as a 'proportional change' by taking 24g (previous DRV for fibre) divided by 30g (current DRV for fibre) = 0.8. A multiplier of 0.8 was applied to the UK NPM 2004/5 fibre scoring increments.

Results of fibre modelling (modification 3: e, f, g, h, i, j, k, l, m, n, o, p)

5.42 **Table 10** shows the results of fibre modifications (modification 3: e, f, g, h, i, j, k, l, m, n, o and p) against the performance measures.

5.43 None of the modifications for fibre had a major impact on the overall number of foods passing compared with the UK NPM 2004/5. It was considered that this was likely to be the result of the impact of the greater change in the reduction of free sugars compared to a smaller increase in the fibre component of the model.

5.44 Regardless of the fibre adaptations made, modification 3 consistently increased the number of foods and drinks high in free sugars that would not pass compared to the UK NPM 2004/5. For products high in free sugars this represented 155 fewer foods and drinks for modification 3 (difference of 16 percentage points), compared to UK NPM 2004/5 (a total of 176 (18%) foods and drinks passing the model). Modification 3 was chosen as the basis for further modifications.

5.45 The following further adaptations were conducted on modification 3. These aimed to assess:

- the impact for opportunities to encourage reformulation ie greater amounts of fibre
- impact on foods with lower amounts of fibre (‘source of fibre’)

5.46 Some adaptations of modification 3 resulted in fewer foods which met the definition of ‘source of fibre’, passing the models compared to UK NPM 2004/5 (h, i, k and p)

5.47 Other adaptations of modification 3 (for example, j, l, m, n and o) resulted in a smaller number of foods with a lower fibre content (defined as ‘source of fibre’) passing the model compared to modification 3 with no fibre adaptations.

5.48 Discussions then focused on whether fibre should be scored in the same way as other ‘C’ nutrients/ food components and remain on a 5 point scale or whether the scale should be extended to allow more points to be scored. There was little difference in the impact of the different modifications, but the 5 point scale models appeared to slightly increase the number of foods with a lower fibre content not passing the model. Extending the scale resulted in slightly more foods, which are either low or high in fibre gaining positive points for fibre.

Decisions of fibre modelling (modifications 3: e, f, g, h, i, j, k, l, m, n, o, p)

5.49 Modification 3n (fibre) was identified as the recommended fibre modification owing to:

- consistency with revised UK dietary recommendation of 30g AOAC fibre (equivalent 22.5g NSP)
- consistency with other 'C' nutrients in relation to the 20% score band maximum
- use of an 8 point scale to pragmatically emphasise the increased UK recommendation for fibre
- potential for contribution of greater fibre intake through recognising the contribution of foods which contain a 'source of fibre' and encouraging reformulation

Agreed outcome for fibre: reference value of 30g AOAC (equivalent to 22.5g NSP) with scoring band adjusted as a proportional change from the existing UK NPM 2004/5 value of 24g (equivalent to 18g NSP). The maximum cut-off point relates to 20% of reference value with an 8 point scale.

Protein

5.50 The focus of the UK NPM 2004/5 review was to align the model with revised UK dietary recommendations for sugar and fibre. As the protein criterion was not within the scope of the review, the expert group decided to retain the weighted average of the Reference Nutrient Intake (RNI) for protein[7] in children aged 11-14 years and 15-18 years (42g of protein) as the derived reference value. Preliminary analysis to model the impact of adjusting the protein scoring, in line with the dietary recommendations for adults in line with other nutrients in the NPM, made no material difference to the outcome.

Agreed outcome for protein: Retain the derived reference value of 42g.

Summary of the changes to the draft 2018 NPM

5.51 A range of modifications to the UK NPM 2004/5 were considered and the effect on a range of foods and drinks in the NPM test dataset were modelled. The performance of each revision of the model was assessed against the UK NPM 2004/5 using a NPM test dataset. The recommended model was modification 3n (fibre) and has subsequently been referred to as the draft 2018 NPM in this document.

5.52 **Table 8** summarises the pass rate for foods and drinks against selected performance measures for the UK NPM 2004/5 (baseline) and the draft 2018 NPM.

Table 8: The overall number and percentage of foods and drinks that pass the UK NPM 2004/5 (baseline) and the draft 2018 NPM against selected performance measures[q]

Model modification	Overall pass, number passed, (%)[r,s]			High free sugars, number passed, (%)[t]			High total sugars, number passed, (%)[u]			High saturated fat, number passed, (%)[v]			High salt, number passed, (%)[w]			'Source of fibre', number passed (%)[x]	'High fibre', number passed (%)[y]
	Food (n=2249)	Drink (n=371)	Food & Drink (n=2620)	Food (n=812)	Drink (n=157)	Food & Drink (n=969)	Food (n=536)	Drink (n=80)	Food & Drink (n=616)	Food (n=784)	Drink (n=5)	Food & Drink (n=789)	Food (n=235)	Drink (n=0)	Food & Drink (n=235)	Food (n=334)	Food (n=144)
UK NPM 2004/5 (Baseline)[z]	1053 (47)	264 (71)	1317 (50)	116 (14)	60 (38)	176 (18)	13 (2)	25 (31)	38 (6)	31 (4)	1 (20)	32 (4)	7 (3)	0 (0)	7 (3)	168 (50)	101 (70)
Draft 2018 NPM (Modification 3n)	917 (41)	186 (50)	1103 (42)	17 (2)	4 (3)	21 (2)	12 (2)	1 (1)	13 (2)	26 (3)	0 (0)	26 (3)	7 (3)	0 (0)	7 (3)	162 (49)	78 (54)

5.53 The number of foods and drinks that pass the draft 2018 NPM in comparison to the UK NPM 2004/5 reduces from 1317(50%) to 1103(42%).

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[q] See **Appendix K** *Rationale for the development of the NPM performance measures* for details on how the performance measures were developed
[r] If a food scores less than 4 points it would pass the model and for the UK NPM 2004/5 meets the criteria to be advertised to children
[s] If a drink scores less than 1 point it would pass the model and for the UK NPM 2004/5 meets the criteria to be advertised to children
[t] Performance measure = Food: High >22.5g/100g total sugars, Drinks: High > 8g/100ml total sugars
[u] Performance measure = Food: High >6.25g/100g free sugars, Drinks: High >3.13g/100g free sugars
[v] Performance measure= Food: High>5g/100g saturated fat, Drinks: High> 2.5g/100ml saturated fat
[w] Performance measure= Food: High>1.5g/100g salt, Drinks: High> 0.75g/100ml salt
[x] Performance measure= Food: 'Source of fibre' (>3g/100g to ≤6g/100g)
[y] Performance measure= Food: 'High fibre' (>6g/100g)
[z] Baseline 'A' components: Based on 8,950kJ, 21% of food energy from total sugars, 11% of food energy from saturated fat, 2.4g sodium

5.54 The draft 2018 NPM has the following impact on primary and other performance measures (ie foods and drinks passing the draft 2018 NPM compared to the UK NPM 2004/5):

- fewer foods and drinks high in free sugars pass the draft 2018 NPM (n=21, 2%) in comparison to the UK NPM 2004/5 (n=176,18%)
- fewer foods and drinks high in total sugars pass the draft 2018 NPM (n=13, 2%) in comparison to the UK NPM 2004/5 (n=38, 6%)
- fewer foods and drinks high in saturated fat pass the draft 2018 NPM (n=26, 3%) in comparison to the UK NPM 2004/5 (n=32, 4%)
- no change in the number of high salt foods and drinks passing the model
- fewer foods with a 'source of fibre' pass the draft 2018 NPM (n=162, 49%) in comparison to the UK NPM 2004/5 (n=168,50%)
- fewer foods with 'high fibre' pass the draft 2018 NPM (n=78, 54%) in comparison to the UK NPM 2004/5 (n=101,70%)

5.55 Some of the foods 'high in fibre' that passed the UK NPM 2004/5 do not now pass the draft 2018 NPM because of their free sugars content (some breakfast cereals and cereal bars for example).

Results tables

6.1 This section presents the results tables that show the overall percentage of foods and drinks in the NPM test dataset that pass the UK NPM 2004/5, and each modification by category. It also presents the draft 2018 NPM compared to the UK NPM 2004/5 (baseline).

6.2 **Table 9** shows the overall percentage of foods and drinks in the NPM test dataset that pass the UK NPM 2004/5 and at each modification (modification 1, modification 2 and modification 3) by category.

6.3 **Table 10** shows the overall percentage of foods and drinks in the NPM test dataset that pass the UK NPM 2004/5 (baseline): for 3 sugar modifications (modifications 1, 2 and 3: (see **Table 3**), for 3 fruit, vegetables and nuts modifications (modifications a, b, c: see **Table 5**), 12 fibre modification (modifications e, f, g, h, i, j, k, l, m, n, o, p; see **Tables 6** and **7**) and no energy scoring against selected performance measures.

Table 9: The overall number and percentage of foods and drinks in the NPM test dataset that pass the UK NPM 2004/5 and at each modification (modification 1, modification 2 and modification 3) by category

NPM test dataset category	Description of NPM test dataset category	Total number (n) in each category	UK NPM 2004/5 **Baseline 'A' components:** Based on 8,950kJ, 21% of food energy from total sugars, 11% of food energy from saturated fat, 2.4g sodium	Modification 1 **Modifications to 'A' components:** Based on 8,400kJ, 21% of food energy from total sugars, 11% of food energy from saturated fat, 6g salt in place of sodium	Modification 2 **Modifications to 'A' components:** Based on 8,400kJ, 18% of food energy from total sugars, 11% of food energy from saturated fat, 6g salt in place of sodium	Modification 3 **Modifications to 'A' components:** Based on 8,400kJ, removed total sugars and replaced with 5% total dietary energy from free sugars, 11% of food energy from saturated fat, 6g salt in place of sodium
			Pass, n (%)[aa]	**Pass, n (%)**	**Pass, n (%)**	**Pass, n (%)**
DRINKS						
Coffee[bb]	Includes coffee granules/instants/pods, caffeinated/ decaffeinated, latte/mocha/ cappuccino coffee with additions	39	29 (74)	26 (67)	25 (64)	20 (51)
Energy drinks, low calorie	Includes all low calorie, still/carbonated drinks containing stimulants	6	6 (100)	5 (83)	5 (83)	5 (83)
Energy drinks, not low calorie	Includes all drinks still/carbonated containing stimulants	14	3 (21)	1 (7)	0 (0)	0 (0)
Fruit juice, vegetable juices and smoothies	Includes chilled and ambient juices, smoothies, lemon juice etc	35	32 (91)	32 (91)	32 (91)	4 (11)
Instant hot and cold beverages	Includes drinking chocolate, cocoa, powdered malted drinks, milkshake powder	23	9 (39)	7 (30	7 (30)	3 (13)
Milk products including dried, flavoured and non-dairy milks	Includes milk products including dried, flavoured and non-dairy milks, coffee whitener	11	8 (73)	7 (64)	6 (55)	6 (55)
Milk, skimmed/semi-skimmed/whole,	Includes milk, dairy, skimmed/semi-skimmed/whole, pasteurised/UHT	7	5 (71)	3 (43)	3 (43)	5 (71)

[aa]If a food scores less than 4 points or a drink scores less than 1 point, it passes the NPM

[bb] For the purpose of the initial analysis, caffeine containing drinks were included. However the 2018 review of the NPM excludes consideration of caffeine as it was considered outside the aims of the review

NPM test dataset category	Description of NPM test dataset category	Total number (n) in each category	UK NPM 2004/5 **Baseline 'A' components:** Based on 8,950kJ, 21% of food energy from total sugars, 11% of food energy from saturated fat, 2.4g sodium	Modification 1 **Modifications to 'A' components:** Based on 8,400kJ, 21% of food energy from total sugars, 11% of food energy from saturated fat, 6g salt in place of sodium	Modification 2 **Modifications to 'A' components:** Based on 8,400kJ, 18% of food energy from total sugars, 11% of food energy from saturated fat, 6g salt in place of sodium	Modification 3 **Modifications to 'A' components:** Based on 8,400kJ, removed total sugars and replaced with 5% total dietary energy from free sugars, 11% of food energy from saturated fat, 6g salt in place of sodium
			Pass, n (%)[aa]	**Pass, n (%)**	**Pass, n (%)**	**Pass, n (%)**
pasteurised/UHT						
Soft drinks, carbonated, low calorie	Includes all low calorie, no added sugar, sugar free types. Includes carbonated soft drinks, lemonade, slimline tonic water, flavoured sparkling drink, soda water, and ginger ale/beer	77	77 (100)	76 (99)	76 (99)	76 (99)
Soft drinks, carbonated, not low calorie	Includes tonic water, carbonated soft drinks, lemonade, sparkling juice drink, and ginger beer/ale	48	14 (29)	10 (21)	8 (17)	0 (0)
Soft drinks, still, low calorie, dilutable	Includes all low calorie drinks and water is used as dilutant. Includes single and double strength squashes	20	20 (100)	20 (100)	20 (100)	20 (100)
Soft drinks, still, low calorie, ready to drink	Includes all low calorie, no added sugar, sugar free types. Includes juice drinks	9	9 (100)	9 (100)	9 (100)	5 (56)
Soft drinks, still, not low calorie, dilutable	Includes all types including squashes and cordials and water used as a diluent	8	2 (25)	2 (25)	1 (13)	0 (0)
Soft drinks, still, not low calorie, ready to drink	Includes all types of still soft drinks not carbonated. Includes juice drinks, coconut water	26	8 (31)	7 (27)	6 (23)	3 (12)
Water, still/sparking and flavoured	Includes bottled water still/sparkling and flavoured water, no calories	38	38 (100)	38 (100)	38 (100)	38 (100)
Yoghurt drinks	Includes flavoured and plain yoghurt drinks	10	4 (40)	4 (40)	3 (30)	0 (0)
Total drinks		371	264 (71)	247 (67)	239 (64)	185 (50)

NPM test dataset category	Description of NPM test dataset category	Total number (n) in each category	UK NPM 2004/5 **Baseline 'A' components:** Based on 8,950kJ, 21% of food energy from total sugars, 11% of food energy from saturated fat, 2.4g sodium	**Modification 1** **Modifications to 'A' components:** Based on 8,400kJ, 21% of food energy from total sugars, 11% of food energy from saturated fat, 6g salt in place of sodium	**Modification 2** **Modifications to 'A' components:** Based on 8,400kJ, 18% of food energy from total sugars, 11% of food energy from saturated fat, 6g salt in place of sodium	**Modification 3** **Modifications to 'A' components:** Based on 8,400kJ, removed total sugars and replaced with 5% total dietary energy from free sugars, 11% of food energy from saturated fat, 6g salt in place of sodium
			Pass, n (%)[aa]	**Pass, n (%)**	**Pass, n (%)**	**Pass, n (%)**
FOODS						
Block pastry	Includes puff/shortcrust pastry sheets/blocks	4	0 (0)	0 (0)	0 (0)	0 (0)
Bread	Includes all plain, multi-seeded, wholemeal breads, toasties, bagels, pitta, muffins, and baguettes. Excludes sweet muffins as they are included in the morning goods	102	98 (96)	96 (94)	96 (94)	97 (95)
Breakfast cereal, high fibre	Includes all breakfast cereals with AOAC fibre of 6g/100g or more eg wheat bran cereal, shredded wholegrain wheat cereal, porridge	53	41 (77)	32 (60)	26 (49)	18 (34)
Breakfast cereals, other	Includes all breakfast cereals with AOAC fibre less than 6g/100g. Eg toasted rice cereal, frosted flakes cereal	19	2 (11)	0 (0)	0 (0)	0 (0)
Butter and fat spreads	Includes salted and unsalted butter, low fat spreads, reduced fat spreads	40	0 (0)	0 (0)	0 (0)	0 (0)
Cakes and pastries	Includes all types of cakes, ambient and chilled, including cake bars and slices, American muffins, doughnuts, Swiss rolls, frozen gateaux, chocolate eclairs. This category also includes sweet pastries such as jam tarts, Bakewell tarts and egg custard tarts	32	0 (0)	0 (0)	0 (0)	0 (0)
Cereal bar	Includes cereal bar, including breakfast cereal bars	21	1 (5)	0 (0)	0 (0)	0 (0)
Cheese	Includes all types of cheese: not reduced	71	5 (7)	4 (6)	4 (6)	4 (6)

NPM test dataset category	Description of NPM test dataset category	Total number (n) in each category	UK NPM 2004/5 **Baseline 'A' components:** Based on 8,950kJ, 21% of food energy from total sugars, 11% of food energy from saturated fat, 2.4g sodium	Modification 1 **Modifications to 'A' components:** Based on 8,400kJ, 21% of food energy from total sugars, 11% of food energy from saturated fat, 6g salt in place of sodium	Modification 2 **Modifications to 'A' components:** Based on 8,400kJ, 18% of food energy from total sugars, 11% of food energy from saturated fat, 6g salt in place of sodium	Modification 3 **Modifications to 'A' components:** Based on 8,400kJ, removed total sugars and replaced with 5% total dietary energy from free sugars, 11% of food energy from saturated fat, 6g salt in place of sodium
			Pass, n (%)[aa]	**Pass, n (%)**	**Pass, n (%)**	**Pass, n (%)**
	fat cheese, medium/reduced fat cheeses, cottage, cheese spreads, quark					
Chocolate confectionery	Includes milk chocolate, dark chocolate, white chocolate, chocolate bars, nut bars, chocolate raisins, chocolate with filling/ripple eg strawberry, caramel, milk chocolate desserts, fondant	181	0 (0)	0 (0)	0 (0)	0 (0)
Cooking oils	Includes olive oils, sunflower, vegetable, various nuts, soya, corn	22	0 (0)	0 (0)	0 (0)	0 (0)
Cream	Includes crème fraiche, single and double cream, clotted, whipping, aerosol	16	0 (0)	0 (0)	0 (0)	0 (0)
Crisps/savoury snacks/popcorn	Includes all potato and cereal based snacks, popcorn, pretzels, pork scratchings	127	5 (4)	4 (3)	4 (3)	4 (3)
Desserts	Includes ambient, chilled and frozen puddings, including custards and jellies	91	34 (37)	32 (35)	28 (31)	6 (7)
Dry pulses and cereals	Includes quinoa, various types of beans, chickpeas	7	7 (100)	7 (100)	7 (100)	7 (100)
Eggs	Includes chicken eggs, duck eggs, egg white	3	3 (100)	3 (100)	3 (100)	3 (100)
Fish	Includes various types of raw fish, shellfish, fish in brine/oil, fish in tomato sauce/vegetable additions, fish fingers, battered fish, breaded fish, canned fish, oily fish	100	90 (90)	89 (89)	89 (89)	87 (87)
Fruit	Includes various types of raw fruits with skin and flesh/flesh only/whole with stones, fruits canned in syrup/juice, olives	130	125 (96)	123 (95)	121 (93)	111 (85)

NPM test dataset category	Description of NPM test dataset category	Total number (n) in each category	UK NPM 2004/5 **Baseline 'A' components:** Based on 8,950kJ, 21% of food energy from total sugars, 11% of food energy from saturated fat, 2.4g sodium	**Modification 1** **Modifications to 'A' components:** Based on 8,400kJ, 21% of food energy from total sugars, 11% of food energy from saturated fat, 6g salt in place of sodium	**Modification 2** **Modifications to 'A' components:** Based on 8,400kJ, 18% of food energy from total sugars, 11% of food energy from saturated fat, 6g salt in place of sodium	**Modification 3** **Modifications to 'A' components:** Based on 8,400kJ, removed total sugars and replaced with 5% total dietary energy from free sugars, 11% of food energy from saturated fat, 6g salt in place of sodium
			Pass, n (%)[aa]	**Pass, n (%)**	**Pass, n (%)**	**Pass, n (%)**
	in brine drained, dried/semi-dried fruits					
Ice cream and ice lollies	Includes all types of ice cream, dairy ice cream, choc ices, milk ice lollies, low fat ice cream, ice lollies without ice cream	39	2 (5)	1 (3)	1 (3)	0 (0)
Meat	Includes sausages, burgers, bacon, various types of fresh and frozen meat, ham, Brussels pâté, cheeseburger	171	83 (49)	77 (45)	77 (45)	76 (44)
Meat substitute	Includes meat alternatives such as vegetarian sausages, meat free chicken fillets, mycoprotein mince, tofu	7	6 (86)	6 (86)	6 (86)	6 (86)
Milk products including condensed, evaporated milks	Includes condensed and evaporated milk	7	0 (0)	0 (0)	0 (0)	0 (0)
Miscellaneous	Includes products that do not fit in any other category, or too small to create a separate category eg scotch eggs, stuffing balls	5	3 (60)	3 (60)	3 (60)	3 (60)
Morning goods	Includes croissants, pain au chocolate, crumpets, English muffins, pancakes, crepes, scotch pancakes, potato cakes, buns, teacakes, scones, waffles, Danish pastries, fruit loaves, pancake mix, fruited iced buns, fruited buns eg hot cross buns, Welsh cakes, crumble mix etc. Excludes plain bread and rolls (included in bread)	71	24 (34)	22 (31)	21 (30)	25 (35)
Noodles	Includes flavoured instant noodles, fresh egg noodles	21	19 (90)	19 (90)	19 (90)	16 (76)
Nuts	Includes various types of nuts,	21	20 (95)	17 (81)	17 (81)	18 (86)

NPM test dataset category	Description of NPM test dataset category	Total number (n) in each category	UK NPM 2004/5 **Baseline 'A' components:** Based on 8,950kJ, 21% of food energy from total sugars, 11% of food energy from saturated fat, 2.4g sodium	Modification 1 **Modifications to 'A' components:** Based on 8,400kJ, 21% of food energy from total sugars, 11% of food energy from saturated fat, 6g salt in place of sodium	Modification 2 **Modifications to 'A' components:** Based on 8,400kJ, 18% of food energy from total sugars, 11% of food energy from saturated fat, 6g salt in place of sodium	Modification 3 **Modifications to 'A' components:** Based on 8,400kJ, removed total sugars and replaced with 5% total dietary energy from free sugars, 11% of food energy from saturated fat, 6g salt in place of sodium
			Pass, n (%)[aa]	**Pass, n (%)**	**Pass, n (%)**	**Pass, n (%)**
	salted/unsalted nuts, peanut butter					
Pasta	Includes fresh filled pasta, canned pasta with sauce, dried/cooked plain pasta, macaroni cheese, tortellini, cous cous	31	30 (97)	30 (97)	30 (97)	24 (77)
Pizza	Includes all types of pizza, thin, deep pan, dough balls, pizza bases, baguette pizza subs	22	6 (27)	4 (18)	4 (18)	3 (14)
Potatoes/processed potato/chips	Includes jacket potatoes, thick/thin straight cut or crinkle cut chips, potato waffles, mashed potato, potato wedges, hash browns, roast potatoes, tinned potatoes, microwave chips	45	43 (96)	43 (96)	43 (96)	43 (96)
Poultry	Includes whole roast chicken, chicken burger, breaded and battered chicken eg goujons/dippers/nuggets/steaks, chicken/turkey Kiev, turkey ham, cooked sliced chicken, chicken in sauce	53	46 (87)	45 (85)	45 (85)	45 (85)
Ready meals	Includes ready meals including burgers, lasagne, shepherds/cottage pie, macaroni and cheese, spaghetti Bolognese, risotto, pasta based ready meals, chicken tikka masala with rice, fish pie, toad in hole	38	31 (82)	31 (82)	31 (82)	27 (71)
Rice	Includes basmati/brown/wholegrain rice, pre-cooked microwave/uncooked, with additions eg with vegetables or with sweet and sour sauce	21	21 (100)	21 (100)	21 (100)	20 (95)
Sandwiches	Includes retail sandwiches eg egg and cress, chicken salad, tuna mayonnaise	12	9 (75)	9 (75)	8 (67)	9 (75)

