



EUROPE

Food consumption in the UK

Trends, attitudes and drivers

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Preface

What we eat has big implications for our health, our society and the environment. Understanding these trends, what drives them and how we can change consumption practices through interventions is crucial to inform policy. This report provides a review of consumer attitudes and practices to food in the UK in support of the work of the Department for Environment, Food and Rural Affairs (Defra) on food production and consumption. The review presents evidence on: (1) the main trends related to consumer food practices and attitudes; (2) the drivers of consumption (e.g. the role of information or food system actors); (3) interventions that can influence food consumption practices; and (4) personal differences between groups, or ‘food publics’, across the trends, drivers and interventions. The report provides a summary of the existing evidence and gaps in the evidence. The study was commissioned by the Department for

Food, Environment and Rural Affairs (Defra) and was delivered by RAND Europe.

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Summary

Introduction and objectives of the study

What we eat has big implications for our health, our society and the environment. Understanding these trends, what drives them and how we can change consumption practices through interventions is crucial to inform policy. The aim of this study is to provide an overview of the existing evidence in four main areas:

- The trends related to consumer food practices and attitudes, and to the changing food environment (e.g. out-of-home sector¹, online retail models) in the UK.
- The drivers of consumption (e.g. the role of information or food system actors).
- Interventions that can influence food consumption practices.
- The differences between groups, or ‘food publics’, across the trends, drivers and interventions (i.e. segmentation).

This report provides evidence around these questions and identifies areas of uncertainty where more evidence is required and, based on this, suggests a number of priority areas for action and further research.

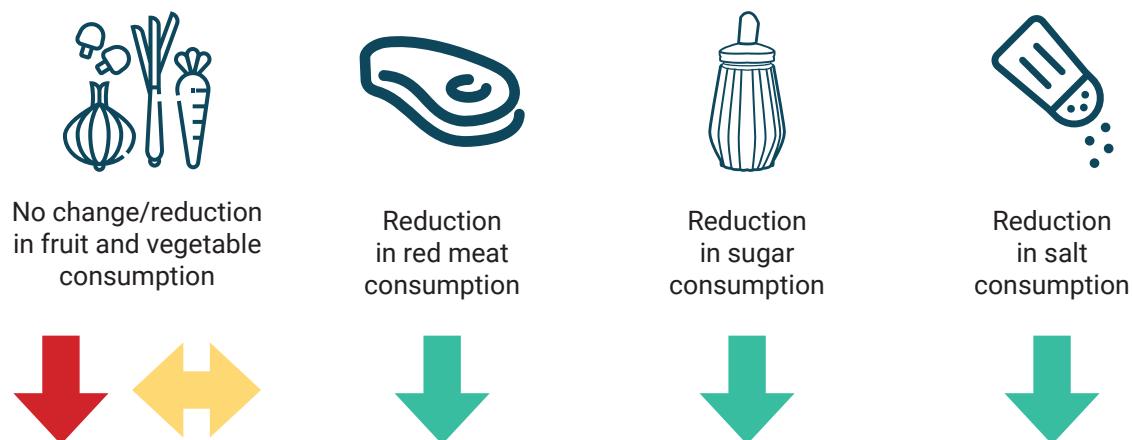
The study approach consisted of a rapid evidence assessment (REA). REAs are similar to systematic reviews, in taking a robust and replicable approach to searching and reviewing the literature. However, the scope and coverage of literature is restricted using a range of criteria that can be adjusted in response to the volume of literature identified, enabling them to be conducted within a more limited timeframe. The focus of this study was on identification of existing evidence and evidence gaps within high-quality, primarily academic literature from the last ten years. The methods and approach for this study are summarised in detail in Annex A.

Consumption trends – which foods are people consuming, where and how?

What people consume still falls short of dietary guidelines. While diets are slowly changing, people are generally not meeting the standards recommended for a healthy diet in the UK or internationally (Figure 1). The UK population continues to consume too much saturated fat and not enough fruit, vegetables and fibre.

¹ The ‘out-of-home’ sector has been defined as any outlet that provides food or drink that has been prepared and is ready for immediate consumption (Department of Health and Social Care, 2018). This includes restaurants, cafes, takeaways and any online businesses that sell food for takeaway or home delivery.

Figure 1 Food consumption trends in the UK in relation to dietary guidelines



Source: RAND Europe analysis. Downward facing arrow indicates a reduction. Bidirectional arrow indicates no change. Colour of arrows indicates relationship with existing dietary guidelines: red indicates the change is against the desired direction; amber indicates there has been no change; and green indicates a change in the desired direction. These trends are based on analysis over the last ten years.

There are socio-demographic differences in the consumption of a healthy diet. Low socio-economic status (in terms of education level, work status and income) is the single most consistent risk factor for an unhealthy diet. There are also various other factors that influence consumption, such as age and gender; however, the evidence for these is less strong or mixed, and studies are not always adequately controlled. Despite these socio-demographic differences, diets remain on average unhealthy across all groups.

The channels through which consumers purchase food are diversifying. The physical food environment is becoming increasingly diverse and fragmented, particularly in terms of the channels through which individuals purchase food. Individuals are increasingly shopping for food online and using food delivery services (e.g. vegetable boxes, Hello Fresh and Amazon Fresh). Although total use of online channels currently remains low, this is a trend that is predicted to increase.

The out-of-home food environment is increasingly common. There has been an increase in the consumption of food outside the home. The importance of the out-of-home environment is facilitated by digital technology and the expansion of online food delivery platforms, particularly new players such as Deliveroo and Uber Eats. This trend, which is predicted to increase, has negative implications for the consumption of a healthy diet since food outside the home tends to be less healthy.

Some individuals care about the origin, sustainability and ethical production standards of their food. Some individuals are increasingly socially conscious, particularly in terms of the ethical, environmental and social impacts of their food choices. There has been an increase in the sales of ethical and sustainable produce, such as Fairtrade and RSPCA Assured products. However, total sales are low, representing only 11 per cent of all household food purchases. Some consumers also increasingly care about the provenance of their

food and production methods, but this mainly relates to certain food groups (e.g. meat) and the evidence is unclear. However, it is likely that most consumers are unaware of the social and environmental consequences of their consumption and how this impacts on wider issues. Moreover, a common challenge when

conducting research on food preferences and drivers of food practices is the ‘value-action gap’, whereby individuals do not necessarily act in line with their stated beliefs. Box 1 provides a summary of the trends in food consumption and attitudes reviewed in the literature.

Box 1 Summary of UK trends in food consumption and attitudes to food reviewed in the literature

Trend 1: What people consume still falls short of dietary guidelines

- UK consumers are generally not meeting the standards recommended for a healthy diet.
- There have been reductions in salt, sugar, and red and processed meat consumption but consumption of fruit, vegetables and fibre has shown little or no change.

Trend 2: The channels through which consumers purchase food are diversifying

- Although UK consumers continue to buy food from large supermarkets, other forms of retailer, including mini supermarkets, have increased in popularity.
- The online grocery market is increasingly important, leading to an increase in supermarket home delivery and other forms of home delivery (e.g. vegetable boxes, Hello Fresh and Amazon Fresh).

Trend 3: The out-of-home food environment is increasingly common

- There has been significant growth in the consumption of food outside of the home, and the proportion of individuals eating out on a regular basis is predicted to increase in the UK.
- The importance of the out-of-home environment is facilitated by digital technology and the expansion of online food delivery platforms, particularly new players such as Deliveroo and Uber Eats.

Trend 4: Some individuals care about the origin, sustainability and ethical production standards of their food

- There has been an increase in the sales of ethical and sustainable products over the last ten years, and an increase in the consumption of plant-based meals.
- Some consumers are concerned about food provenance and safety, although this may depend on the food group, particularly meat.
- However, many consumers demonstrate a value-action gap, in that while they state sustainable and ethical preferences, this often only translates into action if other needs are satisfied (e.g. price, availability and perceived quality), and many consumers remain unaware of social and environmental consequences of their consumption practices. The most important barrier to purchasing sustainable and ethical food cited in the literature is cost, with other barriers including perceived quality and habit.

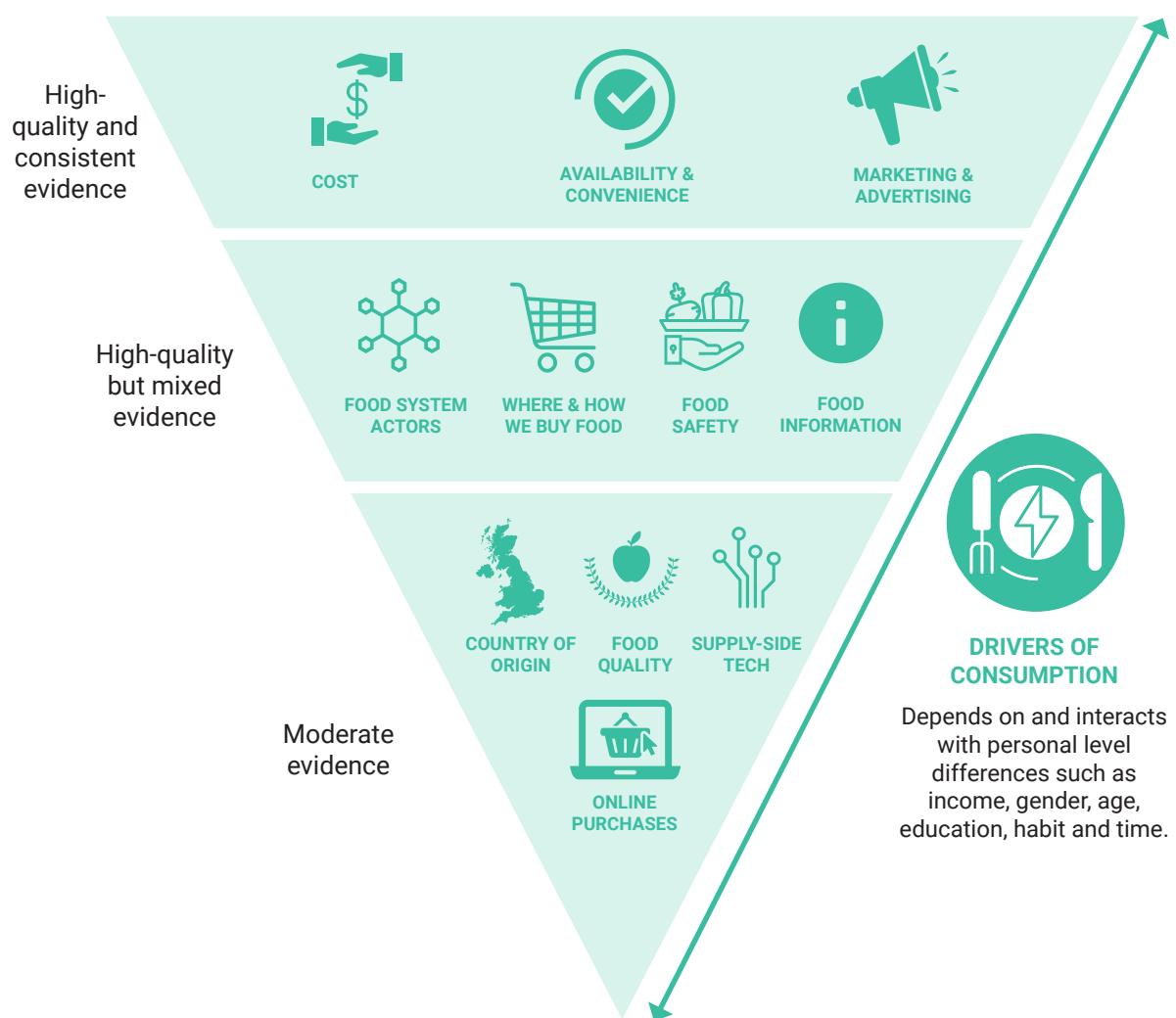
Drivers of consumption – what influences food consumption practices?

A myriad of diverse and interconnected drivers shape and influence the food decisions and practices of consumers. These interact in

ways that are neither fully understood nor fully predictable. Figure 2 provides an overview of the strength of evidence regarding the influence of these drivers.

Cost and perceived value for money are significant drivers of consumption and often trump other drivers and consumer values.

Figure 2 Overview of the strength of evidence on different drivers of trends and patterns in consumer practices and preferences and their coverage in the literature



Source: RAND Europe analysis. There is high-quality and consistent evidence that the factors at the top of the triangle are important drivers of consumption. The factors in the middle have high-quality sources with mixed evidence regarding the relative importance of the factor in driving consumption practices. The factors at the bottom of the triangle have moderate evidence illustrating the relative importance of the factor but are either not widely covered in the academic literature or lack high-quality sources.

Cost impacts on the healthiness, ethics and sustainability of food choices, with consumers less likely to pay for these types of foods if the price is perceived to be too high. However, the impact of cost is also modulated by factors such as income, education level and gender.

Availability and convenience influence the scope for consumers to make choices in a given food environment. Individuals are more likely to be healthy in different environments (e.g. at work, school or the supermarket) if healthy options are made available. Individuals are also likely to be healthy or socially responsible due to convenience, for example through the delivery of organic vegetable boxes. Conversely, the presence of relatively cheaper and unhealthy food also influences the extent to which they are consumed and hence the quality of peoples' diets.

Marketing has a significant effect on consumer choices, in particular increasing the consumption of unhealthy food, especially in children and young people. Emerging evidence suggests that social media is increasingly influencing younger segments of the population.

The built and micro food environments are likely to influence what we eat but there is contrasting evidence about the specific nature of the impact. Home, school and university are thought to be associated with healthier food choices compared with fast-food restaurants and convenience stores; however, the evidence is mixed. The placement of food in supermarkets likely influences consumers' food choices. Food environments are also socially and culturally embedded, and so necessarily interact with other drivers such as social relationships and social identity.

Food system actors have a strong influence in shaping and constraining the food choices made by consumers (Figure 3). The food industry, including manufacturers and retailers, determine the content of products

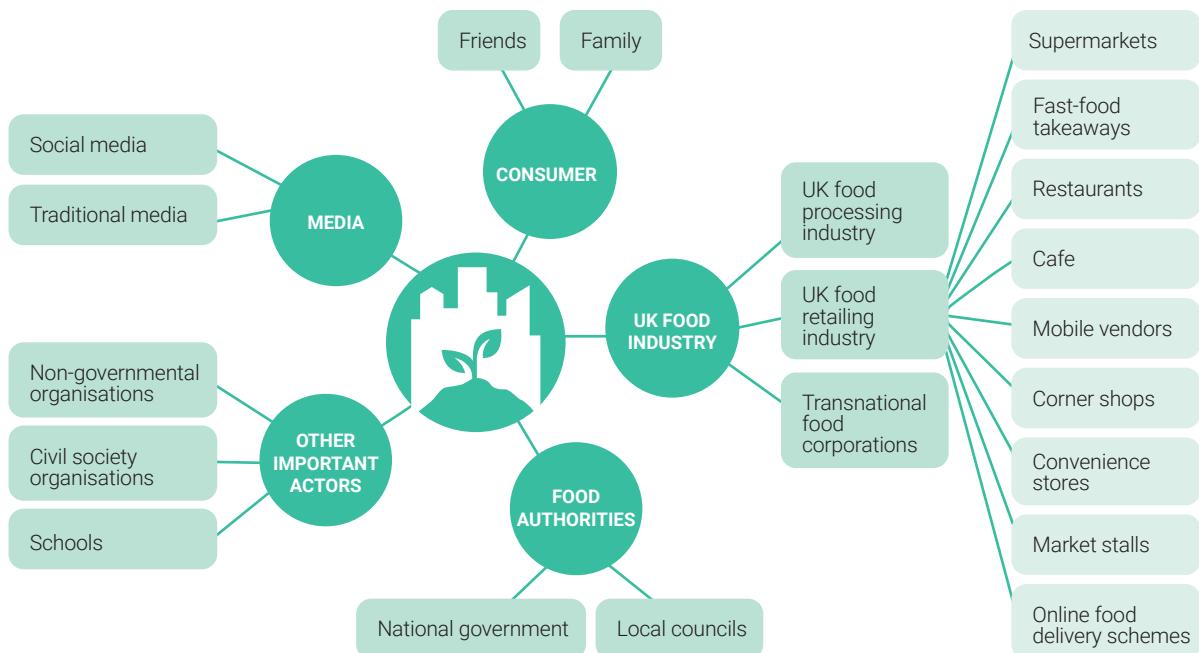
and the placement and availability of food, but also influence consumers through education/information campaigns, labelling and price promotions. Big transnational food corporations can have a negative influence on diets through driving the demand for processed food and the fast-food market. National and local government, together with civil society organisations, also actively shape the food environment through the implementation of policies. There are many other food system actors, including media, family, friends and schools. Although the literature cites a variety of food system actors as being important in influencing the food environment and consumption practices, there is no evidence on their relative importance.

