Public Health England

Protecting and improving the nation's health

Sugar Reduction: The evidence for action

Annexe 1: Background

About Public Health England

Public Health England exists to protect and improve the nation's health and wellbeing, and reduce health inequalities. It does this through world-class science, knowledge and intelligence, advocacy, partnerships and the delivery of specialist public health services. PHE is an operationally autonomous executive agency of the Department of Health.

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Annexe 1a. Summary of Scientific Advisory Committee on Nutrition's report 'Carbohydrates and health'

The Scientific Advisory Committee on Nutrition (SACN) is a UK wide advisory committee set up to provide advice to Public Health England as well as other government agencies and departments. Its remit includes matters concerning the nutrient content of individual foods, advice on diet and the nutritional status of people.

SACN's draft report 'Carbohydrates and health' was published for public consultation in June 2014. Fifty-eight submissions were received from individual academic experts, public health bodies, trade and industry organisations, and professional and consumer associations. All consultation comments received were considered carefully and the draft report amended where appropriate.

The final report 'Carbohydrates and health' was published on 17 July 2015[1] alongside supporting documents including the consultation comments and SACN's responses, and outstanding minutes of SACN's carbohydrate working group meetings.

SACN's dietary recommendations for total carbohydrate, free sugars, starch and sugars contained within the cellular structure of food, and milk sugars were proposed in the context of an energy intake which is appropriate to maintain a healthy weight.

SACN's review of the evidence in relation to sugar has concluded that:

- in adults, when given free access to food, increasing the percentage of total energy from sugar leads to increases in energy intake
- greater consumption of sugar-sweetened drinks is associated with increased risk of type 2 diabetes
- consumption of sugar-sweetened drinks, compared to non-sugar sweetened drinks results in greater weight gain and increases in body mass index in children and adolescents due to increased energy consumption
- higher consumption of sugar and sugar-containing foods and drinks is associated with a greater risk of dental caries

On the basis of these findings SACN make the following recommendations:

- the average population intake of free sugars should not exceed 5% of total dietary energy for age groups from 2 years upwards
- the consumption of sugar-sweetened beverages should be minimised in children and adults
- the definition of 'free sugars' should be adopted in the UK[a]
- with the proposed reduction in the population intake of free sugars, their contribution toward recommended total carbohydrate intake should be replaced by starches, sugars contained within the cellular structure of foods and, for those who consume dairy products, by lactose naturally present in milk and milk products
- the complete replacement of energy derived from free sugars by these carbohydrate sources would only apply to those people who are a healthy BMI and in energy balance. In those who are overweight, the reduction of free sugars would be part of a strategy to decrease energy intake

SACN also drew conclusions in relation to dietary fibre and the overall carbohydrate composition of the diet and recommended that:

- the dietary reference value for total carbohydrate should be maintained at an average population intake of approximately 50% of total dietary energy
- the dietary reference value for the average population intake of dietary fibre (according to the new definition) for adults should be 30g/day
- the average population intake of dietary fibre for children aged 2 to 5 years should approximate 15g/day, for children aged 5 to 11 years 20g/day, for children aged 11 to 16 years 25 g/day and for adolescents aged 16 to 18 years about 30g/day
- the definition of dietary fibre used in the UK should be broadened[b]
- Most of the evidence for the wide range of health benefits of fibre comes from studies where the exposure reflects dietary fibre intakes achieved through a variety of foods where it is present as a naturally integrated component. There is evidence to show that particular extracted and isolated fibres have positive effects on blood lipids and colorectal function but due to the smaller evidence base, it is not known whether these components confer the full range of health benefits associated with the consumption of a mix of dietary fibre rich foods. Therefore, fibre intakes should be achieved through a variety of food sources

[a] The definition of 'free sugars' comprises all monosaccharides and disaccharides added to foods by the manufacturer, cook or consumer, plus sugars naturally present in honey, syrups and unsweetened fruit juices. Under this definition lactose, when naturally present in milk and milk products, and sugars contained within the cellular structure of foods, are excluded.
[b] The definition of dietary fibre should include all carbohydrates that are neither digested nor absorbed in the small intestine and have a degree of polymerisation of three or more monomeric units, plus lignin. For extracted natural carbohydrate components or synthetic carbohydrate products to be defined as dietary fibre, beneficial physiological effects, similar to those demonstrated for the naturally integrated dietary fibre component of foods, must be demonstrated by accepted scientific evidence. Dietary fibre is to be chemically determined using the prevailing AOAC method agreed by regulatory authorities.

No specific recommendations are made for children aged under 2 years, due to the absence of information, but gradual diversification of the diet to provide increasing amounts of whole grains, pulses, fruits and vegetables with reduced amounts of free sugars is encouraged.

The final report and related documents can be downloaded from:
https://www.gov.uk/government/publications/sacn-carbohydrates-and-health-report
Hardcopies of the report can be ordered from TSO (www.tsoshop.co.uk).