NPM test dataset category	Description of NPM test dataset category	Total number (n) in each category	UK NPM 2004/5 **Baseline 'A' components:** Based on 8,950kJ, 21% of food energy from total sugars, 11% of food energy from saturated fat, 2.4g sodium	**Modification 1** **Modifications to 'A' components:** Based on 8,400kJ, 21% of food energy from total sugars, 11% of food energy from saturated fat, 6g salt in place of sodium	**Modification 2** **Modifications to 'A' components:** Based on 8,400kJ, 18% of food energy from total sugars, 11% of food energy from saturated fat, 6g salt in place of sodium	**Modification 3** **Modifications to 'A' components:** Based on 8,400kJ, removed total sugars and replaced with 5% total dietary energy from free sugars, 11% of food energy from saturated fat, 6g salt in place of sodium
			Pass, n (%)[aa]	**Pass, n (%)**	**Pass, n (%)**	**Pass, n (%)**
	etc					
Sauces/condiments	Includes tomato ketchup, mayonnaise, mustard, salad cream, stock cubes, gravy granules, dressing, spice mixes, packet mix sauces, pasta/tomato based sauces, sweet and sour/stir fry sauces, pickles, salsa, meat paste, soy sauce, chicory essence, brown sauce, mint sauce, pesto, apple sauce	70	17 (24)	15 (21)	15 (21)	10 (14)
Savoury biscuits and crackers	Includes crackers, rye crisp bread, oatcakes, breadsticks, biscuits cheese flavoured, toasted minibreads, water biscuits, Cornish wafers, flatbreads	41	4 (10)	4 (10)	4 (10)	4 (10)
Savoury pastries	Includes sausage rolls, Cornish pasty, meat pie	31	2 (6)	2 (6)	2 (6)	2 (6)
Soup	Includes dried, canned, condensed and fresh soup	16	14 (88)	14 (88)	14 (88)	13 (81)
Sugar confectionery	Includes gums, boiled sweets, fruit pastilles, chewing gum, chews, mints, toffees, chocolate sweets, fudge, liquorice	47	2 (4)	2 (4)	2 (4)	2 (4)
Sugars, preserves and sweet spreads	Includes, jams/marmalade, honey, maple syrup, golden syrup, black treacle, caster/icing sugar/demerara, chocolate dessert sauce, toffee sauce, chocolate spread	35	1 (3)	1 (3)	1 (3)	1 (3)
Sweet biscuits	Includes all sweet or short biscuits, including half coated and fully coated biscuits, fig rolls, digestives, wafer, iced	151	1 (1)	1 (1)	1 (1)	1 (1)

NPM test dataset category	Description of NPM test dataset category	Total number (n) in each category	UK NPM 2004/5 **Baseline 'A' components:** Based on 8,950kJ, 21% of food energy from total sugars, 11% of food energy from saturated fat, 2.4g sodium	Modification 1 **Modifications to 'A' components:** Based on 8,400kJ, 21% of food energy from total sugars, 11% of food energy from saturated fat, 6g salt in place of sodium	Modification 2 **Modifications to 'A' components:** Based on 8,400kJ, 18% of food energy from total sugars, 11% of food energy from saturated fat, 6g salt in place of sodium	Modification 3 **Modifications to 'A' components:** Based on 8,400kJ, removed total sugars and replaced with 5% total dietary energy from free sugars, 11% of food energy from saturated fat, 6g salt in place of sodium
			Pass, n (%)[aa]	**Pass, n (%)**	**Pass, n (%)**	**Pass, n (%)**
	biscuits, shortbread, jam filled, ginger nut, chocolate chips, fruit biscuits, cream sandwich biscuits, chocolate coated biscuits with marshmallow					
Vegetables	Includes salad and raw vegetables, canned mushy peas, canned sweetcorn, canned red kidney beans, canned baked beans in sauce, canned baby beetroot, chopped tomatoes in juice, coleslaw, tomato puree, passata, canned vegetables in water, hummus, canned carrots, pickled vegetables	199	195 (98)	193 (97)	193 (97)	191 (96)
Yoghurt and fromage frais	Includes yoghurts including natural/low fat yoghurts, split pot yoghurts with additions, yoghurt with additions, fromage frais, fromage frais with additions eg strawberry	65	53 (82)	50 (77)	44 (68)	20 (31)
Yorkshire puddings	Includes ready-made Yorkshire puddings, dumplings and batter mixes	11	10 (91)	10 (91)	10 (91)	10 (91)
Total food		2249	1053 (47)	1010 (45)	990 (44)	906 (40)
Total food and drink		2620	1317 (50)	1257 (48)	1229 (47)	1091 (42)

Table 10: The overall number and percentage of foods and drinks in the NPM test dataset that pass various modifications of the NPM for; sugar (3 modifications 1, 2 and 3: see table 3); fruit, vegetables and nuts (3 modifications a, b, c: see table 5), fibre (12 modifications e, f, g, h, i, j, k, l, m, n, o, p: see table 6 and 7) and no energy scoring in comparison to the UK NPM 2004/5 (baseline), against selected performance measures[cc]

Model modification	Overall pass, n (%)[dd,ee]			High free sugars, n (%)[ff]			High total sugars, n (%)[gg]			High saturated fat, n (%)[hh]			High salt, n (%)[ii]			'Source of fibre', n (%)[jj]	'High fibre', n (%)[kk]
	Food (n=2249)	Drink (n=371)	F & D (n=2620)	Food (n=812)	Drink (n=157)	F & D (n=969)	Food (n=536)	Drink (n=80)	F & D (n=616)	Food (n=784)	Drink (n=5)	F & D (n=789)	Food (n=235)	Drink (n=0)	F & D (n=235)	Food (n=334)	Food (n=144)
UK NPM 2004/5 (Baseline)[ll]	1053 (47)	264 (71)	1317 (50)	116 (14)	60 (38)	176 (18)	13 (2)	25 (31)	38 (6)	31 (4)	1 (20)	32 (4)	7 (3)	0 (0)	7 (3)	168 (50)	101 (70)
Modification 1 (M1)[mm]	1010 (45)	247 (67)	1257 (48)	92 (11)	48 (31)	140 (14)	8 (1)	24 (30)	32 (5)	22 (3)	0 (0)	22 (3)	6 (3)	0 (0)	6 (3)	161 (48)	91 (63)
Modification 2 (M2)[nn]	990 (44)	239 (64)	1229 (47)	74 (9)	42 (27)	116 (12)	7 (1)	23 (29)	30 (5)	22 (3)	0 (0)	22 (3)	6 (3)	0 (0)	6 (3)	160 (48)	85 (59)
Modification 3(M3)[oo]	906 (40)	185 (50)	1091 (42)	17 (2)	4 (3)	21 (2)	12 (2)	1 (1)	13 (2)	23 (3)	0 (0)	23 (3)	6 (3)	0 (0)	6 (3)	159 (48)	77 (53)
M2a (FVN)	995 (44)	239 (64)	1234 (47)	76 (9)	42 (27)	118 (12)	7 (1)	23 (29)	30 (5)	22 (3)	0 (0)	22 (3)	6 (3)	0 (0)	6 (3)	160 (48)	85 (59)
M2b (FVN)	990 (44)	239 (64)	1229 (47)	74 (9)	42 (27)	116 (12)	7 (1)	23 (29)	30 (5)	22 (3)	0 (0)	22 (3)	6 (3)	0 (0)	6 (3)	160 (48)	85 (59)
M2c (FVN)	999 (44)	239 (64)	1238 (47)	76 (9)	42 (27)	118 (12)	8 (1)	23 (29)	31 (5)	24 (3)	0 (0)	24 (3)	7 (3)	0 (0)	7 (3)	164 (49)	85 (59)

[cc] See **Appendix K** Rationale for the development of the NPM performance measures for details on how the performance measures were developed
[dd] If a food scores less than 4 points it passes the NPM
[ee] If a drink scores less than 1 point it passes the NPM
[ff] Performance measure = Food: High >6.25g/100g free sugars, Drinks: High >3.13g/100g free sugars
[gg] Performance measure = Food: High >22.5g/100g total sugars, Drinks: High > 8g/100ml total sugars
[hh] Performance measure= Food: High>5g/100g saturated fat, Drinks: High> 2.5g/100ml saturated fat
[ii] Performance measure= Food: High>1.5g/100g salt, Drinks: High> 0.75g/100ml salt
[jj] Performance measure= Food: 'Source of fibre' (>3g/100g to ≤6g/100g)
[kk] Performance measure= Food: 'High fibre' (>6g/100g)
[ll] **Baseline 'A' components:** Based on 8,950kJ, 21% of food energy from total sugars, 11% of food energy from saturated fat, 2.4g sodium
[mm] **Modifications to 'A' components:** Based on 8,400kJ, 21% of food energy from total sugars, 11% of food energy from saturated fat, 6g salt in place of sodium
[nn] **Modifications to 'A' components:** Based on 8,400kJ, 18% of food energy from total sugars, 11% of food energy from saturated fat, 6g salt in place of sodium
[oo] **Modifications to 'A' components:** Based on 8,400kJ, removed total sugars and replaced with 5% of total dietary energy from free sugars, 11% of food energy from saturated fat, 6g salt in place of sodium

Model modification	Overall pass, n (%)[pp,qq]			High free sugars, n (%)[rr]			High total sugars, n (%)[ss]			High saturated fat, n (%)[tt]			High salt, n (%)[uu]			'Source of fibre', n (%)[vv]	'High fibre', n (%)[ww]
	Food (n=2249)	Drink (n=371)	F & D (n=2620)	Food (n=812)	Drink (n=157)	F & D (n=969)	Food (n=536)	Drink (n=80)	F & D (n=616)	Food (n=784)	Drink (n=5)	F & D (n=789)	Food (n=235)	Drink (n=0)	F & D (n=235)	Food (n=334)	Food (n=144)
M2d (no energy scoring)	1189 (53)	239 (64)	1428 (54)	133 (16)	42 (27)	175 (18)	27 (5)	23 (29)	50 (8)	51 (7)	0 (0)	51 (6)	27 (11)	0 (0)	27 (11)	223 (67)	117 (81)
M2e (fibre)	976 (43)	238 (64)	1214 (46)	74 (9)	41 (26)	115 (12)	6 (1)	22 (28)	28 (5)	22 (3)	0 (0)	22 (3)	5 (2)	0 (0)	5 (2)	155 (46)	85 (59)
M2f (fibre)	1001 (45)	239 (64)	1240 (47)	83 (10)	42 (27)	125 (13)	8 (1)	23 (29)	31 (5)	25 (3)	0 (0)	25 (3)	6 (3)	0 (0)	6 (3)	161 (48)	95 (66)
M2g (fibre)	1004 (45)	239 (64)	1243 (47)	85 (10)	42 (27)	127 (13)	8 (1)	23 (29)	31 (5)	25 (3)	0 (0)	25 (3)	6 (3)	0 (0)	6 (3)	161 (48)	97 (67)
M3a (FVN)	913 (41)	185 (50)	1098 (42)	17 (2)	4 (3)	21 (2)	12 (2)	1 (1)	13 (2)	23 (3)	0 (0)	23 (3)	6 (3)	0 (0)	6 (3)	159 (48)	77 (53)
M3b (FVN)	906 (40)	185 (50)	1091 (42)	17 (2)	4 (3)	21 (2)	12 (2)	1 (1)	13 (2)	23 (3)	0 (0)	23 (3)	6 (3)	0 (0)	6 (3)	159 (48)	77 (53)
M3c (FVN)	916 (41)	186 (50)	1102 (42)	17 (2)	5 (3)	22 (2)	12 (2)	1 (1)	13 (2)	25 (3)	0 (0)	25 (3)	7 (3)	0 (0)	7 (3)	162 (49)	77 (53)
M3d (no energy scoring)	1032 (46)	186 (50)	1218 (46)	24 (3)	4 (3)	28 (3)	17 (3)	1 (1)	18 (3)	50 (6)	1 (20)	51 (6)	20 (9)	0 (0)	20 (9)	202 (60)	86 (60)
M3e (fibre)	891 (40)	185 (50)	1076 (41)	15 (2)	4 (3)	19 (2)	12 (2)	1 (1)	13 (2)	22 (3)	0 (0)	22 (3)	5 (2)	0 (0)	5 (2)	156 (47)	77 (53)
M3f (fibre)	908 (40)	185 (50)	1093 (42)	17 (2)	4 (3)	21 (2)	12 (2)	1 (1)	13 (2)	25 (3)	0 (0)	25 (3)	6 (3)	0 (0)	6 (3)	160 (48)	78 (54)
M3g (fibre)	891 (40)	185 (50)	1076 (41)	15 (2)	4 (3)	19 (2)	12 (2)	1 (1)	13 (2)	22 (3)	0 (0)	22 (3)	5 (2)	0 (0)	5 (2)	156 (47)	77 (53)
M3h (fibre)	920 (41)	185 (50)	1105 (42)	20 (2)	4 (3)	24 (2)	14 (3)	1 (1)	15 (2)	26 (3)	0 (0)	26 (3)	7 (3)	0 (0)	7 (3)	168 (50)	80 (56)
M3i (fibre)	909 (40)	185 (50)	1094 (42)	16 (2)	4 (3)	20 (2)	12 (2)	1 (1)	13 (2)	24 (3)	0 (0)	24 (3)	6 (3)	0 (0)	6 (3)	160 (48)	77 (53)

[pp] If a food scores less than 4 points it passes the NPM
[qq] If a drink scores less than 1 point it passes the NPM
[rr] Performance measure = Food: High >6.25g/100g free sugars, Drinks: High >3.13g/100g free sugars
[ss] Performance measure = Food: High >22.5g/100g total sugars, Drinks: High > 8g/100ml total sugars
[tt] Performance measure= Food: High>5g/100g saturated fat, Drinks: High> 2.5g/100ml saturated fat
[uu] Performance measure= Food: High>1.5g/100g salt, Drinks: High> 0.75g/100ml salt
[vv] Performance measure= Food: 'Source of fibre' (>3g/100g to ≤6g/100g)
[ww] Performance measure= Food: 'High fibre '(>6g/100g)

Model modification	Overall pass, n (%)[xx,yy]			High free sugars, n (%)[zz]			High total sugars, n (%)[aaa]			High saturated fat, n (%)[bbb]			High salt, n (%)[ccc]			'Source of fibre', n (%)[ddd]	'High fibre', n (%)[eee]
	Food (n=2249)	Drink (n=371)	F & D (n=2620)	Food (n=812)	Drink (n=157)	F & D (n=969)	Food (n=536)	Drink (n=80)	F & D (n=616)	Food (n=784)	Drink (n=5)	F & D (n=789)	Food (n=235)	Drink (n=0)	F & D (n=235)	Food (n=334)	Food (n=144)
M3j (fibre)	912 (41)	185 (50)	1097 (42)	20 (2)	4 (3)	24 (2)	12 (2)	1 (1)	13 (2)	25 (3)	0 (0)	25 (3)	7 (3)	0 (0)	7 (3)	160 (48)	82 (57)
M3k (fibre)	904 (40)	185 (50)	1089 (42)	17 (2)	4 (3)	21 (2)	13 (2)	1 (1)	14 (2)	24 (3)	0 (0)	24 (3)	6 (3)	0 (0)	6 (3)	159 (48)	80 (56)
M3l (fibre)	914 (41)	186 (50)	1100 (42)	17 (2)	4 (3)	21 (2)	12 (2)	1 (1)	13 (2)	23 (3)	0 (0)	23 (3)	7 (3)	0 (0)	7 (3)	160 (48)	77 (53)
M3m (fibre)	916 (41)	186 (50)	1102 (42)	17 (2)	4 (3)	21 (2)	12 (2)	1 (1)	13 (2)	25 (3)	0 (0)	25 (3)	7 (3)	0 (0)	7 (3)	162 (49)	77 (53)
M3n (fibre)	917 (41)	186 (50)	1103 (42)	17 (2)	4 (3)	21 (2)	12 (2)	1 (1)	13 (2)	26 (3)	0 (0)	26 (3)	7 (3)	0 (0)	7 (3)	162 (49)	78 (54)
M3o (fibre)	917 (41)	186 (50)	1103 (42)	17 (2)	4 (3)	21 (2)	12 (2)	1 (1)	13 (2)	26 (3)	0 (0)	26 (3)	7 (3)	0 (0)	7 (3)	162 (49)	78 (54)
M3p (fibre)	891 (40)	185 (50)	1076 (41)	15 (2)	4 (3)	19 (2)	12 (2)	1 (1)	13 (2)	22 (3)	0 (0)	22 (3)	5 (2)	0 (0)	5 (2)	156 (47)	77 (53)

[xx] If a food scores less than 4 points it passes the NPM
[yy] If a drink scores less than 1 point it passes the NPM
[zz] Performance measure = Food: High >6.25g/100g free sugars, Drinks: High >3.13g/100g free sugars
[aaa] Performance measure = Food: High >22.5g/100g total sugars, Drinks: High > 8g/100ml total sugars
[bbb] Performance measure= Food: High>5g/100g saturated fat, Drinks: High> 2.5g/100ml saturated fat
[ccc] Performance measure= Food: High>1.5g/100g salt, Drinks: High> 0.75g/100ml salt
[ddd] Performance measure= Food: 'Source of fibre' (>3g/100g to ≤6g/100g)
[eee] Performance measure= Food: 'High fibre' (>6g/100g)

Conclusion

7.1 It is recommended that the UK NPM 2004/5 is amended as set out in **Figure 2** and **Table 11.** These also outline the differences between the UK NPM 2004/5 and the draft 2018 NPM in terms of the nutrient/food components and scores.

Overall rationale

7.2 The theoretical basis used in the draft 2018 NPM is consistent with the approach used to develop the original UK NPM 2004/5.

7.3 After reviewing arguments considered during the development of the UK NPM 2004/5 and models currently used in other countries, and by international organisations, it was agreed that no changes to the underlying principles of the model should be made. The draft 2018 NPM remains based on per 100g of product rather than per portion and uses 2 product categories (foods and drinks) and 7 nutrients/food components to score foods and drinks. Where appropriate, general principles of the UK NPM 2004/5 would be retained for consistency.

7.4 The draft 2018 NPM is in line with the current UK dietary recommendations, which recommended average population maximum intakes of free sugars should be no more than 5% of total dietary energy and fibre intake should increase to 30g in adults.

7.5 Following SACN's 2011 recommendations on energy, the UK government decided not to adopt the revised energy values in light of the increasing prevalence of obesity. Adjusting the model to reflect a reference value of 8,400kJ (equivalent to 2,000kcal) daily intake was recommended, consistent with food labelling regulations and government recommendations on energy intake for everyone aged 11 years and above. As a result, of the change in the energy criterion, nutrient components such as saturated fat and sugars (total and free sugars as applicable) were recalculated as a proportion of food/total dietary energy.

7.6 The aim of the review was to ensure the NPM reflects the current UK dietary recommendations. This is achieved in the draft 2018 NPM by:

- replacing the total sugars component of the UK NPM 2004/5 by 5% of total dietary energy for free sugars

- adjusting the fibre component as a proportional change from the existing UK NPM 2004/5 value to the current UK dietary recommendation for fibre
- the requirement for mandatory food labelling as presented in the Food Information for Consumers (EU FIC) Regulation (EU) No 1169/2011[38] states declaration of salt rather than sodium as this is more readily comprehensible by consumers, therefore the decision was made to adopt the salt criterion instead of sodium
- the fruit, vegetables and nut component of the model remains unchanged and is consistent with the approach adopted for the UK NPM 2004/5
- the protein component of the model remains unchanged and is consistent with the approach taken in the UK NPM 2004/5

7.7 The performance measures enabled assessment of effectiveness of the modifications against the UK NPM 2004/5.

7.8 The performance of the draft 2018 NPM, in comparison with the UK NPM 2004/5, showed that fewer foods and drinks high in free sugars in particular, high in total sugars and slightly fewer foods and drinks high in saturated fat passed the model. The number of foods and drinks high in salt, which pass the model, remained the same.

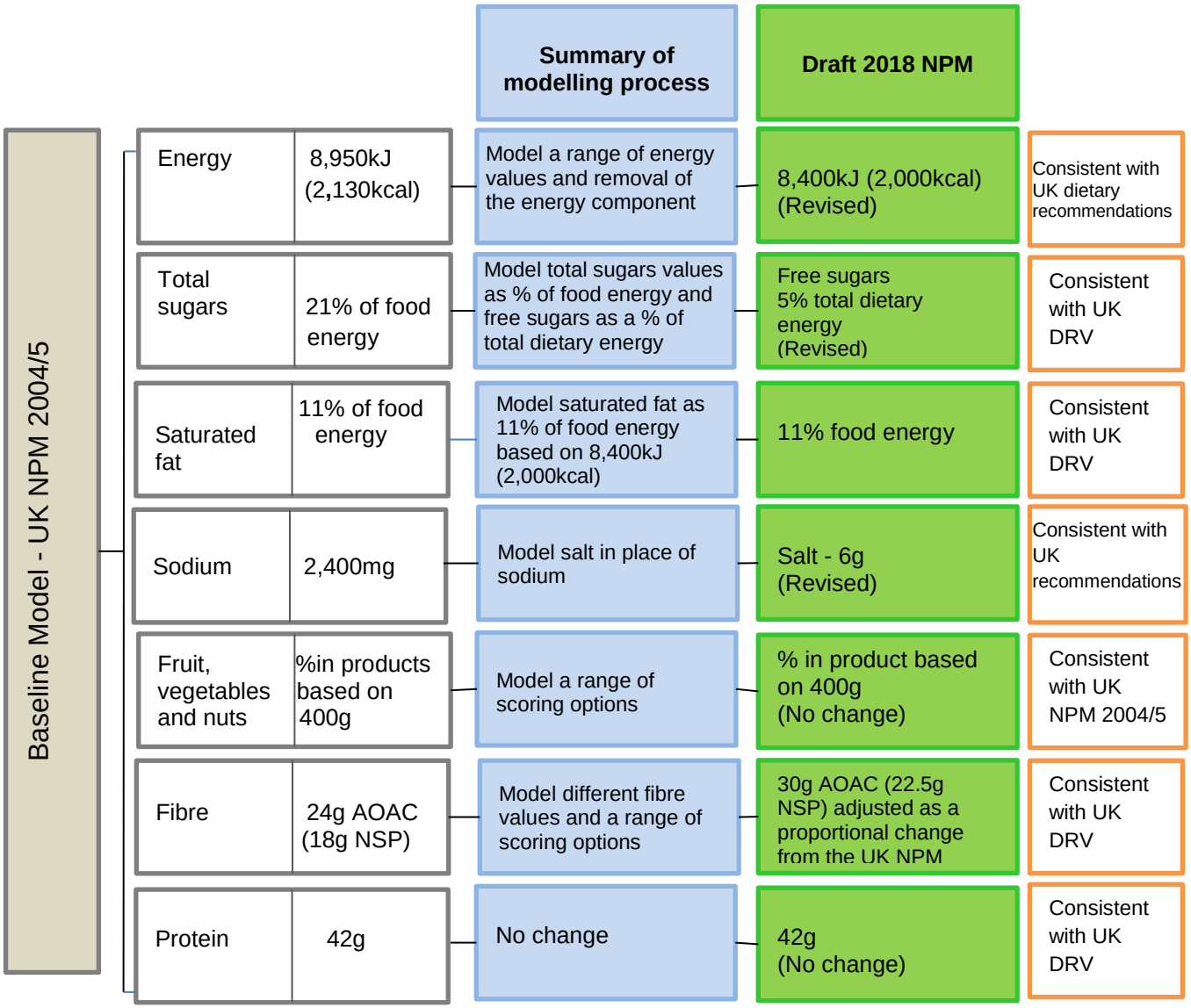
7.9 When comparing the performance for fibre, fewer ‘source of fibre’ foods and ‘high fibre’ foods passed the draft 2018 NPM compared to the UK NPM 2004/5. This is mainly because of the high free sugars content in some breakfast cereals, for example.

7.10 Fruit juices largely no longer pass the model because of their free sugars content.

7.11 Changes to the foods and drinks, which now pass reflect the change in public health advice on sugar recommended by SACN. SACN effectively halved dietary recommendations for sugars, while those for fibre were increased to a lesser extent.

