NHS Health Scotland

Rapid evidence review: Methodologies for identifying foods high in fat, sugar and salt for limiting marketing and promotions

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About this briefing

This briefing paper aims to provide an overview of the best available evidence on the strengths and limitations of methodologies for identifying food which is high in fat, sugar and salt (HFSS). This is to inform the development of Scottish Government legislation to limit the marketing and promotion of foods high in fat, sugar and salt.

The first section looks at the context in Scotland which underpins the decision to address promotions and marketing. The second section sets out the methodology used for this review. The third section gives the considerations to be taken into account when looking at different methodologies. The fourth section outlines the strengths and weaknesses of the approaches.

The evidence in this paper has been used to draw evidence-informed suggestions on the most appropriate methodology to identify the types of foods and drinks to be included in the limitations on marketing and promotions.

Key points

- There was no methodology found which has been used for limiting marketing and promotions.
- Based on the evidence in this review, it is likely that a bespoke model to identify foods and drinks will be required for the purposes of limiting promotions and marketing.
- Any model developed should consider the key nutrients to limit in the Scottish diet, and the evidence about which food categories most contribute to the overconsumption of these nutrients in the Scottish diet.
- Methodologies can either take a ‘category’ approach, which focuses on individual categories of food and drink, or an ‘across the board’ approach, which includes all food and drink.
- Within these approaches, food and drink can be classified using either scoring, threshold or simply ‘all food or drink within a defined category’ methods.

Category approach

- A category approach (which uses a threshold or scoring system) may encourage consumers to switch to healthier alternatives within a category. For example, from high-fat spreads to low-fat spreads.[1] [2]
- A category-specific design which provides criteria specific to each category would not, in principle, exclude any food categories from being promoted outright.
- Criteria specific to a category may also drive reformulation and innovation within the food category due to criteria being more achievable for the specific food group.[1]
- However, the definition of categories is challenging and may cause problems for implementation for borderline products.*

Across the board approach

- An across the board approach may encourage consumers to switch to healthier food categories, for example from confectionary to fruit.[3]
- The model assesses all food and drinks equally and therefore does not require judgement on whether a product should be included or not.
- By assessing all food and drink equally the classification can limit promotions on all food and drink categories high in fat, sugar and salt. This is therefore likely to reduce the negative impact of cross price elasticity.†
- However, by assessing food and drink equally, some food categories may find the criteria unreachable due to their basic composition.

* 'Borderline products' are products where it is unclear which category they fit in to. For example a marshmallow teacake might be classified in the cake category or the biscuit category.

† Cross price elasticity: a measure of how much demand changes for one product as a result of changes in the price of another product. For example a rise in the price of cakes could see a rise in demand for a substitute product such as biscuits.

Threshold system

- Threshold models operate by considering whether the food has a nutrient content higher or lower than a specified threshold. Thresholds are simpler to calculate than scoring systems.
- Current ‘back of pack’ labelling may be adequate to calculate a threshold model.

Scoring system

- Scoring models calculate an overall score for each food. They require algorithms where the precise level of nutrient is considered.
- All the scoring models reviewed required more nutritional information than is currently provided by ‘back of pack’ labelling.

1 Introduction

The prevalence of overweight and obesity in Scotland is stubbornly high, with the majority of adults in Scotland now overweight.[4] Obesity is one of the main contributors to illness such as cancers, Type 2 diabetes and cardiovascular diseases.[5] [6] It is generally agreed that the increase in calories consumed is the most significant contributor to the obesity epidemic in western societies.[7]

Our food environments can often be described as ‘obesogenic’ – i.e. where high fat, sugar and salt foods are affordable and available and there is encouragement to purchase in high volumes.[8]

One mechanism, in the retail environment, that can increase the affordability and availability of food and drink is marketing and promotion. Marketing and promotions are designed to encourage the impulsive purchases of products.[9] They often use price and/or position of products to increase sales, and consumer spending on promoted products is higher in the UK than anywhere else in Europe.[10] In addition, unhealthy food is bought more often on promotion than healthy food.[11]

We know from the evidence that marketing and promotions increase the volume of food and drink purchased during shopping trips and do not lead to a reduction in the frequency of purchasing at subsequent trips. They therefore increase the volume of food and drinks brought into homes in Scotland.[12]

Through the Programme for Government[13] the Scottish Government has committed to action to limit the promotion and marketing of products high in fat, sugar or salt. An essential part of the success of this work will be how the products subject to the limits will be identified.

Nutrient profiling is defined as 'the science of categorising foods according to their nutritional composition for the purpose of preventing disease and promoting health'.[14]

From the evidence there appear to be two dominant methods of classifying food:

1. Scoring models that provide a ranking for food and drink on a continuous scale.
2. Threshold models that assess whether a food or drink is above or below a predetermined threshold.

Within these models the criteria to classify food can either be applied across the whole of food and drink products, known as 'across the board' criteria, or to individual categories, known as 'category specific criteria'.

2 Review methodology

This review follows criteria set by the European Commission when looking at nutrient profiling models.[15] A model must provide a score which considers multiple nutrients to categorise the healthiness of food. Single nutritional component models were not considered as they allow for other undesirable nutrients to be added in place of the nutrient targeted in the model,[16] which would impact on the overall outcomes of a public health policy.

In addition to evidence on the models, the summary below also details evidence on the validation of the model where available. There is general consensus on the hierarchy of validation methodology.[17] The strongest methodology is an assessment on how the model classifications are associated with future risk of disease. Due to the cost and time this type of assessment requires, however, this validation method is rarely performed. Second to this is the assessment of a model's classification against an objective measure of a healthy diet, for example the Eat Well Guide.[18] There is a third methodology that assesses the model against the views of nutritionists. This is considered to be the weakest method due to the subjective nature of the nutritionist's assessments. However, assessing a model against the views of nutritionists is the most commonly performed methodology and, if conducted with an appropriate sample size, it can still be an acceptable method to test the validity of a model.

An initial search was undertaken which identified a small number of studies (six) which were relevant to the research question. A snowballing technique was then used to identify more studies of relevance. Following a review of these articles a revised search strategy (see Appendix A) was developed and used by NHS Health Scotland Knowledge Services and Scottish Government Library to conduct a systematic search of the literature in their databases.

After removing duplications, the search found 528 articles which were subsequently screened. A total of 45 articles were deemed relevant to the research question. The following provides a summary of the evidence on food classification models from these 45 articles. Studies were critically appraised using the CASP tool.*

It should be noted that the evidence for this summary comes from critically appraised single studies, and that the models reviewed were developed for purposes other than the classification of foods to limit marketing and promotions. This potentially limits the generalisability of the findings of the review. The models, although mostly from western countries with similar patterns of overconsumption at a nutrient level,

* CASP tools are a recognised systematic set of tools used to assess the quality of academic research and studies.

can represent very different dietary composition at food category level, again limiting the transferability of the findings to Scotland.

