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By Elliot Stanton,
Natasha Mutebi
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Food, diet, nutrition and cancer

Overview

- Nearly 1 in 2 people in the UK will be diagnosed with cancer at some point in their life. Almost 4 in 10 cases of cancer are currently considered to be preventable, being caused by known risk factors such as diet.
- More of the UK's population than ever are living with overweight or obesity. These are the second largest causes of preventable cancers after smoking. Evidence also suggests that alcohol and processed meat are amongst other factors that increase cancer risk.
- New research methods and technologies could offer better means of accurately investigating the links between diet, nutrition and cancer.
- Public awareness around cancer risk factors varies. For example, around 1 in 10 participants in a September 2023 survey mentioned overweight or obesity as being associated with increased cancer risk.
- There is also low adherence to UK Government dietary recommendations. A 2020 study found that fewer than 1 in 1000 UK adults surveyed adhered to nine recommendations from UK Government dietary guidance.
- Preventing diet and nutrition related cancers is complex. Stakeholders have suggested that measures such as taxes, reformulation programmes, affordability interventions or marketing restrictions, may be more effective in preventing diet and nutrition related cancers than public awareness-based approaches.

Background

Cancer describes a range of diseases that occur following the uncontrolled growth of abnormal cells and subsequent tumour formation (CBP-06877).[1] Cancers are characterised according to the location and tissue type in which primary tumours form.[2]

The Office for National Statistics said in 2021 around 1 in every 4 deaths in England were caused by cancer.[3] A Cancer Research UK (CRUK) study estimated that 135,000 cancer cases in the UK each year are preventable.[4]

Several dietary and nutritional factors appear to change cancer risk.[5–8] There are convincing associations between cancer and an individual's overweight or obesity status,[a] and the consumption of alcohol and processed meats.[6,8]

Accurately identifying associations between diet, nutrition and cancer can be challenging owing to a number of research and methodological hurdles described in a later section.[10–15]

Current policy and guidance

Health and social care policy is devolved. This briefing primarily focuses on policy interventions in England.

Improving diet and reducing the proportion of the population living with overweight or obesity could prevent cancers.[6,8,16,17]Cancer prevention, weight management and alcohol dependency are key focuses in the NHS Long Term Plan and NHS England's Prevention Programme.[16,18]

In August 2023, the Department of Health and Social Care (DHSC) published the 'Major conditions strategy: case for change and our strategic framework'.[b] The framework focuses on six major non-communicable diseases, including cancer, with the aim of improving prevention, diagnosis and patient health.[19]

The Office for Health Improvement and Disparities (OHID) in DHSC has overall responsibility for matters relating to diet and nutrition.[20]

UK dietary recommendations are based on independent advice from the Scientific Advisory Committee on Nutrition (SACN) and are illustrated in the Eatwell Guide (2016) (Box 1).[21] This is the UK's national healthy eating model.[22,23]

[a] For most adults a BMI between 25 to 29.9 is in the overweight range, while a BMI over 30 is in the obese range.[9]

[b] This interim report describes the framework for a future major condition strategy, however the Major Conditions Strategy itself is yet to be published.

Advice on healthy eating and physical activity guidance is also communicated through the Government's 'Better Health' campaigns and resources.[24,25] (CBP-9049).

Box 1: The Eatwell Guide.

For a healthy, balanced diet, The Eatwell Guide recommends that we:

- eat at least 5 portions of a variety of fruit and vegetables every day
- base meals on potatoes, bread, rice, pasta or other starchy carbohydrates; choosing wholegrain versions where possible
- have some dairy or dairy alternatives (such as soya drinks); choosing lower fat and lower sugar options
- eat some beans, pulses, fish, eggs, meat and other proteins (including 2 portions of fish every week, one of which should be oily)
- choose unsaturated oils and spreads and eat in small amounts
- drink 6-8 cups/glasses of fluid a day

The National Food Strategy (2020/21) is an independent report commissioned by the Government that made several recommendations for improving food systems.[26] The Government Food Strategy (2022) responded to some of these recommendations, describing policy initiatives to aid healthy lifestyle choices, improve food security and sustainability and accessibility of healthy foods. Monitoring and evaluation mechanisms have been implemented to support the strategy.[27]

UK Government policy efforts to improve dietary and nutritional health that focus on the food system and environment have included:

- UK-wide financial mechanisms such as the soft drinks industry levy (CBP-7876)[28]
- reduction and reformulation[a] targets addressing the amounts of calories, sugar and salt in foods[29]
- regulation of food placement and promotion, including 'The Food (Promotion and Placement) (England) Regulations 2021'.[30] Placement restrictions came into force in October 2022, while price promotion restrictions are planned to come into force in October 2025[b] [32]

[a] Reformulation describes the process of changing the processing or composition of a food or drink product.