Clear and simple information can influence consumers' purchasing behaviour; however, this depends on the type and format of the information, and also on socio-demographic differences. Consumers have varying levels of trust in different sources and channels. Packaging information is more likely to be used by individuals with a higher socio-economic background. Consumers may also place higher value on information about nutritional quality rather than information on social responsibility of products.

Food safety is a concern for some consumers when choosing food, with the type and level of concern shaped by products and environments. Consumers are particularly concerned about food safety when choosing meat products and when in the out-of-home food environment compared with food prepared at home.

Other important drivers include **provenance of food, perceived food quality, food production technologies** and **technology** in general, but the evidence around their importance and impact on consumption is less clear. Locally or nationally sourced products are often associated with perceived higher quality. Some consumers are

Figure 3 Overview of the food systems actors that the literature cites as important in shaping consumption practices in the UK



Source: RAND Europe analysis.

concerned about food production technologies, but this depends on the technology and does not always influence choice. Generally, increasing digitalisation is likely to influence consumer practices, with evidence that consumers are increasingly purchasing food online, although the impact of digitalisation on consumption is currently unclear.

Individual and social differences – how do different people make decisions about food?

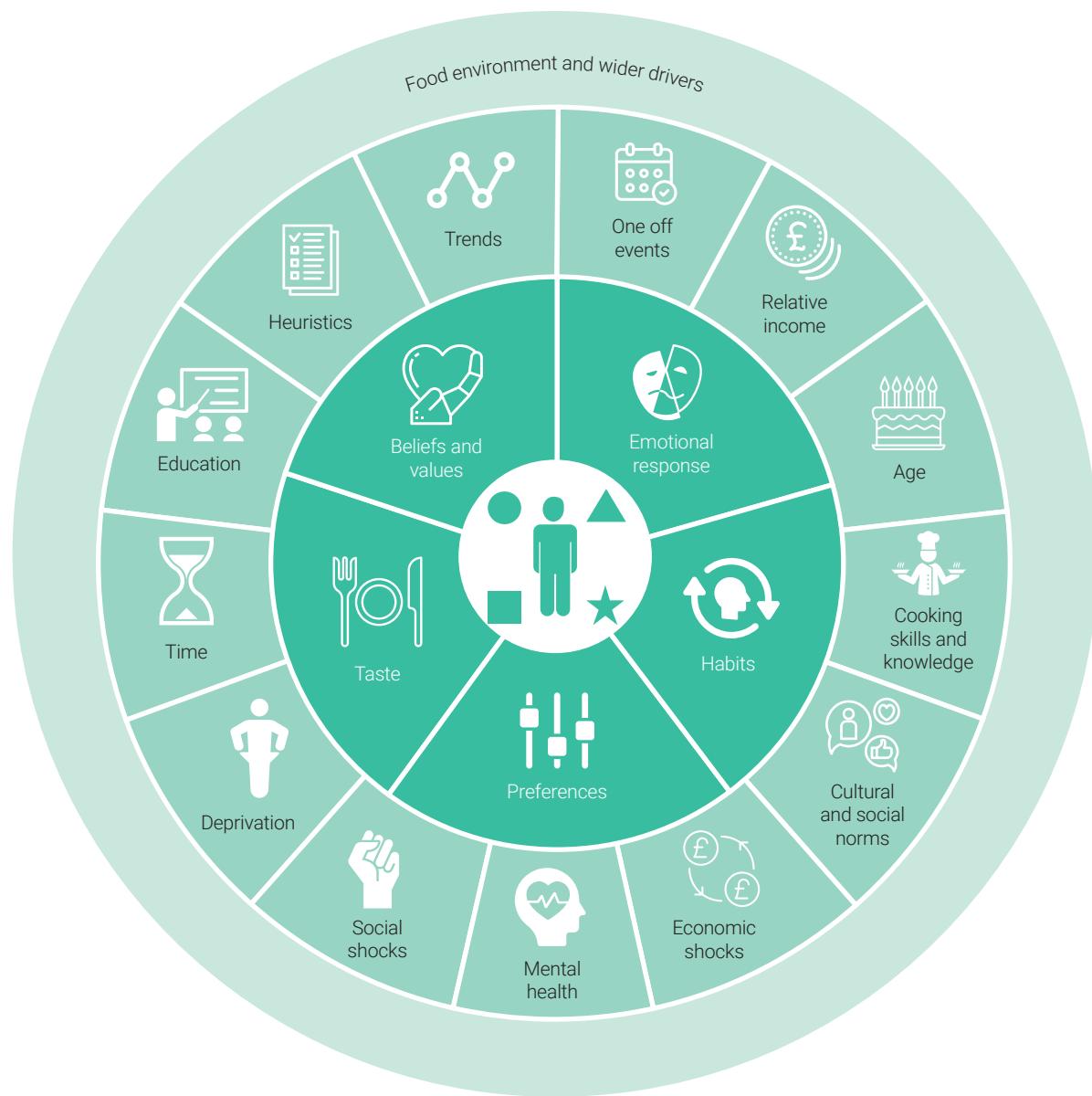
The UK population is not homogeneous and there are multiple ‘food publics’ with different experiences, beliefs and attitudes, which should be taken into account when understanding consumption patterns as well as policies to change them. Figure 4 provides an overview of individual and social differences

in food consumption and how these interact with the wider food environment.

Socio-demographic differences are an important predictor of consumption in both adults and children. Low socio-economic status (in terms of education level, work status and income) is the single most consistent risk factor for not consuming a healthy diet. Other important factors include age and gender.

Food decisions are rarely rational in the sense of being fully conscious and reflective, and instead are driven by largely unconscious mechanisms, such as cultural and social norms, heuristics, habit and emotions. This implies that simple interventions aiming to provide information to consumers are likely to have limited effectiveness as they rely on active and rational decision making that is not necessarily characteristic of many consumption decisions.

Figure 4 Overview of the drivers of individual and social differences in food consumption



Source: RAND Europe analysis. The inner circle illustrates the values, beliefs, preferences and emotions of consumers related to food that drive consumption practices. The second circle illustrates the individual and social differences that drive consumption practices. The outer circle illustrates that the inner and second circle is influenced by and interacts with the food environment and other drivers.

Beliefs and values, such as health, environmental and animal welfare concerns, can inform consumption but there is still a significant value-action gap between what

individuals believe and what they consume in practice. While certain individuals increasingly state sustainable and ethical preferences, this often only translates into actual practices if

other needs are satisfied (e.g. price, availability and quality). This gap also arises because individuals feel a lack of agency with regard to certain issues in a food system dominated by large, powerful food actors. Wider socio-economic changes can also contribute to this gap – for example, during economic crises some consumers are likely to shift their consumption towards less socially responsible, cheaper products.

Reflecting on the range of personal differences, segmentation approaches can be useful to analyse differences in consumption patterns; however, these are typically specific to a particular study context, the specific variables included in the analysis or driven by commercial motivations, and are not necessarily generalisable across the population or able to predict behaviour. While understanding this diversity can be useful to inform thinking and communication strategies, use of segmentation in policy design and implementation has limitations.

Interventions – how can policymakers influence food consumption decisions?

Interventions can help to change food consumption so that it is more healthy, ethical and sustainable. For the purpose of this study, interventions were grouped into three overarching categories. Table 1 provides a summary of interventions and evidence of their effectiveness.



Knowledge and information: This covers interventions that affect the knowledge and information available to people about food, from advertising to labelling. Overall, interventions

that affect knowledge and information can help to raise awareness about healthy, sustainable and ethical diets but they do not necessarily translate into behaviour change. In general, more targeted, accessible and understandable information is most effective at changing consumption, be it through mass media campaigns or food labels. For example, nutritional front-of-pack labels can improve the consumption of healthier food, and traffic light approaches (that provide information in a clear and interpretive format) appear to be the most effective. Food labelling in restaurants can also reduce the number of calories consumed. However, evidence also suggests that use of labels may be restricted to certain groups with a higher income and education level, and thus may serve to widen health inequalities.



Food environment: This covers interventions that change the food environment, from small changes to the layout and prominence of food, to the types of food available in places people spend a lot of time, like at work and in school. There is increasing evidence to suggest that the ability of individuals to make healthy choices is limited by the availability of food through the built and micro environments. There have been limited attempts to develop interventions that attempt to change the food environment or address ‘food deserts’² by changing the density or prevalence of food outlets and availability of healthy foods. Interventions to address the micro environment through ‘nudges’ – changing the placement of food in supermarkets or portion sizes – may be effective in certain contexts (e.g. schools and supermarkets). However, in general, good-quality academic studies around the effects of environmental interventions in ‘real-world’ settings are lacking.

2

While there is no formal definition, ‘food deserts’ can be defined as areas with a low density of supermarkets selling good-quality fresh produce and nutritious food (The University of Sheffield, 2018).



Price and ingredients: This spans interventions that change the ingredients of foods that are available or the prices of

those foods, making it easier and more economical to make better choices. There is evidence to suggest that changing the cost and content of food through taxes, subsidies and reformulation programmes is effective at changing consumption. There is evidence that subsidies may have a bigger impact than taxes. However, the change in price needs to be significant to have an effect and currently there is limited understanding of possible substitution effects.³ This is partly due to a limitation of studies investigating these types of policies, which are often based on modelling rather than real-world data.

There is a continuum across these possible policy approaches reflecting the extent to which the different approaches emphasise personal choice and freedoms, and also the potential challenges in implementation.

Studies and evaluations of most interventions typically do not investigate the long-term outcomes and often focus on intermediate outcomes (e.g. changes in views or awareness rather than actions). This limits the ability to determine whether interventions are effective at producing sustained changes in practices. More comprehensive and longitudinal studies and evaluations to look at active changes in consumption could help to build the evidence base to support more informed interventions.

³ Substitution is an important issue that is not fully understood. Taxes/price increases can lead to substitution at two levels: consumers may buy different (ideally healthier but potentially also unhealthy or cheaper) foods, and producers may replace a particular target product with other unhealthy content (for example, reducing sugar but increasing fat).

Table 1 Summary of interventions to change food consumption and evidence of their effectiveness

	Intervention	Effectiveness	Strength of evidence	Comments and caveats	Key sources
 Knowledge and information	School education	Moderate–high	Moderate–high	Interactive/experiential learning is most effective	Jepson et al., 2010; Muzaffar et al., 2018; Rekhy & McConchie, 2014; Dudley et al., 2015
	Education in healthcare setting	Moderate	Moderate–high	Online approaches are likely less effective than phone/in person	Jepson et al., 2010; Kelly et al., 2016; Harris et al., 2011
	Mass media campaigns	Low–moderate	Low–moderate	Limitations to campaign design (e.g. TV only, not online) – better designed campaigns might be more effective	Afshin et al., 2015; Kite et al., 2018; Wakefield et al., 2010
	Labelling in supermarkets	Low–moderate	Moderate but mixed	Traffic light approaches are more effective than just information provision	Afshin et al., 2015; Campos, Doxey, & Hammond, 2011; Cecchini & Warin, 2016; Shangguan Siyi et al., 2015
	Labelling in restaurants/fast-food settings	Low	Moderate but mixed	More studies needed in real-world settings	(Littlewood et al., 2016; Magnusson, 2010; Wright & Bragge, 2018; Long et al., 2015; Sinclair et al., 2014)
	Advertising regulation	Unclear but likely moderate	Low	Limitations in both evaluation and policy design limit our knowledge of effectiveness	Afshin et al., 2015; Chambers et al., 2015; Galbraith-Emami & Lobstein, 2013; Mills et al., 2013
 Food environment	Food provision in schools	Moderate–high	Moderate–high	Mandatory approaches most effective; combining with education approaches also effective	Coyle et al., 2009; Evans et al., 2012; Afshin et al., 2015; Niebylski et al., 2014
	Worksite well-being	Low	Moderate–high	Main effect is on fruit and vegetable intake, more limited evidence on other outcomes; significant variability in intervention design limits generalisability	Afshin et al., 2015; Geaney et al., 2013; Gudzune et al., 2013; Jepson et al., 2010; Niebylski et al., 2014; Schliemann & Woodside, 2019
	Micro environment – placement, portion size	Low–moderate	Low–moderate but mixed	Effectiveness likely depends on context; acceptability of 'nudges' to public also a concern	Bucher et al., 2016; Cadario & Chandon, 2019; Hartmann-Boyce et al., 2018; Hollands et al., 2015; Houghtaling et al., 2019
	Food provision in other public settings	Unclear	Low	Very little evidence identified	Niebylski et al., 2014
	Built food environment	Unclear but likely moderate	Low	No evidence of policy implementation and evaluation identified	Afshin et al., 2015; Beaulac et al., 2009; Cobb et al., 2015; Fleischhacker et al., 2011
 Cost and content of food	Taxes, subsidies and price changes	Low–moderate	Moderate	Understanding of substitution effects limited	Afshin et al., 2017; Eyles et al., 2012; Hartmann-Boyce et al., 2018; Ng et al., 2012; Niebylski et al., 2014; Thow et al., 2010; Andreyeva et al., 2010; Niebylski et al., 2015; Smith et al., 2018; Wright et al., 2017
	Reformulation of food	Moderate	Moderate	Substitution effects unclear; can be driven by other changes (price changes, labelling requirements)	Federici et al., 2019; Grieger et al., 2017; Hashem et al., 2019

Source: RAND Europe analysis. All target participants are adults (19 years old and above) and children (up to 18 years old), except for interventions in schools that target children only. Depth of shading of the rows provides an indication of the most promising (darker) and least promising (lighter) interventions based on the current evidence. 'Effectiveness' is defined as the ability to achieve the desired behaviour changes, i.e. to reduce food consumption or otherwise change dietary behaviours and/or increase awareness or knowledge related to healthy/sustainable food consumption.

Reflections – what does the evidence say about food consumption in the UK, and what should policymakers do next?

There are a number of observations on food consumption in the UK arising from the evidence in the literature.

A minority of individuals are more sustainable and ethical in their consumption but, overall, UK consumption still falls well short of nutritional guidelines. Although there have been reduction in the consumption of salt, sugar and red meat within the last ten years, there has been little change in the consumption of fruit, vegetables and fibre, with high consumption of processed foods. Although survey evidence indicates an increase in the purchase of sustainable and ethical produce, such as Fairtrade and RSPCA Assured products, this likely represents a small minority of the population. Moreover, a common challenge when conducting research on food preferences and drivers of food consumption is the value-action gap – whereby individuals do not necessarily act in line with their stated beliefs.

There are predictable socio-economic differences in the consumption of a healthy diet but the impact of wider socio-demographic differences is less clear. Socio-economic status (e.g. income and education level) is the single most important predictor of the consumption of a healthy diet. Other socio-demographic factors such as age and gender influence consumption too, although the evidence around these is less clear. However, all groups continue to consume an unhealthy diet. Table 2 summarises the availability of evidence in the literature on socio-demographic differences in food consumption practices.

The food environment is becoming increasingly diverse and fragmented but the impact of this on consumption is not well

understood. Digitalisation is diversifying the channels through which individuals purchase food, with supermarket and other home delivery services in particular (e.g. vegetable boxes, Hello Fresh and Amazon Fresh) increasing in popularity. The out-of-home sector, partly driven by digitalisation, is also increasingly significant, with impacts on what individuals consume. However, there is currently a lack of clear academic evidence around how online shopping and home delivery affects consumption practices and consumer diets.

The food environment, in terms of availability, marketing and advertising, has a significant influence on consumption.

Individuals are often aware of the need for a healthy diet but they are constrained by the current food environment. There is increasing evidence that access to unhealthy food through the built food environment (e.g. fast-food restaurants, convenience stores) is associated with obesity. There is increasing research into 'food deserts' suggesting that they have a significant negative influence on consumption. The micro environment (e.g. through food placement and portion sizes) also has an influence on consumption. Within this environment is also the influence of marketing and advertising by manufacturers and retailers, which has a significant effect on food purchases, particularly driving the consumption of unhealthy food in children and young people.

Food decisions are rarely purely rational and knowledge-led, and instead are driven by a myriad of interacting cultural, societal and personal factors that lead to different 'food publics' with different values and practices.

Food decisions are rarely rational and instead are driven by cultural and social norms but also unconscious mechanisms, such as heuristics, habit and emotions. Policy responses need to take these personal factors into account.