7.12 The expert group agreed that the draft 2018 NPM is put forward for public consultation.

Figure 2: Summary of the differences between the UK NPM 2004/5 and the draft 2018 NPM



* A derived value calculated as a 'proportional change' by taking 24g (previous DRV for fibre) divided by 30g (current DRV for fibre) = 0.8. A multiplier of 0.8 was then applied to the fibre scoring increments

Table 11: Basis of the nutrient/food component and scoring for the UK NPM 2004/5 and the draft 2018 NPM

		UK NPM 2004/5									Draft 2018 NPM [fff]							
		UK NPM 2004/5 Based on 8,950kJ (2,130kcal) diet, 3.75% scoring bands									Modifications: Based on 8,400kJ (2,000kcal); 5% total dietary energy from free sugars; 11% of food energy from saturated fat; salt in place of sodium 3.75% scoring bands							
		'A' points				'C' points					'A' points				'C' points			
		Energy kJ (kcal)	Saturated fat (g)	Total sugars (g)	Sodium (mg)	Protein (g)	FVN (%)	Fibre (AOAC) (g)	Fibre (NSP) (g)		Energy kJ (kcal)	Saturated fat (g)	Free sugars (g)	Salt (g)	Protein (g)	FVN (%)	Fibre (AOAC) (g)	Fibre (NSP) (g)
		8,950kJ (2,130 kcal)	11% of food energy	21% of food energy	2,400mg	42g	400g	24g	18g		8,400kJ (2,000kcal)	11% of food energy[ggg]	5% of total dietary energy	6g	42g	400g	30g [hhh]	22.5g
0	≤	335	1	4.5	90	1.6	40	0.9	0.7		315	0.9	0.9	0.2	1.6	40	0.7	0.6
1	>	335	1	4.5	90	1.6	40	0.9	0.7		315	0.9	0.9	0.2	1.6	40	0.7	0.6
2	>	670	2	9	180	3.2	60	1.9	1.4		630	1.9	1.9	0.5	3.2	60	1.4	1.1
3	>	1005	3	13.5	270	4.8	-	2.8	2.1		945	2.8	2.8	0.7	4.8	-	2.2	1.7
4	>	1340	4	18	360	6.4	-	3.7	2.8		1260	3.7	3.7	0.9	6.4	-	2.9	2.2
5	>	1675	5	22.5	450	8	80	4.7	3.5		1575	4.7	4.6	1.1	8	80	3.6	2.8
6	>	2010	6	27	540						1890	5.6	5.6	1.4			4.3	3.4
7	>	2345	7	31	630						2205	6.6	6.5	1.6			5.0	3.9
8	>	2680	8	36	720						2520	7.5	7.4	1.8			5.8	4.5
9	>	3015	9	40	810						2835	8.4	8.3	2.0				
10	>	3350	10	45	900						3150	9.4	9.3	2.3				

[fff] Calculating a nutrient profiling score:

- a maximum of 10 points can be awarded for each nutrient/component (energy, saturated fat, sugar and salt). The total 'A' points are the sum of the points scored for each nutrient/ food component. Total 'A' points = [points for energy] + [points for saturated fat] + [points for free sugars] + [points for salt]
- a maximum of 5 points can be awarded for protein and fruit, vegetables and nuts. A maximum of 8 points can be awarded for fibre (either as AOAC or NSP). The total 'C' points are the sum of the points for each nutrient/ food component. Total 'C' points = [points for fruit, vegetables and nut content] + [points for fibre (either NSP or AOAC)] + [points for protein]
- the nutrient profiling score is calculated as total 'A' minus total 'C' points
- if a food or drink scores 11 or more 'A' points then it cannot score points for protein unless it also scores 5 points for fruit, vegetables and nuts.
- a food is classified as 'less healthy' where it scores 4 points or more
- a drink is classified as 'less healthy' where it scores 1 point or more

[ggg] Saturated fat based on 11% of food energy calculated as a proportion of food energy based on a 8,400kJ (2,000kcal) diet

[hhh] Adjusted as a proportional change for the existing UK NPM 2004/5 value of 24g (18g NSP)

Appendices

Appendix A	History of the UK's Nutrient Profiling Model 2004/5
Appendix B	Population Dietary Reference Values and derivatives of Dietary Reference Values for children aged 11-16 years used for developing the UK Nutrient Profiling Model 2004/5
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Appendix L	Free sugars decision tree to assess the need for calculation of free sugars within a product
Appendix M	Points scale and scoring bands for the UK Nutrient Profiling Model 2004/5, modification 1, modification 2 (including modelling) and modification 3 (including modelling

Appendix A: History of the UK's Nutrient Profiling Model 2004/5

8.1 The Department of Health White Paper, *Choosing Health: Making healthy choices*[42] and the Food Standards Agency's (FSA) 2004 *Action Plan on Food Promotions and Children's Diets*[43] contained a series of recommendations aimed at addressing the imbalance in promotional activity of foods to children. In 2004, the FSA commissioned research to develop a nutrient profiling model to support the Office of Communications (Ofcom's) work to further regulate broadcast advertising of foods to children.

8.2 The nutrient profiling model was initially developed to be relevant for foods and drinks consumed by children aged 11-16 years, but was subsequently found to be equally applicable to foods and drinks consumed by people over the age of 5 years[44].

8.3 In October 2005, the FSA Board recommended that the UK NPM 2004/5 was suitable for use by Ofcom to determine which foods would be allowed to be advertised during children's TV programming (where children aged 5-16 years make up over 25% of the audience), and committed to reviewing the effectiveness of the model one year from its first date of use. The final nutrient profiling model was handed over to Ofcom in December 2005. In February 2007, Ofcom announced its intention to use the UK NPM 2004/5 to restrict broadcast advertising of food and drink that did not pass the model in and around programmes specifically made for children and of particular appeal to children.

8.4 An independent review of the UK NPM 2004/5 was completed at the end of 2008. An associated FSA board paper[45] set out how the UK NPM 2004/5 was developed, including the independent review process and its outcome. Following this review, it was agreed that the FSA UK NPM 2004/5 would remain unchanged.

8.5 Responsibility for nutrition policy including the UK NPM 2004/5 transferred from the FSA to the Department of Health in 2010. In 2011, the Department of Health published supporting technical guidance to assist food manufacturers, retailers and advertisers to correctly calculate nutrient profiling scores for their products.

Appendix B: Population Dietary Reference Values and derivatives of Dietary Reference Values for children aged 11-16 years used for developing the UK Nutrient Profiling Model 2004/5

Table 1: Population Dietary Reference Values and derivatives of Dietary Reference Values [iii] for children aged 11-16 years used for developing the UK NPM 2004/5

Points	Nutrient	Dietary Reference Values (DRV)[jjj]	Guideline Daily Amounts (GDA)[kkk]	Comments	Score bands
'A' points	Energy[7]	2,130 kcal (8,950kJ)	2,130 kcal (8,950kJ)	Weighted average of 2,220 kcal/day (Estimated Average Requirement (EAR) for boys aged 11-14 years); 1845 kcal/day (EAR for girls aged 11-14 years); 2,755 kcal/day (EAR for boys aged 15-18 years); 2,110 kcal/day (EAR for girls aged 15-18 years)	For 'A' point nutrients (energy, saturated fat, total sugars and sodium), score bands start at 3.75% of GDA with subsequent intervals of 3.75% of the GDA. The maximum scores for energy, saturated fat, total sugars and sodium are capped at 10 points, equivalent to 37.5% of the DRV or derivatives such
	Saturated fat[7]	11% of food energy	26g	GDA calculated using EARs for energy and a conversion factor of 9 kcal for 1 g fat	
	Total sugars[7]	21% of food energy	120g	There was no widely accepted GDA value for total sugars. Total sugars estimated as approx. 21% of food energy intake (ie 11% non-milk extrinsic sugars (NMES)[lll] + 7% intrinsic sugars + 2% milk sugar with rounding) =	

[iii] Guideline Daily Amounts are guideline based on derived reference values, for healthy adults and children on the approximate amount of calories, fat, saturated fat, carbohydrate, total sugars, protein, fibre, salt/sodium required for a healthy diet. GDA have been replaced with Reference Intakes (RIs) in the EU

[jjj] DRVs indicate the average or the maximum contribution that a particular nutrient should make to the population average intakes. DRVs for total fat, fatty acids, starch, sugars and fibre (as NSP) are set as a percentage of daily energy intake in addition to those for energy and some vitamins and minerals

[kkk] Guidelines for healthy adults and children on the approximate amount of calories, fat, saturated fat, carbohydrate, total sugars, protein, fibre, salt/sodium required for a healthy diet. GDA have been replaced with Reference Intakes (RIs) in the EU

[lll] The definition of non-milk extrinsic sugars (NMES)[7] is "sugars not contained within the cellular structure of a food except lactose in milk and milk products"

Points	Nutrient	Dietary Reference Values (DRV)[jjj]	Guideline Daily Amounts (GDA)[kkk]	Comments	Score bands
				2,130kcal x 21/100 = 447.3kcal A conversion factor of 3.75 kcal for 1g sugar = 119.28g GDA	as GDA. The scores have been rounded
	Sodium[37]	2.35g/day	2.35g	The Scientific Advisory Committee on Nutrition (SACN) recommends a maximum intake of salt of 6g/day for everyone over the age of 11 years A conversion factor of 1g of sodium is equivalent to 2.55g salt (2.5g is used by industry for labelling purposes)	
'C' points	Fruits and vegetables [46]	400g/day	400g	The Committee on Medical Aspects of Food and Nutrition Policy (COMA)[46] recommends a 50% increase in consumption of fruit and vegetables. This has been translated into 5 80g servings a day or 400g. Here this amount in grams has been adjusted to take account of the lower energy needs of children	For 'C' points nutrients/food components (ie fibre and protein), score bands start at 3.75% of GDA with subsequent intervals of 3.75% of the GDA. The maximum scores for protein, fibre and fruit and vegetables are capped at 5 points equivalent to 20% of the DRV or derivatives such as GDA or recommendation. The scores have been rounded
	Fibre[7]	18g/day Non-starch polysaccharides (NSP)	24g (AOAC method)	Based on GDA for AOAC fibre for adults Population dietary goal for adults is 18g per day of NSP. NSP to AOAC fibre in foods is approximately1:1.33	
	Protein[7]	42g/day	42g	Protein was included as a marker of iron, calcium and long chain n-3 polyunsaturated fatty acids GDA based on weighted average of the Reference Nutrient Intake (RNI) for protein in children aged 11-14 years and 15-18 years	

Appendix C: How to calculate a nutrient profiling score using the UK Nutrient Profiling Model 2004/5

There are 3 steps to calculating a nutrient profiling score for a food or drink.

Step 1: Calculate the total number of 'A' points

Total 'A' points = (points for energy) + (points for saturated fat) + (points for sugars) + (points for sodium).
A maximum of 10 points can be awarded for each nutrient/ food component.
Protein cap: If a food or drink scores 11 or more 'A' points then it cannot score points for protein unless it also scores 5 points for fruit, vegetables and nuts.

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

Step 2: Calculate the total number of 'C' points

Total 'C' points = (points for % fruit, vegetables and nut content) + (points for fibre) + (points for protein).
A maximum of 5 points can be awarded for each nutrient/food component.

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

Step 3: Calculate the overall score

Nutrient Profiling Score	=	Total 'A' points (energy + saturated fat + sugars + sodium)*	-	Total 'C' points (fruit, vegetables and nuts + fibre + protein)

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

Foods

A food is classified as ‘less healthy’ where it scores 4 points or more.
For the purposes of this report: If a food scores 4 points or more it ‘does not pass’ the model and would not meet the criteria to be able to be advertised to children. If a food scores less than 4 points it ‘passes’ the model and would meet the criteria to be able to be advertised to children.

Drinks

A drink is classified as ‘less healthy’ where it scores 1 point or more.
For the purposes of this report: If a drink scores 1 point or more it ‘does not pass’ the model and would not meet the criteria to be able to be advertised to children. If a drink scores less than 1 point it ‘passes’ the model and would meet the criteria to be able to be advertised to children.

Appendix D: Summary of International Nutrient Profiling Models

9.1 The purpose of the summary is to identify international developments in the use and adaption of the UK Nutrient Profiling Model (NPM) 2004/5. Five nutrient profiling models had been identified that had been adapted from the UK NPM 2004/5. The World Health Organization Europe nutrient profile model[24] is also summarised.

Food Standards Australia New Zealand (FSANZ) Nutrient Profiling Scoring Criterion (NPSC)[19]

Purpose of the model:

9.2 To determine the eligibility of foods to make health claims and certain nutrition content claims.

Use of the model:

9.3 Consultation of use of the model ended in 2008, with the model implemented for use in January 2013.

Characteristics of the model:

9.4 The Food Standards Australia New Zealand Nutrient Profiling Scoring Criterion (NPSC) is based on the UK NPM 2004/5. It has 3 categories:

- category 1 is for beverages
- category 2 is for any food other than those included in category 1 or 3
- category 3 is for the following foods: cheese and processed cheese (with calcium content >320mg/100g); edible oils; edible oil spreads, margarine; butter as defined in the Australia New Zealand Food Standards Code

9.5 The following scoring is used for a food/drink item to be eligible:

- category 1: <1
- category 2: <4
- category 3: <28

Adaptations of the UK NPM 2004/5:

9.6 The FSANZ NPSC is based on the nutrient composition of 100g or 100ml of a food or drink. The following adaptations were introduced in the FSANZ NPSC, including

the use of definitions in the Food Standards Code eg fruit, vegetable, fruit juice, cheese etc.

Introduction of a third category:

9.7 During consultation on the FSANZ NPSC, it was suggested that the current requirements for low saturated fatty acid claims do not discriminate between other fatty acids or provide consumers enough information when purchasing other fats (for example, vegetable oils, fat spreads). A new category was developed for foods that had a low saturated fatty acid proportion (no more than 28%) relative to the total fatty acid.

Increasing the first and second scoring bands for total sugars criterion (eg UK NPM 2004/5 total sugars cut point: (≤4.5g) vs FSANZ NPSC (≤5.0g)):

9.8 The cut-off point between the first and second scoring bands was very close to the average lactose content of whole milk, where some milks would score 0 points for total sugars and some would score 1 point. The extra point was enough to make these milks ineligible. The UK NPM 2004/5 uses total sugars in the model, rather than non-milk extrinsic sugars (NMES), because total sugars are measurable and the modifying points were used to account for the lactose content of milk and the intrinsic sugars in fruit. By adjusting the cut-off point between the first and second scoring bands to ≤5.0g for total sugars, whole milks were more likely to score 0 sugar points.

Raising the protein cap from <11 points (as developed for the UK NPM 2004/5) to <13 points (FSANZ NPSC):

9.9 This was suggested by a consultation respondent specifically to ensure eligibility of some breakfast cereals. Breakfast cereals are a low moisture food compared to, for example bread and is therefore scores more energy points per 100g. The alteration offsets the extra energy points the food scores resulting from their low moisture content.

Extending the scoring scale for fruit/vegetables/nuts/legumes criterion from 5 points (UK NPM 2004/5) to 8 points (FSANZ NPSC):

9.10 This change was suggested to allow all raw or fresh nuts to become eligible. FSANZ modelled various extensions of the scoring range and it was concluded that by extending the points to 8 for 100% fruit/vegetable/nut/legume content, such foods could be eligible to carry a health claim.

9.11 As a result of extending the maximum scoring scale from 5 points to 8 points for fruit/vegetable/nut/legume content, the requirement to score the ‘maximum’ points was amended. Foods that have a total score of 13 or more baseline points are still required to score at least 5 or more points for

fruits/vegetables/nuts/legumes in order to also score points for protein (see above in relation to protein cap, paragraph 9.9).

9.12 It was also noted that potatoes are included in the fruit, vegetable, nut and legume criterion of the FSANZ NPSC. In contrast to the UK NPM 2004/5 where potatoes and other starchy vegetables such as yams are not categorised this way in the UK NPM 2004/5.

South African Nutrient Profile Model[20]

Purpose of the model:

9.13 Recommended as a screening tool for nutrient and/or health claims.

Use of the model:

9.14 No information available.

Characteristics and adaptation of the UK NPM 2004/5:

9.15 The South African NPM is based on an early version of the FSANZ NPSC model. The FSANZ NPSC model was validated[47] (content validity to assess it against South African food based dietary guidelines[mmm], convergent[nnn] and construct[ooo] validation testing). The validation showed that there was no reason to adjust the NPM to be applicable to the South African environment and can be used as it is.

Health Star Rating System[21]

Purpose of the model

9.16 Voluntary front-of-pack labelling scheme endorsed by the Australia and New Zealand Ministerial Forum on Food Regulation. It rates the overall nutritional profile of packaged food and assigns it a rating from ½ a star (‘less healthier choice’) to 5 stars (‘healthier choice’).

Use of the model

9.17 From June 2014, food manufacturers and retailers could voluntarily apply the Health Star Rating to their products.

Characteristics of the model

9.18 The Health Star Rating System is a modified version of the Nutrient Profiling Scoring Criterion (NPSC) developed by FSANZ for the Regulation of health

[mmm] Comparing the classification of a number of „indicator food items as determined by the nutrient profiling model with the Food Based Dietary Guidelines

[nnn] Comparing the standard ranking of food items as determined by nutrition experts to the classification of the same food items by the nutrient profiling model

[ooo] Examine the relationship between the way the profile model categorises foods and the healthiness of diets in South Africa

claims in Australia and New Zealand and prescribed in Standard 1.2.7 – Nutrition, Health and Related Claims of the Food Standards Code.

9.19 Each food or drink item (100g or 100ml) is assigned to one of 6 categories:

- 1 Beverages other than dairy beverages
- 1D Milk and dairy beverages
- 2 All foods other than those included in Category 1, 1D, 2D, 3 or 3D
- 2D Dairy foods other than those included in Category 1D or 3D
- 3 Oils and spreads
- 3D Cheese and processed cheese (with calcium content >320mg/100g)

9.20 Food products which are not expected to display the Health Star Rating, include:

- fresh unpackaged food (such as fresh fruit and vegetables)
- alcoholic beverages
- formulated products for infants and young children
- non-nutritive condiments (such as vinegar, herbs and spices)
- non-nutritive foods (such as tea, coffee)
- single ingredient foods not intended to be eaten on their own (such as flour)
- foods where a nutrition information panel is not required

9.21 The difference between the FSANZ NPSC and the Health Star Rating System is that the FSANZ NPSC has a maximum of 10 points for each criterion (ie energy, total sugars, saturated fat, sodium). Whilst the Health Star Rating has up to a maximum of 11 points for energy, 30 points for saturated fatty acids, 22 points for total sugars (excluding categories 3 and 3D) and 30 points for sodium.

5-Colour National Labelling (5-CNL) System/ Nutri-Score[22]

Purpose of the model

9.22 French front-of-pack nutrition labelling to help consumers make healthier food choices at point of purchase. The 5-CNL is the former graphical format of the French labelling system, which is now named Nutri-Score.

Use of the model

9.23 The 5-CNL (now known as Nutri-Score) model was implemented in France from October 2017.

Characteristics of the model

9.24 Food and drinks are run through an adapted version of the UK NPM 2004/5. The total scores represent the nutritional quality of the product and correspond to a particular colour. The output is a chain of 5 discs of the different colours (a=green/b=yellow/c=orange/ d=pink/e=red), with a larger disc representing the

nutritional quality of the product. Foods labelled with A or “green” discs correspond to foods which consumption is recommended, whereas foods labelled with E or red discs correspond to foods which consumption should be limited.

Adaptation of the UK NPM 2004/5

9.25 Exceptions were made for cheese, fats and drinks to better rank them according to their nutrient profile and consistent with the French nutritional recommendations Programme National Nutrition Santé (PNNS) guidelines. No modifications were performed on the definition of the ‘fruit, vegetables and nuts’.

9.26 The French nutritional PNNS guidelines[48] consider cheese as a good source of calcium[49] and recommends consuming 3 dairy products per day. The original score for cheese was modified, so that protein content would be used in the computation, whatever the total ‘A’ score points of the product: UK NPM 2004/5 score =Total A points – Total C points. The initial algorithm categorised all cheeses in category E “Red”. After adapting the score to take into account of the protein content of cheese, cheeses are spread across 3 categories of the 5-CNL and predominantly categorised in D “Pink”.

9.27 The PNNS guidelines also recommend vegetable fats (eg olive oil, rapeseed oil) over animal fats and encourage diversity in the types of fats used. The original UK NPM 2004/5 does not allow differences in types of fats to be taken into account. The maximum number of points that can be attributed to saturated fat in the UK NPM 2004/5 is equivalent to 10g/100g saturated fat. It was suggested that the saturated fat content is differential across different types of fats, from 80g/100g for butter to 20–30g/100g for margarines and vegetable fats. The points for saturated fat were modified to allow redistribution of added fats within multiple categories of the 5-CNL and to discriminate between animal and vegetable fats.

9.28 The only recommended beverage in the PNNS guidelines is water and the guidelines suggest intake of sugary drinks should be limited. The UK NPM 2004/5 score does not reflect considerations such as encouraging artificially sweetened beverages as an alternative to regular sweetened options. The UK NPM 2004/5 scoring for energy and sugar were modified to take into account the specific composition of sugar and energy in drinks. A two-step approach was taken, modifying the model for beverages, and then the labelling system was set so that only water is categorised as A “green”.

Adapted UK NPM 2004/5 for use in Ireland[23]

Purpose and characteristics of the model

9.29 Ireland adopted the UK NPM 2004/5 for (statutory) marketing restrictions with an exemption for cheese. Advertisements for cheese products that appear in children's programmes or which are directed at children are required to carry an on-screen message indicating the recommended maximum daily consumption limit for cheese. This exemption applies to cheese products only and not to products where cheese is an ingredient eg pizza.

Use of the model

9.30 The codes were formally launched in January 2013 and came into full effect from 1 July 2013.

Exemption of cheese

9.31 The Broadcasting Authority of Ireland (BAI) convened an Expert Working Group (EWG) to examine health concerns for children in Ireland and to determine if the promotion to children of high fat, sugar or salt (HFSS) foods and drinks should be restricted.

9.32 The EWG Report recommended the NPM, developed by the UK Food Standards Agency (FSA) specifically for broadcast regulation as the mechanism for defining HFSS food and drink should be adopted completely without amendment.

9.33 The EWG had previously considered whether exemption from the model should apply to cheese, as it was considered a source of calcium. It was agreed that cheese is also rich in fat and saturated fat, and examination of dietary guidelines in Ireland for those over 5 years has shown that in order to meet desirable goals for saturated fat, consumption of cheese should be limited and lower-fat calcium sources should be encouraged. Hence, the EWG recommended that no exemption should be made for cheese in the application of the NPM.

9.34 The House of the Oireachtas Joint Committee on Health and Children[50] had concerns that foods and drinks with no particular nutrient content (eg low calorie drinks) were categorised as 'more healthy' than foods, such as cheese which although admittedly high in saturated fat, also contain high levels of calcium and protein. The Committee also suggested to '*take cognizance of the importance of certain markets for the economy – markets which are not as important for the UK economy, where the nutrient profiling model was designed'*.

9.35 After further consideration and seeking advice from an independent nutritionist[23], the Joint Committee on Health and Children further stated they were not convinced that '*the proportionate intake of cheese, by children relative to its score in the NPM can identify it as a serious cause of childhood obesity, or that*

the incidence of advertising of cheese directed at children ….is high enough that restrictions on such advertising would have a marked effect'.

World Health Organization Europe nutrient profile model[24]

Purpose of the model

9.36 The World Health Organization (WHO) model is designed for use by governments for the purpose of restricting food marketing to children.

Use of the model

9.37 The WHO European nutrient profile model was published in 2015. As of July 2016, Slovenia is currently adapting the WHO Europe nutrient profile model for national use.

Characteristics of the model

9.38 The WHO Europe nutrient profile model consists of a total of 17 food categories (with some sub-categories) and is based on 2 existing models developed by Norway[51] and Denmark[52]. The rationale for using the Danish and Norwegian models, as opposed to the UK NPM 2004/5, is that the models use 'food category' approaches, which are easier to adapt or modify rather than using a scoring system.

9.39 Thresholds for the categories are largely taken from the Norwegian model, except in cases where the criteria for the same category are stricter or more comprehensive in the Danish model.

9.40 The model includes total fat, saturated fats, added sugar and salt per 100g of the product. Thresholds for salt for certain categories have been taken from the Finnish Ministry of Trade and Industry Decree on food packing markings 1084/2004, section 25, as the salt criteria for some categories[ppp] were missing from the Danish and Norwegian models but during consultation and pilot testing with countries it was considered important to set thresholds for those categories.

9.41 The model contains 5 categories for which marketing is never permitted:

- chocolate and sugar confectionary, energy bars, sweet toppings and desserts
- cakes, sweets biscuits and pastries; other sweet bakery wares and dry mixes for making these
- juices
- energy drinks

[ppp] Categories include: breakfast cereals; cheese; bread, bread products and crisp breads; fresh or dried pasta, rice and grains; processed meat, poultry, fish and similar

- edible ices

9.42 Additionally, marketing of products that contain >1g/100g total fat in the form of industrially produced *trans* fatty acids (countries that have implemented legislation that bans or virtually eliminates *trans* fats from the food supply may choose to adopt a per 100 g figure in line with their statutory limits), or ≥0.5% of total energy in the form of alcohol are prohibited.

9.43 The model contains 2 categories for which marketing is always permitted:

- fresh and frozen meat, poultry, fish and similar
- fresh and frozen fruit, vegetables and legumes

Appendix E: Nutrient Profiling Model expert group terms of reference

Accountability and governance

In order to oversee approaches and support progress, a Nutrient Profiling Model (NPM) reference group and a NPM expert group will be established for this programme of work. The role of the NPM expert group will be to provide technical guidance and scrutiny for the overall work and make recommendations to PHE. The role of the NPM reference group will expose the full range of stakeholder views and advise on matters relating to the NPM. Both the NPM expert group and NPM reference group will be chaired by the same chair.