[b] For the restriction of promotion of foods high in fat salt and sugar (HFSS) by location and by volume price, food that falls within a restricted category is assessed using the nutrient profile model (NPM 2004/2005) to determine whether the product is subject to the restrictions.[31]

- UK-wide restrictions on the advertising of less healthy food and drink (Communications Act 2003, Section 368FA, Advertising: less healthy food and drinks),[33] to be implemented in October 2025 after a series of delays[34–36]
- national standards which aim to ensure healthier food provision in public sector settings[37,38]

Associations between diet, nutrition and cancer

The risk of developing cancer depends on many factors. Some factors, like ethnicity, cannot be changed. Others factors can be changed such as smoking, overweight and obesity, alcohol intake, physical activity, diet and nutrition.[39,40]

Cancers arising from exposure to modifiable risk factors are preventable.[39] Estimates suggest that almost 4 in 10 cancer cases in the UK are currently preventable, because they are caused by known modifiable risk factors.[4]

An estimated 8 in 10 cancers in the UK may be 'preventable in principle'.[a] They are caused by a combination of known risk factors with potentially underestimated impacts, and risk factors not yet identified.[41]

The World Cancer Research Fund (WCRF), American Institute for Cancer Research (AICR) and the World Health Organisation's (WHO) International Agency for Research on Cancer[b] (IARC) bring together scientific panels to assess the strength of existing evidence surrounding potential cancer risk factors.

These panels grade evidence based on how confident they are that risk factors are associated with the risk of developing specific cancers (Table 1).[6,8] The methods used by the WCRF when assessing evidence are discussed in the "Judging the Evidence" section of the WCRF 2018 Expert Report.[43]

New evidence is reassessed gradings can be updated through programmes like the WCRF's Global Cancer Update Programme.[43]

[a] This is based on comparison with countries with the lowest incidence internationally.[41]

[b] This is done through the IARC Monographs programme which brings together expert working groups to assess evidence and identify environmental factors that are carcinogenic hazards to humans.[42]

Table 1 Selected dietary and nutritional factors where there is strong[a] evidence of association with cancer risk (WCRF/AICR 2018 Expert Report)

Risk factor	Direction	Strength of evidence[a]	Cancers affected
Adult adiposity[b], overweight and obesity.	Increases risk	Convincing	Mouth, pharynx and larynx, Oesophagus (adenocarcinoma), Pancreas, Liver, Colorectum, Breast (post-menopause), Endometrium, Kidney
Adult weight gain	Increases risk	Convincing	Breast (post-menopause)
Physical activity (moderate and vigorous)	Decreases risk	Convincing	Colorectum
Alcoholic drinks	Increases risk	Convincing	Mouth, pharynx, and larynx, Oesophagus (Squamous cell carcinoma), Liver, Colorectum, Breast (post-menopause)
Processed meats	Increases risk	Convincing	Colorectum
High dose beta-carotene supplements	Increases risk	Convincing	Lung
Adult adiposity, overweight and obesity	Increases risk	Probable	Stomach, Gallbladder, Ovary, Prostate
Adult adiposity, overweight and obesity	Decreases risk[c]	Probable	Breast (pre-menopause)
Alcoholic drinks	Increases risk	Probable	Stomach, Breast (pre-menopause)
Red meats	Increases risk	Probable	Colorectum

[a] The WCRF group risk factors with 'Probable' or 'Convincing' associations as having strong evidence of association with cancer risk and risk factors with 'Limited' association as having suggestive evidence of association with cancer risk.[43]

[b] Adult adiposity is termed 'Adult body fatness' in the WCRF/AICR 2018 Expert Report.[6]

[c] Decreased pre-menopausal breast cancer risk being associated with overweight and obesity by the WCRF has been hypothesised to result from decreases in oestradiol levels in women living with overweight and obesity, alongside overweight and obesity being associated with lower mammographic breast densities.[6,44]