3 Assessing a food classification model

The following section provides a summary of issues for consideration when systematically assessing a food classification model.[3] [19]

3.1 What is the aim of the intervention?

Different designs will be more effective for different outcomes. For example, if the aim is to encourage a switch to healthier foods within an individual food category then 'category specific criteria' are appropriate.[1] [2] But if the aim is to encourage consumers to switch to healthier food categories, for example from confectionary to fruit, an 'across the board' design will be more effective.[3]

In addition, whether the intention is to identify unhealthy foods to restrict or healthy foods to promote will affect which classification model will be most effective. For example, models which have been designed to identify foods which are healthy and bear a healthy choice logo may have strict criteria, effectively ensuring that no unhealthy product can use the logo. But criteria which are too strict may run the risk of disqualifying foods which would, overall, be part of a healthy diet. Therefore these criteria may not be sensitive in identifying groups of unhealthy foods.[20]

Models developed for the same purpose may find little consensus in the categorisation of food. For example, two studies of moderate quality compared nutrient profiling models which had all been developed to categorise food for advertising restriction to children. Both studies found little agreement between the models on what could and could not be advertised.[21] [22] One study found that across the eight models compared, there was only agreement on five out of the 336 products considered regarding what could be advertised. However, there was more agreement across what foods should *not* be advertised: there was agreement on 38% of the foods considered across all eight models.[22] The second study found that

industry-led nutrient profiling models were less effective in restricting advertising of energy dense foods compared to government-led models, primarily because government-led models contain tougher sugar criteria.[21]

In contrast a study which compared five validated models to assess products for eligibility for healthy labelling found more agreement between the models. Of note, this study only looked at one category of foods – 'fine bakery wares'. This finding suggests that if applied to single categories, models may find more consensus.[23]

3.2 Who is the target group or population?

Evidence suggests that models developed for children, for example the FSA/Ofcom model, are likely to be applicable for interventions including adults.[24] Models which have been developed for other countries' populations will follow the dietary recommendations for that country, which may differ from those in Scotland, and therefore the transferability to a Scottish population should be considered.

3.3 Thresholds or scoring?

Threshold models operate by considering whether or not the food has a nutrient content higher or lower than a specified threshold. They are simpler to calculate than scoring systems and can be made more flexible than a straightforward classification above or below one threshold. Multiple thresholds for different nutrients allow foods to be classified as, for example, 'less healthy', 'intermediate' and 'healthier'.[3]

Scoring models operate by calculating an overall score for each food which can then be used to rank foods. Scoring systems require algorithms where the precise level of nutrient is taken into account. They are more sensitive than thresholds, allowing products with healthier nutrients to rank higher than those with lower levels despite both being above or below a 'threshold'. However, they require more detailed data to calculate.[3]

3.4 Food-category specific or across the board criteria?

3.4.1 Category specific

As mentioned above, models which examine food within identified categories can be useful where the intention is to help consumers switch within categories of foods. For example, from high-fat spreads to low-fat spreads.[1] [2]

A category-specific design provides criteria specific to each category and therefore, in principle, would not exclude any food categories from being promoted outright. By setting criteria within each category it addresses intrinsic differences between food categories and may also drive reformulation and innovation within a food category, due to criteria being more achievable for the specific food group.[1]

However, the definition of food categories can be challenging, and can change as products develop over time. It can also be challenging to assess where to place borderline products which may cause issues for implementation.[16] [25]

3.4.2 Across the board

Models that assess all products according to the same criteria – 'across the board' models – work best when the object of the exercise is to help consumers switch between categories, for example from biscuits to fruit.[3]

These models do not require judgement to be made for categorisation and can ensure all products are treated equally. This approach may have merit when considering one unintended consequence of an intervention that increases the price of a product, which is that a consumer switches to another product that is equally unhealthy but for which the price hasn't changed.[26] This 'cross price elasticity' will affect the impact of an intervention. 'Across the board' models include all food and drink and assess all food categories equally. Therefore, for example, a price rise in one unhealthy product category, such as biscuits, will also be felt in another unhealthy product category, such as ice cream.

However, by treating all foods equally the model can lead to a situation where some food categories that form part of a healthy diet, for example cheese, are excluded from promotion. This approach may also not provide an incentive to reformulate nutrients within food groups as due to the intrinsic nature of the food the criteria may be unreachable for them.[20]

One study of moderate quality compared a fictitious 'across the board' model with a 'category-specific model'. The study found that although the models' assessments for individual food items were different, the relative ranking of food to one another was similar across both models.[27]

3.5 Which nutrients or other food components should be considered?

To ensure an intervention contributes to reducing obesity the model should include the nutrients which are associated with increases in population obesity levels. Total fat (sometimes broken down into saturated fat and trans fat) and sugar are included in nutrients to limit across all the food classification models detailed below. Sodium is also included as a nutrient to limit across all the models due to its association with other health outcomes.

Some models also consider nutrients to promote: these are the nutrients in which there is a shortfall in the diet. For those models that considered these, fibre and protein were common. In the Scottish context shortfall nutrients should relate to the Scottish Dietary Goals.

3.6 How accessible is nutritional information?

How easily nutritional information is accessed will have an impact on the implementation of the model. One European study highlighted that although nutritional information for the 'big eight nutrients' (energy, carbohydrate, sugar, fat, saturated fat, fibre, protein and salt) was available for most products from product

labelling, the five models they compared all required additional information from company websites and food composition tables.[23]

EU regulations require mandatory nutrition information for most food and drink to be provided on the back-of-pack label, which includes seven of the ‘big eight’ except for fibre. Notable exceptions to these regulations include ‘loose goods’ such as loose bakery products.

In the UK mandatory information for product labelling in the UK is:[28]

- name of food
- best before/use by
- any necessary warnings
- net quantity information
- list of ingredients
- name and address of manufacturer
- country of origin
- any special storage conditions
- instructions for use or cooking, if necessary.

3.7 Which reference quantity (e.g. per 100g, per serving, per 100kj) should be used?

The ‘per 100g’ reference quantity calculates the nutrient density per 100g of a food. However, this does not consider the water content or the volume in which a food is typically eaten.[29] This is the reference quantity used in food composition tables and is the required format for EU labelling, and therefore is consistent with existing legislation.

The ‘per 100kj’ reference quantity calculates the nutrient density per 100kj (kilojoules) of a food. This reference quantity discounts the water content of the food. However, this can cause issues for some fruit and vegetables which have little energy density so can appear high in some nutrients when 100kj used, for example in this context celery would be classed as high in sodium.[3]

The choice of which reference quantity is used is not as important when considering category-specific criteria as opposed to 'across the board' criteria, as variation across food within the same category will not be as great.[3]

The 'per serving' reference quantity is not commonly used in models developed in Europe as there is no agreed serving size for food products.[29] It is used in models developed in the US using Reference Amounts Customarily Consumed (RACC), however these serving sizes have not been shown to be applicable in a European context due to differences in typical serving sizes in Europe.[20]

4 Evidence review

4.1 Scoring models

The largest amount of evidence identified related to models which score food and drink in a continuous scale either across all of food and drink or within categories. Of the 45 papers identified through screening, 26 were on scoring models.

In these models the score is calculated using an algorithm which is used to rank any food or drink on a continuous scale. These algorithms require data on the precise level of a nutrient within a food. The score can then be used to assess whether the product could be promoted or not.