Table 2 Availability (volume) of evidence in the literature on socio-demographic differences in food consumption practices and response to interventions

	Factor	Evidence base	Quality of evidence	Availability of academic evidence	Key sources
Trends	 Diet	Lower incomes, economic deprivation and lower levels of education are associated with a poorer diet and being overweight/obese	High	Widely covered	Barrett et al., 2017; Barton et al., 2015; Cribb et al., 2011; de Ridder et al., 2017; Defra, 2017; Pechey & Monsivais, 2016; Wrieden et al., 2013
		Women tend to have slightly greater consumption of healthier foods and pay more for healthy foods	Moderate	Some evidence	Balcombe et al., 2010; Christoph et al., 2016; Defra, 2017; Micha et al., 2015; Rekhy & McConchie, 2014
		Older individuals tend to consume healthier foods overall, although it is not clear whether this is a true age effect or a cohort effect	Low-moderate	Some evidence	Appleton et al., 2017; Lam & Adams, 2017; Micha et al., 2015
	 Out of home	The out-of-home food environment (including for example restaurants, takeaway and fast-food places) is increasingly a major part of the diet of younger adults and adolescents compared to older adults, whose preferred location is home	Moderate	Some evidence	Adams et al., 2015; Nielsen, Siega-Riz, & Popkin, 2002; Tyrrell et al., 2017
		Individuals with health and environmental concerns tend to be female and younger	Low	Some evidence	Latvala et al., 2012; Su et al., 2019; WRAP, 2015; YouGov: Eating Better, 2019
		Ethically certified food is more commonly purchased by older consumers (aged 55 or more)	Low	Not widely covered	Mintel, 2019a

	Factor	Evidence base	Quality of evidence	Availability of academic evidence	Key sources
Drivers	 Price	Costs shape what people can afford to eat; those in low-income groups often have less expensive food expenditure practices, consume less healthy food and less fruits and vegetables	High	Widely covered	Appleton, 2016; Barton et al., 2015; Darmon & Drewnowski, 2015; de Ridder et al., 2017; Griffith et al., 2015; Hawkesworth et al., 2017; Levin, 2014; Levin et al., 2012; Thomas et al., 2019; Townshend & Lake, 2017; Whybrow et al., 2018
	 Marketing and advertising	There is strong evidence that advertising negatively influences the food preferences and choices of children and young people	High	Widely covered	Boyland et al., 2018; Buchanan et al., 2018; Cairns et al., 2009; Chambers et al., 2015; Griffith et al., 2015; Happer & Wellesley, 2019; Kamar et al., 2016; MacGregor & Bicquelet, 2016
Individual/ social differences	 Time and convenience	Time and convenience (i.e. food perceived to be 'quick' and 'easy' to cook) are important drivers of consumption choices, particularly for lower-income individuals who often lack time	Moderate	Some evidence	Appleton, 2016; Howse et al., 2018; Jilcott Pitts et al., 2018
	 Knowledge and information	Information campaigns also rely on personal agency in changing practices, and evidence consistently indicates that they tend to have greater impact in individuals with higher socio-economic status and thus possibly widen inequalities	High	Widely covered	Chandon, 2013; Christoph et al., 2016; Friel et al., 2015; Garnett et al., 2015; McGill et al., 2015
		Use of food labelling information is particularly high among individuals with health conditions and special dietary requirements and notably lower among children, adolescents, older adults and people in lower socio-economic groups	High	Widely covered	Campos et al., 2011

	Factor	Evidence base	Quality of evidence	Availability of academic evidence	Key sources
 Cost and content		Labels in restaurants and fast-food settings may only have effects in certain population subgroups, with some evidence that women may use menu labels whereas men do not	Low–moderate	Not widely covered	Sinclair et al., 2014
		Price changes through taxes or subsidies are regressive and disproportionately have more impact on those with lower incomes because they spend a larger proportion of their income on food and because they tend to buy relatively cheaper foods; even where taxes are regressive, those on lower incomes may still benefit proportionately more from subsidies on fruit and vegetables if they buy them	Moderate	Some evidence	Barrett et al., 2017; Jensen et al., 2011; McGill et al., 2015; Thow et al., 2010

Source: RAND Europe analysis. This table is a summary of the evidence on socio-demographic differences in food consumption cited in the literature reviewed. It serves to highlight the differences and nuances in behaviour and practices related to food. It is not intended as a segmentation and cannot be used to draw predictable conclusions about consumption behaviour.

Future priorities for policy and research

The literature reviewed highlights significant gaps in the evidence base. Some factors have high-quality evidence but are not extensively written about in the academic literature. Other factors have low- or moderate-quality evidence in the academic literature. Table 3 provides a summary overview of areas explored in the literature on food consumption behaviours and

practices, and the interventions to change these, and illustrates both the quality and availability of the evidence for each factor. Building on this, Box 2 summarises a number of key evidence gaps in the existing literature regarding trends, drivers and interventions. Based on these key evidence gaps, there are a number of priority areas that policymakers could consider, which are presented below and summarised in Box 3.

Table 3 Availability (volume) of evidence in the literature on food consumption practices and behaviours and interventions

	Factor	Evidence base	Quality of evidence	Availability of academic evidence	Relevant to chapter			
					Trends	Drivers	Individual/social differences	Interventions
Trends	 Demographic variables	Analyses do often not control for the interaction of these with other factors	High	Strong	✓			
	 Ethical and environmental concerns	Unclear whether these concerns influence consumption A value-action gap persists	High	Strong	✓	✓		
Drivers, individual/social differences	 Online purchases	The role of increased online and out-of-home purchasing is not well understood	Moderate	Not widely covered	✓	✓		
	 Built and micro food environment	Growing but mixed evidence base on the impact of the built environment on consumption	High	Not widely covered		✓		✓
Drivers, individual/social differences	 Food actors	High-quality but not extensive evidence on the relative importance of different actors	High	Not widely covered		✓		
	 Food information	Strong evidence on the type of information that is provided to food consumers, but a lack of academic evidence exploring the type of information that can change food practices	High	Some evidence		✓		
Interventions	 Country of origin	Consumers state the importance of the provenance of food when choosing certain food products (particularly meat) but there is not a lot of evidence	Moderate	Not widely covered	✓	✓		
	 Food quality	There is moderate evidence that perceived food quality is an important driver for consumer choice	Moderate	Some evidence		✓		
Interventions	 Online purchases	The role of the changing digital landscape and its influence on food consumption is not widely covered	Moderate	Not widely covered	✓	✓		
	 Segmentation	Often specific to a particular context and not always generalisable across a population	Moderate	Not widely covered			✓	
Interventions	 Supply-side technologies	Limited evidence that consumers consider technologies in food production processes when making food-related decisions	Low-moderate	Not widely covered		✓		
	Mass media campaigns	Evidence is still limited regarding whether it can influence behaviour change Limitations to campaign design (e.g. TV only, not online); better designed campaigns might be more effective	Moderate	Not widely covered	✓			✓
Interventions	 Food labelling	Evidence on the effect of food labelling in fast-food settings, supermarkets and restaurants is mixed	Low-moderate	Some evidence	✓			✓
	Advertising regulation	Can impact consumption but the evidence is limited Limitations in both evaluation and policy design limit our knowledge of effectiveness	Low-moderate	Some evidence	✓			✓
Interventions	Food provision and procurement in other public settings	Little research on the effects Very little evidence identified	Mixed	Not widely covered		✓		✓
	 Changes in the micro environment	Mixed evidence and effectiveness of these interventions depends on context	Low	Not widely covered	✓			✓
Interventions	Built food environment	Policy actions to address the built food environment have not been widely implemented or evaluated	Low	Not widely covered	✓			✓
	 Reformulation of food	Substitution effects unclear; can be driven by other changes (price changes, labelling requirements)	Moderate	Not widely covered	✓			✓
Interventions	Taxes and subsidies	Understanding of substitution effects limited	Moderate	High	✓			✓

Source: RAND Europe analysis.

Box 2 Summary of key evidence gaps in the existing literature**Trends**

- The effect of demographic variables on consumption is not well understood as analyses are often not adequately controlled for the interaction of these variables with other factors (e.g. correlation between age and wealth).
- Research indicates some differences in consumer practices when shopping online compared to offline, but the overall effects of the changing food environment on consumption, such as increased online and out-of-home purchasing, is not well understood. For example, patterns and frequency of use of different types of outlet are not clear, and the ways in which food options are presented affect consumption in an online setting are not well established.
- The extent to which ethical and environmental concerns influence consumption is unclear beyond information on purchasing data on specific food types (e.g. Fairtrade). Similarly, though some consumers increasingly care about the provenance of their food and production methods, the relative importance of these considerations and their influence on consumption are unknown.
- A value-action gap persists and there is some evidence on why this might be the case; however, there is very little evidence on how and when that gap can be closed.

Drivers

- The role of digital technology, both in terms of a route to purchase food, and as a source of information and a vehicle for advertising, is not well understood and is likely to continue to increase in importance. More evidence is needed on how new technologies and new and existing platforms (e.g. social media) impact on consumption.
- Although there is a growing evidence base on the influence of the built and micro environment on consumption, there are still important gaps that require further investigation, such as the impact of socio-demographic differences in access to fast-food outlets and the impact of planning policies on consumption.
- Although the literature cites a variety of food system actors as being important in influencing the food environment and consumption practices, there is no evidence on their relative importance.

Social differences

- Some of the evidence around social differences in consumption comes from cross-sectional data, which means it is unclear whether interventions could effectively address those differences by changing those personal factors or circumstances. More longitudinal data would be helpful to better understand whether interventions can be effective in changing consumption.

Box 2 Summary of key evidence gaps in the existing literature (continued)**Interventions**

- Many evaluations of the effectiveness of interventions are limited to short-term or intermediate outcomes, which limits their usefulness. Examples include evaluation of healthy eating campaigns, which often look at changes in attitudes or knowledge rather than consumption; and evaluations of workplace well-being initiatives, which often have a poor evaluation design, small sample sizes and only short-term follow-up. More long-term evaluations looking at ultimate intended outcomes are needed. More generally, the quality of evaluations could be improved.
- Interventions aiming to change information availability, either through healthy eating campaigns or restriction of advertising, often focus on traditional media and do not target new media. This may limit their effectiveness and makes it difficult to establish whether these types of interventions could work if they were more comprehensive.
- Most evidence on interventions is focused on health outcomes rather than other types of consumption behaviours (e.g. more sustainable or ethical consumption).
- There is some suggestion that studies in real-world settings may show different effects on consumption than in experimental settings, typically with smaller effects seen in a real-world context. More real-world data is therefore needed. Examples here include provision of calorie information in food outlets and changes in food pricing.
- There is very limited evidence on the effect of changes in the food available in settings such as hospitals or food delivered at home to low-income, older people. Given that changes in provision in schools and, to a lesser extent, workplace settings have an effect on consumption, this merits further investigation.
- There is very limited evidence on the impact of policies aiming to regulate or change the environment in terms of density or prevalence of fast-food outlets or to address food deserts. There is a strong association between obesity and access to unhealthy food, for example through a high concentration of unhealthy fast-food outlets. However, many studies are cross-sectional so the direction of causality is unclear, and the correlation may be mediated by socio-economic status and educational attainment. This needs to be better understood to support effective policy development. There are also no examples of evaluations or reported implementation of policy interventions addressing the built food environment in the academic literature, which is an important gap.

A 'whole systems' approach could help to change food consumption

Overall, the evidence indicates that a combination of approaches across the policy spectrum is needed to promote a healthy, ethical and sustainable diet rather than focusing on any one measure alone. A balance is needed between 'soft' measures (e.g. knowledge and information provision) that promote individual-level change and 'hard' measures that encourage collective change (e.g. changes to the food environment and cost and content of food). Knowledge and information can serve to raise awareness, but individuals are limited in their capacity to change their consumption by the availability of food in the food environment and are also influenced by powerful drivers such as cost and habit, which ultimately serve as significant barriers to healthy, sustainable and ethical diets.

Invest in evaluations of the effectiveness of interventions that target the wider (and changing) food environment

There is increasing evidence that individuals are limited to exercise healthy choices by the availability of food in their environment, and access to unhealthy food has been associated with obesity. However, to date there are few interventions that have explicitly targeted the wider (built and micro) food environment to address the availability of unhealthy food. Good-quality studies based in a real-world setting are also required to help design effective interventions in this space. Both policy and research as yet does not well reflect changing modes of consumption and information sources, particularly in relation to online and out of home. For example, most media campaigns are conducted through television, with limited use of new, online media, and evidence on purchase of food through online routes is currently limited. Both policy and research needs to progress to

ensure adequate information is available and appropriate policy responses are in place to reflect our changing food environment.

Gather real-world evidence around subsidies, taxes and reformulation programmes to better understand potential substitution effects

Although there is emerging evidence that changing the cost and content of food through taxes, subsidies and reformulation programmes is effective at changing practices, there are potential substitution effects that are not well understood. Studies based on real-world data could help to provide more accurate evidence around this.

Collect evidence on longer-term outcomes and more longitudinal data

It is particularly challenging to identify concrete evidence on the longer-term outcomes of interventions and to understand what factors can result in changes in consumption practices. Most evaluations of interventions only include short-term follow-up and many often look at intermediate rather than final outcomes. Assessments of the drivers of consumption are often cross-sectional, limiting the scope to look at whether changes in personal circumstance, knowledge, experience and other wider factors can drive changes in consumption over time. Improving the evidence base through more long-term follow-up and increased longitudinal data would not just help us to understand whether existing interventions are working or what the trends are. It would also enable us better to design policies that are effective at changing consumption. Evidence gaps in longer-term outcomes should not prevent the creation of much needed interventions to address food consumption, but all new policies should have long-term evaluation built in.

Box 3 Summary of possible priority areas for further consideration by policymakers

Priority area 1: A 'whole systems' approach is needed to change food consumption

- A combination of coordinated and complementary approaches across the spectrum of policy categories is likely to be most effective at changing consumer diets to ensure they are sustainable, affordable and healthy.
- Combining individual-level policies (e.g. information and knowledge provision) with collective, population-level approaches (e.g. focusing on the food environment, and cost and content of food) could help to promote sustainable, affordable and healthier food choices.

Priority area 2: Invest in evaluations of the effectiveness of interventions that target the wider (and changing) food environment

- Although individuals are often aware that eating a healthy diet and being physically active is necessary, many are constrained and influenced by their food environment (i.e. the availability of food, marketing, advertising, food placement and portion sizes).
- More evaluations of interventions, supported by good-quality real-world data, are needed that target the built and micro food environment (including online and out of home) to address the availability of unhealthy food.

Priority area 3: Gather real-world evidence around subsidies, taxes and reformulation programmes to better understand the potential substitution effects

- Understanding of the overall effectiveness of prices, subsidies and reformulation of foods is limited by a lack of understanding of possible substitution effects.
- It would be important to conduct more real-world evaluations and studies to better understand the impacts of these policies.

Priority area 4: Collect evidence on longer-term outcomes and more longitudinal data

- Most evaluations of interventions only include short-term follow-up and many often look at intermediate rather than final outcomes.
- Collecting longitudinal data and evidence on the longer-term outcomes of interventions would help to better understand what factors can result in changes in consumption practices. This should form an ongoing activity alongside implementing interventions to address food consumption.



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Abbreviations

Defra	Department for Environment, Food and Rural Affairs
EU	European Union
NGO	Non-governmental organisation
REA	Rapid evidence assessment
RSPCA	Royal Society for the Prevention of Cruelty to Animals
SDIL	Soft Drinks Industry Levy
UK	United Kingdom
WHO	World Health Organisation

Glossary of food certifications used in this report

Carbon Footprint: Certification scheme launched by the Carbon Trust in 2007. Carbon labels inform consumers about the carbon footprint of a product.

Fairtrade: Label established by Fairtrade International in 1997. The label operates as a certification scheme for assuring ethical trading standards for farmers and producers in developing countries.

Marine Stewardship Council: Sustainable seafood eco-label established by the World Wildlife Fund and Unilever in 1996, and operating as a not-for-profit since 1999. The label operates as a certification scheme for sustainable fisheries and to help promote sustainable fishing to maintain seafood stocks.

Rainforest Alliance: Certification scheme operated by the Rainforest Alliance and the Sustainable Agricultural Network. The label assures that products meet certain sustainable production standards.

Red Tractor: Food assurance scheme operated by Assured Food Standards, an independent organisation, launched in 2000. The label recognises UK food and drink that has been produced to a high-quality across the food chain and as such is traceable.