Wholegrains, Food Containing dietary fibre	Decreases risk	Probable	Colorectum
Non-starchy vegetables or fruit	Decreases risk	Probable	Aerodigestive cancers
Foods preserved by salting	Increases risk	Probable	Stomach
Calcium supplements	Decreases risk	Probable	Colorectum
Coffee	Decreases risk	Probable	Liver, Endometrium
Dairy Products	Decreases risk	Probable	Colorectum
Glycaemic load[a]	Increases risk	Probable	Endometrium
Physical activity (moderate and vigorous)	Decreases risk	Probable	Breast (post-menopause), Endometrium
Lactation[b]	Decreases risk	Probable	Breast (post-menopause and Pre-menopause)

WCRF/AICR, 2018.[6] This is not an exhaustive list of the dietary, nutritional and lifestyle factors assessed as having strong evidence by the WCRF/AICR.

Overweight and obesity are leading causes of preventable cancers

Adult overweight and obesity are the second greatest modifiable risk factor for cancer in the UK.[4]

A 2018 study estimated that 6.3% of all cancer cases in the UK were caused by overweight and obesity.[4] In 2018, CRUK estimated that overweight and obesity in females could overtake smoking as the lead cause of preventable cancers by 2043.[45]

Associations between overweight or obesity and cancer means that factors associated with risk of overweight and obesity, like sugar sweetened beverage consumption are then indirectly associated with cancer risk. [6,46]

Some factors, like moderate or vigorous physical activity are thought to contribute towards cancer risk and the risk of overweight or obesity, decreasing both.[6]

[a] An estimate of how much a given food will raise blood glucose levels after being eaten. A one-unit increase is designed to approximate the effect of eating 1 gram of glucose.

[b] This refers to the mother breastfeeding, not to the child being breastfed.[6]

Alcohol consumption and cancer

Alcohol consumption is strongly associated with cancer risk.[6] In the UK, an estimated 3.3% of cancer cases are caused by alcohol, making it the sixth largest cause of preventable cancers.[a] [6]

Alcohol has been classified as a group 1 carcinogen by IARC. Any level of alcohol consumption, regardless of the type of alcoholic drink, increases cancer risk.[6,47,48]

The role of dietary patterns in cancer

Research into diet, nutrition and cancer risk often focuses on dietary patterns, rather than individual dietary components. This approach could have several benefits over research focussing on individual dietary components because individual foods and nutrients are not consumed in isolation.[49–51]

Dietary patterns are assessed using different methods depending on the questions asked.[52] One common method of assessing dietary patterns makes use of indexes to score diets.[53–57]

A meta-analysis study (2018) investigated three different healthy dietary pattern indexes[b] and their associations with non-communicable diseases, including cancer. In this study, compared to those with the lowest adherence, a 16% reduction in overall risk of cancer mortality for those most closely following the assessed dietary patterns was observed. Cancer survivors with the highest adherence to these dietary patterns appeared to have reduced risk of overall and cancer mortality than those with the lowest adherence.[58]

The WCRF/AICR Expert Report (2018), reported limited evidence suggesting associations between 'healthy' dietary patterns and reduced mouth, pharynx and larynx cancer risk. The volume of evidence available was considered insufficient to draw conclusions regarding associations between 'Western' or 'Mediterranean' dietary patterns with cancer risk, although this does not imply the absence of association.[6]

There appears to be an increase in the adoption of plant-based diets in the UK, which has led to an interest in their potential role in cancer prognosis and risk.[59] Some evidence indicates that when implemented in a healthful[c] manner, plant-based diets could be associated with decreased cancer risk.[60,62,63]

Diet and nutrition following cancer diagnosis

Systematic reviews and meta-analyses have suggested that dietary and weight management interventions following cancer diagnosis may influence and/or improve prognosis, patient health and quality of life for at least some cancers.[64–70] There has

[a] Behind ultraviolet radiation, occupational risks, and infections which are estimated to cause 3.8%, 3.8% and 3.6% of UK cancers respectively.[4]

[b] Dietary indexes included the Dietary Approaches to Stop Hypertension (DASH) score, the Healthy Eating Index and the Alternative Healthy Eating Index.[58]

[c] The healthfulness of plant-based diets can vary, with unhealthy plant-based diets potentially featuring higher consumption of plant-based foods high in saturated fats, salt and sugar.[60] Indexes like the healthy and unhealthy plant based diet index have been used to represent greater consumption of healthy or unhealthy plant-based foods respectively.[61]

been particular interest in how lifestyle interventions supporting individuals to avoid obesity can improve quality of life for breast cancer survivors.[71]