Scoring which allows all food and drink to be ranked continuously is more sensitive to differences between products than assessing if a product is over or under a certain threshold, however they require more detailed data to calculate.

Across the board scoring models considered were:

- FSA/Ofcom UK Nutrient Profile
- Nutrient Rich Foods Index (NRF)
- Overall Nutritional Quality Index (ONQI) or NUVAL

- SAIN/LIM French Nutrition Institute
- The Choices Programme
- Category Specific Scoring models
- Swedish Keyhole
- Nutrimap

4.1.1 Across the board scoring models

FSA/Ofcom UK Nutrient Profile (WXYfm model)

- The FSA/Ofcom Nutrient Profile model was developed to serve as a scientific support to establish rules on broadcast advertising of foods that are high fat, sugar and salt (HFSS) to children in the UK. It is based on UK dietary guidelines and takes into account nutrients of major health concern.
- The model combines a scoring and threshold system. It has two broad categories: food and drink. Thresholds are set for seven criteria for determining what is healthy food or what is HFSS food per 100g. These criteria are energy, sugars, saturated fat, sodium, vegetable/fruit/nut content, protein and fibre. A score is provided for each criterion, giving a score for the nutrients to limit and a score for the shortfall nutrients.
- The shortfall nutrient scores are then subtracted from the nutrient to limit scores. A total score of four or more for food and of one or more for drink classifies the item as HFSS and therefore cannot be advertised to children in the UK.[30]
- The McCance and Widdowson database is a database of nutritional information for most products. Data from this database was used by the researchers in these studies to calculate the FSA/Ofcom model.

Strengths

By taking an ‘across the board’ approach the FSA/Ofcom model creates a standard to which all products are assessed equally. The method also provides a score on which products can be ranked to show the relative ‘healthfulness’ of products and product categories in relation to one another.

From the literature the FSA/Ofcom UK Nutrient Profile had the strongest body of validation evidence.

Two high-quality studies with cohorts on England and France assessed the model's classifications against future risk of disease. The studies found statistically significant associations between the consumption of the UK/Ofcom model's recommended foods and a 27–35% reduction of all course mortality and cancer mortality risk.[31] Furthermore, non-recommended foods were significantly associated with a higher risk of developing metabolic syndrome.[32]

In addition, the model's validity was tested against an objective diet quality measure. A high-quality single study found the FSA/Ofcom model categorises food in agreement with the UK National Food Guide Balance of Good Health (BGH). The model's classifications were closely matched to those of the BGH: 97% of fruit and vegetables were classified by the FSA/Ofcom and BGH as healthy and 95% of fatty and sugary foods were classified as unhealthy by both. Differences arose with the classification of bread, cereals and potatoes which were classed by the FSA/Ofcom model frequently as unhealthy but are recommended by the BGH. The model also showed good construct validity, where it categorises food in a way which is associated with the healthfulness of diets when assessed by energy intake.[24]

A study of high quality compared eight nutrient profile models against the rankings of nutritional specialists. The study found ratings of the models that provided continuous scoring such as the FSA/Ofcom model were most strongly related to the standard ratings provided by 700 nutrition specialists. This was compared to models that provided scores for different categories. The SSCg3d and WXYfm models, which underpin the FSA/Ofcom model, provided the best correlation but not significantly more than the other scoring models.[33]

In a study of weaker quality the rankings of the FSA/Ofcom model also correlated with the rankings of lay people when asked to rank foods in order of healthiness.[34] In addition to validating the model, studies have also looked at how the model performs in comparison to others. In a moderate-quality study comparing eight models, which considered shortfall and nutrients to limit, the UK nutrient profile

model permitted the most foods to be advertised (47.4%) including the most fatty and sugary foods. This may be due to the algorithm allowing shortfall nutrients to compensate for nutrients which should be limited. However, it permitted almost 100% of fruit and vegetables to be advertised.[22]

Models like the FSA/Ofcom model which have a less restrictive definition of healthy foods are less likely to exclude products which contribute to a healthy diet.[20] The more restrictive a model is in its definition of healthy foods, the higher the risk of excluding foods which do contribute to a healthy diet.

Studies in different countries[35] have shown the model to be effective. The South African Nutrient Profile Model[36] and the Food Standards Australia and New Zealand (FSANZ) Nutrient Profiling Standard Calculator (NPSC)[37] both derive from the FSA/Ofcom model.

The FSANZ NPSC demonstrates how the model can be adapted. The Australian and New Zealand model includes a separate category for oils and spreads and high calcium cheese, an adaptation that allowed unsaturated spreads and oils and low-fat cheeses to be eligible when the model was used to assess products for certain health claims.[37] The adapted model has also been effective in determining the healthiness of foods for advertising to children.[38]

Limitations

There were limitations found in the evidence, with some of the FSA/Ofcom models' classifications in relation to healthy eating advice. The model also classifies light cheese as unhealthy due to saturated fat content, which is classified as a healthier food in healthy eating advice.[20]

In addition to this, as mentioned above, the model classified bread, cereals and potatoes as unhealthy more frequently than an objective measure of diet quality.[24]

One suggested limitation of models such as the FSA/Ofcom model is that they weight nutrients equally which may not be a valid method of assessing overall nutritional value. The models do not assess to what degree each nutrient contributes

to or detracts from health and cannot account for interactions between nutrients: for example dietary fat promotes vitamin D absorption.[39]

The FSA/Ofcom model is currently calculated using nutritional information supplied by the manufacturer. Due to the detail required to calculate the algorithm for the FSA/Ofcom model there may be barriers to implementation at a retailer level due to lack of adequate nutritional information on product labels in Europe.

Finally, by taking an 'across the board' approach, the model does not recognise the intrinsic nature of foods. Therefore some food groups may never be able to meet the criteria, which may discourage reformulation efforts in these areas.

Nutrient Rich Foods (NRF) Index

- This model was developed in the USA. It ranks foods on the basis of their nutritional content and nutrient per calorie. The model was developed to support understanding of the types of food that make up a healthy diet.[40]
- An associated family of Nutrient Rich Food Index models has been developed. All use saturated fat, sugar and salt as nutrients to limit but each assesses a different number of shortfall nutrients. A number of studies have been published which have assessed the value of the number of shortfall nutrients. Findings from these studies suggest that the NRF 9.3 model, which considers nine shortfall nutrients, performs as well as those models which include more shortfall nutrients (NRF15.3 and NRF 10.3)[29 41] and gives enough sensitivity to distinguish well between the nutritional density of foods in each group.[42]
- The model can be calculated through values on the Nutrient Data System for research which is based on nutrient data maintained by the Nutrients Coordinating Centre of University of Minnesota.[43]

Strengths

Like the FSA/Ofcom model, the 'across the board' approach taken by the NRF model creates a level standard to which all products are assessed equally.