RSPCA Assured: Farm assurance scheme introduced by the Royal Society for the Prevention of Cruelty to Animals in 1994. The scheme assures a certain standard of animal welfare through traceability across the whole supply chain.

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1

Why food consumption matters

The health and environmental impacts of our food choices

Obesity⁴ is a global pandemic influenced by the food environment⁵ and individual choices (FAO, 2018; Meldrum et al., 2017; WHO, 2004). Global obesity rates have more than tripled since 1975 and levels of obesity in the UK are amongst the worst in Europe (OECD, 2017). In the UK, 29 per cent of adults are obese, and by age 11 so are 20 per cent of children (NHS Digital, 2019). This is a 'blatantly visible – yet most neglected' public health challenge (WHO, 2004) and nutritionally poor and unhealthy diets are one of the main factors that make individuals overweight (Public Health England, 2017).

Being overweight⁶ or obese, along with poor diet and nutrition, puts people at risk of ill health and premature death (NHS Digital, 2019) through conditions such as diabetes, cardiovascular disease, cancer, musculoskeletal, liver and dental disease (WHO, 2004). In the UK alone, obesity-related illness is responsible for more than 30,000 deaths per year and on average deprives an individual of an extra nine years

of life (Public Health England, 2017). Ill health as a result of being overweight obese is also expensive. Between 2014 and 2015, the NHS spent an estimated £6.1 billion on weight-related ill health; more than is spent annually on the police, fire service and the judicial system combined (Public Health England, 2017). Poor diet puts people at risk of poor health, but these risks are not equally distributed across populations, with low income groups at greatest risk of having a low-quality diet and the accompanying health problems (Gakidou et al., 2017).

Consumption practices also have an impact on the environment. Food production, transport and packaging can contribute to greenhouse gas emissions, biodiversity loss and plastic and food waste. Food systems contribute between 10–29 per cent of global greenhouse gas emissions (Defra & Government Statistical Service, 2019; Garnett et al., 2015) through agriculture, preproduction and post-production food processes (Vermeulen et al., 2012). Consumption practices also significantly affect deforestation, which is the main cause

⁴ Obesity is defined as having a body mass index greater than or equal to 30 (Public Health England, 2017).

⁵ This report follows the definition of food environments put forward by the Food and Agricultural Organisation of the United Nations as the environments that constitute the food that is available to people's everyday lives and the safety, price, convenience, labelling and promotion, and nutritional quality of these foods. It encompasses both the physical and social contexts within which food consumption occurs (FAO, 2016).

⁶ Being overweight is defined as having a body mass index greater than or equal to 25 (Public Health England, 2017).

of biodiversity loss worldwide (Vermeulen et al., 2012). In addition, consumption practices create substantial food and plastic waste, which has adverse effects on human health, the environment and the economy (van Otterdijk & Meybeck, 2011). Food waste is costly and according to one estimate produces £20 billion in losses in the UK annually⁷, contributes to approximately 25 million tonnes of greenhouse gas emissions (WRAP, 2019) and decreases the supply of nutritious foods available to those in need (European Commission, 2016). Plastic waste introduces chemicals in the natural environment, destroys natural habitats as plastic is non-biodegradable and leaves behind compounds that are dangerous to human health and wildlife (Ilyas et al., 2018; Institute for European Environmental Policy et al., 2018). It should be noted that there is likely a trade-off between food waste and removal of plastic packaging, with evidence suggesting that plastic reduction could increase food waste and use of other types of packaging may contain materials that are more energy intensive or worse for the environment (WRAP, 2019). Therefore, more research regarding the circular economy is required to understand these trade-offs.

However, a change of diet could improve the adverse environmental consequences of the food system. Dietary changes, particularly by reducing the consumption of meat and animal products, can lead to a substantial reduction of greenhouse gas emissions (Hallström et al., 2015). A reduction in meat consumption could also reduce the demand for land and thereby counter biodiversity loss (Hallström et

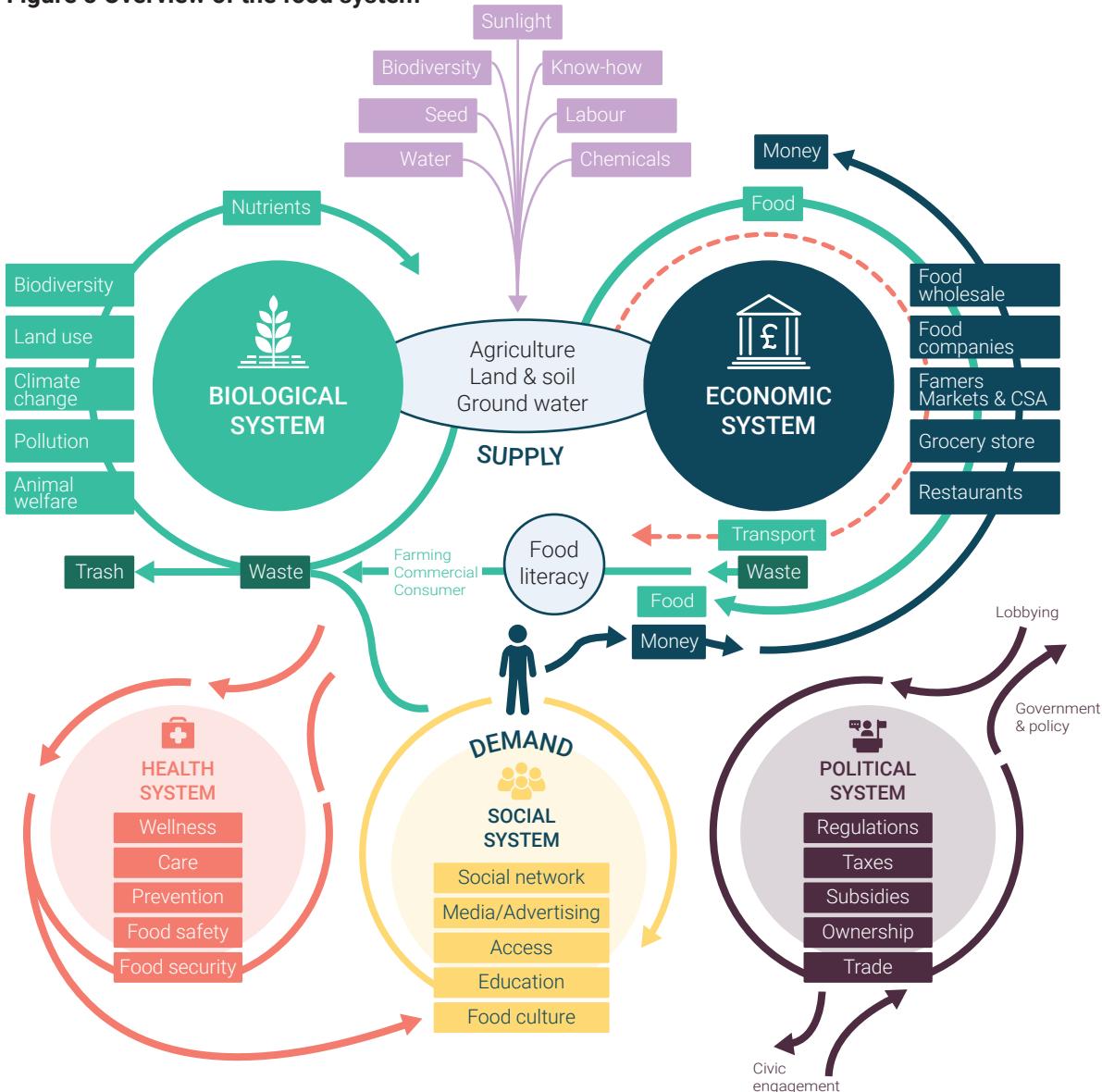
al., 2015), although this is complex to predict as UK produce may be exported to other countries instead. However, the exact amount by which meat consumption should be reduced and the food products that should replace meat remains contentious (Willett et al., 2019). In 2011, the Scientific Advisory Committee on Nutrition recommended that adults who have red meat intakes of more than 90 g per day should consider decreasing to 70 g per day (SACN, 2011). The UK government's Eatwell Guide⁸ recommends eating less red and processed meat and suggests that pulses are good alternatives to meat (Public Health England, 2018). An analysis by the Carbon Trust reported that a diet in line with the Eatwell Guide would have a 32 per cent lower environmental impact (in terms of greenhouse gas emissions, water and land use) than the current average UK diet (Carbon Trust, 2016). A number of differences contribute to the reduction, such as increasing potatoes, fish, wholemeal and white bread, vegetables and fruit while reducing amounts of dairy, meat, rice, pasta, pizza and sweet foods. The EAT-Lancet diet⁹ launched in January 2019 calls for a reduction of about 50 per cent in the global consumption of foods such as red meat (Willett et al., 2019). However, the World Health Organisation (WHO) has withdrawn its support for the EAT-Lancet diet, questioning its scientific basis and feasibility (Torjesen, 2019). This was recently rebutted from the EAT-Lancet Commission that claimed that rather than advocating for 'centralised control of dietary choices', they put forth the latest science and a definition of sustainable food production that fits local and heterogeneous food diets and cultures worldwide (Rockström & Willett, 2019).

7 Food waste arising within UK households, hospitality and food service, food manufacture, retail and wholesale sectors.

8 The Eatwell Guide is a policy tool developed by Public Health England used to define government recommendations on eating healthily and achieving a balanced diet (Public Health England, 2016).

9 The EAT-Lancet diet was developed by the EAT-Lancet Commission on Food, Planet, Health and consists of a set of global recommendations for a sustainable and healthy diet (Willett et al., 2019).

Figure 5 Overview of the food system



Source: Adapted from the Nourish Food System Map, www.nourishlife.org. Copyright WorldLink, all rights reserved.

Our food system is changing and so are we

Tackling the adverse consequences of unhealthy diets is a complex challenge. Different

factors affect people's diet, spanning behaviour, the food environment, genetics and culture, as well as the wider food system¹⁰ (Public Health England, 2017). While obesity is in part the result of individual choices, the food environments

10 In this report, the 'food system' refers to the different processes and infrastructure needed in feeding a population. It includes the stages that food travels, from production and processing through to packaging, consumption and disposal and also the different actors involved in that process.



and cultures in which people operate make it increasingly difficult to make healthy and sustainable food choices. Many actors, including the government and the food industry, contribute to the food environment, and they all have a role to play in promoting healthy and sustainable diets by making healthy food choices easier to access and more appealing (WHO, 2020). Figure 5 illustrates the complex and interconnected elements of the food system as well as the network of different groups with a stake in the food system.

Food is big business. The agri-food sector contributed £121 billion (9.4 per cent) to UK national gross value added in 2018 (Defra, 2019). However, the food industry landscape in the UK is changing. For example, consumers are increasingly buying online and eating out of home (Dablanc et al., 2017; Nguyen et al.,

2018). In addition, the availability of food is also increasing with growing global supply chains and technological progress (Dablanc et al., 2017; FAO, 2018). Upcoming opportunities and events such as new technologies (e.g. novel foods, automation), changing consumer practices (e.g. sustainable and ethical concerns), political and other factors (e.g. the UK's exit from the European Union, antimicrobial resistance) also provide potential opportunities and challenges, with uncertain implications for UK food consumption patterns (Elta Smith et al., 2019).

Some individuals are changing too, as many have different attitudes to food and a range of values that guide food choices. For example, there is a growing concern about the environment among young people and some individuals are increasingly eating less meat (YouGov: Eating Better, 2019). These different

attitudes and values are a result of an ageing population (Allen et al., 2017; Dean et al., 2009), migration, urbanisation and rising income levels (FAO, 2018; Ruben et al., 2019). In addition, wider trends in lifestyle, living conditions (i.e. the number of people who live alone) and the rise of alternative work arrangements also contribute to the different attitudes of individuals towards food and their consumption practices (Hanna & Collins, n.d.; Ruben et al., 2019).

Food matters and we need to understand it

What we eat can have big implications for our health, our society and the environment. Understanding current trends, what drives them, and how we can change consumption practices through interventions is crucial to inform policy. The aim of this report is to provide a review of consumer attitudes and practices towards food in the UK in support of Defra's work on food production and consumption. This work focuses on providing evidence on four main questions:

1. What are the trends related to consumer food practices and attitudes and to the changing food environment (e.g. out-of-home sector, online retail models) in the UK?
2. What are the drivers of consumption¹¹ (e.g. the role of information or food system actors)?
3. Which interventions can influence food consumption practices?

4. What are the differences between groups, or 'food publics' (Darnton, 2016), across the trends, drivers and interventions (i.e. segmentation)?

This report provides a summary of the existing evidence and evidence-gaps on these questions, with a focus on high-quality,¹² primarily academic literature. The study approach consisted of a rapid evidence assessment (REA). The review included high-quality academic studies from 2010 to 2019 restricted to the UK or the UK with comparator countries. In terms of scope, the review considered studies addressing trends in consumer attitudes and practices in relation to food consumption; drivers of those practices; differences by consumer groupings/segmentation; and policies/interventions to change food consumption and their effectiveness. The following studies were outside of the scope of the review: studies addressing the impact of food, diet or consumption patterns on health and health-related behaviours (exclusion does not include health as a driver of consumption); and studies addressing the relationship between socio-economic factors and health. The report was completed before the Covid-19 pandemic, and so the impacts of the pandemic on food consumption trends, drivers and attitudes are outside of the scope of this study. The methods and approach for this study are summarised in detail in Annex A.

¹¹ There are many definitions of consumption. In this report, 'consumption' refers primarily to decisions made by individuals about what foods to buy and eat, but also includes planning, preparation and intake of food (Sobal & Bisogni, 2009). The exception to this definition is children, and particularly young children, who have less agency. While many studies rely on consumption as a proxy for intake, some studies do unpick the relationship between purchasing and intake and these have been described.

¹² The overall assessment of the strength of the evidence that is presented in the findings is qualitative, taking into account both the quality of individual studies, the number of studies reinforcing the point and, particularly, the existence (or otherwise) of prior systematic review evidence suggesting confidence in a particular finding. These factors have been combined together to give an overall assessment of the status of the existing evidence across different areas. Please see Annex A for more detail on the quality assessment process and criteria.



2

Consumption trends – what foods are people consuming, where and how?

Analysis of trends over the last ten years (2010–2019) indicates that although the foods people consume still fall short of nutritional guidelines, attitudes and values are shifting and the channels through which individuals and households purchase food are diversifying. Notable trends observed include the increasing consumption of ethical and sustainable foods, the increasing use of digital technology to facilitate food purchasing, and, recently, the widening of inequalities and increase in levels of food poverty. Box 4 below provides a summary of the trends in food consumption and attitudes reviewed in the literature.

What people consume still falls short of dietary guidelines

Healthy diets typically include greater consumption of fruit, vegetables and whole grains, and reduced consumption of sugar, salt, processed foods and red meat (Defra, 2017; WHO, 2004; Public Health England, 2018). While UK national nutrition surveys indicate some positive changes to diets, people are generally not meeting the standards recommended for a healthy diet in the UK or internationally (de Ridder et al., 2017; Micha et al., 2015). There is strong evidence to suggest

that the UK population continues to consume too much salt, sugar, and saturated fat, and not enough fruit, vegetables, and fibre (Defra, 2017; Kamar et al., 2016; PHE & FSA, 2019), with most people eating less than '5 a day'.¹³ Trends from various national surveys show no change (PHE & FSA, 2019) or even reductions in fruit and vegetable consumption, with purchases falling by 5.2 per cent between 2008 and 2015 (Defra, 2017; NHS Digital, 2018). Evidence from the National Diet and Nutrition survey indicates that there is some reduction in the consumption of red and processed meat, from 75 per cent of respondents in 2012 to 55 per cent in 2018 (FSA, 2019b; PHE & FSA, 2019). There is some evidence, both in terms of household purchases and consumption data, to suggest that sugar consumption is falling (by 7.3 per cent between 2012 and 2015) (Defra, 2017; PHE & FSA, 2019), including sugar sweetened beverages (PHE & FSA, 2019), but levels of consumption of both remain high (Defra, 2017; Ng et al., 2012; PHE & FSA, 2019). Some evidence also indicates that salt consumption has fallen in the UK, falling 2.4 per cent between 2012 and 2015 (Defra, 2017), but remains above recommended levels (Caraher & Hughes, 2019; Defra, 2017; PHE & FSA, 2019). Consumption of processed foods

13

The 5 A Day campaign is a health awareness campaign launched by the UK government in 2003 to get people to eat at least five portions of a variety of fruit and vegetables a day (Policy Navigator, 2003).