Some researchers state that the period following cancer treatment could be seen as a 'teachable moment'. Diet and lifestyle interventions given during this period could reduce the risk of cancer growth and progression, prevent secondary cancers and reduce the risk of other comorbidities.[a] [72–74] Interventions such as The Healthy Eating and Lifestyle After Bowel Cancer trial (HEAL ABC) have been developed with the aim of doing this.[73,75]

The microbiota's role in cancer

The human microbiota refers to the microorganisms living on and within the body.[76] Evidence suggests that the human microbiota could play a role in many physiological processes, including both cancer risk and survival.[77–79] Diet and nutrition play an important role in influencing the composition of the microbiota.[80]

The microbiota may reduce cancer risk by:

- reinforcing mucosal barriers[77,81]
- improving antitumour immunity and activating antitumour responses[77,82]
- reducing inflammation[77,83]
- producing cancer risk reducing compounds, like butyrate[84]
- providing resistance to mutation[77,85]

Conversely the microbiota may increase cancer risk by:

- inducing inflammation[77,86]
- promoting tumour progression and secondary tumour formation[b] [77,87]
- suppressing the immune system's response to tumours[77,88]
- producing tumour causing compounds[77,89]

It has been argued that elements of the microbiota associated with cancer could serve as effective biomarkers[c] and assist in cancer diagnosis or serve as targets in treatment.[d] [90]

[a] Diseases or conditions occurring at the same time as another disease.

[b] Through promoting the process of epithelial-mesenchymal transition where epithelial cells become migratory and invasive, rather than adhered to other cells.[87]

[c] Biological indicators of processes, events, or conditions.

[d] Therapeutic strategies could attempt to modulate the microbiota through, for instance, removing detrimental organisms and/ or supplementing with beneficial organisms.[80]

Public awareness of cancer risk factors

CRUK, via YouGov,[a] use the Cancer Awareness Measure to survey public awareness of symptoms, risk factors and barriers to receiving help for cancer. 4053[b] UK participants took part in the September 2023 survey.[93] Some key results are shown in Table 2. In unprompted questioning, eating processed meat and having insufficient dietary fibre were mentioned as causing cancer by fewer than 5% of participants.[92]

Table 2 Cancer Research UK Cancer Awareness Results for unprompted questioning on possible cancer risk factors.

Risk	Proportion of participants that mentioned[c]
Smoking	68%
Drinking alcohol	45%
Poor/ Unhealthy diet	21%
Lack of exercise/ Physical activity	17%
Diet	11%
Being obese	10%
Eating Processed/ Ultra processed foods	10%
Being overweight	9%
Lifestyle	7%

Source: Whitelock, V, Cancer Research UK, September 2023.[92] Number of participants = 4053.

Public health trends in dietary and nutritional factors related to cancer

Rates of overweight and obesity are currently at their highest recorded levels:

- In 2021, 38% of adults[d] in England had overweight, and 26% had obesity. More men (69%) than women (59%) had overweight or obesity, but a slightly greater percentage of women had obesity (26% versus 25%) (CBP-03336).[94]

[a] YouGov is a global public opinion and data company which produces internet-based market research and data analytics, for example via surveys and questionnaires.[91]

[b] Of which, 2501 respondents were living in England, 541 in Scotland, 506 in Wales and 505 in Northern Ireland.[92]

[c] Weighted by age, gender, social grade, region and ethnicity to be more representative of UK adults aged 18 and above.[92]

[d] Individuals over 16.

- In the 2022/23 school year, 21.3% of children in Reception (4-to-5 years old) and 36.6% in Year 6 (10-to-11 year olds) were overweight or obese.[95]

In the 2018/19 National Diet and Nutrition Survey[a] (NDNS), 66% of participants reported meeting Government guidance of not exceeding an average intake of 70g per day of red or processed meat compared with 47% in 2008-09.[59] Red/processed meat consumption did not appear to differ substantially in an NDNS Covid-19 follow up.[97]

Dietary fibre intake across all age groups was below Government recommendations of 30g/day in the 2018/19 NDNS.[98] In the 11 years between the 2008/09 and 2018/19 NDNS, trends in fibre consumption have been inconsistent in direction.[98] Mean fibre intake remained below recommendations in all age and sex groups in the NDNS 2020 Covid-19 follow up.[97]