Two studies of moderate quality sought to validate the NRF 9.3 model using objective diet quality measures. The studies found the NRF score was correlated with the Healthy Eating Index (HEI)[44] and the Dutch Health Diet Index.[45]

The NRF 9.3 index was associated with lower energy density, and more nutrient-rich diets. The model scored low energy, nutritionally dense vegetables and fruit the highest followed by legumes and eggs. Within groups, whole grains scored better than refined grains. Fats, oils, grains and sweets which had higher energy density and lower per-calorie nutrient content scored lowest.[44]

An earlier study of moderate quality found that diets awarded higher NRF scores were associated with higher consumption of foods and nutrients to encourage higher eating index values and lower energy intakes.[40] The study also found the model was effective in identifying nutrient-rich food subgroups within food groups.

Limitations

A study of moderate quality assessing the performance of the NFR 10.3 model (which includes 10 nutrients to promote) looked at its classification of common snack foods. Other studies have assessed this model as performing in a similar way to the NRF 9.3 model.[42] Yoghurt, milk and fruit were the highest scoring foods and ice cream, cakes and carbonated drinks scored the lowest. Potato crisps scored higher than expected, coming above tea, crackers and popcorn. The authors suggested this was due to the high amounts of potassium, magnesium, fibre and vitamin C in potatoes and changes in the type of oils used to cook them.[39]

As with the FSA/Ofcom model, the NRF model weighs nutrients equally and does not consider the intrinsic nature of foods across categories. Therefore some food groups may never be able to meet the criteria, which may discourage reformulation efforts in these areas.[39]

Due to the detail required to calculate the algorithm for the NRF model there may be barriers to implementation at a retailer level due to lack of adequate nutritional information on product labels in Europe.

Comparison between FSA/Ofcom model and NRF 9.3 model

A study of moderate quality comparing the models for potential use in Turkey found the scoring of the FSA/Ofcom nutrient profile model and the NRF 9.3 model showed high positive correlation, with a few notable differences. The FSA/Ofcom model uses energy, therefore more energy-dense products such as cheese tend to be classified as less healthy in this model, whereas the inclusion of calcium in the NRF 9.3 model means cheese scored more highly.[46] Soda with fruit flavour did not score highly on the NRF model due to its lack of shortfall nutrients, whereas it scored higher on the FSA/Ofcom model due to the model energy criteria.

Overall Nutritional Quality Index (ONQI) or NuVal

- This model was developed in the US, primarily to inform the development of food labelling to encourage healthier consumer choices.[47] The basic entry in the algorithm is a weighted trajectory score, which compares nutritional concentration in a food to the recommended concentration of a given nutrient in a healthy diet.[47]
- The nutrients selected for inclusion were of established public health importance and relevance to health. General consumption of these was deemed to be below or above recommended levels and/or there was a meaningful association with one or more specific health outcomes. These were: shortfall nutrients including fibre, folate, vitamin C, D, E, B6, B12, potassium, calcium, zinc, omega 3, flavonoids, carotenoids, iron and magnesium. Nutrients to limit: saturated fat, trans fat, sodium, added sugar and cholesterol.

The score takes into account:

- nutrients of favourable effect on health
- nutrients of unfavourable effect on health
- macronutrient factors – fat quality, protein quality, energy density, glycaemic load
- how the concentration of a nutrient in the food compares to the recommended concentration of that nutrient in the overall diet

- how consumption of that food influences the trajectory of daily intake for recommended nutrients that are in food.

Strengths

Like the models above, the 'across the board' approach of the ONQI model creates a level standard to which all products are assessed equally. The model also gives weight to the nutrients considered against the composition of a healthy diet and considers the quality of the macronutrients on the food or drink.

Several studies have validated the ONQI model. When assessed in a moderate-quality study validated against expert panel rankings it correlated highly and was significantly associated with the Healthy Eating Index, an objective assessment of diet quality.[48]

In a study of low quality exploring the impact of labelling based on NuVal nutrient profiling scores, the food selected by shoppers exposed to the labels represented an increase in overall diet quality but did not reduce the total energy purchased.[49] Due to methodological limitations these findings cannot be said to be robust.

Finally, a moderate-quality study assessing whether high ONQI scores predicted lower risk of major chronic disease, found the ONQI score was inversely associated with risk of chronic disease such as cardiovascular disease (CVD), diabetes and all-cause mortality but not cancer in both men and women. Consumption of foods that lead to a higher score for the ONQI scoring system is associated with modestly lower risk of chronic disease and all-cause mortality.[50]

Limitations

The calculation of the model is complex. It requires 30 different entries representing both micro and macronutrient properties of foods, as well as weighting coefficients representing epidemiologic associations between nutrient concentrations and health outcomes, which would make it unwieldy to implement in a retail setting.

SAIN/LIM French Nutrition Institute

- The SAIN/LIM model was developed in France by the French Food Standards Agency to provide the assessment for a 'front of pack' labelling system. The model classifies food into one of four categories based on two independent scores: SAIN – nutrients to promote and LIM – nutrients to limit.
- Nutrients included in the SAIN score are protein, fibre, ascorbic acid, calcium and iron. Nutrients included in the LIM score are sodium, sugars and saturated fat. The LIM score is multiplied by 2.5 for soft drinks. During the development of the model the number of nutrients to include was assessed to balance between importance to public health and the need for a manageable number of nutrients for use in a field setting.[51]
- The SAIN and LIM scores are two independent scores. SAIN synthesises the healthy aspects of food and LIM is based on the unhealthy aspects; there is no compensation between the SAIN and LIM scores. A SAIN value of over 5 indicates food of good nutrient density. LIM value of under 7.5 indicates low content of nutrients to limit.

Using these scores food and drink is classified into four categories:

- Category one includes foods with the most favourable nutrient profile (high nutrient density and low nutrients to limit).
- Category two includes foods with low nutrient density and low nutrients to limit.
- Category three includes foods with high nutrient density and high nutrients to limit.
- Category four includes foods with the least favourable nutrient profile (low nutrient density and high nutrients to limit).

Strengths

Like the models discussed previously, the 'across the board' approach of the SAIN/LIM model creates a level standard to which all products are assessed equally.

Findings from a moderate-quality validation study, which used model diets to provide an objective measure, suggested that the scoring of the SAIN/LIM model's

classifications correlated with foods groups associated with a healthy and unhealthy diet.[51] This study found that of the foods tested by the SAIN/LIM, 80% of fruit and vegetables, 50% of meat, fish, poultry and eggs, and 40% of starches and grains were in category one, 50% of dairy was in category three, and 88% of sweets and salted snacks were in category four.

Limitations

There were some limitations in the classification of the model. The above moderate-quality validation study found the SAIN/LIM model classified most nuts as category four. This does not acknowledge the health benefits of consuming nuts in moderation as part of a healthy diet.[51]

In a small, high-quality study, when compared with the FSA/Ofcom model the SAIN/LIM model did not have as high associations observed between its recommended products and reductions in future health risks. The authors of this study suggested this indicated that the FSA/Ofcom model may be a more adequate way to identify dietary patterns predictive of improved health status compared with SAIN/LIM. This may be explained by the SAIN/LIM model being more restrictive when selecting healthier food. As opposed to the recommended food in the FSA/Ofcom, foods such as pears, grapes, wholemeal bread, brown rice, boiled potatoes or vegetable soups were not included in the recommended foods for SAIN/LIM. Again, and in contrast to the FSA/Ofcom model, the SAIM/LIM model recommends whole milk.[31]

Due to the detail required to calculate the algorithm for the SAIN/LIM model there may be barriers to implementation at a retailer level due to lack of adequate nutritional information on product labels in Europe.