Box 4 Summary of UK trends in food consumption and attitudes to food reviewed in the literature**Trend 1: What people consume still falls short of dietary guidelines**

- UK consumers are generally not meeting the standards recommended for a healthy diet.
- There have been reductions in salt, sugar and red and processed meat consumption but consumption of fruit, vegetables and fibre has shown little or no change.

Trend 2: The channels through which consumers purchase food are diversifying

- Although UK consumers continue to buy food from large supermarkets, other forms of retailer, including mini supermarkets, have increased in popularity.
- The online grocery market is increasingly important, leading to an increase in supermarket home delivery and other forms of home delivery (e.g. vegetable boxes, Hello Fresh and Amazon Fresh).

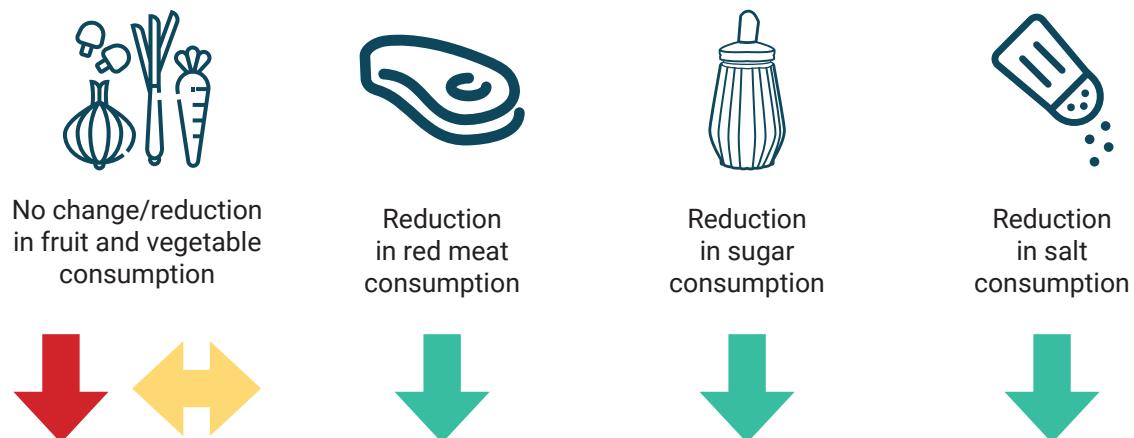
Trend 3: The out-of-home food environment is increasingly common

- There has been significant growth in the consumption of food outside of the home and the proportion of individuals eating out on a regular basis is predicted to increase in the UK.
- The importance of the out-of-home environment is facilitated by digital technology and the expansion of online food delivery platforms, particularly new players such as Deliveroo and Uber Eats.

Trend 4: Some individuals care about the origin, sustainability and ethical production standards of their food

- There has been an increase in the sales of ethical and sustainable products over the last 10 years and an increase in the consumption of plant-based meals.
- Some consumers are concerned about food provenance and safety, although this may depend on the food group, particularly meat.
- However, many consumers demonstrate a value-action gap, in that while they state sustainable and ethical preferences, this often only translates into action if other needs are satisfied (e.g. price, availability and perceived quality), and many consumers remain unaware of social and environmental consequences of their consumption practices. The most important barrier to purchasing sustainable and ethical food cited in the literature is cost, with other barriers including perceived quality and habit.

Figure 6 Food consumption trends in the UK in relation to dietary guidelines



Source: RAND Europe analysis. Downward facing arrow indicates a reduction. Bidirectional arrow indicates no change. Colour of arrows indicates relationship with existing dietary guidelines: red indicates the change is against the desired direction; amber indicates there has been no change; and green indicates a change in the desired direction. These trends are based on analysis over the last ten years.

remains high, with analysis of National Diet and Nutrition Survey data indicating that more than half of all calories consumed on average across the UK population come from ultra-processed foods (Rauber et al., 2018).¹⁴ Figure 6 provides an overview of food consumption trends in the UK.

Together, these findings suggest that, overall, actions so far to encourage healthier eating have been of limited or mixed effectiveness on aggregate, indicating further action may be needed.

The channels through which consumers purchase food are diversifying

Self-reported survey evidence shows that the majority of UK consumers continue to buy

food from large supermarkets (FSA, 2019b). One study found that older people may prefer luxury supermarkets (e.g. Marks & Spencer and Waitrose), though this may also be linked to income levels (Omar et al., 2014). However, in recent years, survey evidence indicates that other forms of retailer have increased in popularity, including mini supermarkets, supermarket home delivery and other forms of home delivery (e.g. vegetable boxes, Hello Fresh and Amazon Fresh), although use still remains low (FSA, 2019b). These newer channels reflect the increasing importance of the online grocery shopping market, which is projected to increase its market share from 18.6 per cent to 23.4 per cent by 2024 (IGD, 2019b).

Although there has been an increase in online sales in the UK, including in grocery shopping

¹⁴ Recent definitions of 'ultra-processed' food define it as foods typically modified by chemical processes, which are then assembled into ready-to-eat food products using additives (e.g. flavours, colours, emulsifiers). Foods include savoury snacks, reconstituted meat products, pre-prepared frozen dishes and soft drinks (Carlos A. Monteiro et al., 2019). However, the term 'ultra-processed' is not defined consistently in the literature and is open to interpretation, which can be a potential confounding factor in assessing the strength of the evidence.

(Mintel, 2018), 'bricks and mortar' store sales currently continue to surpass online sales (ONS, 2018b). In addition, recent evidence suggests that the number of UK customers shopping online dropped between 2015 and 2018 (Mintel, 2018); however, this may be an effect of having reached saturation – an initial fast start with many early adopters, followed by slower growth in line with populations who are more used to this approach. There is some evidence to suggest that online sales also vary by age, with younger consumers more likely to shop online, compared to older shoppers who are less likely to shop for groceries online (Mintel, 2018). Despite the recent slowdown in growth, digital food shopping is predicted to increase, with food and grocery shopping likely to be more automated in the next five to ten years (IGD, 2019). Research indicates some differences in consumer practices when shopping online compared to offline, particularly around the purchase of fresh produce, although the evidence is mixed. While some evidence suggests that consumers may be less likely to buy fresh produce online due to concern about quality and freshness (Hand et al., 2009), recent analysis of one Morrisons data set (of real online grocery transactions via Morrisons Google Analytics account) suggests that contrary to some findings, consumers spent more on fresh produce when shopping online than offline (Munson et al., 2017). The Morrisons dataset also investigated price sensitivity (e.g. propensity to engage with offers), but found that online consumers were not more price sensitive than offline consumers (Munson et al., 2017).

There is a need to build more evidence on what policies are needed to encourage healthy eating in the online setting. In an offline setting, there is considerable evidence from

the behavioural economics literature about the impact of the food micro environment (e.g. the architecture of a supermarket) on food purchases (Bucher et al., 2016; Cadario & Chandon, 2019; Hartmann-Boyce et al., 2018; Hollands et al., 2015; Houghtaling et al., 2019). However, this is likely to apply very differently, if at all, in an online context. In contrast, the surfeit of information in the online context, particularly through social media, is likely to considerably influence the dynamics of healthy food purchasing and communication of food information (Garcia et al., 2019).

The out-of-home food environment is increasingly common

Overall, the consumption of food and beverages from outside the home has undergone considerable growth over the last decade, due to changes in consumer practices and greater flexibility in personal budgets (Jean Adams, Tyrrell, et al., 2012; FSA, 2019b). One study found that in the UK, 27 per cent of adults and 19 per cent of children consumed meals outside the home once per week or more and 21 percent of adults and children ate takeaway meals at home once per week or more (J. Adams et al., 2015). There is some evidence to suggest that attitudes have also changed in the last 20 years, with eating out becoming more informal and no longer reserved for special occasions (Paddock et al., 2017). The increase in out-of-home food consumption is also driven by the rise of digital technology and expansion of online food delivery platforms, particularly new players such as Deliveroo and Uber Eats, and the expansion of delivery-only or 'dark' kitchens¹⁵ (Edelman, 2019; Hirschberg et al., 2016).

There is some evidence to suggest that patterns of eating out may vary by age and socio-economic status. Whereas the out-of-home food environment (including for example restaurants, takeaway and fast-food places) is increasingly a major part of the diet of younger adults and adolescents (Adams et al., 2015; Nielsen, Siega-Riz, & Popkin, 2002; Tyrrell et al., 2017), home appears to be the most important location of food consumption for older adults, who are less likely to go to restaurants, fast-food outlets or pubs (Omar et al., 2014; Thompson et al., 2018; Ziaudddeen et al., 2018). Some evidence indicates that children from lower income households are more likely to eat takeaway meals at home or purchase food from outside school (Adams et al., 2015; Wills, Danesi, Kapetanaki, & Hamilton, 2019). In contrast, the evidence in adults is mixed (J. Adams et al., 2015), with some evidence that adults with lower income tend to consume more takeaway meals eaten at home (ONS, 2018b), compared to those with higher income who tend to spend more on restaurant and café meals (ONS, 2018a). The literature reviewed does not provide evidence around patterns or frequency of eating out by type of out of home food outlet in children or adults.

The proportion of individuals eating out on a regular basis is predicted to increase in the UK (Caraher & Hughes, 2019). Food from outside the home tends to be less healthy and associated with a higher energy content than food prepared in the home (i.e. containing high quantities of fat, sugar and salt) (Goffe et al., 2017; Jaworowska et al., 2014; Lachat et al., 2012; Robinson et al., 2018) and has been associated with weight gain and other negative

health outcomes (e.g. biomarkers of greater cardiometabolic risk) (Lachat et al., 2012). This trend suggests that policies should consider the challenges presented by the out-of-home sector, which is fragmented compared with the traditional food retail market and does not have the same requirements around mandatory nutrition labelling for example (Caraher & Hughes, 2019).

Some individuals care about the origin, sustainability and ethical production standards of their food

There is increasing awareness about the negative environmental impact of food production systems, with moves to develop more sustainable dietary guidelines (Apostolidis & McLeay, 2016; Lang & Mason, 2018). For example, the UK government's Eatwell Guide,¹⁶ published in 2016, has taken some steps towards incorporating sustainability with wording to guide people to make more sustainable choices and an evaluation of the sustainability of the Eatwell Guide carried out after its development. Also, plant-based foods are given more prominence, which are more healthy and more sustainable (Atherton & Head, 2016).

There is considerable evidence showing an increase in ethical, sustainable and healthy food purchases by consumers (Defra, 2010; FSA, 2019b, 2019a; WRAP, 2015). Survey data shows that sales of 'socially responsible' produce¹⁷ have increased year on year since 2007, despite the economic downturn, and in 2017 represented 11 per cent of all household food sales (Defra, 2019; Price et al., 2016).

16 The Eatwell Guide is a policy tool developed by Public Health England used to define government recommendations on eating healthily and achieving a balanced diet (Public Health England, 2016).

17 This includes for example: Fairtrade, organic, free range (eggs and poultry), vegetarian meat alternatives, sustainable fish, RSPCA Assured foods and Rainforest Alliance. RSPCA Assured is a food labelling scheme that assures a certain standard of animal welfare.

However, research from Mintel, a market research organisation, suggests that over the last five years, sales of ethical food and drink¹⁸ have increased by 43 per cent from £5.7 billion in 2013 to £8.2 billion in 2018 (Mintel, 2019a). The consumption of plant-based meals in particular is on the rise, and consumption has grown by 37 per cent in the last four years (Kantar, 2019). There has been a particular increase in 'flexitarian' or semi-vegetarian diets (George, 2019; Mintel, 2019b), which according to one survey make up just over 9 per cent of the UK population (George 2019). There is some evidence on socio-demographic characteristics suggesting that environmentally sustainable consumers tend to be female and younger (Latvala et al., 2012; Su et al., 2019; WRAP, 2015; YouGov: Eating Better, 2019), whereas the consumption of ethically-certified food is driven by older consumers (aged 55 or more) (Mintel, 2019a).

There is also some evidence for changes to various other consumer values (such as food provenance and safety), although this may depend on the food group.

In general, some consumers would like more locally produced food (e.g. British food) (FSA, 2019a), with one survey showing that 59 per cent of shoppers agree that they try to buy British food whenever they can (Defra, 2019). Some consumers may also prefer shorter supply chains, although the evidence around this is less clear and may be linked to one-off events such as the 2013 horsemeat scandal, which served to highlight the length and complexity of food chains (J. Barnett et

al., 2016). There is also some evidence that some consumers prefer less processing and are cautious around novel food technologies for food processing, particularly around meat production, having a negative perception of the production and processing of beef products (W. Verbeke et al., 2010). Consumers' acceptance of novel food technologies such as nanotechnologies varies greatly depending on their awareness but also general attitude towards new technologies, with some evidence suggesting that consumers may have greater acceptance for applications that are not ingested such as smart packaging (Santeramo et al., 2018). Some consumers are also concerned about food safety specifically when it comes to meat consumption, although this may also be linked to meat-related food scares, which are often short term and related to political events (Font-i-Furnols & Guerrero, 2014). For example, events such as the bovine spongiform encephalopathy crisis in the UK in the 1990s and more recently the debate on chlorinated chicken following the UK's exit from the European Union, can serve to highlight food production in the public debate for a few years (Food Safety News, 2019; Murray, 2018).

However, consumers typically demonstrate a 'value-action gap',¹⁹ in that while certain individuals increasingly state sustainable and ethical preferences, this often only translates into actual practices if other needs are satisfied (e.g. price, availability and quality) (Apostolidis & McLeay, 2016; Bondy & Talwar, 2011; IGD, 2019a; W. Verbeke et al., 2010). For example, a study of 3,000 UK households found that although a range of issues (such as animal welfare, ethical production and sustainability) were rated as important by a high percentage of households, the percentage claiming to

18 This includes for example: organic, Fairtrade, Rainforest Alliance and Marine Stewardship Council certified products.

19 The 'value-action gap' refers to gaps seen between stated consumer values and preferences and consumption practices (Carrigan, 2017; Hassan et al., 2016).

actively seek these products was much lower across all three categories (Defra, 2011). The concept of a value-action gap – where stated preferences do not necessarily translate into actions in practice – is a common challenge in conducting research on food preferences and drivers of food practices (Garnett et al., 2015). In many contexts, people will state that certain values (e.g. animal welfare, sustainability) are important or matter to them when asked (for example in a survey setting), but the extent to whether these preferences show in consumption practices in real-world settings is often much more limited (BARR, 2006; Padel & Foster, 2005; Vermeir & Verbeke, 2006).

A number of factors have been found to contribute to the value-action gap. In particular, price has been identified as a key barrier to ethical and sustainable food purchases (Defra, 2011; Mintel, 2019a) and in one study 'price conscious' consumers made up the largest segment in the market (Apostolidis & McLeay, 2016). The recession was found to decrease purchasing of Fairtrade products in 'occasional' consumers compared to 'active' consumers, with the former being more driven by product characteristics such as price and quality (Bondy & Talwar, 2011). Perceived quality is another factor, with evidence from a choice experiment study showing that consumers expressed very low preferences for meat substitutes, partly due to lower perceived quality, although the same consumers valued attributes such as being produced in the UK and having a low carbon footprint (Apostolidis & McLeay, 2016). Habit was also found to be a barrier in one study, with respondents in one survey stating that they did not choose sustainable and ethical food out of habit (Defra, 2011).

In addition, not all consumers are equally aware of social and environmental consequences of their consumption. There can be a lack of

awareness of how personal food choices (e.g. meat consumption) impact on wider issues (e.g. climate change), leading to resistance to the idea of behavioural change (e.g. reducing personal meat consumption) (Happer & Wellesley, 2019; Macdiarmid, Douglas, & Campbell, 2016). Even where individuals are aware, there may be differences in their ability to act on their beliefs and values. For example, we note that ethically certified food is more commonly purchased by older consumers (aged 55 or more) (Mintel, 2019a). This may reflect the values of this group, relative to the wider population, or it may be that there is a perception of greater quality, or simply that they are better able to act on those values due to factors such as wealth or availability of time (Regan et al., 2018; Toti & Moulins, 2016). Some individuals may feel a lack of agency with regard to issues such as sustainability and animal welfare in a food system dominated by large powerful companies (Howse et al., 2018).

Based on these findings, it is likely that a combination of approaches may be effective to encourage ethical and sustainable food consumption. The rise in 'flexitarian' consumers suggests there could be scope for policymakers to develop interventions to encourage meat reduction. For example, information campaigns could be used to increase awareness and encourage the reduction of meat consumption in those groups of consumers who currently lack awareness. Although these policies are unlikely to change practices on their own, they could encourage consumers to accept future, more substantive interventions such as economic measures. There is also scope for policymakers to target the value-action gap by making it easier for socially conscious consumers to purchase ethical and sustainable food.