In The Health Survey for England (2021), 76% of women and 82% of men reported drinking alcohol in the last 12 months.[94] During the Covid-19 pandemic there were reported changes in alcohol consumption and purchasing habits in the UK.[b] [99–101] Alcohol consumption in the UK appeared to increase during the pandemic. A 2024 study found little evidence to suggest that levels of consumption had fallen to pre-pandemic levels.[102]

Health inequalities in diets, nutrition and cancer

Overweight or obesity rates are 14 percentage points greater in the most deprived areas compared to the least deprived areas.[94] Disability status, ethnicity and education levels are also associated with overweight or obesity risk (PN640, CBP-03336, PN686).[c] Inequalities are also apparent in the consumption of specific food groups and drinks, including alcohol and fibre.[94,104,105]

Department for Environment, Food and Rural Affairs' Food security report (2021) showed that around 8% of households regard themselves as being food insecure, having insufficient food to facilitate a healthy lifestyle. The poorest households spend a higher proportion of their income on food compared to the wealthiest.[106]

CRUK observed that people living in the most deprived areas were less likely than those living in the least deprived areas to recognise potential cancer symptoms.[107] Cancer survival across cancer types also appears lower in the most deprived groups compared with the least deprived.[107]

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[a] The NDNS is a rolling, cross-sectional survey that collects information on food consumption, nutrient intake and nutritional status of the general population living in private households in the UK. Fieldwork for the survey began in 2008.[96]

[b] Reported changes in UK alcohol consumption during the Covid-19 pandemic included increases in the frequency and quantity of alcohol consumed.[99]

[c] People with disabilities are 12% more likely to be overweight or obese, black ethnic groups experience the highest rates of obesity and there is a 12% increase in overweight or obesity prevalence between those with no qualification and those who hold level 4 qualifications (a degree).[103]

Research into diet, nutrition and cancer

Research into diet, nutrition and cancer is often observational (using retrospective or prospective cohort and case-control designs), rather than experimental.[10,43,108]

Randomised controlled trials are considered the gold standard for identifying factors causing disease. However, they are challenging to conduct in the context of diet, nutrition and cancer due to:

- issues of non-adherence to interventions[108]
- ethical challenges[109]
- non-representative study participants[108]
- prohibitively long follow up periods[43,108]
- difficulties in capturing the interaction of complex dietary constituents[43,110]

Challenges for observational research into diet and cancer

Challenges in robustly identifying associations via observational studies include:

- measuring or estimating exposure to potential risk factors[10]
- publication bias[a] [10]
- long latency periods between exposure and cancer development[10]
- confounding[b] and selection bias[10]

Measuring dietary and nutritional exposures

Measurement error and a lack of sufficiently detailed data can hinder the ability of studies to identify valid associations between diet, nutrition and cancer. This can also present challenges in assessing intervention efficacy.[10,11,112]

Confounding and bias in nutritional epidemiology

Factors correlated with cancer do not necessarily cause cancer. This can be a substantial hurdle to identifying potential dietary and nutritional risk factors.[10,113]

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[a] Publication bias refers to the publication of study results dependent on their strength or direction, hindering the accurate evaluation and review of evidence.[111]

[b] Confounding describes the process by which a variable influences both the exposure (independent variable) and the outcome (dependent variable). Confounding can lead to less accurate estimates of the strength and direction of associations and can make exposures appear associated with the outcome, regardless of a causal effect.

Individuals with different dietary and nutritional exposures often also differ in other ways, such as in their smoking histories. Where such differences correlate with cancer risk, inaccurate associations may occur. Accounting for this relies on knowledge of such confounding factors and their accurate measurement. Without this there can be biased results.[6,114,115]

Research opportunities

Measuring dietary and nutritional exposures

Digital technologies could improve the measurement of diets. For example, the intake24 self-completed dietary recall system has been used for data collection in the NDNS since October 2019. [112,116–119]

Data sources such as supermarket sales data tied to store loyalty cards, physical and chemical sensors, or biomarkers of diet and nutrition may offer an alternative to self-reported information.[10,120–127]

Analysing compounds produced and used during metabolism in response to different dietary and nutritional factors (an approach termed 'metabolomics') has been suggested by stakeholders to offer an accurate, cost-effective way to evaluate complex dietary exposures.[128,129]