The Choices Programme

- The Choices Programme was developed by the Choices International Foundation to determine whether foods are eligible to carry a 'healthier options' stamp.
- The model was developed to be applied internationally. It aims to stimulate product reformulation and help consumers make healthier choices.
- The model has criteria for energy and key nutrients: total fat, saturated fat, sodium, added sugar and fibre. These were adapted from the WHO recommendations for a daily diet. No further detail on how the model is calculated was found in the evidence.

Strengths

A single study compared nutritional intakes from the Choices menu with typical menus from seven countries. The analysis showed energy, saturated fat, sodium and added sugar were reduced, however the size of the reduction differed across different countries – for example energy was reduced by 2% in China, and 17% in Spain and Greece. None of the countries included the UK, therefore we cannot conclude that similar reductions would be experienced in the UK using this model.[52]

In a comparison study of the Choices Programme, the US Food and Drug Administration (FDA) model and the FSA/Ofcom model, the Choices Programme was the most restrictive model. The highest levels of agreement were identified for the Choices Programme and FSA/Ofcom based on the low number of qualifying products overall (6% and 10% respectively).[23]

Limitations

Little evidence was found on how this model is calculated, therefore it is not transparent. In addition, no validation studies were found for this model against risk of future disease, objective measures of diet quality or nutritionists' ranking.

Due to the detail required to calculate the algorithm for the model there may be barriers to implementation due to lack of adequate nutritional information on products in Scotland.

4.1.2 Category-specific scoring model

Category-specific scoring models calculate scores for food in individual categories differently. These models avoid the issue of whole food groups being classified as good or bad, as they are calculated considering the intrinsic composition of the type of food in the category.[20]

Swedish keyhole model

The Swedish keyhole scheme was developed to regulate the use of a nationally recognised healthier choice logo and aims to promote reformulation from industry. The keyhole has nine main food groups, each with a number of categories which have specific criteria:

- Dairy products (9 categories)
- Margarine and spreads (2 categories)
- Meat (1 category)
- Fish (1 category)
- Mixed products (1 category)
- Ready-prepared products; pizza/pies; soups (3 categories)
- Fruit and berries (1 category)
- Vegetables; potatoes (1 category)
- Cereals: bread, breakfast cereals, flour (7 categories)

The keyhole symbol can appear on a package of a product that has a reduced amount of one or more of the following: total fat, saturated and trans fat, sugar, salt and or a high amount of fibre. The score is mostly calculated on a per 100g basis, although for some the criteria are calculated on a per 100kcal or per cent energy basis. The model is used to classify food in retail and out-of-home sectors.

The score is assessed against a product category average. The keyhole can be used if the product has a reduced amount of fat, sugar or salt, or more fibre than the category average.[34]

Strengths

The Swedish keyhole model allows for healthier versions of foods to be identified within categories, providing an incentive to industry for reformulation.

The Swedish keyhole model scores foods using criteria which recognise the intrinsic nature of the food within the category, therefore providing information to shift consumption away from unhealthy to heathier products within a category.

Limitations

No evidence was found on how the score is calculated.

As the score classifies food against other foods within the same category, it is a relative measure. Foods which carry the keyhole symbol may be healthier within their category but may still not be associated with a healthy diet. For example, it allows for the keyhole symbol to be used on reduced-fat spreads (up to 41% fat) of which a third can be saturated and trans fat, and on breakfast cereal up to 13% sugar.[16]

No validation of this method was found in the evidence search.

Nutrimap

- Nutrimap is a trademarked nutritional profiling system designed to help inform healthy dietary choices. The Nutrimap model quantifies nutritional assets and weakness of foods, scoring items in relation to other foods within the same food category. The food is positioned according to its nutritional composition, the food category it belongs to, the nutrition needs of the consumer, available consumption data, and major public health objectives.
- The model assesses 15 nutrients (carbohydrates, sugars, total lipids, saturated fat, mono-saturated fat, poly-saturated fat, fibre, folic acid, vitamins D, C and E, calcium, iron, magnesium and sodium). These nutrients were chosen because they had been identified as being over- or under-consumed in the diet. Each nutrient is allocated a score between minus one and plus one. This is allocated dependent on the amount of nutrient present in 100kcal.

Nutrients to limit are scored minus one if the food contains more than the recorded national intake and plus one if they have less than the recommended intake. Shortfall nutrients are scored plus one if they are more than the recorded national intake and minus one if they are less than the recommended minimum intake. Therefore, each nutrient is scored against two thresholds: recommended intake and current consumption.

- This scoring is done for seven categories:
  - cereals, legumes and potatoes
  - milk and dairy
  - meat, fish and eggs
  - vegetable and animal fat
  - fruit and vegetables
  - composite dishes
  - sugar-rich foods.
- These categories were set based on the main nutrient they provide, i.e. protein – meat and fish. Weightings are then given to nutrients to allow the proportion of the nutrient typically found in the food to be taken account of in the scoring.
- The model requires data from the McCance and Widdowson and the CIQUAL food composition tables, in addition to the National Nutritional Recommendations and national food consumption data.

Strengths

The Nutrimap model scores foods using criteria which recognise the intrinsic nature of the food within the category, therefore providing information to shift consumption away from unhealthy to heathier products within a category.

The Nutrimap model uses two thresholds: recommended intake and current consumption. Using these thresholds would allow the model to be adapted to different groups by using the recommended intake and current consumption data for the particular group.[53]

The Nutrimap model allows products to be mapped by nutritional assets and weakness across categories. A study found the model efficiently describes the nutritional quality of foods and provides a score that can distinguish between overall nutritional quality of items in the same category, for example croissants and cookies.[53] In addition, the models' classifications were highly consistent with the FSA/Ofcom model. However, as this study was sponsored by the food industry there is a strong chance of bias and the findings should be treated with caution.

Limitations

No independent validation study of the model was found in the literature search. One study using the model reported it was difficult to obtain reliable data for the composite dishes category.[53]

Software is available to perform the calculations; however, the developers of the model note that knowledge and expertise in nutrition would be required to use it.[53]

4.2 Threshold models

Sixteen papers looked at threshold models. The following provides a summary of the evidence from these papers.

Thresholds are defined as a predetermined value for a nutrient that a food must not exceed (upper limit) or that must be reached (lower limit). In some models all limits must be met, while in other models one or more must be met.

Threshold systems can be simpler to communicate and practical to implement than scoring systems which are worked out through algorithms.[1]

Threshold limits should be carefully considered and based on suitable referenced data. Methods include:

- the recommendations for the nutrient intake in the diet, however this may lead to unrealistic thresholds for some food categories and exclude them from the possibility of whole categories meeting the criteria

- using food composition data to set a threshold at the average value of nutrient content of foods in a given group, which allows for different thresholds across different food groups and works better for category-based schemes
- using nutrient composition data – thresholds for food groups set using desirable changes in the population nutrient intake.