3 Drivers of consumption – what influences food consumption practices?

The underlying drivers of trends and patterns in consumer food practices and preferences are complex. A range of diverse and interconnected factors shape and influence the actions and decisions that individuals take within particular food environments as well as the wider food system. By considering the influence of social practices, cost, availability and access to information and marketing, as well as the role of industry and government and the importance of food quality and safety, it is possible to understand the diverse and complex system in which consumer practices and preferences to food are shaped. Figure 7 provides an overview of the drivers that the literature highlights are important and their relative importance. The drivers at the top of the triangle are those that have high-quality evidence and are perceived as consistently important in the literature, while the drivers at the bottom are those that have the least evidence to support their importance in the literature.

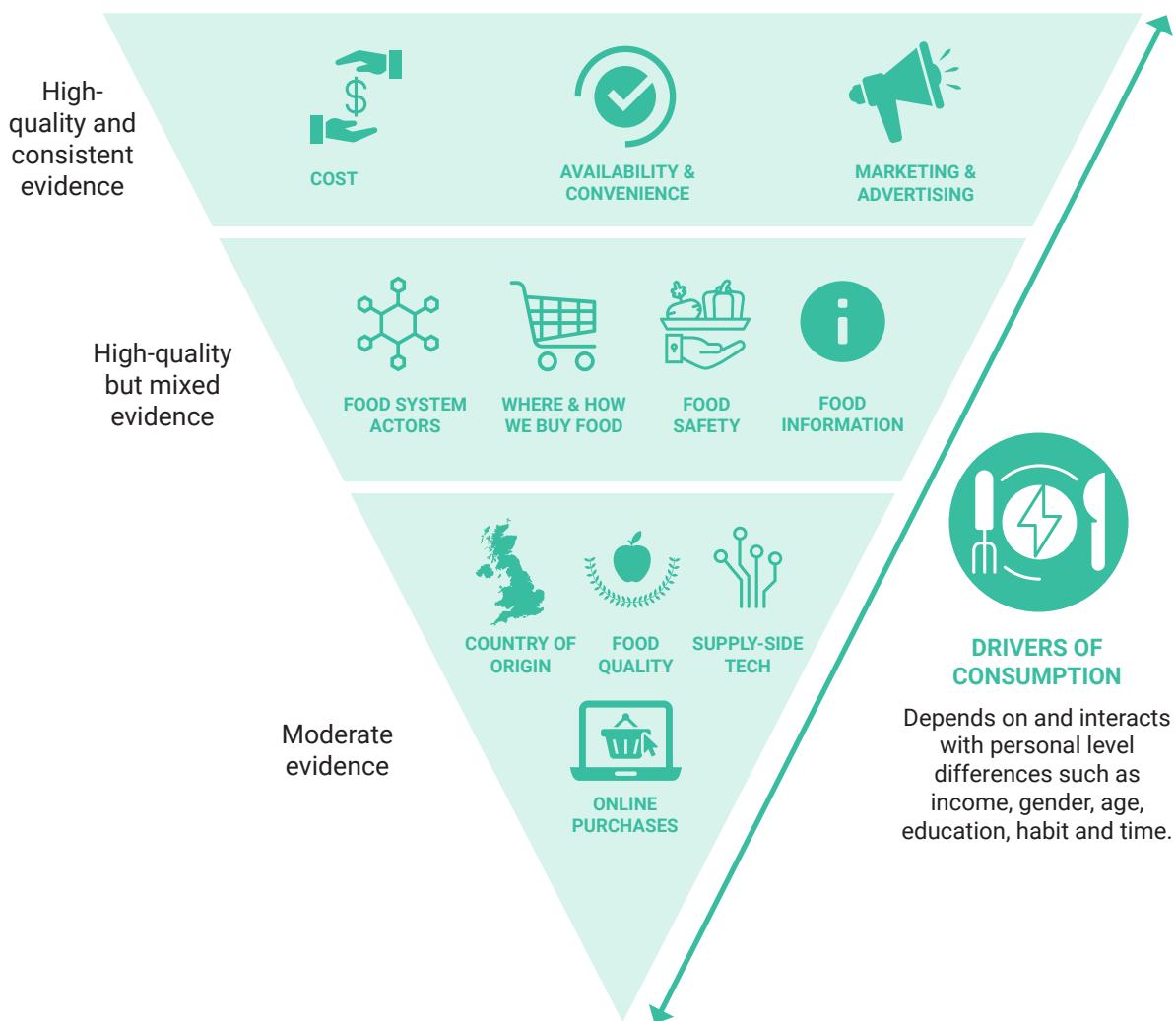
There is strong evidence that the cost of food is an important predictor of food purchases

There is strong evidence that the cost of food has an effect on consumer purchases, with increasing cost decreasing the likelihood of consuming certain food products (Akaichi et al., 2016; Appleton et al., 2017; Edwards et al., 2010; European Food Safety Authority, 2019;

Howse et al., 2018; Lee et al., 2018; Stephens et al., 2018; Vinther et al., 2016). Consumer choices are driven by the perceived affordability of certain food products (Appleton et al., 2017), price (Akaichi et al., 2016; Apostolidis & McLeay, 2019; Edwards et al., 2010; Font i Furnols et al., 2011; Ghvanidze et al., 2017; Howse et al., 2018; Revoredo-Giha et al., 2018; Stephens et al., 2018) and perceived value for money (Blow et al., 2019; Bondy & Talwar, 2011; Griffith et al., 2015).

Costs shape what people can afford to eat, the healthiness of their food choices and the willingness to consume 'socially responsible' food products. Food prices shape where people eat and whether they eat in the home or outside of it (Appleton, 2016). The perception that healthier choices are more expensive is a major barrier to making healthier decisions about food (An, 2013; Griffith et al., 2015; Howse et al., 2018; Pechey & Monsivais, 2016). The price of food influences consumers' willingness to purchase Fairtrade and organic products (An, 2013; Bondy & Talwar, 2011; Jensen et al., 2011). Costs also shape the consumption of meat and meat replacements. Studies have cited cost as driving the frequency of meat consumption, the willingness to consume meat substitutes, as well as consumption of vegetarian products, with a lower price preferred (Akaichi et al., 2016; Appleton, 2016; Font i Furnols et al., 2011). Although cost is a major barrier to the

Figure 7 Overview of the strength of the evidence on the different drivers of trends and patterns in consumer practices and preferences and their coverage in the literature



Source: RAND Europe analysis. There is high-quality and consistent evidence that the factors at the top of the triangle are important drivers of consumption. The factors in the middle have high-quality sources with mixed evidence regarding the relative importance of the factor in driving consumption practices. The factors at the bottom of the triangle have moderate evidence illustrating the relative importance of the factor but are either not widely covered in the academic literature or lack high-quality sources.

purchase of ethical and sustainable products, a number of studies have shown that some consumers are willing to pay a price premium for products with ethical and sustainable labels (e.g. Fairtrade) (see Akaichi et al., 2016).

However, the relative importance of cost as a driver of consumer purchases also interacts

with other factors. These include taste, availability, the perceived healthiness of foods and the frequency with which certain food types and products are already consumed (Apostolidis & McLeay, 2019; Edwards et al., 2010; Jensen et al., 2011; Kamar et al., 2016).

Costs are also relative to income level and, in many instances, income differences explain a lot of the observed dietary health differences (Appleton et al., 2017; Barton et al., 2015; Bondy & Talwar, 2011; Cribb et al., 2011; Edwards et al., 2010; Hawkesworth et al., 2017; Levin, 2014; Palma et al., 2017; Pearson et al., 2018; Pechey & Monsivais, 2016; Rekhy & McConchie, 2014; Thomas et al., 2019; Townshend & Lake, 2017). Food products that are more expensive and have higher-quality health outcomes are associated with more consumption in higher income groups (Darmon & Drewnowski, 2015). There is also some evidence that changes in relative prices drive households' decisions to change the quantities of the different food groups that they buy (Griffith et al., 2015). In general, those in low-income groups often have less expensive food expenditure practices, consume less healthy food and less fruits and vegetables (Appleton, 2016; Barton et al., 2015; de Ridder et al., 2017; Hawkesworth et al., 2017; Levin, 2014; Levin et al., 2012; Thomas et al., 2019; Townshend & Lake, 2017; Whybrow et al., 2018).

Marketing and advertising have a significant effect on food purchases, especially for children and young people

There is strong evidence that consumer choices are significantly influenced by marketing and advertising (Buchanan et al., 2018; Cairns et al., 2009; Kamar et al., 2016; Kavallari et al., 2011; Kearney, 2010; Roberto et al., 2015; Saltmarsh, 2014; Vinther et al., 2016;

Wills et al., 2019).²⁰ Marketing and advertising increases the consumption of unhealthy foods in children (Cairns et al., 2009; Chambers et al., 2015), adolescents (Kamar et al., 2016) and young adults (Buchanan et al., 2018). In addition, a significant amount of money is spent by food companies on marketing each year, with the companies producing the top 18 brands in the UK spending more than £143 million in 2016 on marketing unhealthy foods (O'Dowd, 2017).²¹

In particular, there is some high-quality evidence around the negative impacts of advertising has on children and young people (Buchanan et al., 2018; Griffith et al., 2015; MacGregor & Bicquelet, 2016). For example, each additional hour of commercial TV that children in the UK watch is associated with a 27 per cent increased likelihood of buying unhealthy food and drink (Boyland et al., 2018). A systematic review found that the most persuasive marketing techniques for children are premium offers, the use of promotional characters, nutritional and health claims,²² the theme of taste and the emotional appeal of fun (Jenkin, Madhvani, Signal, & Bowers, 2014; Buchanan et al., 2018).

Particular forms of marketing and advertising are also cited to be more effective. For example, digital marketing has a strong positive association with unhealthy energy drink consumption for young people (Buchanan et al., 2018) and media narratives can help endorse and challenge established notions about food (Happer & Wellesley, 2019; MacGregor & Bicquelet, 2016). While the impact of traditional media (i.e. television, radio, newspapers) on

20 Food advertising, marketing and food promotion is used interchangeably in the literature (Buchanan et al., 2018; Cairns et al., 2009; Griffith et al., 2018; Kamar et al., 2016).

21 Unhealthy foods are defined as crisps, confectionary, junk food and sugary drinks.

22 Although health and nutrition claims are typically aimed at an adult audience, they are also commonly found in advertising to children and emerging evidence suggests that children are influenced by this information (Dixon et al., 2014).

food consumption also relies on whether media narratives align with existing beliefs, there is strong evidence that traditional media can create uncertainty about established narratives by, for example, making consumers doubt the scientific basis for the environmental benefits of a vegetarian diet (Happer & Wellesley, 2019). There is also some emerging, albeit weaker, evidence in the grey literature that the role of television is increasingly being replaced by social media, particularly for younger segments of the population (i.e. millennials and subsequent generations), as youth are influenced by social media behaviours and the sharing culture around food, for example on Instagram (wbcisd, 2018).

However, while marketing and advertising have some effect, it is difficult to isolate the effects on specific diet-related practices. The effectiveness of marketing and advertising campaigns for certain segments of the population depends on other factors such as the political and socio-economic context in which marketing operates, accessibility and availability of food, meal patterns, as well as packaging, product design and price (Buchanan et al., 2018; Cairns et al., 2009; MacGregor & Bicquelet, 2016; Webb & Byrd-Bredbenner, 2015). Peoples' purchasing decisions depend on knowledge and prior experience; for example, marketing effects tend to be stronger for unfamiliar brands and products (Chandon, 2013).

The scope for consumers to make decisions in a given food environment depends on availability and convenience of food and food outlets

There is strong evidence that food-related decisions in certain environments depend on the availability and convenience of food and food outlets (Appleton, 2016; Cook et al., 2015;

Howse et al., 2018; Jensen et al., 2011; Kamar et al., 2016; Moore et al., 2010; Paddock et al., 2017; Roberto et al., 2015; Stephens et al., 2018; Townshend & Lake, 2017; Vinther et al., 2016; Walmsley et al., 2018). For example, consumers are more likely to increase their consumption of certain food types (such as meat, fruit and eggs) if they perceive that it is convenient (Appleton, 2016) and easily accessible in supermarkets and convenience stores (Howse et al., 2018; Jensen et al., 2011; Kamar et al., 2016; Walmsley et al., 2018), in the home (Cook, O'Reilly, DeRosa, Rohrbach, & Spruijt-Metz, 2015; Stephens et al., 2018), at work or in schools (Kamar et al., 2016; Stephens et al., 2018) or in local neighbourhoods (Paddock et al., 2017; Stephens et al., 2018; Townshend & Lake, 2017).

The availability of certain foods in environments frequently visited by consumers also influences consumption. In particular, the presence of relatively cheaper and unhealthy food increases their consumption and hence the quality of people's diets (Griffith et al., 2015; Mansfield & Savaiano, 2017; Moore et al., 2010; Roberto et al., 2015; Townshend & Lake, 2017, Stephens et al., 2018). For example, school environments facilitate healthy food choices if healthy options are readily available and promoted within the school environment (Mansfield & Savaiano, 2017). This also applies to supermarkets and other food outlets, where the availability of healthy choices in supermarkets and the general availability of different food outlets have an influence on healthy food choices (Marshall et al., 2018; Stephens et al., 2018; Walmsley et al., 2018; Xin et al., 2019), although this might differ based on whether the food outlet is online or offline. For example, the convenience of online ordering and home delivery is a major factor affecting consumers' decision to purchase organic box schemes (Hashem et al., 2018; Jilcott Pitts et al., 2018; Munson et al., 2017) and in general, availability is an important driver

for the choice to consume organic products (Hashem et al., 2018). However, it is not just the presence of foods that drive food decisions but also the lack of alternatives (Jensen et al., 2011; Kamar et al., 2016; Paddock et al., 2017; Stephens et al., 2018; Vinther et al., 2016). For example consumers are more likely to choose meat options when there are no vegetarian options available (Vinther et al., 2016).

However, the availability and convenience of food in different food environments is not as dominant in shaping food consumption choices as cost. Instead, availability and convenience are associated and interplay with other factors such as advertising, the food culture (such as the 'grab it and go' food culture) and the consumption patterns of peers, portion sizes and price (Kamar et al., 2016; Roberto et al., 2015; Roe et al., 2016; Wills et al., 2019; Ziauddeen et al., 2018).

The built and micro food environments have an influence on consumption

There is evidence from high-quality sources that the built food environment and the food architecture²³ influences where we buy and eat food²⁴ and shapes individuals' food-related decisions (Burgoine et al., n.d.; Horgan et al., 2019; Moore et al., 2010; Roberto et al., 2015; Tyrrell et al., 2017; Ziauddeen et al., 2018). Eating at home and at school or university is generally associated with healthier food choices than eating in food outlets, 'on the go' and at leisure places (Blow et al., 2019; Mak et al., 2012; Shareck et al., 2018; Tanton et al., 2015; Tyrrell et al., 2017; Ziauddeen et al., 2018). Children are more likely to consume fruit

and vegetables in 'structured and formal care settings' (e.g. at school) rather than at home (Mak et al., 2012). However, this is contrasted with weaker evidence that eating at school has less of an impact on food-related practices than the consumption of fruits and vegetables at home (Tanton et al., 2015; Tyrrell et al., 2017). Similarly, the consumption of food in certain environments increases the likelihood of eating certain food products. For example, meat consumption was found to be more likely in a restaurant than when eating at home (Horgan et al., 2019). In one study, young adults stated being aware of how the physical environment shapes their food choices, stating awareness of techniques to make food more appealing, such as the placement of snack foods, displays in supermarkets and convenience stores (Howse et al., 2018). However, although there is a growing evidence base on the influence of the built and micro environment on consumption, there is some mixed evidence (e.g. regarding the impact of structured and formal care settings on children's fruit and vegetable consumption) and important gaps that require further investigation, such as the impact of socio-demographic differences in access to fast-food outlets and the impact of planning policies to restrict fast-food outlets near schools (Townshend & Lake, 2017).

Food environments interact with other drivers in multiple ways. First, the influence of food environments depends on the social relationships and cultures that facilitate certain consumption patterns. Food environments are socially and culturally embedded, and so the social relationships and cultures created in certain food outlets and when eating with friends are an important driver of food practices and consumption (Allman-Farinelli

23 Food architecture is defined by Roberto et al as the placement of food items in supermarkets, the price of products and the strategies used to promote foods (Roberto et al., 2015).