Annexe 1b. Impact assessment – modelling potential health and other benefits of achieving SACN recommendations for sugar

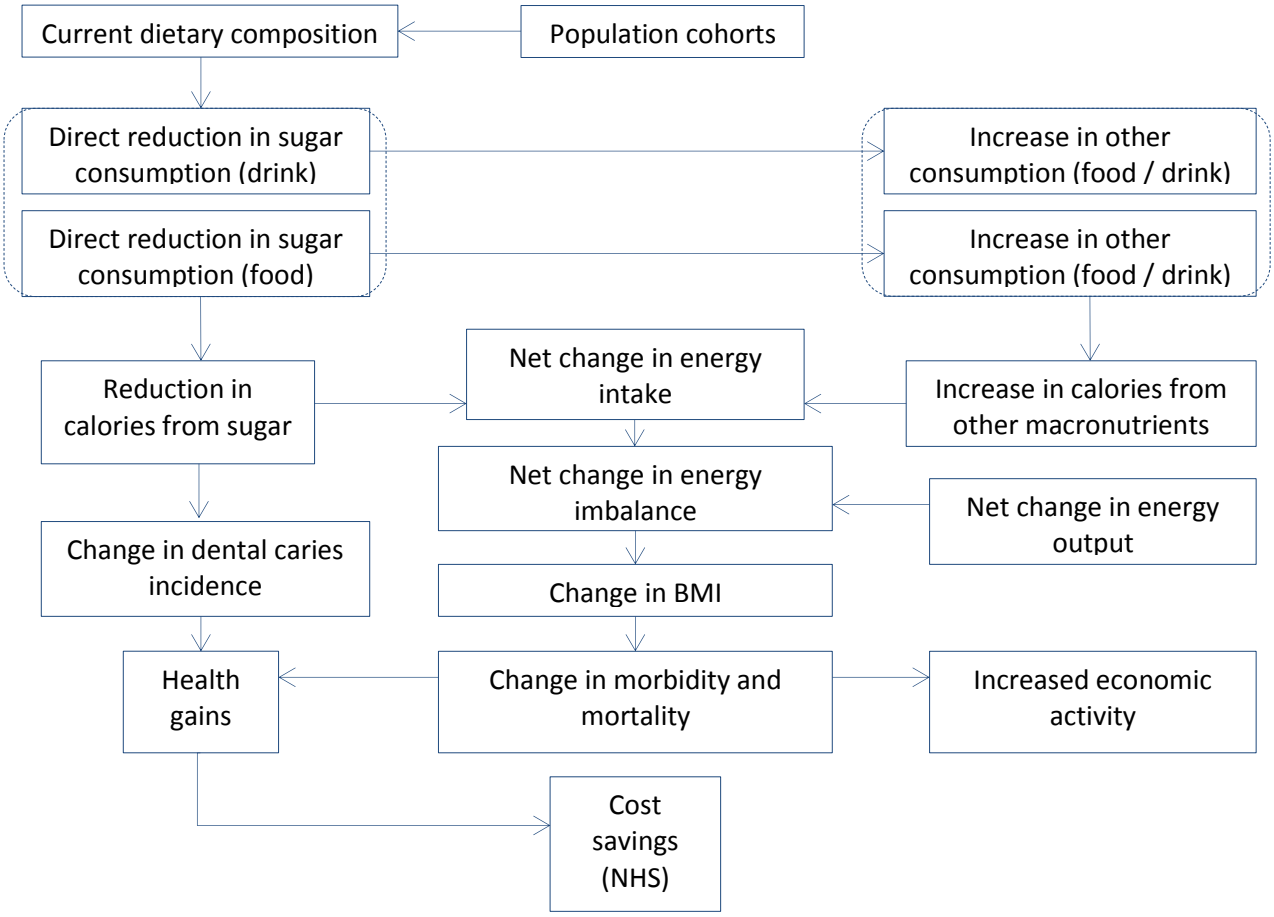
In response to the draft report ‘Carbohydrates and health’, the Department of Health was commissioned by PHE to estimate the potential health impact (ie from reduced levels of overweight, obesity and dental caries) and wider economic benefits associated with achieving the recommendation that population free sugar intakes should not exceed 5% of total dietary energy.

This summary, produced by the Department of Health in collaboration with PHE, describes the data sources, methodology, limitations and assumptions of the modelling calculations used to assess these. The outcome of the modelling exercise is presented in the section ‘Potential cost savings of achieving SACN’s sugar recommendation’ in the main document ‘Sugar Reduction: The evidence for action’.

The general structure of the model is displayed in figure 1 below. Population cohorts are followed for a period of 25 years, with cohort characteristics described by average values for each group. The model is formed of a number of discrete sections: dietary changes, weight changes, obesity-related health implications, and dental health implications.