The threshold limits will affect the impact of the public health intervention. One study found 57% more energy dense foods were considered appropriate to market to children based on industry models due to higher thresholds of nutrients to limit.[54]

One moderate-quality study tested thresholds for the purpose of identifying foods with a negative impact on health. A lower limit threshold of foods to provide at least 5% of the daily value for at least one shortfall nutrient identified cake, carbonated beverages, chips, crisps, pie, bologna, processed meat, pastries and candies as foods with a negative impact on health. This was identified as the most effective of the thresholds tested; however out of the 7,146 foods assessed the threshold only affected 232 individual foods, therefore it could arguably be more stringent.[27]

Threshold models can give clear criteria on which foods industry can reformulate, however they may only encourage reformulation to reach just above or below a threshold. One study on the impact of one threshold model implemented in school catering found nutrient content of many registered foods clustered just below the thresholds for energy and nutrients to limit.[55]

Models considered were:

Across the board threshold models

- Multiple traffic light criteria
- Food and Drink Administration model
- US interagency model
- Centre for Science in the Public Interest

Category specific threshold models

- European Nutrient Profile model

- Danish model
- Mexican taxation threshold
- Dutch tripartite model
- Guiding Star
- UK sugar reduction programme

4.2.1 Across the board threshold models

Multiple traffic light (MTL) criteria

- This model, based on the UK FSA traffic light front of pack labelling, is used to assess whether a food can carry a healthy label in Australia and New Zealand.[37]
- This approach uses a set of thresholds for sugar, salt and fat which trigger a change of colour of 'traffic light'. If the nutrient content per portion of a product exceeds 20g fat, 5g saturated fat, 15g added sugars or 1.8g salt the product is classified as red for that nutrient regardless of the per-100g value.[56]
- Points are given to score the product depending on the colour of the traffic light. One point for every green light, two points for every amber light and three points for every red light. In Australia and New Zealand healthy food is categorised as those with fewer than seven points.

Strengths

The 'across the board' threshold approach of the MTL model creates a level standard to which all products are assessed equally.

In a study of moderate quality, the MTL model was compared with a scoring model which allowed for modifying ingredients such as fibre and protein. The study found overall using the MTL, which only has criteria for nutrients to limit, fewer products were classified as healthy than for the scoring model (14% vs 39%). The models agreed 73% of the time. However, agreement across the models was lowest for products such as breakfast cereals, with 29% of breakfast cereals being classified as healthy using MTL, mostly due to sugar content, but 70% of breakfast cereals

classified as healthy with the scoring model.[37] This suggests the model may be effective in identifying products with high levels of fat, sugar and/or salt without the presence of shortfall nutrients compensating for them.

Two single studies, modelling the impact of replacing those products classified with red lights with products with only amber or green lights, found significant reductions in energy, total fat, saturated fat and sodium compared to baseline; sugars were not significantly reduced.[57] [58] The lack of reduction in sugars was reported as due to a lower number of products starting with a red light for sugar, suggesting sugar criteria could be strengthened. Caution should be taken when interpreting these findings due to limitations in the methodology.

Limitations

In a high-quality study assessing validation methodology the FSA banding on which the MTL model was based did not correlate with healthy dietary patterns. It had the lowest sensitivity for high fat indicators.[2]

In the UK, front of pack labelling is voluntary and only covers two thirds of products. Action to use this information to restrict marketing may drive manufactures to remove this information from products.

Food and Drink Administration (FDA) model

- The FDA model was developed in the US to set requirements for products to be eligible to make health claims. The model is calculated in nutrient quality per serving, not per 100g. This is based on the reference amounts customarily consumed (RACC).
- Thresholds for the model are based on nutritional recommendations for a 2000 kcal diet. Levels for nutrients to limit correspond to 20 per cent of the daily recommended value and for shortfall nutrients correspond to 10 per cent of the recommended daily intake. To be eligible, food has to meet four levels of the nutrients to limit and one of the shortfall nutrients.

- The FDA criteria have also been used by the American Heart Foundation (AHF). Products are permitted to use the AHF checkmark if a serving of the product has less than 3g of fat, 1g of saturated fat, and 20mg of cholesterol, 480mg sodium or 0.5g of trans fat.[27]

Strengths

The 'across the board' threshold approach of the FDA model creates a level standard to which all products are assessed equally.

This is the only model which uses serving size as a reference quantity. This approach takes into account the quantity in which the food or drink is commonly consumed when classifying. For example, bread sticks per 100g are high in salt but when assessed per portion would be under an upper salt threshold.

Limitations

One comparative study, of weak quality, found the RACC used in the FDA model do not correspond to volumes typically consumed in Europe.[20] Due to the FDA model criteria of having to meet one shortfall nutrient criteria, the model disqualifies water as it doesn't meet its shortfall nutrients criteria. In addition, fibre criteria per portion of 50g caused vegetables with moderate fibre content to be classified as unhealthy. Due to the purpose of the model, which focuses on disqualifying unhealthy foods from using health claims, the model is more sensitive for classifying unhealthy foods than healthy foods.[20]

A high-quality study seeking to validate a number of models against the rankings of nutrition professionals found the AHF only defined 26% of foods as healthy as opposed to between 32% and 50% of foods for nutrition professionals. The study found the AHF model to have the best correlation of all the threshold models, however all the scoring models had greater correlation with the nutritionists' rankings.[33] There were two items noted that were not classified as healthy with the AHF – granary bread and unsweetened soya milk – despite these being among the healthy items in the nutritionists' rankings.

US interagency model

- This model has been developed in the US to set standards for foods marketed to children ages 2–17 years. No evidence was found in the literature of a final model, therefore the evidence below is based on the proposals.
- There were three levels proposed,[59] each with thresholds to meet. These were set using data from current regulation on health claims, 2005 dietary guidelines for Americans, and dietary reference intakes.

Strengths

The 'across the board' threshold approach of the US interagency model creates a level standard to which all products are assessed equally.

Limitations

In two studies of moderate quality comparing models, the US interagency model was one of the strictest models, approving only 13%[22] and 14%[21] of the foods considered. In one study which provided the breakdown of the foods approved, the study showed that the model approved no snacks, composite dishes and sweet bakery, two per cent of meals and savoury baking, six per cent or breakfast cereal, and seven per cent of dairy.

The researchers stated the model was very complex to calculate.[21]

No evidence was found on a final model's implementation in the US or any validation studies of this model.

Centre for Science in the Public Interest (CSPI) model

- The Centre for Science in the Public Interest in the US have developed voluntary guidelines for responsible food marketing to Children[60] which are intended to be a guide for manufacturers and retailers as well as the media promoting food to young people. The guidelines include broad categories of beverage and foods with threshold criteria.

Strengths

The ‘across the board’ threshold approach of the CSPI model creates a level standard to which all products are assessed equally.

In a moderate-quality comparative study, the CSPI model approved 20.8% of considered foods.[22]

Limitations

No evidence was found on how the criteria were set or on the validation of the model.

The CSPI acknowledges that the criteria set allow for the marketing of products that may not be nutritionally ideal but that provide some positive nutritional benefit and that could help children limit their intake of calories, saturated and trans fat, sodium, and refined sugars.[60]

4.2.2 Category specific threshold models

European Nutrient Profile

The model was developed by the World Health Organization (WHO) to determine whether a food product may or may not be marketed to children. The model was based on the Norwegian and Danish models.