24 This includes both food prepared and consumed at home and out-of-home sources (Townshend & Lake, 2017)

et al., n.d.; Blow et al., 2019; Meah & Watson, 2011; Wills et al., 2019). In addition, factors such as age, availability and accessibility, wider social changes, class, lifestyle and food culture trends, and the preferences of consumers interact with the food environment (Allman-Farinelli et al., n.d.; Roe et al., 2016; Tanton et al., 2015; Ziauddeen et al., 2018).

Different actors have important roles in shaping the food environments that frame the food choices made by consumers

Different food system actors, including the food industry, the government, civil society and the individual, all work together to either constrain and or enable the food consumption practices of individuals and the biological, psychological, social, and economic vulnerabilities and opportunities that promote the consumption of certain foods (Jackson, 2010; Roberto et al., 2015). Although the literature cites a variety of food system actors as being important in influencing the food environment and consumption practices, there is no evidence on their relative importance.

There is strong, but not extensive, evidence on the distinct role of the food industry in shaping the food environment and consumption practices in the academic literature, although the grey literature deals with this in more detail (Food & Drink Federation, n.d.; GrantThornton, 2017; USDA, 2018). The food industry is shaped by and responds to consumer demand, but manufacturers and retailers also shape and change consumption practices in the UK. The food industry in the UK can determine the ingredients and content of food²⁵ and the placement and availability of food in the food

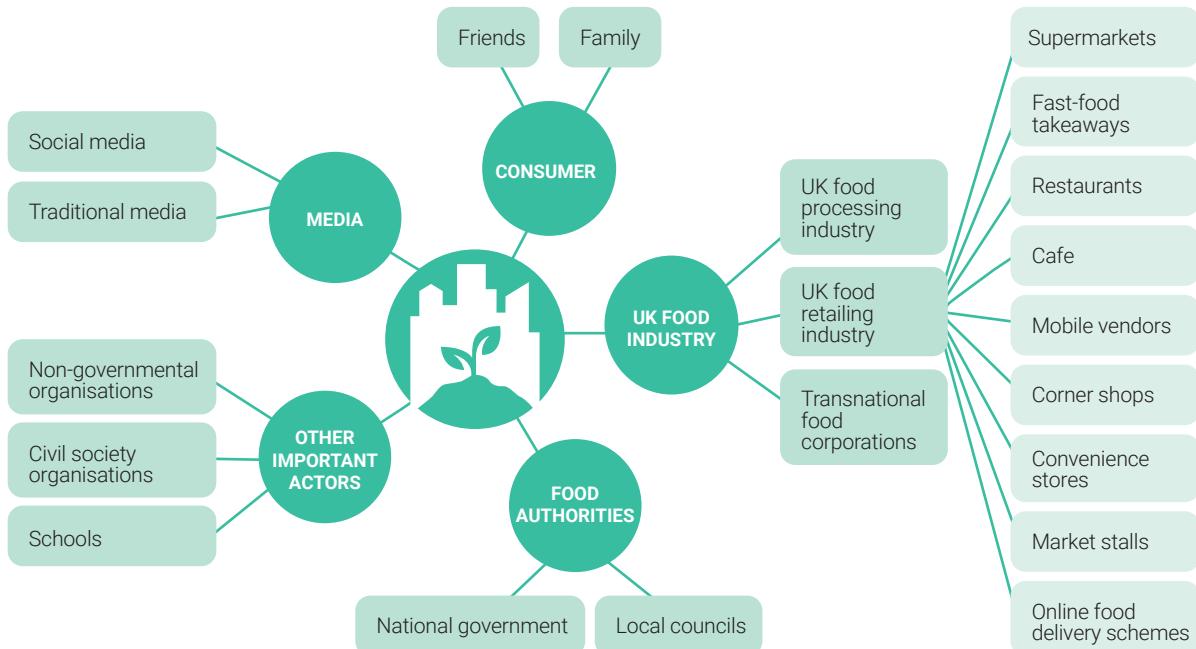
environment (MacKay, 2011; Roberto et al., 2015). In addition, although there is less trust in the food industry than other sources of information on food-related risks (European Food Safety Authority, 2019), there is strong evidence that manufacturers and retailers can help create or damage consumer trust in food (J. Barnett et al., 2016; Houghtaling et al., 2019; Jackson, 2010; Marshall et al., 2018), for instance through scandals such as the horsemeat scandal. Retailers also guide the food market in terms of education/information campaigns (e.g. enhanced promotion of healthy products and how to use them), labelling (e.g. shelf labelling, particularly using nutrition summary scores) and price promotions (e.g. 'buy one get one free', other multi-purchase or multipack discounts, basic discount offers and meal deals) (Cameron et al., 2016; Howse et al., 2018; Sparks & Burt, 2017), and there is potential for the food industry to promote healthy food environments (Roberto et al., 2015).

In addition, there is some evidence that big food industry players, such as transnational food corporations, play a significant role in driving demand for processed foods, the fast-food market, and a Western lifestyle globally, which is driven by global marketing campaigns (Baker & Friel, 2016; Kearney, 2010). For example, evidence suggests that ultra-processed food sales have increased rapidly in most middle-income countries (Baker & Friel, 2016). Another factor that shapes the food environment is also the influence that lobbying from the food industry, including manufacturers of prepared and processed foods, has on enabling or challenging policies and interventions aimed at changing consumer demand (Roberto et al., 2015).

25

Determining the content of food is within the limits of existing food regulations, for example regulations that specify mandatory food compositional standards.

Figure 8 Overview of the food systems actors that the literature cites as important in shaping consumption practices in the UK



Source: RAND Europe analysis.

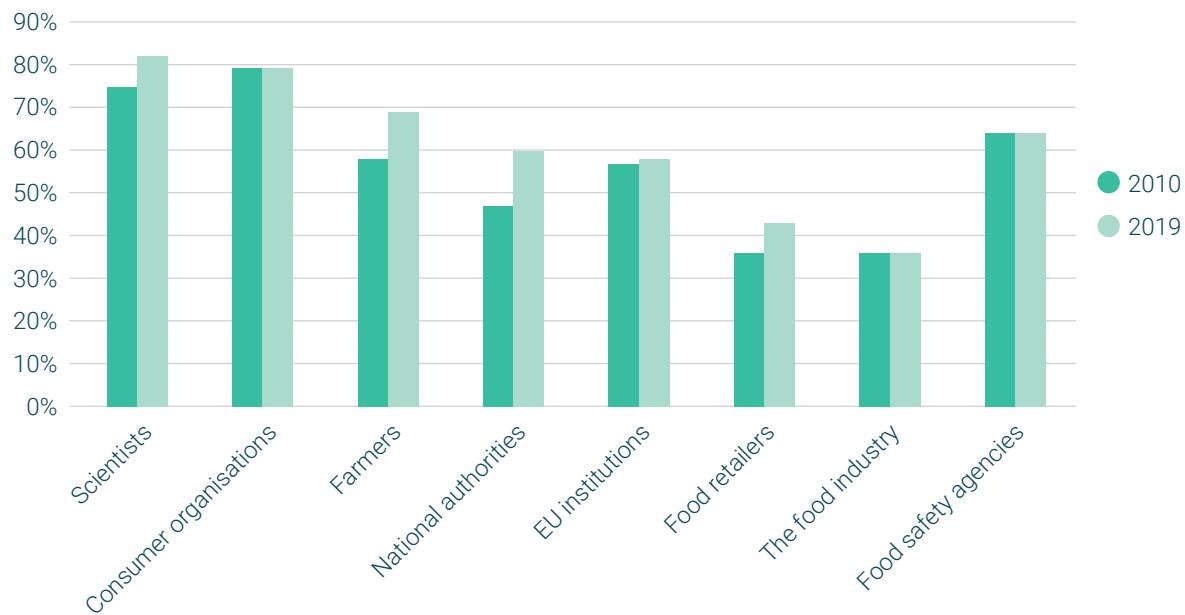
High-quality evidence also indicates that changes in the food environment depend on the ability and willingness of national and local government to implement policy such as specific food-related guidelines, mandatory reformulation and taxation, information and education campaigns, and national policies such as trade liberalisation policies that affect costs (Bitler & Wilde, 2014; Kearney, 2010; Roberto et al., 2015; R. D. Smith et al., 2018). Often, information and education campaigns depend on implementation and administration by civil society organisations and non-governmental organisations (Rekhy & McConchie, 2014).

Other food system actors, such as the media, family, friends and schools, also have

a significant role in shaping consumption practices (the role of culture and norms is dealt with in more detail in Chapter 4). For example:

- Both traditional and social media are major sources of food marketing, which has a significant effect on food purchases.
- Consumption practices are socially and culturally embedded, and individual food choices are influenced by the consumption practices of friends and family that contribute to creating and reinforcing social norms and habits.

Figure 8 provides an overview of the different actors that the literature cites are important in influencing the food environment and consumption practices.²⁶

Figure 9 Overall differences in trust in sources of food information in the EU in 2010 and 2019

Source: European Food Safety Authority, 2010, 2019

There is some evidence that clear and simple information can influence consumers' food purchases

Some studies highlight the role of information, including guidelines and labelling, in driving food purchasing (Apostolidis & McLeay, 2016; Christoph et al., 2016; D. A. Cohen & Lesser, 2016; Ghvanidze et al., 2017; Hodgkins et al., 2019; Omar et al., 2014; Palma et al., 2017; Saltmarsh, 2014). In the UK, 36 per cent of consumers have made changes to their consumption practices at least once in their life based on food information (European Food Safety Authority, 2019).

There is strong evidence that how information is provided influences the relative importance of information for consumers. Consumers tend to act on information when it is provided in clear and simple formats (Hodgkins et al., 2019; Kelly et al., 2016). For example, the use

of front-of-pack labelling is challenging for consumers when there are different formats used on different food products (Draper et al., 2013). The source of food information and its influence on consumer trust is not widely covered in the academic literature, but the grey literature reports on the types of information that consumers find more reliable. There is moderate evidence that consumers most frequently get information on food from television (69 per cent of respondents in the EU and 61 per cent respondents in the UK), followed by the Internet (46 per cent in the EU and 56 per cent in the UK), newspapers and magazines (38 per cent in the EU and 41 per cent in the UK), and family and social circles (36 per cent in the EU and 33 per cent in the UK). Younger respondents in the EU prefer information from social media and the Internet (European Food Safety Authority, 2019). The source of information also affects the trust that consumers in the EU have in food information (European Food Safety Authority, 2010, 2019).

Figure 9 illustrates overall differences in trust in different sources of food information amongst EU citizens between 2010 and 2019.²⁷

While these response categories were not measured in the European Food Safety Barometer survey in 2010 (European Food Safety Authority, 2010), EU citizens also cite the trust that they have in non-governmental organisations (NGOs) (56 per cent), journalists (50 per cent) and influencers, celebrities and bloggers (19 per cent) in 2019 (European Food Safety Authority, 2019).

There are differences between the value that different consumers place on different information. High-income consumers, those willing to buy expensive products and consumers that are health conscious when making consumption and purchasing decisions are more likely to use packaging information (Ghvanidze et al., 2017; Palma et al., 2017). The type of label will also have different importance for consumers. Fat content labels are important for all consumers, origin labels and carbon footprint labels have a moderate impact across all consumer groups, while brand, point of purchase (i.e. labels enabling consumers to assess healthiness of foods) and production method labels are significantly but comparatively less important for consumer choices (Apostolidis & McLeay, 2019).

The review process did not come across academic evidence exploring the type of information that can change food practices. However, a European Food Safety Authority European-wide study cites that two-thirds of all European citizens have changed their consumption as a result of information on food risks (European Food Safety Authority, 2019). Evidence also exists that some consumers

value information on nutritional quality more than information on the social responsibility of products and their ecological impact (Hodgkins et al., 2019; Omar et al., 2014). While information has some effect on consumers' food practices, it is difficult to isolate the effects of specific types of information and the extent to which consumers only state that they value particular types of information. The influence of information is also likely to depend on consumer beliefs and values, as well as factors in the wider food environment (Webb & Byrd-Bredbenner, 2015).

Although most consumers think that food in the UK is safe, food safety is a concern for some consumers when choosing food

Consumers in the UK and in the rest of Europe cite that food safety is a concern when choosing food (Balcombe et al., 2010; European Food Safety Authority, 2019; FSA, 2019b; Jackson, 2010; Saltmarsh, 2014). For example, 41 per cent of UK respondents say that they are interested in food safety when choosing food (European Food Safety Authority, 2019) and 60 per cent of UK consumers say they look at the hygiene rating of food outlets when choosing where to consume food (FSA, 2019b). However, there is no uniform food safety concern that is prevalent in all countries and across all consumer groups. Areas of general food safety concern include: the presence of antibiotics, hormone or steroid residues in meat; pesticide residues in food; environmental pollutants in fish, meat or dairy; and additives such as colours, preservatives and flavourings that are used in food and drinks (European Food Safety Authority, 2019; FSA, 2019b; Jackson, 2010; Saltmarsh, 2014).

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The European Food Safety Barometer in 2010 asked a similar question to the Food Safety Barometer in 2019, but this should be taken with some caution as the question wording and response options differed in 2010 and 2019.

The importance that consumers place on each issue depends on personal differences, such as emotions and habit, as well as questions of identity, culture and belonging (FSA, 2019). In addition, the types and levels of concern can be shaped by the type of products consumed. For example, consumers frequently cite safety as a concern when choosing meat products (such as beef and chicken) (Jackson, 2010; W. Verbeke et al., 2010), shellfish, and takeaway food that has been reheated (FSA, 2019a). There are also some concerns around eggs, unwashed and frozen vegetables, bread, cooked sliced meats, and sandwiches that are pre-prepared (FSA, 2019a). Although not widely covered in the academic literature, there is strong evidence in the grey literature that food safety concerns are also shaped by food environments. Consumers are less likely to be worried about food prepared in their own home and perceive that consuming food in the out-of-home sector increases the likelihood of being exposed to food safety risks (FSA, 2019a). Food safety is likely to be an increasing concern with the increasing diversification and fragmentation of food consumption channels due to the growth of the online food market.

Perceived food quality might be an important driver for some consumers' choices

There is moderate evidence that perceived food quality is an important driver for consumer choice, with studies citing that consumers look for 'freshness', taste and sensory and visual appeal when making food decisions (Apostolidis & McLeay, 2019; S. Hashem et al., 2018; Mansfield & Savaiano, 2017; K. H. Ng et al., 2015; Patterson et al., 2012; Wills et al., 2019). Food quality is a reason for consumers choosing organic products, for example, because organic products are perceived to be 'fresher', have greater sensory appeal and, in

the case of home delivery boxes or farmers markets, fruits and vegetables delivered directly from farmers are considered to be of a higher quality than that found in supermarkets (S. Hashem et al., 2018; Mansfield & Savaiano, 2017). It should be noted that perceived quality relates to a consumer's own perception of what quality is.

Consumers consider the country of origin of food products, as they associate the country of origin with food quality and safety

When consumers are asked, some evidence exists that country of origin of food products is an important stated preference (Apostolidis & McLeay, 2019; European Food Safety Authority, 2019; Font i Furnols et al., 2011; FSA, 2019b; Ghvanidze et al., 2017). Consumers tend to say they prefer British, UK or Irish products rather than products that come from elsewhere when purchasing intentions are analysed (FSA, 2019b). The perception amongst many UK consumers is that products that are nationally or locally sourced are of higher quality (FSA, 2019b). For example, in the most recent Food and You survey published by the Food Standards Agency, approximately half of the respondents said that they had greater trust in the quality of food produced in the UK (FSA, 2019b). The exception is when a food product is perceived to be of higher quality when sourced from a particular region, such as Mediterranean olive oil (Kavallari et al., 2011). Country of origin also relates to perceptions of food safety and food security, as UK and EU consumers tend to perceive that locally and nationally sourced food follows stricter hygiene standards than those products that are internationally procured (European Food Safety Authority, 2019; FSA, 2019b). The origin country of products is particularly important when consumers make decisions about the

types of meat they purchase as origin labels are perceived to be associated with food safety (Apostolidis & McLeay, 2019; Font i Furnols et al., 2011).