Objectives

The NPM expert group will:

1. Review the existing UK NPM 2014/5 and provide technical scrutiny.
2. Review and provide advice on existing models, evidence, relevant methodologies and the latest scientific developments.
3. Provide advice and technical scrutiny to the approach, methodology, modelling and validation processes for updating/revising the NPM.
4. Review the results of the modelling and assist in the selection of the model(s) to be put forward for public consultation.
5. Review comments from the public consultation and assist in developing the recommendations to PHE on the final NPM.

Responsibilities of the NPM expert group

1. The NPM expert group will provide technical leadership, knowledge and intelligence about the NPM, including any practical application for its intended purpose.
2. To contribute to the discussion and advise on the process of reviewing and updating the NPM.
3. To scrutinise proposals developed by PHE ensuring that such activity takes full account of the prevention agenda; innovation; resources; and wider developments in and external to PHE, ensuring interrogation of identified issues.
4. Act as a source of advice to the NPM reference group on technical aspects of the NPM and support progress of work.

5. To give a cohesive and balanced stakeholder perspective to inform reviewing and updating the NPM.
6. To consider the current risks to delivery, provide insights to potential future. threats and risks and consider the escalation of risks where appropriate
7. All advice should be scientifically based, and not be driven by bias, personal opinion or lobbying.

NPM expert group membership*

Number	Member	Organisation/Role
Chair		
1	Professor Russell Viner**	Institute of Child Health (ICH), Professor in Adolescent Health
Members		
2	Dr Jean Adams	University of Cambridge, School of Clinical Medicine, Centre for Diet and Activity Research Programme Lead for Evaluation of Population Interventions in Dietary Public Health
3	Professor Judy Buttriss	British Nutrition Foundation, Director General
4	Professor Mike Rayner	Nuffield Department of Population Health, University of Oxford, Professor of Population Health and Director
5	Dr Nicole Darmon – until November 2016	Aix-Marseille Université, Marseille, French National Research Institute for Agricultural Research, Research Director
6	Professor Sian Robinson	University of Southampton, Professor of Nutritional Epidemiology
7	Dr Tim Lobstein	World Obesity Federation, Director of Policy
Observers		
8	Liliya Skotarenko (Sharon Egan – until June 2016)	Department of Health and Social Care (DHSC)
9	Kate Halliwell	Food and Drink Federation
10	Dr Modi Mwatsana	UK Health Forum
11	Andrew Taylor	Committee of Advertising Practice
12	Joanne Casey	Food Standards Agency Northern Ireland
13	Dr Gillian Purdon	Food Standards Scotland
14	Dr Sarah Rowles	Welsh Government
Secretariat		
15	Dr Alison Tedstone	PHE Deputy Director Diet and Obesity and Chief Nutritionist
16	Professor Louis Levy	PHE Head of Nutrition Science
17	Charlie Parker – until October 2016	PHE Diet and Obesity
18	Kate Sweeney	PHE, Deputy Head of Risk Factors Intelligence

19	Rebecca Worboys – until August 2017	PHE, Health Economist
20	Sakhi Dodhia	PHE Diet and Obesity
21	Penny Blair	PHE Diet and Obesity
22	Rachel Manners	PHE Diet and Obesity

* This includes overlap of members on the NPM reference group
* *The secretariat will appoint a Deputy Chair to chair meetings in the absence of the appointed Chair

Review

The NPM expert group will review the relevance and value of the groups function, performance and review the terms of reference every 6 months to ensure that it is operating effectively. Membership will be regularly reviewed with the secretariat. Additional members with the relevant expertise may be invited to join the NPM expert group following the publication of the UK government's Childhood Obesity Plan.

NPM work plan

The outline of the NPM timeline is set out: https://app.box.com/v/NPMTimeline

Ways of working

Meetings

The NPM expert group will meet once every 2 months. The first meeting will be held on 1 July 2016. Meetings will be aligned with the NPM reference group and will be held on the same day.

Ad hoc teleconference meetings will be scheduled accordingly. Ad hoc teleconference meetings, will be used for members to give a steer to ensure that the work prepared by the secretariat is on course.

Appendix F: Nutrient Profiling Model reference group terms of reference

Accountability and governance

In order to oversee approaches and support progress, a Nutrient Profiling Model (NPM) reference group and a NPM expert group will be established for this programme of work. The role of the NPM expert group will be to provide technical guidance and scrutiny for the overall work and make recommendations to PHE. Members of the NPM expert group will also sit on the NPM reference group. The role of the NPM reference group is detailed below under objectives. Both the NPM expert group and NPM reference group will be chaired by the same chair.

Objectives

The NPM reference group will:

1. Expose the full range of stakeholder views, advise on matters relating to the NPM, and appraise a selection of models in relation to their applicability.
2. Provide oversight and comments to the methodology, approach and validation processes for updating/revising the NPM.
3. Review comments from the public consultation.

Responsibilities of the NPM reference group

1. The NPM reference group will provide, through its multi-disciplinary membership, knowledge about NPM, including proportionality through its practical application for its intended purpose.
2. To observe and contribute to the discussion on the process of updating the NPM that can be fed back to the NPM expert group.
3. To comment on proposals developed by PHE ensuring that such activity takes full account of the prevention agenda; innovation; resources; and wider developments in and external to PHE, ensuring interrogation of identified issues.
4. To give a cohesive and balanced stakeholder perspective to inform reviewing and updating the NPM and support progress of work.
5. To consider the current risks to delivery, provide insights to potential future threats and risks and consider the escalation of risks where appropriate.

6. To represent their members and communicate processes and issues to them as appropriate.

NPM reference group membership*

Number	Member**	Organisation/Role
Chair		
1	Professor Russell Viner***	Institute of Child Health (ICH), Professor in Adolescent Health
Members		
2	Andy Taylor	Committee of Advertising Practice (CAP), Regulatory Policy Executive
3	Andrea Martinez-Inchausti	British Retail Consortium (BRC), Deputy Director of Food Policy
4	Kate Halliwell	Food and Drink Federation (FDF), Nutrition and Health Manager
5	Malcolm Clark	Cancer Research UK Policy Manager [*from January2018. Prior January 2018 - Children's Food Campaign co-ordinator]*
6	Dr Modi Mwatsama	UK Health Forum, Director of Global Health
7	Wan Mak	Sodexo, Head of Dietetics and Nutrition and British Hospitality Association (BHA) representative
8	Dr Jean Adams	University of Cambridge, School of Clinical Medicine, Centre for Diet and Activity Research Programme Lead for Evaluation of Population Interventions in Dietary Public Health
9	Professor Judy Buttriss	British Nutrition Foundation, Director General
10	Professor Mike Rayner	Nuffield Department of Population Health, University of Oxford, Professor of Population Health and Director
11	Dr Nicole Darmon – until November 2016	Aix-Marseille Université, Marseille, French National Research Institute for Agricultural Research, Research Director
12	Professor Sian Robinson	University of Southampton, Professor of Nutritional Epidemiology
13	Dr Tim Lobstein	World Obesity Federation, Director of Policy
Observers		
14	Gwyn Owens	Department of Culture, Media and Sports (DCMS)
15	Dr Michelle McQuillan	Department of Environment, Food and Rural Affairs (Defra)
16	Liliya Skotarenko (Sharon Egan – until June 2016)	Department of Health and Social Care (DHSC)
17	Joanne Casey	Food Standards Agency Northern Ireland
18	Dr Gillian Purdon	Food Standards Scotland
19	Dr Sarah Rowles	Welsh Government
Secretariat		
20	Dr Alison Tedstone	PHE Deputy Director Diet and Obesity and

		Chief Nutritionist
21	Professor Louis Levy	PHE Head of Nutrition Science
22	Charlie Parker – until October 2016	PHE Diet and Obesity
23	Kate Sweeney	PHE Deputy Head of Risk Factors Intelligence
24	Rebecca Worboys – until August 2017	PHE Health Economist
25	Sakhi Dodhia	PHE Diet and Obesity
26	Penny Blair	PHE Diet and Obesity
27	Rachel Manners	PHE Diet and Obesity

* This includes overlap of members on the NPM expert group
** Invited guests eg PHE behavioural Insights team, SACN members, PHE dietary improvement representatives, PHE Chief Knowledge Officers team etc will be invited as appropriate. The NPM reference group through the secretariat will work with DHSC, DCMS and Defra to ensure the below are briefed on any relevant activities:

- Ofcom, CAP, BCAP, ASA, AA
- Behavioural Insights Team
- Devolved administrations

*** The secretariat will appoint a Deputy Chair to chair meetings in the absence of the appointed Chair

Review

The NPM reference group will review the relevance and value of the groups function, performance and review the terms of reference every 6 months to ensure that it is operating effectively. Membership will be regularly reviewed with the secretariat. Additional members may be invited to join the NPM reference group following the publication of the UK government's Childhood Obesity Plan.

NPM work plan

The outline of the NPM timeline is set out: https://app.box.com/v/NPMTimeline.

Appendix G: Nutrient Profiling Model test dataset - overview of data sources

10.1 PHE has used a variety of data sources to construct the NPM test dataset. The justification for using other data sources is provided in **Appendix H**. These include:

Kantar database

10.2 The Kantar Worldpanel is a global market research company, which runs and analyses a continuously reporting panel of approximately 30,000 GB shoppers. The Kantar Worldpanel database consists of >110,000 retail food and drink products, which cover all food and drink categories. The information for each product includes the price, sales volume, category, sub-category, information on manufacturer and nutritional information (calories, total fat, saturated fat, carbohydrate, sugars, protein, fibre and sodium).

10.3 The demographic make-up of the panel is defined using the Broadcasters' Audience Research Board (BARB) survey and government census. The key demographic targets are based on geographic region, social class, household composition, size, and the age of the main shopper.

10.4 Each household is provided with barcode scanning equipment, which allows them to record all take-home grocery purchases and report the data together with till receipts. Panel members scan the barcodes of all grocery products purchased and bring back into the home. Data on non-barcoded items (fruit and vegetables, store bakery items for example) are collected using a patented codebook with food photographs and barcodes. 'Out of home purchasing' is also collected from an additional panel since 2015.

10.5 Nutritional information is sourced from Brandbank or alternatively fieldworkers visit key retail stores and capture images with nutritional information on the packaging on a rolling 6-month basis. Products not found or missing nutritional information during the fieldwork process are estimated either from a similar product (cloned) or otherwise using a category average (imputed). Nutritional values for a small number of non-barcoded products are taken from *McCance and Widdowson's, The Composition of Foods 7th Summary Edition*[53].

10.6 Quality control procedures assessing household eligibility are run every 4 weeks. These include tracking household purchasing patterns, monitoring correct data capture, panel continuity and household compliance. Any household that has not been recording data on the panel for the full 4-week period is removed from the

final Kantar Worldpanel database (approximately 10-15% of the 30,000 GB household panel do not meet the eligibility criteria in a typical 4-week period). Compliance with scanning is encouraged by frequent email, postal, or telephone reminders.

10.7 Data from Kantar Worldpanel was selected for use in constructing the NPM test dataset as it provides relevant sales and nutrient information for products bought for consumption at home. PHE had access to Kantar Worldpanel (2015) data for product categories which make a substantial contribution to sugar intakes and only selected nutrient information as the data was originally purchased by PHE for the purpose of sugar reduction work; therefore Kantar Worldpanel (2014) and other data sources were required to supplement this data.

Nielsen Brandbank database

10.8 The Nielsen Brandbank database consists of nutritional information for >100,000 food and drink products, from over 7,000 suppliers, including 200 major retailers and manufacturers worldwide.

10.9 Nielsen Brandbank captures the back-of-pack and front-of-pack data as well as high-resolution images of each product. Brandbank captures data from physical samples of every product. Manufacturers send Brandbank a sample of the product, and Brandbank then photograph it to provide all the images of the product that consumers will later see on e-retail platforms. It is then the role of the data entry teams to capture the nutritional information, which online manufacturers and retail brands communicate to consumers, so that consumers buying the product online can make an informed choice; as if they were holding the package in front of them in a shop. The backbone of this data capture is the product barcode standard GTIN, maintained by GS1, which sets rigorous standards around, for example, when changes to products necessitate new barcodes.

10.10 Data is initially captured from product images supplied to Nielsen Brandbank's office in India then a further 2 proof checks are carried out at the UK office before uploading to their manufacturer/retail brand portal for approval. Once the manufacturer/retail brand owner has approved the images and data captured by Brandbank, it goes live on Brandbank’s product database and is date stamped. No new or updated product data is ever published without approval from manufacturer/brand, which improves accuracy and ensures the most current data are used.

10.11 Product data, including nutrient data is updated when manufacturers alert (Nielsen) Brandbank that a product’s content, composition or packaging has changed. This occurs on an ongoing basis and the most up-to-date nutrient data is

provided by the manufacture at that point in time, for Brandbank to then code into their systems. New or updated product data received by Brandbank is subjected to the capture and approval process described above.

10.12 The Nielsen Brandbank database was selected for use in constructing the NPM test dataset as it provides the full back-of-pack, front-of-pack nutrient information and ingredients listing for a large number of products. As no sales information was available from the Nielsen Brandbank database, supplementary data from other sources (that is, Kantar Worldpanel data) was required to establish the most commonly consumed products.

The Composition of Foods Integrated Dataset

10.13 The Composition of Foods Integrated Dataset (CoFID[30]), first published in 2008 and reviewed and updated in 2015, contains the nutrient values for a range of commonly consumed foods in the UK. The nutrient data includes macronutrients, vitamins, vitamin fractions, minerals, fatty acid fractions, phytosterols and organic acids.

10.14 The nutrient data contained in CoFID have been obtained from a range of sources. Although most of the data have been derived by analysis of foods, where analytical data were not available the values have been taken from manufacturers' data, scientific literature and determined by calculation.

10.15 PHE had access to Kantar Worldpanel data for product categories, which made a substantial contribution to sugar intakes only, and therefore some categories were excluded. CoFID[qqq] values was used to 'gap-fill' some of these excluded product categories such as:

- standardised/regulated (eg eggs, milk)
- generic/unbranded products (eg fruit, vegetables and nuts)
- other missing products (eg oils and spreads, dried pasta, cream, cheese and packaged sandwiches)

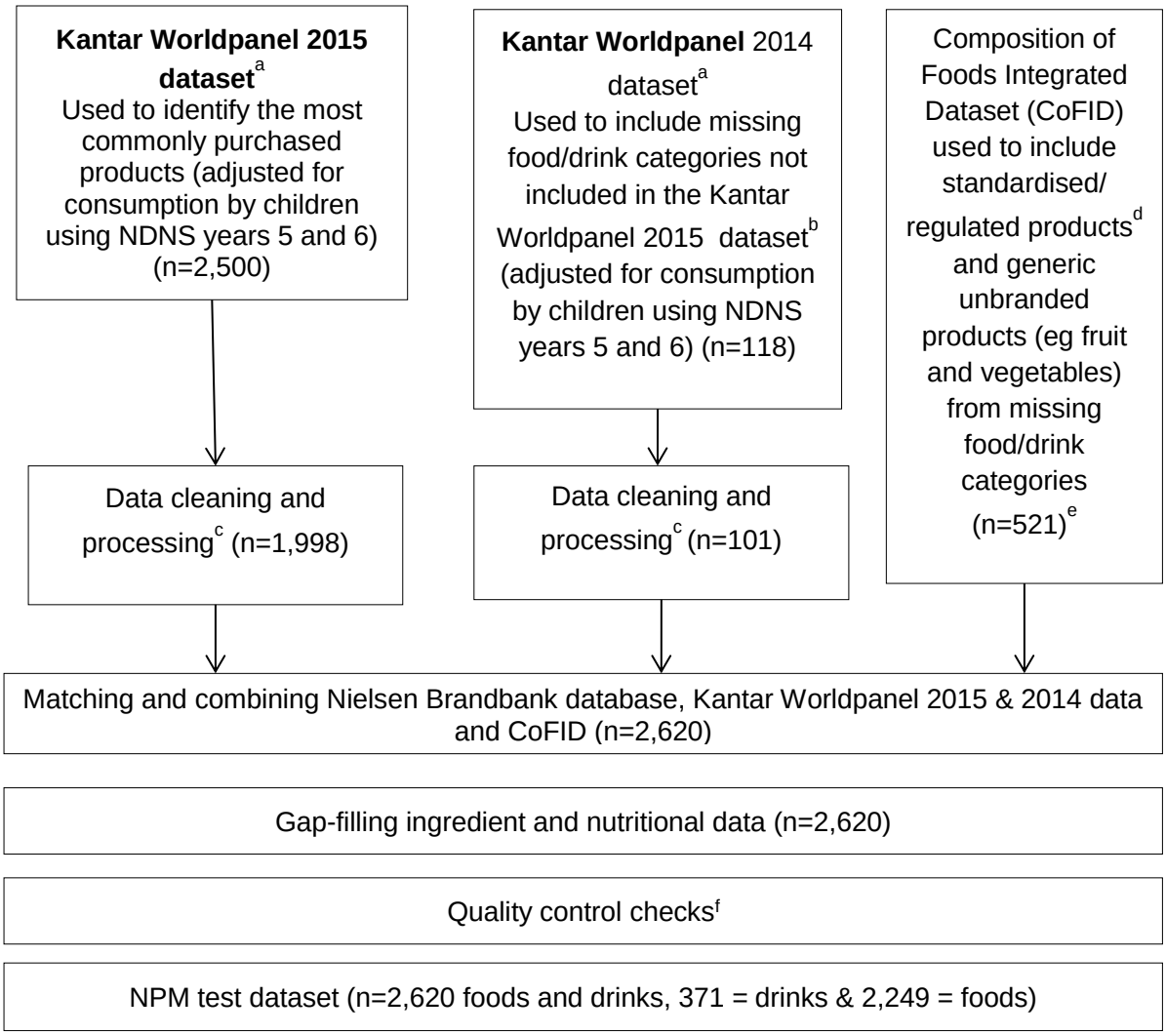
[qqq] For the purpose of the review, CoFID values re-calculated in the format required for nutrition labelling were used

Appendix H: Nutrient Profiling Model test dataset - processes involved in its development

11.1 The NPM test dataset contained 2,620 food and drink products.

11.2 **Figure 1** summarises the processes involved in the development of the NPM test dataset. This is followed by a detailed account for each procedure.

Figure 1: Flowchart of the NPM test dataset development process



[a] Data cleaned and processed to remove duplicates, baby foods, alcoholic drinks, generic/unbranded products, several retailers' own-branded products

[b] Missing food and drink categories from the Kantar Worldpanel 2015. For example: cheese, dried pasta and sandwiches

[c] Data cleaned and processed to remove duplicates, discontinued products, non-identified products (ie unable to identify the product based on the description in the Kantar data), products with missing nutritional information (ie impossible to gap-fill) and products with implausible nutritional values

[d] Standardised/regulated products: Low nutrient variation between products (eg milk, eggs)

[e] Nutritional values for 3 products were gap-filled using the retailer's website. Additional battered fish products (n=4) from retailer's/manufacturer's website were added to the NPM test dataset due to high nutrient variation between these products

[f] 30% of the food and drink products in the NPM test dataset were randomly selected and the nutritional data manually checked against retailers'/manufacturers' websites

Kantar 2015 data

11.3 Sales data from Kantar Worldpanel 2015 was used as a starting point for constructing the NPM test dataset. This data was cleaned and processed to remove:

- generic/unbranded products and several retailer own branded products for which nutrient information could not be matched
- alcoholic drinks and baby foods as the UK NPM 2004/5 excludes these products
- duplicate products: products sold in multiple pack sizes were identified and only the most frequently purchase variant retained

11.4 Unit sales of food and drink products from the Kantar Worldpanel 2015 data were adjusted to reflect the difference between adults' and children's consumption using National Diet and Nutrition Survey (NDNS) years 5 and 6 data[14]. The average contribution of a food group to overall total energy intake for 11-18 year olds was compared with those of 19-74 year olds. A worked example is provided below.

For example, data from the NDNS years 5 and 6 shows that non-alcoholic beverages made up 6.7% of total energy intakes for 11-18 year olds and 3.9% for 19-64 year olds. The adjusted data was calculated by multiplying beverage sales by an appropriate adjustment factor:

$$\frac{\text{\% contribution of the food category to energy intake for 11-18yr olds: 6.7}}{\text{\% contribution of the food category to energy intake for 19-64yr olds: 3.9}} = 1.7$$

11.5 A full list of the food category adjustment factors that were applied are provided in **Table 1**.

11.6 The NDNS food categories[rrr] were then broadly matched to the Kantar food categories. For each product from the Kantar Worldpanel 2015 data, the unit sales data was multiplied by the NDNS food category adjustment factor data[sss] to calculate an adjusted unit sales figure.

11.7 The Kantar Worldpanel data was then sorted by the adjusted unit sales (in descending order). The top 2,500 products were selected for inclusion in the NPM test dataset.

[rrr] This weighting was undertaken at broad food category level only based on the NDNS foods categories and not at a product level, hence all products in a particular food category will have the same weight
[sss] Based on the percentage contribution of the food categories to total energy intake

Table 1: List of food category adjustment factors derived from the National Diet and Nutrition Survey (years 5 and 6) reflecting the difference between adults' and children's consumption [ttt]

Food category	Adjustment factor
Cereals and cereal products	1.16
Milk and milk products	1.02
Eggs and egg dishes	0.56
Fat spreads	0.80
Meat and meat products	1.02
Fish and fish dishes	0.60
Vegetables and potatoes	0.97
Savoury snacks	1.92
Nuts and seeds	0.33
Fruit	0.56
Sugar, preserves and confectionery	1.18
Non-alcoholic beverages	1.70
Miscellaneous	0.83

Source: National Diet and Nutrition Survey Rolling Programme[14]

Data cleaning and processing of the Kantar Worldpanel 2015 data

11.8 The 2,500 food and drink products were reviewed to remove duplicates, discontinued products, non-identified products (where it was not possible to identify products using the description provided in the Kantar data), products with missing nutritional information (and where impossible to gap-fill) and products with implausible nutritional values. This resulted in the exclusion of 502 food and drink products.

Additional products added from Kantar Worldpanel 2014 data and Composition of Foods Integrated Dataset (CoFID)

11.9 The Kantar Worldpanel 2015 data was originally purchased by PHE for the purpose of sugar reduction work. As such, it only included products that made a substantial contribution to sugar intake and excluded certain unprocessed food and drink categories. In order to widen the range of foods beyond those which were high in sugar, foods and drink categories missing from the Kantar Worldpanel 2015 dataset such as dried pasta, sandwiches and cheese were added from the Kantar Worldpanel 2014 data which PHE had previously purchased. In addition, standardised/regulated products (that is, those where there was low variation in nutrition profiles between products (eggs and milk for

[ttt] Percent contribution to total energy intake for 11-18 year olds / percent contribution to total energy intake for 19-64 year olds

example) and generic/unbranded products (fruit, vegetables and nuts for example) were added from the CoFID[30].

11.10 Unit sales were adjusted for the difference between adults' and children's consumption using the same methodology used for the Kantar Worldpanel 2015 data. An additional 118 products were identified for potential inclusion in the NPM test dataset. Data cleaning of these products was also carried out as per the Kantar Worldpanel 2015 data (paragraph 11.8) resulting in 101 food and drink products to be added to the NPM test dataset.

11.11 514 standardised/regulated products and generic/unbranded products were added from CoFID as these were missing from the Nielsen Brandbank and Kantar Worldpanel dataset to ensure the dataset was more rounded and contained a wide range of products. Nutritional values for 3 CoFID products were gap-filled (paragraph 11.17) using retailer's websites and additional battered fish products (n=4) were added from retailer's/manufacturer's websites due to high nutrient variation between these products, bringing the total to 521 food and drink products.

Matching and combining of the Nielsen Brandbank database, Kantar Worldpanel 2015 data, Kantar Worldpanel 2014 data and CoFID

11.12 Data from Brandbank was used to populate the nutrient composition data (energy, total carbohydrate, total sugars, total fat, saturated fat, fibre and salt per 100g or per 100ml) within the NPM test dataset. This was because the Kantar data available to PHE did not contain nutrient information on fibre and protein or ingredient information.

11.13 The data from Brandbank was exported in October 2016. Therefore, any changes to a product's nutritional profile after that date, due to reformulation for example, were not captured.

11.14 The exported Brandbank data was cleaned and processed to remove duplicates. In addition, food items with very high nutritional values (cut-off points) for energy, carbohydrate, sugar, protein, total fat, saturated fat, fibre and salt were identified and manually inspected to confirm that the top food contributors to the nutrient were correct. Cut-off points were applied to identify foods with very high nutritional values based on values obtained from *McCance Widdowson's the Composition of Foods: 7th Summary Edition* (MW7)[53]. These cut-off points are provided in **Table 2**.