The model is divided into 17 categories (with some sub-categories).[61] The thresholds for these categories were developed taking into account dietary recommendations and public health and industry considerations.

Strengths

A category approach takes into account the role that different food types play in diet and discriminates between food products within categories.[1] In addition the category

approach was considered easier to adapt and be used in different European countries.

Category thresholds were set to ensure that only the healthier versions of products would be permitted to be advertised to children, for example only reduced-fat sauces would be permitted in the 'vegetable and animal fat and oil' category.

To promote reformulation in categories, for example the thresholds from the subcategory 'potato chips and potato-based snacks' will require reformulation to meet sodium targets. To discourage the addition of nutrients to limit, for example the sugar thresholds are challenging for preparations such as fruit compote; thresholds for the nuts and seeds subcategory are designed to discourage addition of fat, salt, frying or coating.[1] One study using the European model reports the classification of foods within it unproblematic except for the 'cereal products' and 'other foods' categories.[25]

In a study of moderate quality testing the model, the model permitted 41% of considered products. The main types of product permitted in this model were ready meals and composite dishes, meals, tinned pasta, yoghurt, peanut butter, and oat-based cereals. No product failed on having insufficient shortfall nutrients, while 26% failed due to their sugar content.[21]

Limitations

There are no thresholds within the category for sugar-based products or soft drinks within the model due to previous commitments from members not to advertise these products to children.

As mentioned above, the classification of foods within the 'cereal products' and 'other foods' categories have been problematic in one study.

Danish model

- The Danish model has been developed as a collaboration between private sector agencies and is endorsed by the government to support a voluntary code of responsibility to children.[62]
- Foods are divided into 10 categories, each with a specific threshold. The categories are:
    - dairy products
    - cheese
    - meat, poultry and fish
    - bakery
    - cereal
    - fruit and vegetables
    - sauces and dressings
    - beverages
    - desserts, snacks and candy
    - ready-made meals and convenience food

Strengths

The Danish model sets thresholds for foods using criteria which recognise the intrinsic nature of the food within the category, therefore providing information to shift consumption away from unhealthy to healthier products within a category.

Thresholds may also be simpler to communicate to retailers in implementing the model.

Limitations

The model permits assessment of food on a case by case basis, allowing foods which have passed the model thresholds to be disqualified from marketing to children through subjective judgement. For example, some fast foods were disqualified due to this category not being regarded as unsuitable to promote to children. This level of assessment would make the model challenging to implement in a legislative setting.

No evidence on how the thresholds were set or evidence on the validation of the model was found.

In a comparison study of moderate quality against validated models the Danish model was the most restrictive, approving only six per cent of products. Most products failed because of their sugar or salt content.[21]

Mexican taxation threshold

- In Mexico an eight per cent tax on non-essential foods (foods with excessive amounts of saturated fat, sugar and/or sodium) which are above the threshold of 275 kcal per 100g has been implemented. Non-essential foods were targeted due to a 2012 national health and nutrition survey which reported 11–18% of the national calorific intake came from these products.
- Categories of food that are included in non-essential foods subject to the tax are:
    - salty snacks
    - chips
    - cakes
    - pastries
    - candies
    - sweets
    - puddings
    - peanut and hazelnut butter
    - ice cream and ice pops
    - cereal-based products with substantial added sugar
    - chocolate and frozen desserts.

Strengths

Using national diet data, the foods which were most negatively contributing to the Mexican diet were identified and for these items a maximum threshold of calories per 100g was set. Due to the targeting of the foods with most negative impact, reduction in the consumption of these foods or the calories per 100g is likely to have a positive effect on public health.

A poor-quality study looking into the impact of the tax on these non-essential food products found that increasing the price reduced low socioeconomic status (SES) households' purchase of taxed foods by 10.2%, medium SES households declined by 5.8%, and high SES households did not change.[63] However, the study did not collect data on chocolate, candy and sweet breads, three significant groups of non-essential foods, and therefore this is likely to impact on the results.

Limitations

It is not clear from the evidence how the threshold criteria were reached and therefore we cannot be sure whether it is set at an appropriate level to see impact across the population.

It is not clear from the evidence if the Mexican Nutrient Profile model was used to classify the categories of non-essential foods for the taxation thresholds. However, it should be noted in a small comparison study comparing the Mexican profile model with the WHO and FSA/Ofcom models, the Mexican model permitted the most products to be advertised to children, at 35.7% compared to 21.3% (FSA/Ofcom) and 16.9% (WHO). This was due to its weaker sugar criteria.[64]

The Dutch tripartite classification model

- The Dutch tripartite classification model was developed to help consumers make healthier choices within food categories. The model has eight categories with thresholds that consider nutritional criteria according to the intrinsic nature of the food group and the nutrition policy. These eight categories were defined as basic food groups that are important to the typical Dutch diet. The thresholds were set using data from daily intake recommendations and nutrition policy. The thresholds set preferable (recommended foods), middle course and exceptional (foods to limit) food within each category.[20]

Limitations

In a high-quality validation study assessing models against the ranking of nutritionists, the tripartite model had the weakest correlation to the ranking, classifying only 23% of foods as healthy in comparison to 32–50% from the nutritionists' ratings. The model classified granary and wholemeal bread, semi-skimmed milk and reduced sugar and salt beans as unhealthy, in disagreement with nutritionists' rankings.[33]

No further validation evidence was found.

Guiding star

- The Guiding star model was developed in the US with private sector collaboration from a supermarket chain as a way of informing healthy choices through labelling. It is designed to assess all products within a supermarket.
- Nutrients were included only if there was felt by the panel of nutritionists to be significant scientific consensus regarding their association with public health outcomes and were reviewed to ensure consistency with current dietary guidelines.
- The model included fibre, vitamins, minerals and whole grains, with nutrients to limit including trans fat, saturated fat, cholesterol, added sodium and added sugar.
- The model used two broad categories: general food and beverages, and meat, poultry, seafood, dairy and nuts. Maximum and minimum thresholds were set for the nutrients in each of these categories. These thresholds were set using percentages of daily values (DV) or established dietary guidelines recommended for each nutrient. Guiding stars are allocated depending on the number of threshold met.

Strengths

Products with at least one star had lower levels of sodium, saturated fat and sugars, and higher amounts of fibre than those not earning stars. Products receiving no stars

had three and a half times higher saturated fat and double the cholesterol than products with one to three stars.[65]

The guiding star includes thresholds for meat, poultry, seafood, dairy and nuts and recognises the intrinsic nature of these food which play in important role in a healthy diet.

Thresholds may also be simpler to communicate to retailers in implementing the model.