Mendelian randomisation analyses

Mendelian randomisation uses genetic variants associated with a potentially modifiable exposure to assess the role of the exposure on the outcome of interest.[130–133] Mendelian randomisation can allow strong causal relationships to be identified through being less prone to problems of confounding and measurement error.[131,133]

For example, when using mutations in the gene encoding the ALDH2[a] enzyme as an indicator for lower alcohol consumption, it was observed that different *ALDH2* genotypes were associated with different oesophageal cancer risks, thus supporting a causal association between alcohol exposure and oesophageal cancer.[135]

This method is reliant on there being genetic variants associated with the exposure of interest, which can limit its applicability to risk factors lacking genetic determinants.[130]

[a] *ALDH2* encodes an aldehyde dehydrogenase enzyme which is involved in the transformation of acetaldehyde to acetic acid, an important step in alcohol metabolism. Mutations in *ALDH2* can result in lower metabolism of acetaldehyde, resulting in a number of physiological responses to alcohol consumption such as facial redness.[134]

Preventing cancers through dietary and nutritional health intervention

Information and education for dietary and nutritional health

Information and education is a policy for improving diets. The UK Government's dietary recommendations the WCRF dietary recommendations for cancer prevention broadly agree. However, the WCRF recommend zero alcohol consumption, while Chief Medical Officers' Guidance, suggests drinking no more than 14 units of alcohol per week.[6,136]

However, evidence has suggested low adherence to UK Government dietary recommendations. In a 2020 study, fewer than 1 in 1000 UK adults surveyed were estimated to adhere to nine[a] recommendations from UK Government dietary guidance and the Eatwell Guide. Around 7 in 10 participants adhered to fewer than half of the recommendations.[137]

The Food Foundation has suggested that to meet the Eatwell Guide's recommendations, households with incomes in the lower fifth had to spend 50% of their disposable income on food, compared to 11% for the fifth with the highest incomes in 2021/22.[138]

CRUK and the Obesity Health Alliance (OHA) suggest that interventions to improve diet and nutrition should focus on improving the food environment[b], rather than purely focussing on individual behaviour change.[139,140]

Other types of policy interventions focused on providing nutritional information and support

Other approaches providing individuals with nutritional information and support in England include:

- supplying nutritional information through food labelling such as front-of-packaging 'traffic light' labels and regulations on back-of-packaging nutritional information[141–143]
- supplying calorie information on menus in qualifying establishments[144,145]
- providing Better Health resources, including free apps and tools, aiming to support people to make and sustain changes to improve their health[146]

[a] 11 food and nutrient groups with recommended consumption levels are described in UK Government dietary recommendations, although adherence to carbohydrate and protein consumption recommendations were not considered in the study owing to difficulties in extrapolating grams/day values from food frequency questionnaires with heterogeneous foodstuffs.[137]

[b] The food environment refers to the physical, social, economic, cultural and political factors that influence how consumers engage with the wider food system.

- providing weight management services to support people to achieve and maintain a healthier weight[147,148]

Food environment interventions

Interventions targeting the broader food environment and the socioeconomic factors surrounding food choice are described below.

The WCRF suggested that such interventions have been less readily implemented by governments, including in the UK, than education based interventions.[8,149]

CRUK and the OHA state that the right legislative and regulatory framework is needed to make healthier options the default.[140,150]

Financial mechanisms

In April 2018, the UK Government implemented the Soft Drinks Industry Levy (SDIL) (CBP-7876). This requires producers or importers of soft drinks to pay a tax on drinks that contain added sugar and have a total sugar content of 5g or more per 100ml.[28,151] The SDIL was introduced to encourage businesses to reformulate products and/or purchasers to opt for cheaper (less sugary) products.[28]

A 2023 study suggested that in the year after introduction of the SDIL there was an increase in total household soft drinks purchasing of 2.6% per week. Despite the increase, sugar intake from these drinks had decreased by 2.7% per week between April 2018 and March 2019.[152] A 2020 analysis reported that the levy had incentivised manufacturers to reformulate products.[153]

Reporting from OHID suggested that between 2015 and 2020, the level of sugar in soft drinks subject to the levy reduced by 46%, while sales of drinks subject to the levy increased by 21.3%.[154]