It should be noted that this model only assesses the outcomes associated with a reduction in sugar consumption. It does not consider how such a reduction could be achieved. The model follows cohorts of people over a defined time period, and so only assesses the impacts of reducing sugar consumption for people who are alive during the study period (ie it cannot predict the impact on future generations).

Figure 1. Structure of the impact assessment model



Methods

Dietary change

Data from years 1 to 4 (2008/09 to 2011/12) of the National Diet and Nutrition Survey (NDNS) has been used as the baseline dietary input to the model. In the base case the model displays results for a 50% reduction for sugar calories from food, and a 83.5% reduction in sugar calories from drink. These reductions are chosen to be illustrative and these are not the only, or necessarily the most appropriate, reductions that could be made.

A reduction in consumption of sugary foods and drinks may not reduce total energy consumption by the full amount expected as energy may be replaced by other products, partially offsetting any reduction in calories.[2] There is no consensus around the expected rate of this 'calorie offsetting' partly because the rate is likely to depend on the policy interventions used to target a reduction in sugar consumption. Evidence suggests that calorie offsetting is less likely to occur for liquid calories than solid calories,[3,4] however in the case presented in the main document 'Sugar reduction: The evidence for action' the model assumes that **no calorie offsetting occurs for either food or drink**. SACN has made its recommendations in the context of an energy intake required for a healthy body weight, ie less energy than an obese or overweight person requires to maintain their current body weight, assuming population average levels of physical activity.[5]

Taking these factors in to consideration, the model estimates the reduction in calories from sugar necessary to achieve the target level, for each of the population subgroups considered in the NDNS.

Change in weight following reduced calories from sugar consumed

After the dietary changes for age-gender groups have been determined, the modelling disaggregates the population groups by obesity level using Health Survey for England[6] data. Outcomes are derived only for those aged 4 to 79 years who are overweight, obese or morbidly obese at the outset. Normal and underweight people are excluded as reductions in sugar intake are assumed to have minimal impact on their health.

The estimate of weight change is derived from the absolute change in total calories resulting from dietary change. This assumes that, on average, every 100kJ reduction in energy intake will eventually result in a 1kg loss in weight, or 0.042kg lost per calorie reduction.[7] For simplicity, the model assumes that weight is lost in a linear manner over a three-year period.

The estimated reduction in weight for a given reduction in calorie intake increases as total weight increases. Given individuals in the obese and morbidly obese groups will naturally weigh more than those in the overweight group, it is expected that weight loss used in the model will be underestimated for these people.

The calculation above expresses changes in terms of weight loss. In order to calculate the health impacts of changes in obesity levels these were then converted to change in BMI. An expected change in BMI was calculated for each age-gender-BMI sub-group. As noted above, weight reduction is constant within each age-gender group across the different weight categories. Consequently, it is expected that the model underestimates BMI loss for all groups, with especially large underestimates in the higher weight groups.

Obesity-related health implications

The modelling of obesity-related health implications is predominately based on the PHE weight management economic assessment tool.[8] Certain changes have been made to the original PHE model calculations for this modelling.

NHS costs for prevalent cases of heart disease, stroke, colorectal cancer and breast cancer were estimated in a similar manner to the original PHE model. A cost is attributed to each person year lived with a condition linked to obesity. This cost is estimated using existing data for 2012/13 on the total cost attributed to that condition and estimates of prevalence of the conditions.[9,10,11] This approach is likely to underestimate the cost of conditions associated with healthcare complications, such as diabetes. Costs of the acute phases of myocardial infarction (MI) and stroke were also included in the model.

The model does not assign conditions to individuals; rather it estimates the total number of cases of each condition across the population group and assumes the cost of each condition is additive – in other words, the cost of treating one person with colorectal cancer and coronary heart disease (CHD) is the same as treating one person with colorectal cancer and another person with CHD.

An estimate of lost production resulting from premature mortality is derived from this considering expected wages and likelihood that an individual would be in employment. The proportion of deaths avoided for each single year of age (for the 19 to 64 year old cohort) is estimated.

Dental health implications

Baseline data from English dental health surveys of children[12,13,14] on the number of dental caries currently experienced was used to estimate the ongoing incidence of caries into adulthood, sense checked against alternate data on adult caries. The incidence of dental caries has fallen over time in the past, and so using current rates of dental caries incidence may mildly overestimate the number of dental caries that will be avoided. The model only considers the impact of changes in sugar consumption on the incidence of dental caries in children and young adults (aged 0 to 18 years), because the development of dental caries depends on life-long exposure to risk factors.

Adults will almost certainly benefit from a reduction in sugar consumption, but this calculation based on children could overestimate the potential benefit to adults. Estimates were based on NHS costs for dental treatment, excluding patient charges as these do not apply for those under 18 years of age.

References

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