Table 2: Cut-off points to identify outliers in the NPM test dataset

Nutrient	Cut-off points[uuu]	Top contributor
Energy (kJ/100g)	3702	Fats and oils (eg ghee)
Energy (kcal/100g)	900	Fats and oils (eg ghee)
Carbohydrates (g/100g)	99.0	Milkshake powder
Protein (g/100g)	85.0	Gelatine
Fat (g/100g)	100.0	Fats and oils (eg compound cooking fat)
Saturated fat (g/100g)	86.0	Coconut oil products
Fibre AOAC (g/100g)	50.0	Dried herbs
Salt (g/100g)	39.0	Salt mixes, sauces, seasoning

11.15 Product matching was conducted using Kantar Worldpanel (2014 and 2015) product descriptions against Brandbank product descriptions and also matched against nutritional values for the products (that is, against energy, sugar, saturated fats and sodium) using Fuzzy Lookup add-in function in Excel. The Fuzzy-Lookup add-in function performs matching of textual data in Excel and computes the probability of an exact match. Using Fuzzy Lookup add-in function in Excel, the product match rate between Kantar and Neilson Brandbank was set at 70% match quality. The nutritional data from Brandbank was then added onto the Kantar data to form the NPM test dataset. Two PHE nutritionists then manually checked for any mismatches where discrepancies were found between the nutritional values taken from Brandbank and Kantar, retailers' and/or manufacturers' websites were used and data corrected as per the website information.

11.16 The selected CoFID data were then combined with the matched Brandbank data to form the final NPM test dataset.

Gap-filling ingredient and nutritional data (including assumptions made, and adapting food and drink data to enable compatibly for use in the NPM)

11.17 Food and drink products from the matched and combined dataset that did not contain the full nutrient profile data required were identified.

11.18 Nutritional data that was not available from the Brandbank database was inputted manually from manufacturers' and/or retailers' websites (1,998 and 101 food and drinks products from Kantar Worldpanel 2015 and Kantar Worldpanel 2014 respectively).

[uuu] Values rounded up to the nearest whole number

11.19 Some assumptions were required to enable the gap-filling of nutritional data for the NPM test database. These included:

- estimating nutritional values for assortment 'variety' packs estimating values for fibre, free sugars and sodium
- estimating the proportion of fruit, vegetables and nuts they contained
- converting data from per serving/portion to per 100g
- converting data from 100ml to 100g
- converting data from 'drained weight' to 'as sold'
- converting reconstituted food and drink data from 'as sold' to per 100g of the product after reconstitution
- converting data from 'as consumed' to 'as sold' (when possible to do so)

11.20 Full details of the actions taken to gap-fill and convert ingredient and nutrient data for the NPM test dataset (including assumptions made) are provided in **Table 3**.

Table 3: Actions taken to gap-fill and convert ingredient and nutrient data (including assumptions made) in the NPM test dataset

	Description	Actions
1	Missing products in Brandbank but present in Kantar Worldpanel	Manually matched products against retailers'/manufacturers' websites Retrieved nutritional data and ingredient declaration Recorded website link and access date
2	Missing nutrient data in Brandbank	Collected nutrient data against retailers'/manufacturers' websites If data not available on websites, then data was imputed[vvv] or gap-filled from MW7[53] If data was not available, the product was excluded from the NPM test dataset
3	Missing ingredient declaration	Ingredient data collected from retailers'/manufacturers' websites or estimated from similar retail data or estimated by analytical survey sampling reports

[vvv] Imputed values refers to the assumption that a nutrient value in a closely related food will be the same in the food that has the gap or the assumption that some foods contain none of a particular nutrient, based on the knowledge of the composition of the food

	Description	Actions
4	Nutritional values incompatible between Brandbank and Kantar data	Values corrected using retailers'/manufacturers' websites
5	Unable to identify product details due to inconsistencies between short and long descriptions for Kantar data (eg different package sizes in descriptions affecting products being mapped	Nutritional values were used as a comparison to identify the product from Kantar 'long' or 'short' descriptions
6	Nutritional values are the same per 100ml and 100g in the Brandbank database	Checked against retailers'/manufacturers' websites and values corrected
7	Products which are described as "a variety pack" (eg crisps different nutritional information for each pack)	Estimated the average nutritional value of the 'variety/assortment' pack using the nutritional data for each flavour/type of product included
8	Sodium	Converted salt/ salt equivalent values to sodium using a conversion factor of 2.5 A conversion factor of 2.5 is in line with a value used by industry[37]
9	Fibre	Assumed label data to be AOAC fibre If fibre values were missing energy calculations were used:

	Description	Actions
		Fibre (g) = (total energy kJ - (protein × 17 + fat × 37 + carbohydrate × 17 + alcohol × 29))/2 If polyols present, assumed that the energy value was 10kJ/1g; 2.4kcal/1g[30] If vinegar (ie acetic acid, malic acid and citric acids) is present, assumed that the energy values were 13kJ/1g; 3kcal/1g[30] In some instances it was found that there was a discrepancy in the energy values due to: • fibre values absent from the energy calculations • Brandbank/retailers/manufacturers used 3.75 kcal/g for carbohydrates rather than 4kcal/g • challenges estimating fibre values using 'by difference' approach when polyols/organic acids were present. Where this was the case, fibre was taken to be 0
10	Estimating fruit, vegetables and nuts proportions[www]	The percentage of fruit, vegetables and nuts was determined from the ingredient declaration Where this was not possible, it was estimated from a similar product in the test dataset that provided the proportions of fruit vegetables and nuts in the ingredient declaration If no similar product was identified, then the following approaches were taken: • estimates based on the NDNS disaggregation data[xxx] (eg mince pies) or recipes from the MW7[53] of the same products (eg beef lasagne) were used • if the product was not present in the NDNS disaggregation data or MW7[53] the percentage of the next ingredient listed in the ingredient declaration was taken

[www] Estimating fruit, vegetables and nuts following this process could lead to potential under/overestimation of the proportions of these to varying degrees

[xxx] Source from the NDNS Nutrient Databank (internal). In order to estimate consumption of fruit, vegetables, meat and fish in NDNS all food codes in the NDNS Nutrient databank containing these ingredients were broken down into estimates of the proportion of meat, fish, fruit and vegetable components in the dish`, based on data from a number of sources

	Description	Actions
		Specific issues relating to assumptions made for estimating proportions of fruit, vegetables and nuts: • dried fruit and vegetables and tomato puree (typically concentrated) were multiplied by 2 when calculating the amount in grams per 100g in line with NPM technical guidance • the percentage of moistened fruit and freeze dried fruit and vegetables were included in the total percentage of dried fruit. The correction factor used to estimate the impact of freeze drying and as equivalent to fresh/raw might be much greater. As there were no data to define whether the impact on freeze drying had a different effect to that achieved for dried fruit and vegetables, it was included in the total percentage of dried fruit and vegetables • if the ingredient declaration suggested the amount of tomatoes used in the product was more than 100g (eg ketchup made with 125g tomatoes per 100g ketchup), the amounts were divided by 2 to estimate the percentage of pureed tomatoes • if the ingredient declaration did not include the percentage of canned fruits/vegetables mixed with water/syrup, the percentage was determined by dividing drained weight by the total weight. Canned fruits with fruit juice were assumed to have 100% fruit • the percentage of fruit in drinks that require dilution before consumption (ie squash) was estimated by dividing the provided percentage in the ingredient declaration based on its dilution factor (eg recommended dilution 1:4, so divide the percentage by 5) • the percentage of fruit/vegetable/nuts in an assortment pack was determined based on the weight of the product that contained fruit, vegetables and nuts. If the weight of each product was not specified, it was assumed that all products contributed equally to the total weight. • vegetables in reconstituted soups were assumed to be dried

	Description	Actions
11	Estimating free sugars	See **Appendix I**
12	Converting/using product data ('as sold' vs 'as consumed')	The UK NPM 2004/5 technical guidance[3] states that nutrient profile scores should usually be calculated for a product 'as sold' Checked Brandbank and collected nutritional information 'as sold' (eg frozen) If not available on Brandbank, checked against retailer's/manufacturer's website 'As consumed' product data was used if 'as sold' product data was not available For foods such as chips, potato products, pizzas and pies, the nutritional values for these products were typically provided 'as consumed' (eg grilled/oven baked) rather than 'as sold'. If the product presented nutritional values for more than one cooking method, the nutritional values 'as sold' were selected Products that provided nutritional values 'as consumed' only were not adjusted to account for weight changes on preparation of foods resulting from the loss or gain of water. For many meats and fried foods there will also be a loss or gain of fat. This was not considered.
13	Reconstituted food and drink products	If the nutritional information for the reconstituted products (eg custard powder, dilutable squash, powdered soups) was provided 'as sold', the nutrient profile score was calculated per 100g of the products after reconstitution, based on the manufacturer's cooking instructions
14	Converting product data from 'drained weight' to 'as sold'	For canned foods, the net content 'as sold' values per 100g were used, or calculated
15	Converting product data from per serving/portion to per 100g	Nutritional information provided per serving/portion was calculated to per 100g

	Description	Actions
16	Converting product data from 100ml to 100g	Foods and drinks with data that was presented as 100ml were converted to 100g using appropriate specific gravity (SG) See **Table 4** for the SG values used Where the SG values were not provided or could not be estimated from a similar food/drink, the specific gravity was assumed to be '1'

Table 4: Specific gravity (SG)[yyy] values that were used to convert nutritional values per 100ml to per 100g

Product	Specific gravity	Source
Dairy products		
Skimmed milk	1.04	MW7[53]
Semi-skimmed milk	1.03	MW7
Whole milk	1.03	MW7
Evaporated milk	1.07	MW7
Single cream	1.00	MW7
Whipping cream	0.96	MW7
Double cream	0.94	MW7
Choc ices/sticks	1.30	Internal industry communication
Ice lollies	0.90	Internal industry communication
Carbonated drinks		
Cola	1.04	MW7
Fruit juice drinks	1.04	MW7
Lemonade	1.02	MW7
Lucozade	1.07	MW7
Diet drinks and diet energy drinks	1.00[zzz]	n/a
Drinks with stevia	1.04[aaaa]	n/a
Ginger ale	1.04[bbbb]	n/a
Fruit juice drinks		
Blackcurrant juice drink/squash, undiluted	1.28	MW7
Fruit juice drinks/squash, undiluted	1.09	MW7
Fruit juice drinks/squash, ready to drink	1.03	MW7

[yyy] Specific gravity defined as the ratio of the density (mass of a unit volume) of a food to the density (mass of the same unit volume) of water
[zzz] Specific gravity was assumed to be 1 as no SG had been identified for 'diet' or 'low calorie' soft drinks
[aaaa] SG for drinks with stevia was assumed to be 1.04 based on 30% of sugar is replaced with this stevia for stevia containing drinks
[bbbb] SG of 1.04 was used as the ingredient list of ginger ale is similar to soft drinks

Product	Specific gravity	Source
Fruit juice drink, no added sugar, undiluted	1.01	MW7
Fruit juice drink, no added sugar, ready to drink	1.01	MW7
High juice drinks, undiluted	1.15	MW7
High juice drinks, ready to drink	1.04	MW7
Lime juice cordial, undiluted	1.102	MW7
Foods		
Mayonnaise, traditional	0.91	FAO[54]
Maple syrup	1.32	FAO
Other assumptions[cccc]		
Other	1.00[dddd]	n/a

Quality control checks

11.21 Quality control checks were performed by 2 PHE nutritionists[eeee] to ensure the integrity and accuracy of the NPM dataset and to identify errors that may have been introduced during cleaning, processing or gap filling the data. 30% of the food and drink products in the NPM test dataset were randomly selected and the nutritional data manually checked against retailers/manufacturers websites. Of the 30% of the food and drink products that were quality checked, less than 0.4% of food and drink products were corrected using data from retailers and manufacturers websites.

11.22 The assumptions made for fruit, vegetables and nuts proportions, free sugars, sodium values and fibre were checked and the integrity of the data verified. This included, for example, ensuring sugar values were lower than carbohydrate and saturated fat values were lower than total fat. Where there were discrepancies, the nutritionists cross-checked the data using retailers and manufacturers' websites.

[cccc] Assumptions made for SG values of products that were not available
[dddd] SG assumed as 1 due to lack of available data of the SG for that product
[eeee] Registered with the Association for Nutrition www.associationfornutrition.org

Appendix I: Nutrient Profiling Model test dataset - estimating free sugars

12.1 PHE's 'working definition of free sugars' was used during the development of the NPM test dataset. This definition had been developed for use in the National Diet and Nutrition Survey (NDNS) to estimate the free sugars content of foods, drinks and composite products and was based on the broad definition set out in The Scientific Advisory Committee on Nutrition (SACN) report on *Carbohydrates and Health*[6] and further advice from SACN on its practical implementation. A PHE definition of free sugars for the UK is awaiting publication[55].

12.2 A summary of what was included and excluded in the working definition of free sugars used for the development of the NPM test dataset is provided in **Table 1**.

Table 1: PHE working definition of free sugars

Included in free sugars
All added sugars in whatever form (including honey, syrups and added lactose)
All sugars in drinks except for lactose naturally present in milk. This includes the sugars naturally present in fruit and vegetable juices, smoothies, and in milk substitutes
All sugars in fruit and vegetable purees and pastes. Includes jams, preserves. Also fruit bars made from purees/paste/juice/extruded fruit
Whey powder

Excluded from free sugars
Milk sugar (lactose) naturally present in milk and dairy products
Fresh, frozen, dried, stewed and canned fruit – ie most processed fruit (other than purees, juice and smoothies). Fruit 'confectionery' items made from dried pressed fruit Fresh and processed (eg frozen, dried, stewed, canned) vegetables
Small amounts of sugar naturally present in cereal grains and nuts and seeds however processed
Dried milk powder (eg skimmed/whole milk powder)

12.4 Wherever possible assumptions were made on a category basis (which can be found in **Table 2.** However, some categories required further consideration on foods and drinks.

12.5 During the development of the NPM test dataset, it became apparent that further decisions were required on whether whey powder and dried milk powders should be included as free sugars.

12.6 **Table 2** presents the assumptions used in estimating free sugars values by category (and where possible sub-category) level in the NPM test dataset. For the purpose of estimating free sugars, the categories developed to estimate free sugars are not aligned with categories used(including the numbers in each category), in reporting the results tables (ie those foods and drinks listed in **Appendix J**).

12.7 A free sugars decision tree which could be used to help decide whether a food or drink contains free sugars, is provided in **Appendix L**.

Table 2: Assumptions used in estimating free sugars values in foods and drinks in the NPM test dataset by category

	Category	Description of category	Sub-category[ffff]	Total number	Assumptions for estimating free sugars	Likely degree and direction of error	Comments
Drinks							
1	Coffee (n=39)	Includes coffee granules/instant/pods, caffeinated/ decaffeinated, latte/mocha/cappuccino and coffee with additions	*Added sugar*	*27*	Estimated on an individual basis from ingredients listing Free sugars calculated as total sugars minus lactose from skimmed powder. Skimmed milk powder contains 52.9g/100g of lactose (as determined by CoFID[30]) % skimmed powder taken or estimated from ingredient declaration	Fairly small random error in estimating skimmed powder content	
			No added sugar	*12*	No free sugars	No error	
2	Yoghurt drinks (n=10)	Includes plain and flavoured yoghurt drinks		10	Free sugars = total sugars – lactose. 33% of total sugars taken as lactose where the proportion of lactose could not be determined from the ingredient declaration (based on average of MW7 values)	Slight overestimation of free sugars in yoghurt drinks	
3	Energy drinks, low calorie (n=6)	Incudes all low calorie, still/carbonated drinks containing stimulants		6	All free sugars	No error	All free sugars by definition. No dairy content
4	Energy drinks, not low calorie (n=14)	Includes all drinks still/carbonated containing stimulants		14	All free sugars	No error	All free sugars by definition. No dairy content
5	Fruit juice, veg juices and smoothies (n=35)	Includes chilled and ambient juices, smoothies, lemon juice etc		35	All free sugars	No error	All free sugars by definition. No dairy content
6	Instant hot and cold beverages (n=23)	Includes drinking chocolate, cocoa, powdered malted drinks, milkshake powder	*Added sugar*	*21*	Assessed on an ‘as consumed/as made up’ basis Estimated on an individual basis from ingredients listing. Most products are instant – milk or whey powder in the product and made up with water. Some contain no milk powder and are made up with milk Drinking chocolate made with semi skimmed milk – assumed 40% of total sugars is lactose based on an average milk to powder ratio (as determined by CoFID) Instant chocolate drinks made up with water may contain milk powder and/or whey powder as well as sugar. Products containing whey powder, but no milk powder, are treated as 100% free sugars. For products containing milk powder, the proportion of sugar from milk powder was estimated. Skimmed milk powder contains 52.9g/100g of lactose (as determined by CoFID). % skimmed powder taken or	Potential under-/overestimation of free sugars	

[ffff] Sub-categories not aligned to the food and drink categories for reporting results as shown in **Appendix J** and **Table 9** in the 2018 review of the NPM document

	Category	Description of category	Sub-category[ffff]	Total number	Assumptions for estimating free sugars	Likely degree and direction of error	Comments
					estimated from ingredient declaration		
					Powdered malt drinks made up with water- estimated on an individual basis from ingredients listing Products containing milk powder that did not list quantity in the ingredients declaration – assume all free sugars	Fairly small overestimation of free sugars in products containing skimmed milk powder, and/or wheat in malted products	
			No added sugar	*2*	Cocoa powder - No free sugars	No error	No other ingredients included in the product
7	Milk products including dried, flavoured and non-dairy milks (n=11)	Includes milk and other milk products including dried, flavoured and non-dairy milks, coffee whitener	*Added sugar*	*5*	For chocolate flavoured milks - assumed 50% of total sugars is lactose (as determined by CoFID) where proportion of lactose could not be determined from the ingredient declaration For reduced sugar flavoured milks (1 product) – taken as 97% total sugars as lactose (as determined by ingredient declaration)	Random error due to lack of information on the ingredient declaration	Most products did not list quantity of dairy content in the ingredients declaration
				1	Non-dairy milks – all free sugars	No error	
				1	For coffee whitener- assumed all free sugars	No error	No milk powder in these products
			No added sugar	*2*	No free sugars in dried dairy milk	No error	
				1	No free sugars in sheep or goat milk	No error	
				1	Non-dairy milks – all free sugars	No error	
8	Milk, skimmed /semi-skimmed/ whole, pasteurised/ UHT (n=7)	Includes milk, dairy, skimmed/semi-skimmed/whole, pasteurised/UHT		7	No free sugars in unsweetened dairy milk	No error	
9	Soft drinks, carbonated, low calorie (n=77)	Includes all low calorie, no added sugar, sugar free types. Includes carbonated soft drinks, lemonade, slimline tonic water, flavoured sparkling drink, soda water, and ginger ale/beer		77	All free sugars	No error	All free sugars in drinks by definition. No dairy content
10	Soft drinks, carbonated, not low calorie (n=48)	Includes tonic water, carbonated soft drinks, lemonade, sparkling juice drink, and ginger beer/ale	*Added sugar* *No added sugar*	*45* *3*	All free sugars	No error	All free sugars in drinks by definition. No dairy content
11	Soft drinks, still, low calorie, dilutable (n=20)	Includes all low calorie drinks and water is used as diluent. Includes single and double strength squashes		20	All free sugars	No error	All free sugars in drinks by definition. No dairy content
12	Soft drinks, still, low calorie, ready to drink (n=9)	Includes all low calorie, no added sugar, sugar free types. Includes juice drinks	*Added sugar* *No added sugar*	7 2	All free sugars	No error	All free sugars in drinks by definition. No dairy content
13	Soft drinks, still, not	Includes all types including squashes and cordials		8	All free sugars	No error	All free sugars in drinks by

	Category	Description of category	Sub-category[ffff]	Total number	Assumptions for estimating free sugars	Likely degree and direction of error	Comments
	low calorie, dilutable (n=8)	and water used as a diluent					definition. No dairy content
14	Soft drinks, still, not low calorie, ready to drink (n=26)	Includes all types of still soft drinks not carbonated. Includes juice drinks, coconut water drinks	*Added sugar* *No added sugar*	*22* *4*	All free sugars	No error	All free sugars in drinks by definition. No dairy content
15	Water, still/ sparkling and flavoured (n=38)	Includes bottled water still/sparkling and flavoured water, no calories		38	No free sugars	No error	No sugar content
Foods							
16	Block pastry (n=4)	Includes puff/shortcrust pastry sheets/blocks		4	Assumed no free sugars	Slight underestimation of free sugars in products containing small amounts of sugar	Products that contained 'sugar' did not list quantity in the ingredients declaration. Assumed ingredients listed in descending order of weight at the time of their use in the preparation of the food, therefore quantity of 'sugar' in the product is assumed to be very small
17	Bread (n=102)	Includes all plain, multi-seeded, wholemeal breads, toasties, bagels, pitta, muffins, and baguettes. Excludes sweet muffins as they are included in 'morning goods'	*Bread*	*93*	Assumed no free sugars	Underestimation of free sugars in products (mostly wholemeal and brown breads) containing sugars/caramelised sugar/dextrose	Approximately 40% of products contained 'sugar/ caramelised sugar/ dextrose' and did not list quantity in the ingredients declaration
			Bagels/ muffins	*9*	Assumed no free sugars	Underestimation of free sugars in products containing sugar/dextrose	All of the products contained 'sugar/dextrose' but did not list quantity in the ingredients declaration
18	Breakfast cereal, high fibre (n=53)	Includes all breakfast cereals with AOAC fibre of 6g/100g or more eg plain shredded whole-wheat, porridge	*Added sugar with added fruit*	*7*	Estimated on an individual basis from ingredients listing Free sugars calculated as total sugars minus the proportion of total sugars from known quantities of dried fruit/nuts (as determined by CoFID) and milk powder if present	Random errors due to lack of information on the dried fruit content and its sugar content, especially for sweetened dried fruit Slight overestimation of free sugars as sugar naturally present in wheat or other grain not accounted for	The amount of free sugars in sweetened dried fruit could not be determined.
			Added sugar without added fruit	*33*	All free sugars unless product contained known quantity of nuts as declared on the ingredient declaration, then estimated on an individual basis Free sugars calculated as total sugars minus total sugars from known quantities of nuts (as determined by CoFID)	Slight overestimation of free sugars as sugar naturally present in wheat or other grain is discounted Random errors due to lack of information on the ingredient declaration	Where the quantity of the type of nut could not be identified eg (nuts (15%) (almonds, Brazil nuts, pecan nuts and hazelnuts)), the proportion was split equally eg (3.75% almonds, 3.75% Brazil nuts, 3.75% pecan nuts, and 3.75% hazelnuts)
			No added sugar	*12*	No free sugars	No error	
			No added sugar with added fruit	*1*	Assumed no free sugars	Slight underestimation of free sugars as product contains unknown proportion of whey powder	Quantity of 'whey powder' in the product was very small , product contained >2.5% whey powder

	Category	Description of category	Sub-category[ffff]	Total number	Assumptions for estimating free sugars	Likely degree and direction of error	Comments
19	Breakfast cereals, other (n=19)	Includes all breakfast cereals with AOAC fibre less than 6g/100g eg toasted rice cereal, frosted flakes cereal	*Added sugar with added fruit*	*2*	Estimated on an individual basis from ingredients. Free sugars calculated as total sugars minus the sugars from known quantity of dried fruit and nuts	Random errors due to lack of information on the dried fruit content and its sugar content, especially for sweetened dried fruit Slight overestimation of free sugars as sugar naturally present in wheat or other grains	The amount of free sugars in 'sweetened' dried fruit could not be determined
			Added sugar without added fruit	*17*	Other breakfast cereals with added sugar without fruit – assumed all free sugars	Slight overestimation of free sugars as sugar naturally present in wheat or other grain is discounted	Lactose content of milk powder where quantities were not declared from the ingredient list could not be determined
					Products that contain known quantities of nuts and/or milk chocolate as declared on the ingredient declaration then estimated on an individual basis where free sugars calculated as total sugars minus sugars from known quantities of nuts and/or lactose proportion of total sugars content of milk chocolate (as determined by CoFID)	For products containing milk chocolate where quantities were not declared, free sugars is overestimated as the lactose is not subtracted from total sugars	
20	Butter and fat spreads (n=40)	Includes salted and unsalted butter, low fat spreads, reduced fat spreads		40	No free sugars	Underestimation of free sugars in one product containing whey powder	Products that contained 'whey powder' did not list quantity in the ingredients declaration. Assumed ingredients listed in descending order of weight at the time of their use in the preparation of the food, therefore quantity of 'whey powder' in the product is assumed to be very small
21	Cakes and pastries (n=32)	Includes all types of cakes, ambient and chilled, including cake bars and slices, American muffins, doughnuts, Swiss rolls, frozen gateaux, chocolate eclairs. This category also includes sweet pastries such as jam tarts, Bakewell tarts and egg custard tarts		32	Estimated on an individual basis from ingredients listing For cakes no fruit, no chocolate, no cream – assumed all free sugars For cream cakes (eg cream slices, cream sponge, eclairs), free sugars calculated as total sugars minus lactose from known proportion of cream. If proportion was unknown, assumed as 35% cream[gggg]. Fresh whipping cream contains 2.7g/100g of lactose (as determined by average values taken from CoFID) For milk chocolate coated cakes (eg mini rolls, triple choc rolls), free sugars calculated as total sugars minus lactose from known proportion of milk chocolate.	Slight overestimation of free sugars as small amount of sugar from wheat or other cereal content not taken into account Random error for products containing cream, skimmed milk powder, milk chocolate, dried fruit where the proportion not specified on the ingredients list	