When the SDIL was proposed in the 2016 Budget, the Government stated that proceeds would be used to fund children's health and wellbeing initiatives (CDP-2017-0006, CBP-9049)[155]. Sustain (a charity) stated that this initiative had not been continued.[156]

Stakeholders increasingly suggest combining taxes or levies on less healthy products with subsidies on healthier food and drink options.[157–160]

As well as the SDIL across the UK, several financial mechanisms have been implemented in the devolved nations (Box 2).[161,162] Some suggestions include applying taxes to other foods such as those considered high in fat, salt and sugar (HFSS)[159] and meat products.[163,164]

Box 2: Encouraging healthy diets in devolved nations

- Minimum unit pricing was introduced in Scotland in May 2018 and Wales in March 2020 to reduce alcohol related harms.[165,166] In March 2024 the Scottish Parliament's Health, Social Care and Sport Committee recommended that the minimum unit price should be increased from "50 pence per unit (ppu), to 65ppu".[167]
- Reformulation for health is part of the 'Scottish Government's Obesity prevention plan: A Healthier Future'. It is funded by the Scottish Government and implemented by the Food and Drink Federation Scotland. The scheme offers support to small-to-medium-sized food companies seeking to reformulate food products.[168,169]
- Nutritional standards in health and social care settings were developed to improve the food choices of staff and visitors in hospitals in Northern Ireland.[170]

Food placement, accessibility and affordability

In October 2022, the UK Government implemented regulations restricting the placement of HFSS foods in prominent areas of qualifying stores in England.[32] In 2023, a qualitative evaluation of stakeholder interviews[a] found positivity towards the legislation as "a good first step" in broader policies towards limiting obesity.[171]

Food availability and affordability are identified as barriers to healthy dietary patterns by several stakeholders.[172,173] The Social Market Foundation state that food deserts[b] present "local-level" problems, therefore local interventions such as improved public transport could be effective.[173]

The Food Foundation stated that around a quarter (25.6%) of food outlets in England are fast food outlets with the proportion increasing to 30.5% for those living in the most deprived fifth of areas, compared to 21.1% for those living in the least deprived fifth. The Food foundation suggest local authorities should use "planning powers to prevent further proliferation of unhealthy fast-food outlets".[138]

Product reformulation

To support the UK Government childhood obesity plan there is an ongoing voluntary programme to reduce sugar, salt and calorie levels in everyday food and drink, through reformulation of products.[29]

For salt, the most recent reduction targets were published in 2020, following 5 downward revisions.[174] Sugar reduction targets were published in 2017 and the calorie reduction targets in 2020.[175,176] OHID reported an overall 3.5% decrease in

[a] In which 34 consumers, 24 manufacturers and retailers, 22 local authority enforcement officers and 28 academic and charitable health representatives were interviewed.[171]

[b] The exact definition of a food desert varies although in general they describe areas with a lack of nearby supermarkets or convenience stores selling nutritional healthy foods.

the sales weighted average of sugar in assessed food and drinks between 2015 and 2020.[154]

The Food Foundation state that despite reported reductions of 14.9% and 13.5% in the sugar contents of breakfast cereals and yoghurts, respectively, voluntary reformulation programmes are insufficient to solve problems of diet related disease.[138] It stated in 2023 that "only 7% of breakfast cereals and 8% of yoghurts marketed to children are low in sugar".[138]

Innovations in food science like non-nitrite[a] based curing agents for meat processing could enable reductions in the cancer-causing potential of foods.[178]

Marketing restrictions

The marketing of HFSS foods, particularly towards children, has been associated with influencing food purchasing and eating behaviours (CDP 2018/0012).[179]

The UK Committee of Advertising Practices (CAP) produces the Code of Broadcast Advertising. As of July 17 the committee advises that the advertising of HFSS foods must not appear in media directed at anyone under 16. Adherence to the Code is monitored and regulated by the Advertising Standards Agency.[180]

In July 2020, the Government announced intentions to introduce further restrictions on the advertising of HFSS foods, suggesting that HFSS advertising restrictions could reduce the number of children living with obesity by around 20,000.[36] Proposed advertising restrictions include the introduction of a 9pm watershed for TV advertising and restrictions on online advertising.[33,34]

Having faced delays since its announcement, the policy is now set to come into force in October 2025.[35,36,181]

[a] Nitrites are converted to N-nitrosamines in the body which are considered carcinogenic.[177]

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Contributors

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Members of the POST Board*

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