Limitations

A study of moderate quality found only 23.6% of the 27,466 products within a supermarket earned one star or more.[65] The model's strict criteria meant that some products categorised as healthy by other labelling schemes received no stars.[27] Sixteen per cent of the products were unable to be rated due to lack of nutrient information or being deemed inappropriate for the model criteria, for example baby food.[65]

UK sugar reduction programme

- The UK sugar reduction programme has identified eight categories of foods which have been set the threshold of a reduction in sugar by 20%. These categories are:
    - breakfast cereals
    - yoghurts and fromage frais
    - biscuits
    - morning goods
    - puddings
    - ice cream, lollies and sorbets
    - chocolate confectionary
    - sweet confectionary.

These categories of foods were identified by analysing sugar and calorie levels in food and drink and the percentage contribution to the total sugar intake for children and adults, and therefore may be of interest for an intervention which intended to reduce sugar intake.[66]

4.3 Categories

In addition to methodology to classify food and drink using algorithms or thresholds, another method to classify food is through setting categories. This methodology divides foods into categories based on a component common to them all, for example ‘cakes’ or ‘fast food’. For a public health intervention with the intention to reduce obesity, categories could be decided on the types of foods which contribute the most sugar or fat to the diet. Categories would require precise definitions.

This method has the advantage of not requiring nutritional information to classify a food, making it simpler to implement in a retail setting. However, it may have limitations in encouraging reformulation and may be potentially problematic for borderline products.

These are some examples of how food is categorised in the UK.

Kantar World Panel

Kantar World Panel divides food and drink into categories for reporting. No information on the criteria for inclusion of a foods in each of the categories was found for this review. Clear criteria would have to be available in order to use these categories for a mandatory policy. However, these are the categories by which data around food and drink purchases are collected and therefore could be of value.

VAT

VAT is a well-established categorisation for food in the UK and is understood by the industry. However, the categorisation has not been developed to achieve health-related outcomes – for example high-fat and -sugar products such as flapjacks and

marshmallow teacakes are zero rated. Therefore, a model based on these categories would be unlikely to effectively reduce health-related harm.

Strengths

This method is simple to communicate which products would lie within and out with the scope of the intervention and therefore would be practical to implement.

Limitations

As it only classifies foods by the category they belong in, this method does not recognise differences in the nutritional composition of foods within a category – for example yoghurts may or may not have added sugar. This will provide no incentive for manufacturers to make products in the categories healthier and therefore will be unlikely to result in reformulation.

Foods which are borderline between categories, for example marshmallow teacakes, may be difficult to place and therefore would require clear guidance to those implementing on borderline products in the chosen categories.

5 Conclusions

From the evidence found for this review there are no methodologies that have been used for identifying foods for limiting marketing and promotions of HFSS products at a population level. The main body of methodologies have been developed for restricting advertising to children or regulating health claims. Therefore, there was no direct example of an ‘off the shelf’ methodology that has been evidenced to work in the context of limiting marketing and promotions.

An ‘across the board’ approach allows all food and drink to be assessed using the same criteria. This reduces the potential impact of cross price elasticity leading to increased demand for unaffected substitute products. However, this increases the risk of whole categories being subject to limits as a result of unachievable criteria

due to the intrinsic nature of the food or drink, and therefore discouraging reformulation.

A ‘category-specific’ approach can identify whole categories to limit marketing in which, like the approach above, may discourage reformulation. Scoring or threshold criteria can be developed which consider the intrinsic nature of the food or drink in the category and therefore may provide an incentive for reformulation, if that was an aim of the policy, due to the criteria being more achievable.

The category-specific approach allows for the foods and drinks which most negatively impact on the Scottish diet to be targeted. However, this approach requires clear category definitions to avoid issues in implementation for borderline products.

Using a scoring algorithm to assess the products either ‘across the board’ or within categories provides a sensitive tool to rank food and drink. However, it requires nutritional information to calculate which is not always available in a retail or out-of-home setting and therefore would require all assessment to be done at the manufacturer level.

Thresholds are simpler to assess than scoring systems. Depending on the nutrients chosen for the thresholds, current ‘back of pack’ labelling may be adequate to calculate whether a product is above or below a threshold.

Based on the evidence in this review, NHS Health Scotland would suggest that a bespoke methodology is required for limiting marketing and promotions of HFSS food and drinks. The development of such a methodology should consider the following areas:

- the overall aim of the programme
- Scottish dietary tracking data and Scottish dietary goals
- nutritional information currently available on packs
- ease of implementation and where the burden of implementation will lie
- public acceptance.

The recent Food Standards Scotland situation report[67] highlighted the need to reduce fat, sugar and salt within the Scottish diet. In addition it identified that 'discretionary foods and drinks such as confectionery, cakes, biscuits, pastries, crisps and savoury snacks and regular soft drinks together with puddings and desserts, ice cream, edible ices and dairy desserts contribute considerably to purchase of calories (24%), total fat (25%), saturated fat (28%), total sugar (37%) and sodium (11%)'.

A methodology that effectively classified these categories of discretionary foods for restrictions in marketing and promotions is therefore likely to have a positive impact on reducing purchasing of fat and sugar at a population level.

Appendix: Search strategy

Question: What methods have been used to define high fat, sugar, salt food and drink for public health interventions?

Search terms

‘Food Typology’
‘Food classification system’
‘Nutrient Profile’
‘Food Index’
‘Stratification of foods’
‘Nutrient thresholds’
‘Food categorisation’
‘IARC-EPIC’
‘IFIC toolkit’
‘NUVAL’
‘FSA multiple Traffic Light Criteria’
‘Nutrient Rich Foods Index’
‘Naturally Nutrient Rich Score’
‘Overall Nutritional Quality Index’
‘Calories per nutrient scale’
‘Ratio of recommended to restricted foods’
‘Vo Vo scheme’
‘Swedish Key Hole’
‘NOVA classification’

Limits:

Article within the last 10 years
Articles from:

- UK
- Europe
- USA and South America
- Australia and New Zealand

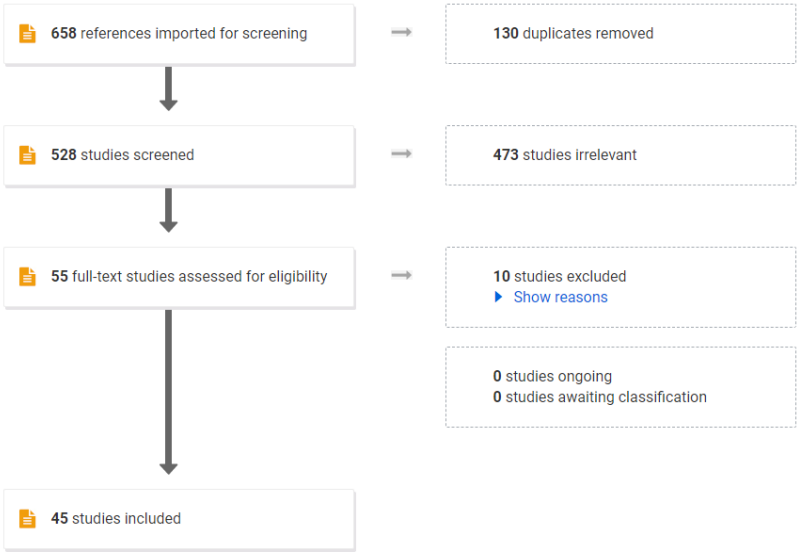

Figure 1: PRISMA diagram

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