[gggg] Based on results from an analytical survey

	Category	Description of category	Sub-category[ffff]	Total number	Assumptions for estimating free sugars	Likely degree and direction of error	Comments
					If proportion of milk chocolate was unknown, assumed as 33% chocolate[hhhh]. Milk chocolate contains 9.2g/100g of lactose (as determined by average values taken from CoFID) For custard tarts, free sugars calculated as total sugars minus lactose content from known proportion of milk. If proportion of milk, in the custard tart, was unknown, this was assumed as 40%[iiii] Fruit cake (eg fruit cake, genoa cake) calculated on an individual basis as free sugars = total sugars minus sugars from dried fruit as listed on the ingredient declaration. When the product did not quantify the proportion of dried fruit in the products, the dried fruit content of the product was assumed as 35%[hhhh] Sweet pastries – all free sugars. No lactose proportion accounted from products with milk powder Sponge puddings (no fruit or dairy) – assume all free sugars		
22	Cereal bars (n=21)	Includes cereal bar, including breakfast cereal bars	*Added sugar no added dried fruit*	*15*	Estimated on an individual basis based on ingredients listing. Products without milk chocolate or milk content – assume all free sugars Free sugars calculated as total sugars minus lactose content from known proportion of skimmed milk powder (as determined by CoFID) Estimated on an individual basis based on ingredients listing. Products containing milk chocolate or milk, sugar from these sources estimated from ingredients listing and subtracted from total sugars	Slight overestimation of free sugars as small amount of sugar from wheat or other cereal content not taken into account	
			Added sugar with added dried fruit	*6*	Estimated on individual basis using ingredient listing for dried fruit content and milk powder content Free sugars calculated as total sugars minus sugars from known quantities of dried fruit and milk powder (as determined by CoFID)	Slight overestimation of free sugars as small amount of sugar from wheat or other cereal content not taken into account Random errors in estimation of dried fruit and milk content as limited quantitative information on ingredients lists	

[hhhh] Based on results from an analytical survey
[iiii] Based on label data

	Category	Description of category	Sub-category[ffff]	Total number	Assumptions for estimating free sugars	Likely degree and direction of error	Comments
23	Cheese (n=71)	Includes all types of cheese: not reduced fat cheese, medium/reduced fat cheeses, cottage, cheese spreads, quark	*Cheese spread/ spreadable and triangles*	*10*	No free sugars	Slight underestimation of free sugars in products containing small amounts of whey powder not quantifiable from ingredients declaration	Products that contained 'whey powder' did not list quantity in the ingredients declaration. Assumed ingredients listed in descending order of weight at the time of their use in the preparation of the food, therefore quantity of 'whey powder' in the product is assumed to be very small
			Cottage cheese or quark	*3*	No free sugars	No error	
			Medium/ reduced fat cheese	*20*	No free sugars	No error	
			Not reduced fat cheese	*36*	No free sugars	No error	
			Other	*2*	No free sugars	Underestimation of free sugars in processed cheese product (biscuit component) and cheese with 'sweetened dried fruit'– small amount of added sugar has not been accounted for as impossible to quantify	
24	Chocolate confectionery (n=181)	Includes milk chocolate, dark chocolate, white chocolate, chocolate bars, nut bars, chocolate raisins, chocolate with filling/ripple eg strawberry, caramel, fondant		181	Plain chocolate –all free sugars	No error	
					Milk chocolate. Free sugars calculated as total sugars minus known proportion of lactose - assumed 16% of total sugars in milk chocolate is lactose (as determined by CoFID)	Random error due to variation in lactose content of milk chocolate	
					Milk chocolate filled. Estimated on an individual basis from ingredients listing and matched to similar chocolate confectionery product in CoFID where possible. If the product could not be matched the free sugars for milk chocolate filled were calculated as total sugars minus known proportion of lactose - assumed 6% of total sugars in milk chocolate filled is lactose (as determined by CoFID)	Random error due to variation in milk chocolate content of products	
25	Cooking oils (n=22)	Includes olive oils, sunflower, vegetable, various nuts, soya, corn		22	No free sugars	No error	
26	Cream (n=16)	Includes crème fraiche, single and double cream, clotted, whipping, aerosol		12	Products with no added sugar – no free sugars	No error	
				4	Aerosol creams that contained known quantities of added sugar were estimated as free sugars = % added sugar in the ingredients list Aerosol creams that contained unknown	Random error due to no information on ingredients declaration for 2 products	

	Category	Description of category	Sub-category[ffff]	Total number	Assumptions for estimating free sugars	Likely degree and direction of error	Comments
					quantities of added sugar were estimated as no free sugars		
27	Crisps/savoury snacks/popcorn (n=127)	Includes all potato and cereal based snacks, popcorn, pretzels, pork scratchings		*127*	Potato crisps plain –no free sugars	No error	No added sugar or other source of free sugars in these products
					Cereal snacks plain – assumed no free sugars	Underestimation of free sugars in some products containing whey powder or lactose	Insufficient information on ingredients list to estimate free sugars content separately from other sugars
					Crisps with added sugar (eg flavoured crisps and cereal based snacks[iiii]) - assumed all free sugars	Overestimation of free sugars as small amounts of sugars from the potato / cereal are not taken into account	Insufficient information on ingredients list to estimate free sugars content separately from other sugars
28	Desserts (n=91)	Includes ambient, chilled and frozen puddings, including custards and jellies.	*Dairy based*	*45*	Custard ready to serve- assumed 36% of total sugars is lactose (as determined by average values taken from CoFID). Free sugars estimated as total sugars minus lactose	Underestimation of free sugars in products containing whey as lactose from whey not separately identified Random error due to variation in milk content of products - likely to be small	
					Custard powder made up with milk - assumed 48% of total sugars is lactose (as determined by average values taken from CoFID). Free sugars estimated as total sugars minus lactose	Random error due to variation in amount of milk and sugar added to powder to make up – likely to be small	
					Custard powder made up with water- assumed all free sugars	No error	Products contain whey powder and added sugar
					Rice pudding (plain and with fruit puree) - assumed 45% of total sugars is lactose (as determined by average values taken from CoFID). Free sugars estimated as total sugars minus lactose	Random error due to variation in dairy content and fruit puree of products	
					Mousse- assumed 23% of total sugars is lactose (as determined by average values taken from CoFID). Free sugars estimated as total sugars minus lactose	Random error due to variation in dairy content of products	
					Trifle- assumed 18% of total sugars is lactose (as determined by average values taken from CoFID). Free sugars estimated as total sugars minus lactose	Random error due to variation in dairy content of products	
			Fruit based	*9*	Mince pies - The proportion of dried fruit was based on an individual basis. Free sugars estimated as total sugars minus sugars in fruit/dried fruit If the proportion of fruit could not be determined by the ingredient declaration, assumed estimation of 15% of dried fruit[kkkk]	Error due to lack of information on dried fruit content of mincemeat Slight overestimation of free sugars as small amount of sugar from wheat or other cereal content not taken into account	

[jjjj] Includes potato based snacks with added sugar in ingredients listing
[kkkk] Based on label data

	Category	Description of category	Sub-category[ffff]	Total number	Assumptions for estimating free sugars	Likely degree and direction of error	Comments
					Fruit pies (2 products - apple pie) - free sugars calculated as total sugars minus total sugars in raw apples. Assumed estimation of 34% of apples in an apple pie (as determined by average values taken from CoFID)	Error from variation in fruit content of products Slight overestimation of free sugars as small amount of sugar from wheat or other cereal content not taken into account	
			Sponge based	*5*	Sponge based desserts- assumed all free sugars	Slight overestimation of free sugars in 2 products containing milk / milk powder Slight overestimation of free sugars as small amount of sugar from wheat or other cereal content not taken into account	
			Other	*32*	Jelly- assumed all free sugars	No error	Includes no added sugar jelly
					Powdered desserts (*as made up*)- assumed all free sugars	Slight overestimation of free sugars as small amount of sugar from other cereal content not taken into account	Insufficient details of ingredient quantities in the ingredients declaration
					Other desserts estimated on an individual basis from ingredients listing		
					Soya dessert- assumed all free sugars	No error	
29	Dry pulses and cereals (n=7)	Includes quinoa, various types of beans, chickpeas		7	No free sugars	No error	
30	Eggs (n=3)	Includes chicken eggs, duck eggs, egg white		3	No free sugars	No error	
31	Fish (n=100)	Includes various types of raw fish, shellfish, fish in brine/oil, fish in tomato sauce/vegetable additions, fish fingers, battered fish, breaded fish, canned fish, oily fish	*Fish*	*94*	Estimated on an individual basis from ingredient listing. Fish where sugars (eg dextrose) declared on the ingredient list, assumed product contains all free sugars Sushi - assumed all free sugars Smoked salmon – assumed all free sugars All other fish (eg breaded/battered fish) – assumed no free sugars	Random error due to limited information on ingredients declaration Slight underestimation of free sugars in 2 products containing small unquantifiable amounts of added sugar (fish cakes and chargrills)	
			Canned fish or fish in tomato sauce/vegetable additions	*6*	Assume all free sugars Tomato content of canned products taken as puree or juice – all free sugars One product estimated on an individual basis as known proportion of sweetcorn. Free sugars estimated as total sugars minus sugars from sweetcorn	No error	
32	Fruit (n=130)	Includes various types of raw fruits with skin and flesh/flesh only/ whole with stones, fruits canned in syrup/juice, olives in brine drained, dried/semi-dried	*Fruit fresh and dried/ semi dried*	*102*	No free sugars	No error	

	Category	Description of category	Sub-category[ffff]	Total number	Assumptions for estimating free sugars	Likely degree and direction of error	Comments
		fruits	*Fruit canned in syrup/juice*	*28*	Assumed all fruit canned in juice/syrup contained approximately 40% of fruit juice/syrup. Free sugars estimated as total sugars minus total sugars of the proportion of fruit as determined by CoFID Fruit cocktail with juice: the estimation of the amount of 'non-free sugars' was based on the sugar content of the first fruit on the ingredient list	No error	
33	Ice cream and ice lollies (n=39)	Includes all types of ice cream, dairy ice cream, choc ices, milk ice lollies, low fat ice cream, ice lollies without ice cream		32	Dairy-based ice cream. Free sugars calculated as total sugars minus proportion of lactose from dairy sources - assumed 20% of total sugars in the dairy ice cream is lactose (as determined by CoFID)	Random error due to lack of information presented on proportion of ingredients in the ingredient declaration. Proportion of lactose likely to be variable as wide variation of products with some dairy ice creams containing cream and some economy products based on skimmed milk and whey powder	
				7	Ice lollies and dairy free ice creams - assume all free sugars	Slight overestimation of free sugars in ice-lollies that contain milk, where proportions not declared in the ingredients listing	
34	Meat (n=171)	Includes sausages, burgers, bacon, various types of fresh and frozen meat, ham, Brussels pâté, cheeseburger		171	Products assessed on individual basis Where 'sugars' declared on the ingredient list, assumed that product contained all free sugars	Slight overestimation of free sugars in products containing wheat and/or vegetables	
					Where no sugars declared on the ingredient list, assumed that product contained no free sugars	Slight underestimation of free sugars in products containing vegetable powder and/or lactose	.
35	Meat substitute (n=7)	Includes meat alternatives such as vegetarian sausages, meat free chicken fillets, mycoprotein mince, tofu		4	Products assessed on individual basis Where no sugars declared on the ingredient list, assumed that product contained no free sugars	Slight underestimation of free sugars in products containing vegetable powders and purees	Products that contained 'vegetable powders and purees' did not list quantity in the ingredients declaration Assumed ingredients listed in descending order of weight at the time of their use in the preparation of the food, therefore quantity of 'vegetable powders' or 'purees' in the product is assumed to be very small
				3	Where sugars declared on the ingredients list, assumed all free sugars	Slight overestimation of free sugars in products that contain wheat flour (eg vegetarian sausage rolls)	
36	Milk products including condensed, evaporated milks (n=7)	Includes condensed and evaporated milk	*Added sugar*	2	Condensed milk estimated on an individual basis. Free sugars estimated as proportion of sugar listed on ingredient declaration If the proportion of sugar was not declared	Random error due to lack of information presented on proportion of ingredients in the ingredient declaration and variation between products	

	Category	Description of category	Sub-category[ffff]	Total number	Assumptions for estimating free sugars	Likely degree and direction of error	Comments
					in the ingredients listing, free sugars were calculated as total sugars minus the proportion of lactose in condensed milk - assumed 22% of total sugars in the condensed milk is lactose (as determined by CoFID)		
			No added sugar	5	Evaporated milk - no free sugars	No error	No added sugar in products
37	Miscellaneous (n=5)	Includes products that do not fit in any other category, or too small to create a separate category eg Scotch eggs, stuffing balls		4	Scotch eggs, stuffing balls- no free sugars	No error	No added sugar
				1	Fajita kit - all free sugars	Slight overestimation of free sugars as sugar naturally present in wheat or other grain or intact vegetables not accounted for	
38	Morning goods (n=71)	Includes croissants, pain au chocolate, crumpets, English muffins, pancakes, crepes, scotch pancakes, potato cakes, buns, teacakes, scones, waffles, Danish pastries, fruit loaves, pancake mix, fruited iced buns, fruited buns eg hot cross buns, Welsh cakes, crumble mix etc. Excludes plain bread and rolls		71	Crumpets – assume no free sugars	Slight underestimation of free sugars in products that contain sugar	
					Scotch pancakes, brioche rolls (including those with chocolate chip), pains au chocolat, croissants, waffles, scotch pancakes, Danish selections – assumed all free sugars	Slight overestimation of free sugars in products that contain skimmed milk powder. sugar naturally present in wheat flour and lactose in milk chocolate	
					Sultana scones, hot cross buns, Welsh cakes, malt loaf, fruit buns, tea cakes – Free sugars estimated as total sugars minus known proportion of total sugars from dried fruit (from ingredients list) Dried fruit content of malt loaf was unknown, this was estimated as 26% (as determined by CoFID)	Slight overestimation of free sugars as sugar naturally present in wheat flour not taken into account	
					Potato cakes- no free sugars	No error	No added sugar
39	Noodles (n=21)	Includes flavoured instant noodles, fresh egg noodles		12	Where the ingredient declared sugar/dried glucose syrup/molasses including those at unknown quantity –total sugars assumed as all free sugars	Slight overestimation of free sugars as sugar naturally present in wheat flour or intact vegetables or milk powders not accounted for	
				9	Where no sugars declared on the ingredient list - no free sugars	Slight underestimation of free sugars in products that contain soy sauce, garlic/ginger puree	
40	Nuts (n=21)	Includes various types of nuts, salted/unsalted nuts, peanut butter	*Nuts including salted*	20	Nuts (intact, not blended) with no added sugar -no free sugars	No error	
			Peanut butter	1	Peanut butter with added sugar. Free sugars calculated as total sugars minus total sugars in peanuts (as determined by CoFID) based on ingredients listing	Random error due to variation of sugars in peanuts in comparison to value obtained from CoFID	

	Category	Description of category	Sub-category[ffff]	Total number	Assumptions for estimating free sugars	Likely degree and direction of error	Comments
41	Pasta (n=31)	Includes fresh filled pasta, canned pasta with sauce, dried/cooked plain pasta, macaroni cheese, tortellini, cous cous	*In sauce/filled/added sugar*	*19*	Estimated on an individual basis from ingredients listing Assumed all free sugars if no source of cheese present. Tomato in canned products assumed to be puree /juice If cheese listed in the ingredients declaration, than the following formula was used: free sugars = total sugars minus lactose content of known proportion of cheese. If the known content of cheese not declared, similar values from MW7 taken eg macaroni and cheese	Slight overestimation of free sugars in products containing naturally occurring sugars from wheat	
			Dry pasta	*12*	No free sugars	No error	
42	Pizza (n=22)	Includes all types of pizza, thin, deep pan, dough balls, pizza bases, baguette pizza subs		22	All free sugars – from tomato puree and added sugar in some products	Overestimation of free sugars in products containing unknown proportions of intact vegetables, and/or wheat flour	Lack of information on the ingredient proportions from ingredient declaration
43	Potatoes, processed potatoes and chips (n=45)	Includes jacket potatoes, thick/thin straight cut or crinkle cut chips, potato waffles, mashed potato, potato wedges, hash browns, roast potatoes, tinned potatoes, microwave chips		45	No free sugars	Slight underestimation of free sugars for products containing dextrose	Products that contained dextrose did not list quantity in the ingredients declaration. Assumed ingredients listed in descending order of weight at the time of their use in the preparation of the food, therefore quantity of 'dextrose' in the product is assumed to be very small
44	Poultry (n=53)	Includes whole roast chicken, chicken burger, breaded and battered chicken eg goujons/dippers/nuggets/steaks, chicken/turkey kiev, turkey ham, cooked sliced chicken, chicken in sauce		17	Where sugars (eg dextrose/glucose syrup/lactose/brown sugar/sugar) declared on the ingredient list – assumed all free sugars (eg sliced chicken, breaded goujons, chicken kievs)	Slight overestimation of free sugars in products containing wheat flour, semolina, milk, and cheese	
				36	Where no sugars declared on the ingredient list – assumed no free sugars	No error	
45	Ready meals (n=38)	Includes ready meals including burgers, lasagne, shepherds/cottage pie, macaroni and cheese, spaghetti Bolognese, risotto, pasta based ready meals, chicken tikka masala with rice, fish pie, toad in hole		38	Chicken tikka masala- assumed 33% of total sugars is lactose (as determined by average values taken from CoFID)	Random error due to lack of information presented on proportion of ingredient in the ingredient declaration and variation between products	
					Beef lasagne- assumed approximately 43% of total sugars lactose (as determined by average values taken from CoFID)	Random error due to lack of information presented on proportion of ingredient in the ingredient declaration and variation between products	
					Where no sugars declared on the ingredient list, assumed product contains no free sugars	Potential underestimation of free sugars for products containing whey, vegetable powder and tomato puree	
					Where sugars declared on the ingredient list, assumed product contains all free sugars	Potential overestimation of free sugars in products containing wheat, intact vegetables, milk powder	

	Category	Description of category	Sub-category[ffff]	Total number	Assumptions for estimating free sugars	Likely degree and direction of error	Comments
46	Rice (n=21)	Includes basmati/brown/wholegrain rice, pre-cooked microwave/uncooked, with additions eg with vegetables or with sweet and sour sauce		18	Products without sugar – assumed no free sugars	Random underestimation of free sugars for products that contain small quantities of vegetable powder	
				3	Products containing sugar (eg sugar, dried glucose syrup) assumed total sugars all free sugars (eg sweet and sour rice)	Potential overestimation of free sugars in products that contain intact vegetables and one product that contains semolina (cous cous)	
47	Sandwiches (n=12)	Includes retail sandwiches eg egg and cress, chicken salad, tuna mayonnaise etc		12	No free sugars	Slight underestimation of free sugars in products containing 'small' amounts of sugar/ dextrose/ honey in bread or filling	
48	Sauces/ condiments (n=70)	Includes tomato ketchup, mayonnaise, mustard, salad cream, stock cubes, gravy granules, dressing, spice mixes, packet mix sauces, pasta/tomato based sauces, sweet and sour/stir fry sauces, pickles, salsa, meat paste, soy sauce, chicory essence, brown sauce, mint sauce, pesto, apple sauce		70	Where sugars declared on the ingredient list, assumed product contains all free sugars (eg ketchup, brown sauce)	Slight overestimation of free sugars in products that contain wheat, intact vegetables, dried fruit	
					Powdered gravy granule products assumed product contains no free sugars	Slight underestimation of free sugars in products that contain vegetable powder and purees - likely to be small	Products that contained sugar did not list quantity in the ingredients declaration. Assumed ingredients listed in descending order of weight at the time of their use in the preparation of the food, therefore quantity of sugar in the product 'as made up' is assumed to be very small
					For korma/ tikka masala sauce (typically to contain dairy content) -assume 7% of total sugars is lactose (as determined by CoFID)	Random error due to variation in dairy content of products	
					Cheese sauce, powdered, made up with milk - assume 98% of total sugars is lactose (as determined by CoFID)	Random error due to variation in dairy content of products - likely to be small	
49	Savoury biscuits and crackers (n=41)	Includes crackers, rye crisp bread, oatcakes, breadsticks, biscuits cheese flavoured, toasted minibreads, water biscuits, Cornish wafers, flatbreads		17	No sugar - assumed no free sugars (eg cream crackers, oatcakes)	Random error in estimating free sugars in products that contain whey powder and malt extract	
				24	If sugars (eg sugar, glucose syrup, glucose-fructose syrup, dextrose, sugar cane syrup etc.) declared on the ingredient list, assumed all free sugars (eg cheese crackers, crisp bread)	Slight overestimation of free sugars values in products containing wheat flour, cheese, cheese powder or milk powder	
50	Savoury pastries (n=31)	Includes sausage rolls, Cornish pasty, meat pie		31	Estimated on an individual basis from ingredients listing Assumed ingredients listed in descending order of weight at the time of their use in the preparation of the food. If sugar (eg sugar, glucose syrup, dextrose etc) declared towards the start on the ingredient list - assume all free sugars If no sugar declared, or declared towards end of the ingredient list - assume no free sugars	Random error of free sugars in products that contain wheat flour, dried milk, dried vegetable, cheese, cream or intact vegetables Slight underestimation of free sugars in products that contain small quantities of sugar, vegetable puree, juice or vegetable powder	

	Category	Description of category	Sub-category[ffff]	Total number	Assumptions for estimating free sugars	Likely degree and direction of error	Comments
51	Soup (n=16)	Includes dried, canned, condensed and fresh soup		14	Vegetable soups with added sugar, not chunky, meat flavoured soups with added sugars, powdered soups assume 100% free sugars	Slight overestimation of free sugars in products that contain wheat (from croutons or noodles), skimmed milk powder, double cream or unknown proportions of intact vegetables in chunky soups	Assumed ingredients listed in descending order of weight at the time of their use in the preparation of the food, therefore quantity of dairy content of 'cream of…' soups assumed to be very small and not accounted for
				2	Soups with known quantities of intact vegetables (eg chunky soups) estimated individually. Free sugars calculated as total sugars minus total sugars of the intact vegetables	Slight variation of free sugars in products that contain unknown quantities of intact vegetables (chunky soups) and wheat flour	
52	Sugar confectionery (n=47)	Includes gums, boiled sweets, fruit pastilles, chewing gum, chews, mints, toffees, chocolate sweets, fudge, liquorice	*Added sugar*	*37*	Products that contained dairy content or desiccated coconut did not list quantity in the ingredients declaration Sugar confectionery where sugars declared on the ingredient list, assumed product contains all free sugars	Slight overestimation of free sugars in products that contain dairy content (eg butter candies) or desiccated coconut	
				3	Fudge – proportion of dairy content not declared on ingredient listing, free sugars estimated as total sugars minus lactose content of fudge. Fudge, homemade contains 5g /100g of lactose (as determined by CoFID	Random error in estimating dairy content	
				3	Products that contained milk chocolate did not list quantity in the ingredients declaration Sugar confectionery with milk chocolate estimated as containing 56% milk chocolate[llll]. Free sugars were calculated as total sugars minus lactose content of milk chocolate. Milk chocolate contains 9.2g /100g of lactose (as determined by CoFID)	Random error due to lack of information of proportion of milk chocolate in products	
			Sugar free	*4*	Sugar-free confectionery with artificial sweeteners- assumed no free sugars		
53	Sugars, preserves and sweet spreads (n=35)	Includes, jams/marmalade, honey, maple syrup, golden syrup, black treacle, caster/icing sugar/demerara, chocolate dessert sauce, toffee sauce, chocolate spread	*Sugar*	*19*	All free sugars	No error	
			Preserves	*10*	All free sugars	Slight overestimation of free sugars in jams and marmalades with intact fruit	
			Sweet spreads	*4*	Chocolate spreads- estimated on an individual basis. Free sugars estimated as total sugars minus total lactose from declared proportion of skimmed milk powder (as determined by CoFID) and/or declared proportion of total sugars from nuts	Slight overestimation of free sugars in sweet spreads that contain unknown quantities of skimmed milk powder, milk chocolate and nuts	

[llll] Based on results from an analytical survey

	Category	Description of category	Sub-category[ffff]	Total number	Assumptions for estimating free sugars	Likely degree and direction of error	Comments
					Other sweet spreads (unknown quantities of ingredients)-assumed all free sugars		
			Artificial sweeteners	*2*	No free sugars	No error	
54	Sweet biscuits (n=151)	Includes all sweet or short biscuits, including half coated and fully coated biscuits, fig rolls, digestives, wafer, iced biscuits, shortbread, jam filled, ginger nut, chocolate chips, fruit biscuits, cream sandwich biscuits, chocolate coated biscuits with marshmallow		102	Biscuits without milk chocolate -assumed all free sugars. If dried fruit (eg currants) or desiccated coconut is included in the product, free sugars was estimated as total sugars minus contribution from dried fruit content from the label or using typical values as determined by CoFID	Slight overestimation of free sugars as small amount of sugar from wheat or other cereal content not taken into account and dried milk powder not accounted for	
				48	Milk chocolate covered biscuits estimated on an individual basis. Free sugars calculated as total sugars minus lactose content (lactose 9.2g/100g in milk chocolate as determined by CoFID) of known proportion of milk chocolate and known proportion of dried fruit if applicable If the proportion of milk chocolate was not declared in the ingredients listing, assumed fully coated milk chocolate biscuits contained 40% milk chocolate, whilst half coated milk chocolate biscuits contained 30% milk chocolate[mmmm]	Random error of free sugars in products that did not declare quantity of milk chocolate and dried fruit	
				1	Biscuits with no added sugar -assume no free sugars	No error	
55	Vegetables (n=199)	Includes salad and raw vegetables, canned mushy peas, canned sweetcorn, canned red kidney beans, canned baked beans in sauce, canned baby beetroot, chopped tomatoes in juice, coleslaw, tomato puree, passata, canned vegetables in water, hummus, canned carrots, pickled vegetables	*Baked beans*	*20*	All free sugars	Slight overestimation of free sugars as it does not take into account the contribution of sugars coming from intact beans	
			Canned vegetables – added sugar	*20*	Mushy peas- assume all free sugars	Slight overestimation of free sugars in products with intact peas	
					Sweetcorn - Free sugars were calculated as total sugars minus total sugars in raw sweetcorn kernels at 2g/100g (as determined by CoFID)	Variability of sugar content of sweetcorn – reliance on CoFID typical value to calculate free sugars in individual products	
			Chopped tomato in juice	*17*	Proportion of tomatoes determined from the ingredient declaration and free sugars was estimated on an individual basis Free sugars calculated as total sugars minus l sugars in the proportion of tomatoes at 3g/100g (as determined by CoFID)	No error	

[mmmm] Based on results from analytical survey

	Category	Description of category	Sub-category[ffff]	Total number	Assumptions for estimating free sugars	Likely degree and direction of error	Comments
					If the proportion of intact tomatoes could not be determined from the ingredient declaration, assumed the product contained 62.5% intact tomatoes (based on average % of known chopped tomatoes, in juice in the test dataset) Free sugars were calculated as total sugars minus total sugars in intact tomatoes (3g/100g)[nnnn]	Random error due to lack of information on proportion of intact tomatoes from ingredient declaration of free sugars as a broad assumption was used to estimate the proportion of tomatoes	
			Tomato/ vegetable puree	*10*	All free sugars	No error	
			Vegetables	*119*	Hummus- assume all free sugars	No error – chickpeas in hummus are pureed	
					Raw, canned/bottled vegetables without added sugar (not tomato vegetable puree or canned tomato) assume no free sugars	No error	
			Coleslaw	*13*	Assume coleslaw contains 60% of cabbage[oooo]. Free sugars were calculated as total sugars minus total sugars in raw cabbage at 4.1g/100g (as determined by CoFID)	Variation in cabbage (and other vegetable) content of products Small random error of free sugars in products with dairy content[pppp]	
56	Yoghurt and fromage frais (n=65)	Includes yoghurts including natural/low fat yoghurts, split pot yoghurts with additions, yoghurt with additions, fromage frais, fromage frais with additions eg strawberry	*Added sugar*	*50*	Free sugars estimated as total sugars minus lactose content. Lactose content of yoghurt and fromage frais taken as 3.8g/100g[qqqq]	Random errors due to lack of information from ingredient declaration and variation in the proportion of yoghurt/fromage frais vs fruit/ fruit puree/sugar/ dextrose/glucose/fructose/ fructose syrup/glucose-fructose syrup/ invert sugar syrup	
			Natural/ no added sugar	*13*	No free sugars	No error	
			Non-dairy yoghurt	*2*	All free sugars Fruit content assumed to be pureed	No error	
57	Yorkshire puddings (n=11)	Includes ready-made Yorkshire puddings, dumplings and batter mixes		11	No free sugars	Slight underestimation of free sugars in products that that contain whey powder	One product listed whey in the ingredients in this category

[nnnn] Based on results from an analytical survey
[oooo] Based on label data
[pppp] Data from MW7 for coleslaw presents trace value for lactose
[qqqq] Value based on Provision Trade Federation research on the intrinsic milk sugar (lactose and galactose) content of a fruit flavoured yoghurts and fromage frais (weighted average) on sale in the UK in 2017

Appendix J: Nutrient Profiling Model test dataset - list of foods and drinks

12.1 The final NPM test dataset consisted of 2,620 products of which 2,249 (86%) foods and 371 (14%) drinks. Products were grouped into food and drink sub-categories informed by the NDNS categories. A list of all the foods and drink categories and sub-categories are provided in **Table 1**.

Table 1: Description and number of food and drinks contained within the NPM test dataset

	NPM test dataset category	Description of NPM test dataset category	NPM test dataset sub-category	Total number[rrrr]
Drinks				
1	Coffee	Includes coffee granules/instants/pods, caffeinated/decaffeinated, latte/mocha/ cappuccino coffee with additions	*Added sugar* *No added sugar*	*27* *12* **39**
2	Energy drinks, low calorie	All low calorie, still/carbonated drinks containing stimulants		**6**
3	Energy drinks, not low calorie	All drinks still/carbonated containing stimulants		**14**
4	Fruit juice, vegetable juices and smoothies	Includes chilled and ambient juices, smoothies, lemon juice etc		**35**
5	Instant hot and cold beverages	Includes drinking chocolate, cocoa, powdered malted drinks, milkshake powder	*Added sugar* *No added sugar*	*21* *2* **23**
6	Milk products including dried, flavoured and non-dairy milks	Includes milk and other milk products including dried, flavoured and non-dairy milks, coffee whitener	*Added sugar* *No added sugar*	*7* *4* **11**
7	Milk, skimmed/semi-skimmed/whole, pasteurised/UHT	Includes milk, dairy, skimmed/semi-skimmed/whole, pasteurised/UHT		**7**
8	Soft drinks, carbonated, low calorie	All low calorie, no added sugar, sugar free types. Includes carbonated soft drinks, lemonade, low calorie tonic water, flavoured sparkling drink, soda water, and ginger ale/beer		**77**
9	Soft drinks, carbonated, not low	Includes tonic water, carbonated soft drinks, lemonade, sparkling juice drink,	*Added sugar*	*45*

[rrrr]Total number of products separated by sub-categories (values in *italics*) or combined/total if no sub-category (value in **bold**)

	NPM test dataset category	Description of NPM test dataset category	NPM test dataset sub-category	Total number[rrrr]
	calorie	and ginger beer/ale	*No added sugar*	*3* **48**
10	Soft drinks, still, low calorie, dilutable	All low calorie drinks and water is used as diluent. Includes single and double strength squashes		**20**
11	Soft drinks, still, low calorie, ready to drink	All low calorie, no added sugar, sugar free types. Includes juice drinks	*Added sugar* *No added sugar*	*7* *2* **9**
12	Soft drinks, still, not low calorie, dilutable	Includes squashes and cordials and water used as a diluent		**8**
13	Soft drinks, still, not low calorie, ready to drink	Includes all types of still soft drinks not carbonated. Includes juice drinks, coconut water drinks	*Added sugar* *No added sugar*	*22* *4* **26**
14	Water, still/sparking and flavoured	Includes bottled water still/sparkling and flavoured water, no calories		**38**
15	Yoghurt drinks	Includes plain and flavoured yoghurt drinks		**10**
Foods				
16	Block pastry	Includes puff/shortcrust pastry sheets/blocks		**4**
17	Bread	Includes all plain, multi-seeded, wholemeal breads, toasties, bagels, pitta, muffins, and baguettes. Excludes sweet muffins as they are included in 'morning goods'	*Bread* *Bagels/Muffins*	*9* *93* **102**
18	Breakfast cereal, high fibre	Includes all breakfast cereals with AOAC fibre of 6g/100g or more (eg plain shredded wholewheat, porridge)	*Added sugar with fruit* *Added sugar without fruit* *No added sugar* *No added sugar with fruit*	*7* *32* *12* *1* **53**
19	Breakfast cereals, other	Includes all breakfast cereals with AOAC fibre less than 6g/100g (eg toasted rice cereal, frosted flakes cereal)	*Added sugar with fruit* *Added sugar without fruit*	*2* *17* **19**
20	Butter and fat spreads	Includes salted and unsalted butter, low fat spreads, reduced fat spreads		**40**
21	Cakes and pastries	Includes all types of cakes, ambient and chilled, including cake bars and slices, American muffins, doughnuts, Swiss rolls etc, frozen gateaux, chocolate eclairs. This category also includes sweet pastries such as jam tarts, Bakewell tarts and egg custard tarts		**32**

	NPM test dataset category	Description of NPM test dataset category	NPM test dataset sub-category	Total number[rrrr]
22	Cereal bar	Includes cereal bars, including breakfast cereal bars	*Added sugar* *Added sugar with dried fruit*	*15* *6* **21**
23	Cheese	Includes all types of cheese: not reduced fat cheese, medium/reduced fat cheeses, cottage, cheese spreads, quark	*Cheese spread/ spreadable and triangles* *Cottage cheese or quark* *Not reduced fat cheese* *Medium/ reduced fat cheese* *Other*	*10* *3* *36* *20* *2* **71**
24	Chocolate confectionery	Includes milk chocolate, dark chocolate, white chocolate, chocolate bars, nut bars, chocolate raisins, chocolate with filling/ripple eg strawberry, caramel, fondant		**181**
25	Cooking oils	Includes olive oils, sunflower, vegetable, various nuts, soya, corn		**22**
26	Cream	Includes crème fraiche, single and double cream, clotted, whipping, aerosol		**16**
27	Crisps/savoury snacks/popcorn	Includes all potato and cereal based snacks, popcorn, pretzels, pork scratchings	*Added sugar* *No added sugar*	*68* *59* **127**
28	Desserts	Includes ambient, chilled and frozen puddings, including custards and jellies	*Dairy based* *Fruit based* *Sponge based* *Other*	*44* *9* *5* *33* **91**
29	Dry pulses and cereals	Includes quinoa, various types of beans, chickpeas		**7**
30	Eggs	Includes chicken eggs, duck eggs, egg white		**3**
31	Fish	Includes various types of raw fish, shellfish, fish in brine/oil, fish in tomato sauce/vegetable additions, fish fingers, battered fish, breaded fish, canned fish, oily fish	*Fish* *Fish in tomato sauce/vegetable additions*	*94* *6* **100**
32	Fruit	Includes various types of raw fruit with	*Fruit*	*102*

	NPM test dataset category	Description of NPM test dataset category	NPM test dataset sub-category	Total number[rrrr]
		skin and flesh/flesh only/whole with stones, fruit canned in syrup/juice, olives in brine drained, dried/semi-dried fruit	*Fruit canned in syrup/juice*	*28* **130**
33	Ice cream and ice lollies	Includes all types of ice cream, dairy ice cream, choc ices, milk ice lollies, low fat ice cream, ice lollies without ice cream		**39**
34	Meat	Includes sausages, burgers, bacon, various types of fresh and frozen meat, ham, Brussels pâté, cheeseburger		**171**
35	Meat substitute	Includes meat alternatives such as vegetarian sausages, meat free chicken fillets, mycoprotein mince, tofu		**7**
36	Milk products including condensed, evaporated milks	Includes condensed and evaporated milk	*Added sugar* *No added sugar*	*2* *5* **7**
37	Miscellaneous	Includes products that do not fit in any other category, or too small to create a separate category eg scotch eggs, stuffing balls		**5**
38	Morning goods	Includes croissants, pain au chocolate, crumpets, English muffins, pancakes, crepes, scotch pancakes, potato cakes, buns, teacakes, scones, waffles, Danish pastries, fruit loaves, pancake mix, fruited iced buns, fruited buns eg hot cross buns, Welsh cakes, crumble mix etc. Excludes plain bread and rolls (included in bread)		**71**
39	Noodles	Includes flavoured instant noodles, fresh egg noodles		**21**
40	Nuts	Includes various types of nuts, salted/unsalted nuts, peanut butter		**21**
41	Pasta	Includes fresh filled pasta, canned pasta with sauce, dried/cooked plain pasta, macaroni cheese, tortellini, cous cous	*In sauce/filled/added sugar* *Dry pasta*	*19* *12* **31**
42	Pizza	Includes all types of pizza, thin, deep pan, dough balls, pizza bases, baguette pizza subs		**22**
43	Potatoes, processed potatoes and chips	Includes jacket potatoes, thick/thin straight cut or crinkle cut chips, potato waffles, mashed potato, potato wedges, hash browns, roast potatoes, tinned potatoes, microwave chips		**45**
44	Poultry	Includes whole roast chicken, chicken burger, breaded and battered chicken eg goujons/dippers/nuggets/steaks, chicken/turkey Kiev, turkey ham, cooked sliced chicken, chicken in sauce		**53**
45	Ready meals	Includes ready meals including burgers, lasagne, shepherds/cottage pie,		**38**

	NPM test dataset category	Description of NPM test dataset category	NPM test dataset sub-category	Total number[rrrr]
		macaroni and cheese, spaghetti Bolognese, risotto, pasta based ready meals, chicken tikka masala with rice, fish pie, toad in hole		
46	Rice	Includes basmati/brown/wholegrain rice, pre-cooked microwave/uncooked, with additions eg with vegetables or with sweet and sour sauce		**21**
47	Sandwiches	Includes retail Sandwiches eg egg and cress, chicken salad, tuna mayonnaise etc		**12**
48	Sauces/condiments	Includes tomato ketchup, mayonnaise, mustard, salad cream, stock cubes, gravy granules, dressing, spice mixes, packet mix sauces, pasta/tomato based sauces, sweet and sour/stir fry sauces, pickles, salsa, meat extract paste, soy sauce, chicory essence, brown sauce, mint sauce, pesto, apple sauce		**70**
49	Savoury biscuits and crackers	Includes crackers, rye crisp bread, oatcakes, breadsticks, biscuits cheese flavoured, toasted minibreads, water biscuits, Cornish wafers, flatbreads		**41**
50	Savoury pastries	Includes sausage rolls, Cornish pasty, meat pie		**31**
51	Soup	Includes dried, canned, condensed and fresh soup		**16**
52	Sugar confectionery	Includes gums, boiled sweets, fruit pastilles, chewing gum, chews, mints, toffees, chocolate sweets, fudge, liquorice	*Added sugar* *Sugar free*	*43* *4* **47**
53	Sugars, preserves and sweet spreads	Includes jams/marmalade, honey, maple syrup, golden syrup, black treacle, caster/icing sugar/demerara, chocolate dessert sauce, toffee sauce, chocolate spread	*Sugars* *Preserves* *Sweet spreads* *Artificial sweeteners*	*19* *10* *4* *2* **35**
54	Sweet biscuits	Includes all sweet or short biscuits, including half coated and fully coated biscuits, fig rolls, digestives, wafers, iced biscuits, shortbread, jam filled, ginger nuts, chocolate chips, fruit biscuits, cream sandwich biscuits, chocolate coated biscuits with marshmallow		**151**
55	Vegetables	Includes salad and raw vegetables, canned mushy peas, canned sweetcorn, canned red kidney beans, canned baked beans in sauce, canned baby beetroot, chopped tomatoes in juice, coleslaw, tomato puree, passata, canned vegetables in water, hummus, canned carrots, pickled vegetables	*Baked beans* *Canned veg – added sugar* *Chopped tomato in juice*	*20* *20* *16*

	NPM test dataset category	Description of NPM test dataset category	NPM test dataset sub-category	Total number[rrrr]
			Tomato/veg puree	*10*
			Vegetables	*120*
			Coleslaw	*13*
				199
56	Yoghurt and fromage frais	Yoghurts including natural/low fat yoghurts, split pot yoghurts with additions, yoghurt with additions, fromage frais, fromage frais with additions eg strawberry	*Added sugar*	*50*
			Natural/no added sugar	*13*
			Non-dairy yoghurt	*2*
				65
57	Yorkshire puddings	Ready-made Yorkshire puddings, dumplings and batter mixes		**11**

Appendix K: Rationale for the development of the Nutrient Profiling Model performance measure cut-off values

13.1 The performance measure cut-off values agreed by the expert group were developed pragmatically and initially focused on total and free sugars, to ensure high sugar products would not be potentially advertised to children. Other performance measure cut-off values included: saturated fat, salt and fibre in order to guard against unintended consequences of the modelling. **Table 1** details the rationale for performance measure cut-off values used in the NPM review.

13.2 A performance measure for fruit and vegetables was not developed, as this would have been unlikely to change the outcome as few foods and drinks in the NPM test dataset contain sufficient fruit and vegetables to increase the likelihood of achieving a pass score.

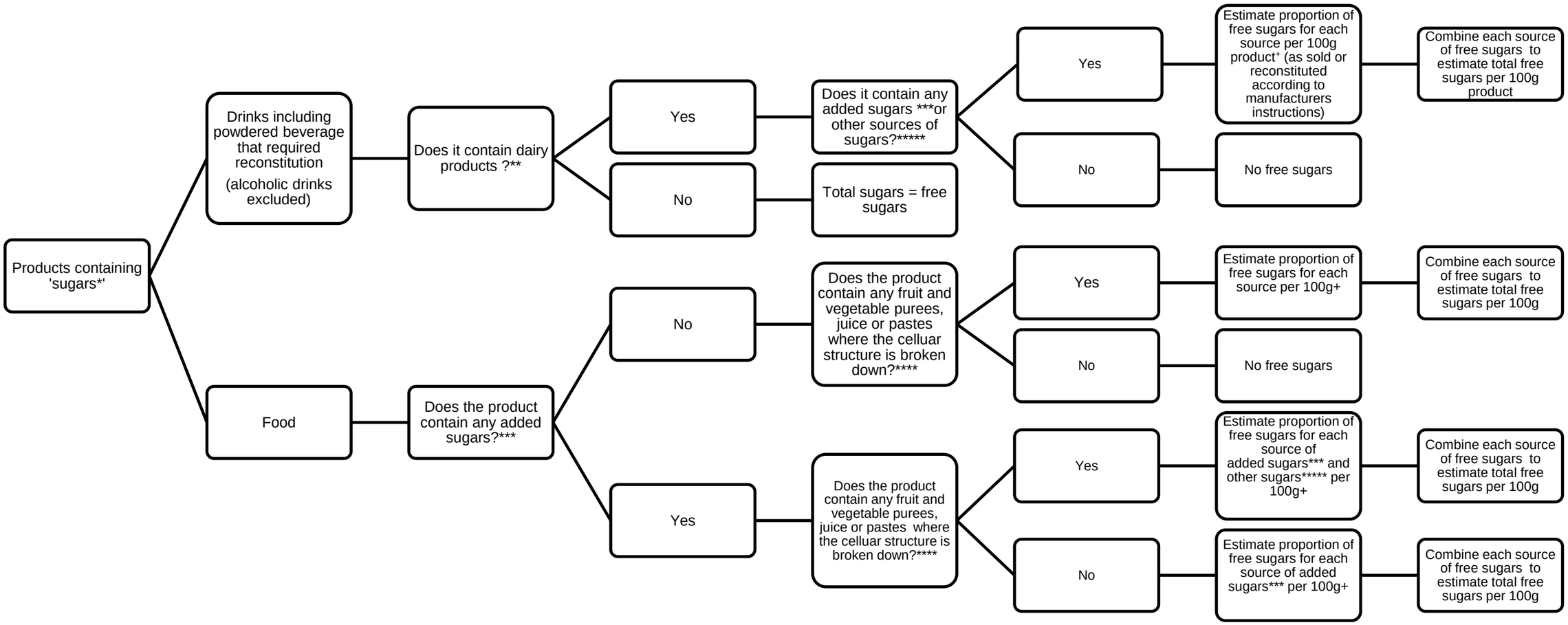
13.3 To help support the development of the performance measures, a literature review was carried out to determine which performance measures were being used in other nutrient profiling models and how they were determined. The review found no papers directly relevant to the performance measures used in nutrient profiling models, and therefore no additional information was available to inform the expert group when making their recommendations.

Table 1: Rationale for the development of the NPM performance measure cut-off values

Performance measure cut-off values	Rationale
Total sugars	
Food High>22.5g/100g	Based on the front-of-pack 'high' labelling criteria[31]
Drinks High> 8g/100ml Medium-High >5.0g to ≤8.0g/100ml	Based on the higher and lower levy rates outlined in the soft drinks industry levy[32]. The 'high' is based on the higher levy rate of a total sugars content of 8g or more per 100ml, the 'medium – high' on the lower levy rate of a total sugars content of 5g or more per 100ml
Free Sugars	
Food High >6.25g/100g	The 'high' front-of-pack labelling criteria[31] for total sugars, saturated fat and salt are determined using 25% of the reference intake. Therefore, 25% of the reference intake of free sugars, 5% of total dietary energy based on a 2,000kcal diet, has been used
Drinks High> 3.13[ssss]g/100ml	The 'high' front-of-pack labelling criteria [31]for total sugars, saturated fat and salt is determined using 12.5% of the reference intake. Therefore 12.5% of the reference intake of free sugars, 5% of total dietary energy based on a 2,000kcal diet, has been used for the performance measure
Saturated fat	
Food High >5g/100g	Based on the front-of-pack 'high' labelling criteria[31]
Drinks High > 2.5g/100ml	Based on the front-of-pack 'high' labelling criteria[31]
Salt	
Food High >1.5g/100g	Based on the front-of-pack 'high' labelling criteria[31]
Drinks High > 0.75g/100ml	Based on the front-of-pack 'high' labelling criteria[31]
Fibre	
Food High fibre >6g/100g Source of fibre >3g/100g to ≤6.0g/100g	There is no front-of-pack 'high' labelling criteria[38] or Recommended Intake (RI) for fibre. The performance measure was based on the Nutrition Claims legislation Regulation (EC) No 1924/2006[33]. For High the 'high fibre' claim was used (product contains at least 6g fibre per 100g) and for 'source of fibre' the source of fibre claim was used (product contains at least 3g fibre per 100g)
Drinks	No performance measure cut-off values were developed for fibre for drinks

[ssss] For the purpose of the modelling, a value of 3.125g was used

Appendix L: Free sugars decision tree to assess the need for calculation of free sugars within a product



+See **Appendix I** for information on assumptions used when estimating free sugars for different categories of food and drink in the NPM test dataset

*As required under food labelling legislation: https://ec.europa.eu/food/safety/labelling_nutrition/labelling_legislation_en

** For the purposes of estimating free sugars, dairy products include milk (liquid and dried), cream, yoghurt, cheese and butter. Lactose and whey powder added as ingredients are included in the definition of free sugars, so are excluded from dairy products

*** Added sugars include the sugars in honey, syrups, nectars, added glucose, fructose, sucrose, lactose

**** the sugars naturally present in fruit and vegetable purees, pastes and juices and extruded fruit and vegetables, jams and preserves and whey powder are included in the definition of free sugar. The sugars naturally present in dried, stewed and otherwise processed fruit and vegetables are excluded from the definition of free sugars

***** Other sugars include the sugars found in fruit juices, concentrates and purees

Appendix M: Points scale and scoring bands for the UK Nutrient Profiling Model 2004/5, modification 1, modification 2 (including modelling) and modification 3 (including modelling)

Table 1: UK NPM 2004/5 Based on 8,950kJ (2,130kcal) diet, 3.75% scoring bands

		UK NPM 2004/5								
		UK NPM 2004/5 Based on 8950kJ (2,130kcal) diet, 3.75% scoring bands								
		'A' points					'C' points			
		Energy kJ (kcal)	Saturated fat (g)	Total sugars (g)	*Free sugars (g)*[tttt]	Sodium (mg)	Protein (g)	Fruit, vegetables, nuts (%)	Fibre (AOAC) (g)	Fibre (NSP) (g)
		8,950kJ (2,130kcal)	11% of food energy	21% of food energy	*5% of total dietary energy*	2,400mg	42g	400g	24g	18g
0	≤	335	1	4.5	*1.0*	90	1.6	40	0.9	0.7
1	>	335	1	4.5	*1.0*	90	1.6	40	0.9	0.7
2	>	670	2	9	*2.0*	180	3.2	60	1.9	1.4
3	>	1005	3	13.5	*3.0*	270	4.8	-	2.8	2.1
4	>	1340	4	18	*3.9*	360	6.4	-	3.7	2.8
5	>	1675	5	22.5	*4.9*	450	8.0	80	4.7	3.5
6	>	2010	6	27	*5.9*	540				
7	>	2345	7	31	*6.9*	630				
8	>	2680	8	36	*7.9*	720				
9	>	3015	9	40	*8.9*	810				
10	>	3350	10	45	*9.9*	900				

[tttt] Calculated. Not included in the UK NPM 2004/5, for reference only

Table 2: Modification 1 - Based on 8,400kJ (2,000kcal) diet (changes to energy, saturated fat, total sugars and salt in place of sodium)

		Modification 1							
		Modifications: Based on 8,400kJ (2,000kcal); 21%of food energy from total sugars; 11% of energy from saturated fat; salt in place of sodium. 3.75% scoring bands.							
		‘A’ points				‘C’ points			
		Energy kJ (kcal)	Saturated fat (g)	Total sugars (g)	Salt (g)	Protein (g)	Fruit, vegetables, nuts (%)	Fibre (AOAC) (g)	Fibre (NSP) (g)
		8,400kJ (2,000kcal)	11% of food energy	21% of food energy	6g	42g	400g	24g	18g
0	≤	315	0.9	3.9	0.2	1.6	40	0.9	0.7
1	>	315	0.9	3.9	0.2	1.6	40	0.9	0.7
2	>	630	1.9	7.8	0.5	3.2	60	1.9	1.4
3	>	945	2.8	12	0.7	4.8	-	2.8	2.1
4	>	1260	3.7	16	0.9	6.4	-	3.7	2.8
5	>	1575	4.7	19	1.1	8.0	80	4.7	3.5
6	>	1890	5.6	23	1.4				
7	>	2205	6.6	27	1.6				
8	>	2520	7.5	31	1.8				
9	>	2835	8.4	35	2.0				
10	>	3150	9.4	39	2.3				

Table 3: Modification 2 - Based on 8,400kJ (2,000kcal) diet (changes to energy, saturated fat, total sugars to free sugars and salt in place of sodium) including sugar, fruit, vegetables and nuts, energy and fibre modelling

		Modification 2													
		Modifications: Based on 8,400kJ(2,000kcal); 18% of food energy from total sugars; 11% of energy from saturated fat; salt in place of sodium 3.75% scoring bands								Fruit, vegetables, nuts a	Fruit, vegetables, nuts b	Fruit, vegetables, nuts c	Fibre e		Fibre f		Fibre g	
		‘A’ points				‘C’ points													
		Energy kJ (kcal)[uuuu]	Saturated fat (g)	Total sugars (g)	Salt (g)	Protein (g)	Fruit, vegetables nuts (FVN) (%)[vvvv]	Fibre (AOAC) (g)[wwww]	Fibre (NSP) (g)[xxxx]	FVN (%)	FVN (%)	FVN (%)	Fibre (AOAC) (g)	Fibre (NSP) (g)	Fibre (AOAC) (g)	Fibre (NSP) (g)	Fibre (AOAC) (g)	Fibre (NSP) (g)
		8,400kJ (2,000 kcal)	11% of food energy	18% of food energy	6g	42g	400g	24g	18g	400g	400g	400g	30g	22.5g	24g	18g	30g	22.5g
0	≤	315	0.9	3.3	0.2	1.6	40	0.9	0.7	40	40	40	1.1	0.8	0.9	0.7	1.1	0.8
1	>	315	0.9	3.3	0.2	1.6	40	0.9	0.7	40	40	40	1.1	0.8	0.9	0.7	1.1	0.8
2	>	630	1.9	6.7	0.5	3.2	60	1.9	1.4	50	60	50	2.3	1.7	1.8	1.4	2.3	1.7
3	>	945	2.8	10	0.7	4.8	-	2.8	2.1	60	-	60	3.4	2.5	2.7	2.0	3.4	2.5
4	>	1260	3.7	13	0.9	6.4	-	3.7	2.8	70	-	70	4.5	3.4	3.6	2.7	4.5	3.4
5	>	1575	4.7	17	1.1	8.0	80	4.7	3.5	80	80	80	5.6	4.2	4.5	3.4	5.6	4.2
6	>	1890	5.6	20	1.4						-	90			5.4	4.05	6.8	5.1
7	>	2205	6.6	23	1.6						-	100			6.3	4.725	7.9	5.9
8	>	2520	7.5	27	1.8						100				7.2	5.4	9.0	6.8
9	>	2835	8.4	30	2.0										8.1	6.075	10.1	7.6
10	>	3150	9.4	33	2.3										9	6.75	11.3	8.4

[uuuu] Energy modelling (M2d (no energy scoring)) included removing the energy component (ie all score bands =0)
[vvvv] Fruit, vegetables and nuts modelling, refer to Fruit, vegetables and nuts a-c
[wwww] Fibre modelling refer to Fibre e- g
[xxxx] Fibre modelling refer to Fibre e- g

Table 4: Modification 3 - Based on 8,400kJ (2,000kcal) diet, (changes to energy, saturated fat, free sugars, salt in place of sodium) including sugar, fruit, vegetable nuts, energy and fibre modelling

		Modification 3																													
		Modifications: Based on 8,400kJ(2,000kcal); 5% total dietary energy from free sugars; 11% of food energy from saturated fat; salt in place of sodium 3.75% scoring bands								Fruit, vegetables, nuts a	Fruit, vegetables, nuts b	Fruit, vegetables, nuts c	Fibre e		Fibre f		Fibre g		Fibre h		Fibre i		Fibre j		Fibre k		Fibre l		Fibre m		Fibre n		Fibre o		Fibre p	
		‘A’ points				‘C’ points																											
		Energy kJ (kcal)[yyyy]	Saturated fat (g)	Free sugars (g)	Salt (g)	Protein (g)	Fruit, vegetables, nuts (FVN) (%)[zzzz]	Fibre (AOAC) (g)[aaaaa]	Fibre (NSP) (g)[bbbbb]	FVN (%)	FVN (%)	FVN (%)	Fibre (AOAC) (g)	Fibre (NSP) (g)	Fibre (AOAC) (g)	Fibre (NSP) (g)	Fibre (AOAC) (g)	Fibre (NSP) (g)	Fibre (AOAC) (g)	Fibre (NSP) (g)	Fibre (AOAC) (g)	Fibre (NSP) (g)	Fibre (AOAC) (g)	Fibre (NSP) (g)	Fibre (AOAC) (g)	Fibre (NSP) (g)	Fibre (AOAC) (g)	Fibre (NSP) (g)	Fibre (AOAC) (g)	Fibre (NSP) (g)	Fibre (AOAC) (g)	Fibre (NSP) (g)	Fibre (AOAC) (g)	Fibre (NSP) (g)
		8,400kJ[ccccc] (2,000kcal)	11% of food energy	*5% of total dietary energy*	6g	42g	400g	24g	18g	400g	400g	400g	30g	22.5g	24g	18g	30g	22.5g	30g	22.5g	30g	22.5g	24g	18g	Nutrition claims	Nutrition claims (g)	Proportional change in recommendation in fibre from 24g to 30g						30g	22.5g
0	≤	315	0.9	0.9	0.2	1.6	40	0.9	0.7	40	40	40	1.1	0.8	0.9	0.7	1.1	0.8	1.1	0.8	1.1	0.8	0.9	0.7	1.0	0.8	0.7	0.6	0.7	0.6	0.7	0.6	0.7	0.6	1.1	0.8
1	>	315	0.9	0.9	0.2	1.6	40	0.9	0.7	40	40	40	1.1	0.8	0.9	0.7	1.1	0.8					0.9	0.7	1.0	0.8	0.7	0.6	0.7	0.6	0.7	0.6	0.7	0.6	1.1	0.8
1.25	>																		1.1	0.8															
2	>	630	1.9	1.9	0.5	3.2	60	1.9	1.4	50	60	50	2.3	1.7	1.8	1.4	2.3	1.7	1.1	0.8			1.8	1.4	2.0	1.5	1.4	1.1	1.4	1.1	1.4	1.1	1.4	1.1	2.3	1.7
2.5	>																		2.3	1.7															
3	>	945	2.8	2.8	0.7	4.8	-	2.8	2.1	60	-	60	3.4	2.5	2.7	2.0	3.4	2.5					2.7	2.0			2.2	1.7	2.2	1.7	2.2	1.7	2.2	1.7	3.4	2.5
3.75	>																		3.4	2.5															
4	>	1260	3.7	3.7	0.9	6.4	-	3.7	2.8	70	-	70	4.5	3.4	3.6	2.7	4.5	3.4	2.3	1.7			3.6	2.7			2.9	2.2	2.9	2.2	2.9	2.2	2.9	2.2	4.5	3.4
5	>	1575	4.7	4.6	1.1	8.0	80	4.7	3.5	80	80	80	5.6	4.2	4.5	3.4	5.6	4.2			4.5	3.4	4.5	3.4	3.0	2.3	3.6	2.8	3.6	2.8	3.6	2.8	3.6	2.8	5.6	4.2
6	>	1890	5.6	5.6	1.4						-	90			5.4	4.05	6.8	5.1	3.4	2.5			5.4	4.1					4.3	3.4	4.3	3.4	4.3	3.4	6.8	5.1
6.25	>																		5.6	4.2															
7	>	2205	6.6	6.5	1.6						-	100			6.3	4.725	7.9	5.9					6.3	4.7					5.0	3.9	5.0	3.9	5.0	3.9		
8	>	2520	7.5	7.4	1.8						100				7.2	5.4	9.0	6.8	4.5	3.4			7.2	5.4							5.8	4.5	5.8	4.5		
9	>	2835	8.4	8.3	2.0										8.1	6.075	10.1	7.6					8.1	6.1									6.5	5		
10	>	3150	9.4	9.3	2.3										9	6.75	11.3	8.4	5.6	4.2			9.0	6.8	6.0	4.5							7.2	5.6		
11	>																						9.9	7.4												
12	>																						10.8	8.1												
13	>																						11.7	8.8												

[yyyy] Energy modelling (M3d (no energy scoring)) included removing the energy component (ie all score bands =0)
[zzzz] Fruit, vegetable nuts modelling, refer to Fruit, vegetables and nuts a- c
[aaaaa] Fibre modelling refer to Fibre e-p
[bbbbb] Fibre modelling refer to Fibre e-p

References

[1] HM Government. Childhood obesity: A plan for action. 2016. Online. Available from: www.gov.uk/government/publications/childhood-obesity-a-plan-for-action (accessed 26/06/17)
[2] Department of Health. The Nutrient Profiling Model. 2011. Online. Available from: www.gov.uk/government/publications/the-nutrient-profiling-model (accessed 24/11/17)
[3] Department of Health. Nutrient Profiling Technical Guidance. 2011. Online. Available from: www.gov.uk/government/uploads/system/uploads/attachment_data/file/216094/dh_123492.pdf (accessed 26/06/17)
[4] Office of Communication (Ofcom). Ofcom publishes final Statement on the television advertising of food and drink products to children. 2007. Online. Available from: www.ofcom.org.uk/about-ofcom/latest/media/media-releases/2007/ofcom-publishes-final-statement-on-the-television-advertising-of-food-and-drink-products-to-children (accessed 26/06/17)
[5] Committee of Advertising Practice. New rules ban the advertising of high fat, salt and sugar food and drink products in children's media. 2016. Online. Available from: www.asa.org.uk/news/new-rules-ban-the-advertising-of-high-fat-salt-and-sugar-food-and-drink-products-in-childrens-media.html (accessed 24/11/17)
[6] Scientific Advisory Committee on Nutrition. Carbohydrates and Health. 2015. Online. Available from: www.gov.uk/government/publications/sacn-carbohydrates-and-health-report (accessed 28/11/17)
[7] 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.
[8] Public Health England. Government Dietary Recommendations: Government recommendations for energy and nutrients for males and females aged 1 – 18 years and 19+ years. 2016. Online. Available from: www.gov.uk/government/uploads/system/uploads/attachment_data/file/618167/government_dietary_recommendations.pdf (accessed 07/09/17)
[9] Public Health England in association with the Welsh Government, Food Standards Scotland and the Food Standards Agency in Northern Ireland. The Eatwell Guide. 2016. Online. Available from: www.gov.uk/government/uploads/system/uploads/attachment_data/file/551502/Eatwell_Guide_booklet.pdf (accessed 28/11/17)
[10]Public Health England. Sugar Reduction: The evidence for action. 2015. Online. Available from: www.gov.uk/government/publications/sugar-reduction-from-evidence-into-action (accessed 26/06/17)
[11] NHS Digital. National Child Measurement Programme - England, 2016-17. 2017. Online. Available from: https://digital.nhs.uk/catalogue/PUB30113 (accessed 28/11/17)
[12] Gatineau M, Dent M. Obesity and Mental Health. Oxford: National Obesity Observatory; 2011. Online. Available from: //khub.net/c/document_library/get_file?uuid=18cd2173-408a-4322-b577-6aba3354b7ca&groupId=31798783 (accessed on 28/11/17)
[13] Singer MR, Moore LL, Garrahie EJ, Ellison RC. The tracking of nutrient intake in young children: the Framingham Children's Study. Am J Public Health.1995;85:1673-1677. 10.2105/AJPH.85.12.1673

[14] Bates B, Cox L, Nicholson S, Page P, Prentice A, Steer T, et al. National Diet and Nutrition Survey: Results from years 5 and 6 (combined) of the Rolling Programme (2012/2013 - 2013/2014). 2016. Online. Available from: www.gov.uk/government/statistics/ndns-results-from-years-5-and-6-combined (accessed 01/08/17)
[15] Bates B, Lennox A, Prentice A, Bates C, Page P, Nicholson S, et al. National Diet and Nutrition Survey: Results from years 1, 2, 3 and 4 (combined) of the Rolling Programme (2008/2009 - 2011/2012). 2014. Online. Available from: www.gov.uk/government/statistics/national-diet-and-nutrition-survey-results-from-years-1-to-4-combined-of-the-rolling-programme-for-2008-and-2009-to-2011-and-2012 (accessed 01/08/17)
[16] Rayner M, Scarborough P, Stockley L. Nutrient Profiles: Options for definitions for use in relation to food promotion and children's diets. London: Food Standards Agency; 2004
[17] Scarborough P, Boxer A, Rayner M, & Stockley L. Testing nutrient profile models using data from a survey of nutrition professionals. Public Health Nutrition. 2007;10(4): 337-345
[18] Food Standards Agency. Board Paper - FSA 09/03/06 Review of the Agency's Nutrient Profiling Model. 2009. Online. Available from: webarchive.nationalarchives.gov.uk/20120413225357/http://www.food.gov.uk/multimedia/pdfs/board/fsa090306v2.pdf (accessed 28/11/17)
[19] Food Standards Australia New Zealand. Nutrient Profiling Scoring Calculator for Standard 1.2.7. 2012. Online. Available from: www.foodstandards.gov.au/industry/labelling/Pages/nutrientprofilingcalculator/Default.aspx
[20] Department of Health Republic of South Africa. Nutrient Profiling Model. Online: Available from: www.health.gov.za/phocadownload/FoodInfor/NPC_NWU.html (accessed 01/02/18)
[21] Australian Government Department of Health. Guide for Industry to the Health Star Rating Calculator (HSRC). Canberra: Australian Government Department of Health; 2016. Online. Available from: healthstarrating.gov.au/internet/healthstarrating/publishing.nsf/content/E380CCCA07E1E42FCA257DA500196044/$File/Guide%20for%20Industry%20to%20the%20HSR%20Calculator%20v5%20June%202016.pdf (accessed 28/11/17)
[22] Julia C, Ducrot P, Péneau S, et al. Discriminating nutritional quality of foods using the 5-Color nutrition label in the French food market: consistency with nutritional recommendations. Nutrition Journal. 2015;14:100. doi:10.1186/s12937-015-0090-4
[23] Houses of the Oireachtas. Joint Committee on Health and Children. Debate on the nutritional value of certain foods. Online. Available from: oireachtasdebates.oireachtas.ie/Debates%20Authoring/DebatesWebPack.nsf/committeetakes/HEJ2011101100004?opendocument (accessed 28/11/17)
[24] World Health Organization (WHO) Regional Office for Europe. Nutrient Profile Model. Copenhagen; 2015.Online. Available from: www.euro.who.int/__data/assets/pdf_file/0005/270716/Nutrient-children_web-new.pdf?ua=1
[25]Public Health England. Timeline for review of the Nutrient Profiling Model (NPM). 2017. Online. Available from: app.box.com/v/NPMTimeline/file/97258159259 (accessed 28/11/17)
[26] Public Health England. Nutrient Profiling Model Reference Group, Terms of Reference. 2016. Online. Available from: www.gov.uk/government/uploads/system/uploads/attachment_data/file/558213/NPM_reference_group_terms_of_reference.pdf (accessed 28/11/17)
[27]Public Health England. Nutrient Profiling Model Expert Group, Terms of Reference. 2016. Online. Available from:

www.gov.uk/government/uploads/system/uploads/attachment_data/file/558212/NPM_expert_group_terms_of_reference.pdf (accessed 28/11/17))

[28]Public Health England. Review of the Nutrient Profiling Model. Agenda, action points and minutes of the Nutrient Profiling Model Reference and Expert Group. 2016. Online. Available from: www.gov.uk/government/collections/review-of-the-nutrient-profiling-model (accessed 28/11/17)

[29] Scientific Advisory Committee on Nutrition. Update on trans fatty acids and health – position statement by the Scientific Advisory Committee on Nutrition. 2007. Online. Available from: www.gov.uk/government/collections/sacn-reports-and-position-statements (accessed 28/11/17)

[30] Public Health England. (2015) Composition of foods integrated dataset. Online. Available from: www.gov.uk/government/publications/composition-of-foods-integrated-datasetcofid (accessed 28/11/17)

[31]Department of Health, the Food Standards Agency and devolved administrations in Scotland, Northern Ireland and Wales. Guide to creating a front of pack (FoP) nutrition label for pre-packed products sold through retail outlets. 2016. Online. Available from: www.gov.uk/government/uploads/system/uploads/attachment_data/file/566251/FoP_Nutrition_labelling_UK_guidance.pdf (accessed 28/11/17)

[32] HM Revenue and Customs. Policy paper Soft Drinks Industry Levy. 2016. Online. Available from: www.gov.uk/government/publications/soft-drinks-industry-levy/soft-drinks-industry-levy (accessed 28/11/17)

[33] European Parliament and Council. Regulation (EC) No 1924/2006 on nutrition and health claims made on foods. 2006. Online. Available from: http://eur-lex.europa.eu/legal-content/en/ALL/?uri=CELEX:32006R1924 (accessed 28/11/17)

[34] Public Health England. From Plate to Guide: What, why and how for the eatwell model. 2016. Online. Available from: www.gov.uk/government/uploads/system/uploads/attachment_data/file/579388/eatwell_model_guide_report.pdf (accessed 28/11/17)

[35] Scientific Advisory Committee on Nutrition (SACN). Dietary Reference Values for Energy. London: The Stationery Office; 2011

[36] Public Health England. Healthier and more sustainable catering: Nutrition principles. 2017. Online. Available from: www.gov.uk/government/uploads/system/uploads/attachment_data/file/648744/healthier_and_more_sustainable_nutrition_principles.pdf (accessed 28/11/17)

[37] Scientific Advisory Committee on Nutrition. Salt and Health. 2003. Online. Available from: www.gov.uk/government/publications/sacn-salt-and-health-report (accessed 28/11/17)

[38] European Parliament and Council. Regulation (EU) No 1169/2011 of the European Parliament and of the council Provision of food Information to Consumers (FIC). 2011. Online. Available from: eur-lex.europa.eu/legal-content/en/ALL/?uri=CELEX:32011R1169 (accessed 28/11/17)

[39] World Health Organization. Diet, nutrition and the prevention of chronic diseases. 2003. Online. Available from: whqlibdoc.who.int/trs/WHO_TRS_916.pdf (accessed 28/11/17)
and World Health Organization. Diet, nutrition and the prevention of chronic diseases. 1990. Online. Available from: www.who.int/nutrition/publications/obesity/WHO_TRS_797/en/index.html (accessed 28/11/17)

[40] National Health Service (NHS). 5 A Day. 2011. Online. Available from: www.nhs.uk/LiveWell/5ADAY/Pages/5ADAYhome.aspx (accessed 28/11/17)

[41] Food Standards Agency. Board Paper - FSA 13/10/05 Nutrient Profiling Model. 2005. Online. Available from: webarchive.nationalarchives.gov.uk/20101209161942/http://www.food.gov.uk/aboutus/ourboard/boardmeetings/boardmeetings2005/boardmeeting101305/boardagenda131005 (accessed 28/11/17)
[42] Choosing Health: Making healthy choices executive summary. Online. Available from: www.nhshistory.net/choosing%20health%20summary.pdf (accessed 04/07/17)
[43] Food Standards Agency. 2004 Action Plan on Food Promotions and Children's Diets. Online. Available from: webarchive.nationalarchives.gov.uk/20101211000459/http://www.food.gov.uk/multimedia/pdfs/apkidsfood.pdf (accessed 01/02/18)
[44] Rayner M, Scarborough P, Stockley L. Nutrient profiles: Applicability of Currently Proposed Model for Uses in Relation to Promotion of Foods in Children Aged 5–10 and Adults. London: Food Standards Agency; 2005
[45] Food Standards Agency. Board paper – FSA 09/03/06 Review of the Agency's Nutrient Profiling Model 2009. Online. Available from: webarchive.nationalarchives.gov.uk/20110804165759/http://www.food.gov.uk/multimedia/pdfs/board/fsa090306v2.pdf (accessed 01/02/18)
[46] Department of Health. Nutritional Aspects of Cardiovascular Disease. London: HMSO;1994
[47] M Wicks. The validation of a suitable nutrient profiling model for South Africa, North-West University. 2012. Online. Available from: https://repository.nwu.ac.za/handle/10394/9253 (accessed January 2018)
[48] Ministère des Solidarités et de la Santé. Second National Nutrition and Health Programme. 2006. Online. Available from: solidarites-sante.gouv.fr/IMG/pdf/pnns2.pdf (accessed 01/02/18)
[49] Coudray B. The Contribution of Dairy Products to Micronutrient Intakes in France. J Am Coll Nutr. 2011;30:410S–4S
[50] Houses of the Oireachtas. Position Paper on the review of the Children's Commercial Communication Code Section 11. 2011. Online. Available from: www.oireachtas.ie/parliament/media/committees/healthandchildren/Joint-Committee-on-Health-and-Children---Report---Position-Paper-on-the-review-of-the-Childrens-Commercial-Communication-Code-(Section-11),-October-2011.pdf\ (accessed 28/11/17)
[51] Appendix 1 to Draft Regulations. Foods and beverages that are considered unhealthy under these Regulations. Oslo: Helsedirektoratet; 2013. Online. Available from: www.eftasurv.int/media/notification-of-dtr/Appendix-to-Regulations.-Unhealthy-foods---9005.pdf (accessed 28/11/17)
[52] Code of responsible food marketing communication to children. Copenhagen: Forum of Responsible Food Marketing Communication; 2015
[53] Finglas PM, Roe MA, Pinchen HM, Berry R, Church SM, Dodhia SK, et al. McCance and Widdowson's The Composition of Foods. Seventh Summary Edition. Cambridge: Royal Society of Chemistry; 2015
[54] FAO/INFOODS. FAO/INFOODS Density Database Version 2.0. 2012. Online. Available from: www.fao.org/docrep/017/ap815e/ap815e.pdf (accessed 28/011/2017)
[55] Swan GE, Powell NA, Knowles BL, Bush MT, Levy LB. A definition of free sugars for the UK. Public Health Nutrition (in press); 2018