There is limited evidence that consumers consider the technologies used in food production processes when making food-related decisions

There is some evidence in the literature that the public is sometimes concerned with the supply-side technologies used in food production, including technologies involved in the production of some functional foods,²⁸ irradiation, and cultured and mechanically separated meat (FSA, 2016; Wim Verbeke et al., 2015). When prompted, some consumers say that they support technologies that can strengthen the health benefits of certain food products without being excessively invasive (e.g. the application of muscle profiling in beef production), but are resistant to food technologies that they perceive to be 'unnatural' or that involve excessive manipulation (e.g. processed beef) (W. Verbeke et al., 2010; Wim Verbeke et al., 2015). This reflects that there are different preferences related to different technologies in the UK. The Food Standards Agency (FSA, 2016) finds that consumers in the UK perceive that mechanically separated meat is relatively acceptable and does not drive consumption and purchasing patterns. However, technologies such as irradiation and cultured meat production are perceived in less favourable terms to consumers because the technologies are perceived as unnatural and invasive (FSA, 2016; Wim Verbeke et al.,

2015). Some evidence indicates that these perceptions may not necessarily influence the consumption choices of individuals in a significant way (W. Verbeke et al., 2010) because many consumers feel like they lack knowledge and awareness or are uncertain about what each technology is and so tend to take a position of neutrality when faced with decisions based on food technologies (FSA, 2016). More recent evidence suggests that consumers' perceptions of agri-food technologies may act as a barrier to consumption (Wim Verbeke et al., 2015). For example, in one study investigating consumer reactions towards the concept of cultured meat in three EU countries (including the UK), reactions included disgust, considerations of unnaturalness and uncertainty over the long-term consequences of a shift from traditional to cultured meat production and consumption (Wim Verbeke et al., 2015). However, consumers did acknowledge that there are potential societal benefits associated with cultured meat (Wim Verbeke et al., 2015). Consumers are wary of novel technologies such as genetic modification, cloning and nanotechnology, which they perceive to contain significant technological intervention but little direct benefit to consumers (Wim Verbeke et al., 2015). Attitudes also change when confronted with issues such as the bovine spongiform encephalopathy crisis in the 1990s or the horsemeat scandal in 2013, which can lead to an increase in awareness that may affect practices, although this is only likely to be short term (Food Safety News, 2019; Murray, 2018).

28 While there is no formally agreed definition, 'functional foods' can be defined as foods that contain biologically active components, which can enhance health or reduce the risk of disease beyond ordinary nutritional effects. Functional foods can be natural food or processed food that has been modified by technological or biotechnological methods (del Castillo et al., 2018).

Emerging evidence indicates that online food purchases enabled by digital technologies (either grocery shopping or takeaway consumption) will become an important driver for consumption trends in the future

There is some evidence in the academic literature that the changing digital landscape (in terms of increased availability of computers, tablets and mobile phones) has increased instant deliveries, on-demand delivery, rush deliveries, flexible transport services and peer-to-peer logistics in the UK (Allen et al., 2017; Dablanc et al., 2017; Nguyen et al., 2018; O'Neill et al., 2019; Sparks & Burt, 2017). However, to date, the role of the changing digital landscape and its influence on consumption trends is not widely covered (Dablanc et al., 2017).

This literature finds that the general rise in e-commerce combined with the changing habits of consumers has contributed to the growth in online food purchases. The growth in online food shopping is also driven by the product range available, the lower prices offered and convenience (i.e. that consumers can save time when not having to physically shop) (Dablanc et al., 2017). Conversely, some

of the barriers to the use of instant delivery is the unwillingness of consumers to pay a lot of money for these services (Dablanc et al., 2017). However, different types of consumers are driven by different trends related to online purchases, as convenience shoppers might aim for time savings while those who seek variety might look for novel brands and products (Nguyen et al., 2018).

There are also some suggestions in the literature that online food purchases influence the types of foods consumed by individuals; however, it appears to be a 'double-edged sword' as online shopping can drive both healthy and unhealthy food consumption. For example, it can reduce the likelihood of buying unhealthy foods due to a reduction in impulse purchases and can be a way to overcome healthy food accessibility challenges. However, it can also increase the chances of buying unhealthy products, since consumers may be more reluctant or unable to buy fresh products online (Jilcott Pitts et al., 2018). There is evidence suggesting that in an offline setting, customers with lower self-control may be more susceptible to marketing of unhealthy foods; however, the evidence is lacking around the types of individuals who make healthy and unhealthy online purchases.

4 Individual and social differences – how do different people make decisions about food?

Although we can see broad trends in attitudes and consumption practices, as well as common system level and environmental drivers, the way people respond to them differs depending on who they are, their experiences, beliefs, attitudes and other characteristics. There is no one, generalisable, public, rather there are multiple ‘food publics’²⁹ (Darnton, 2016) and understanding these differences is crucial both in understanding the changing food environment and thinking about how policies can be developed to change consumption practices. Individual differences can be driven by social factors and constructs, but also by psychological factors; we discuss both of these in this chapter. Figure 10 provides an overview of the complex factors that constitute individual and social level differences.

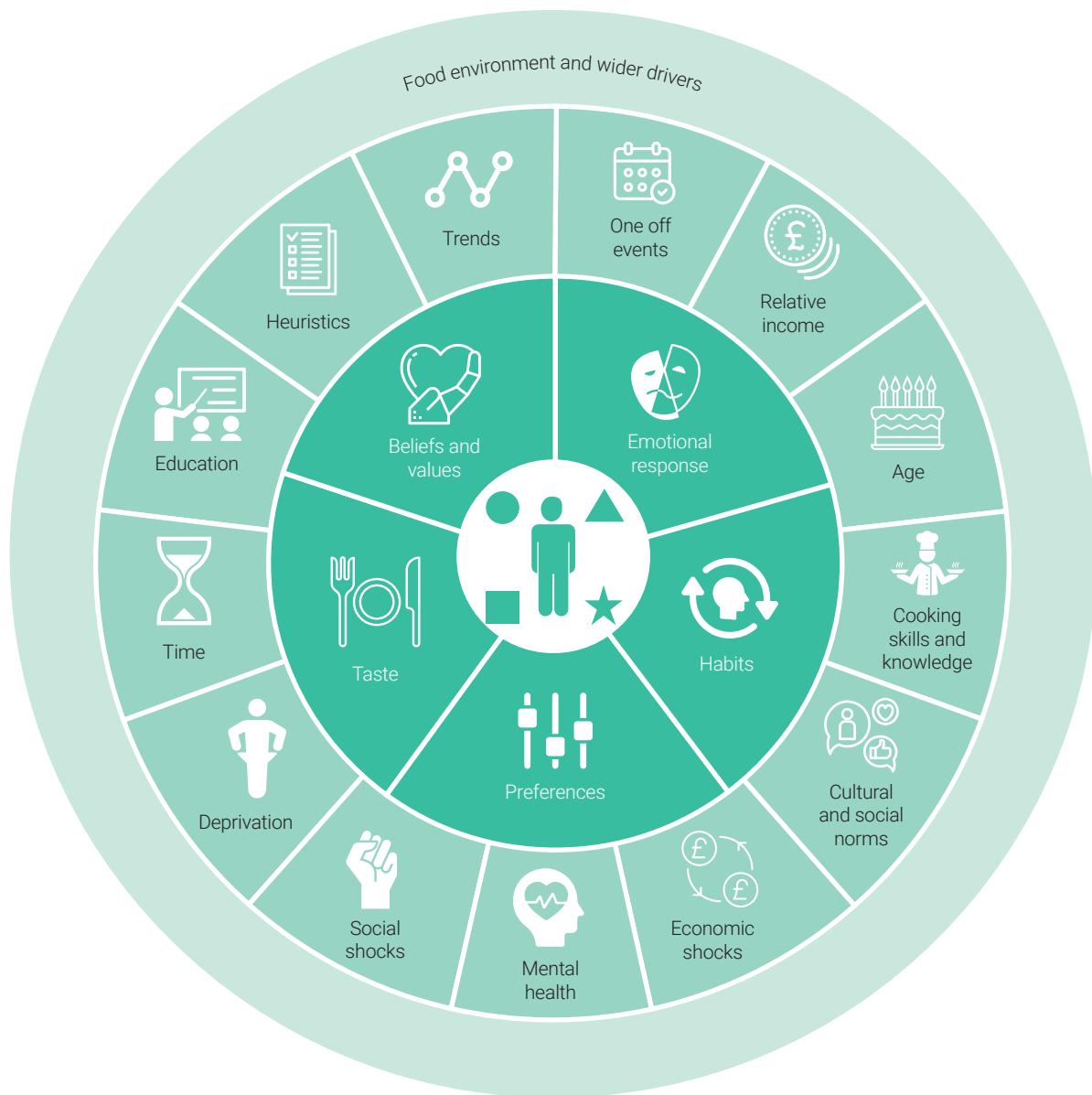
Socio-demographic factors are associated with consumption in predictable ways

There is strong evidence that lower incomes, economic deprivation and lower levels of education are associated with a poorer diet and being overweight/obese (Appleton et

al., 2017; Barton et al., 2015; Bondy & Talwar, 2011; Cribb et al., 2011; Edwards et al., 2010; Hawkesworth et al., 2017; Levin, 2014; Palma et al., 2017; Pearson et al., 2018; Pechey & Monsivais, 2016; Rekhy & McConchie, 2014; Thomas et al., 2019; Townshend & Lake, 2017). A systematic review considering the environmental determinants of a healthy diet found that low socio-economic status (in terms of education level, work status and income) is the single most consistent risk factor for not adhering to a healthy diet (de Ridder et al. 2017). Data from multiple studies and surveys indicates that compared to those with higher socio-economic status, individuals with lower socio-economic status tend to obtain a greater proportion of energy from less healthy foods and beverages (i.e. sugar-sweetened drinks, red meat products – such as processed meat, pies and sausages – whole milk, processed potatoes and takeaway foods) and fewer foods associated with a healthy diet (i.e. fruit and vegetables, brown/wholemeal bread, breakfast cereal, oil-rich fish, white fish and complex carbohydrates) (Barrett et al., 2017; Barton et al., 2015; Cribb et al., 2011; Defra, 2017; Pechey & Monsivais, 2016; Wrieden et al., 2013). Socio-economic differences affect children too. A higher level of parental education is associated

²⁹ The term ‘food publics’ is used to emphasise that in the evidence base on food and consumption, the public is not a single entity, but rather composed of different subgroups with different socio-demographic characteristics, experiences, beliefs, attitudes and other characteristics (Darnton, 2016).

Figure 10 Overview of the drivers of individual and social differences that influence food consumption



Source: RAND Europe analysis. The inner circle illustrates the values, beliefs, preferences and emotions of consumers related to food that drive consumption practices. The second circle illustrates the individual and social differences that drive consumption practices. The outer circle illustrates that the inner and second circle is influenced by and interacts with the food environment and other drivers.

with higher fruit and vegetable consumption in preschoolers (Cribb et al., 2011; Lee et al., 2018; Volland, 2019), and in lower-income families, children are more likely to have poor diets (Pearson et al., 2018).

There are various other factors, such as age and gender, that have been found to be associated with the consumption of a healthy diet. Survey evidence from the UK and globally (from 266 surveys across 113 countries)

indicates that women tend to have slightly greater consumption of healthier foods (Defra, 2017; Micha et al., 2015). Women are also more likely to pay more for healthy foods and use food labels (Balcombe et al., 2010; Christoph et al., 2016; Rekhy & McConchie, 2014). Age differences are also associated with dietary differences (Palma et al., 2017; Price et al., 2016). The same global survey also found that intake of more healthy foods was generally higher in older adults (Micha et al., 2015). Some studies find a correlation between age and fruit and vegetable consumption, where fruit and vegetable consumption increases with age until 60–65, after which it starts to decline (Appleton et al., 2017; Rekhy & McConchie, 2014). Older individuals also tend to consume healthier foods overall, although it is not clear whether this is a true age effect or a cohort effect (Appleton et al., 2017; Lam & Adams, 2017). Analysis of UK food purchase data (controlling for equivalised income)³⁰ found that consumption of healthier foods (e.g. fruit and vegetables, oil-rich fish and fibre) was lower and consumption of less healthy foods was higher in Scotland than in England, and this discrepancy was greater for lower-income groups (Barton et al., 2015). However, evidence for these factors is less clear, particularly as these studies are not all adequately controlled. Despite these socio-demographic differences, diets remain unhealthy across all groups. Collectively, these findings suggest that existing policies have not adequately addressed food inequalities.

Beliefs and values can inform consumption, and health concerns are a greater driver of choice than other (e.g. environmental) issues

Consumers, when asked, often cite the importance of values and beliefs in driving their food choices. However, there are differences in the relative importance of different values such as health, environmental concerns and animal welfare for consumers. There is strong evidence that health concerns are a bigger driver of consumption than environmental concerns (e.g. sustainability) (Appleton et al., 2017; Blow et al., 2019; Ghvanidze et al., 2017; S. Hashem et al., 2018; Mylan, 2018; K. H. Ng et al., 2015). Purchase of organic food boxes, for example, are in part driven by ethical and political motivations, such as growing concerns over the globalised and industrialised food system, and the lack of transparency in food origin; however, perceived health benefits are also a key motivator (S. Hashem et al., 2018). Similar trends are seen in meat reduction, with health perceptions being the most prominent influence, and only limited significance placed on environmental concerns and animal welfare (Appleton et al., 2017; Clark et al., 2016; Jackson, 2010; Mylan, 2018); although differences exist depending on gender, age, education and familiarity with and interest in the issue (Clark et al., 2016; Garnett et al., 2015). Evidence on the socio-demographic characteristics of individuals with health and environmental concerns suggests that these tend to be female and younger (Latvala et al., 2012; Su et al., 2019; WRAP, 2015; YouGov: Eating Better, 2019), but more good-quality and controlled studies are needed to determine this relationship.

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A measure of household income that takes into account the differences in a household's size and composition (Eurostat, 2018).

'Food identities'³¹ can be fluid depending on interactions between social change, practices, trends and the food environment (Roe et al., 2016). Beliefs and values also drive level of engagement with policy actions. For example, those concerned about healthy eating are more likely to derive value from food labelling (Ghvanidze et al., 2017).

However, while consumers cite the importance of values and beliefs in driving their food choices, values are often less significant than other factors such as taste, cost or convenience (Apostolidis & McLeay, 2019; Garnett et al., 2015; Vinther et al., 2016). Consumers highlight values and beliefs as important when making food decisions, but there is still a significant value-action gap between what people believe and what they actually consume in practice (YouGov: Eating Better, 2019). There is strong evidence to suggest that in addition to other important factors (e.g. price, quality and availability), one reason for this is because the extent to which people respond to social and environmental labelling depends not just on attitudes towards those issues but the extent to which people feel they can make a difference (Ghvanidze et al., 2016; Sleddens et al., 2015; Spencer et al., 2014). People may feel a lack of agency with regard to issues such as sustainability and animal welfare in a food system dominated by large powerful companies (Howse et al., 2018). In addition, confidence is positively associated with individuals changing their diets (Hardcastle et al., 2015) and many consumers deal with socially responsible food decisions with a degree of cynicism (Happer & Wellesley, 2019). Thus, interventions aimed at changing consumption patterns should develop an individuals' confidence to change diets (Hardcastle et al., 2015).

Food decisions are rarely the outcome of conscious deliberation and influenced by habitual mechanisms and emotions

There is strong evidence that our choices about what foods to buy and eat are often made unconsciously and driven by unconscious mechanisms such as heuristics. Choices about food are a combination of reflective (i.e. deliberate and self-conscious) and automatic (i.e. rapid and driven by unconscious mechanisms and biases) decision making. Food 'choice' is in reality often not a rational 'choice' per se but an unconscious response to a food setting or environment mediated through personal and social experiences and factors (Gutjar et al., 2015; Wansink & Sobal, 2007). Thus, the extent to which people are able to consciously control and regulate their practices varies significantly (being driven by emotions, mental health and habit), and is an important determinant of their consumption decisions. In addition, heuristics are influenced by the external food environment; the design of menus and food products, as well as the surroundings in restaurants and supermarkets, act as contextual cues that subconsciously influence food choices (D. Cohen & Babey, 2012).

Emotions are an important factor influencing consumption. Eating is often emotional (Jackson, 2010; Lu et al., 2013), pleasurable (den Uyl et al., 2016) and a social experience (Carey, Bell, Duff, Sheridan, & Shields, 2011; Köster & Mojet, 2015), and memories and feelings about foods can influence food choices (Piqueras-Fiszman & Jaeger, 2016; Robinson, 2014; Uprichard et al., 2013). People express emotional responses to food choices,

31 'Food identity' is defined as a way of characterising regular or preferred food consumption and food production based on what is eaten, purchased, produced, and how people perceive the value and purpose of food (Roe, Sarlöv Herlin, & Speak, 2016).

feeling guilt about their consumption decisions (e.g. consuming takeaway meals) (Blow et al., 2019) and moralising certain types of foods (e.g. snack food being construed negatively or healthy food being described as 'sensible') (Stephens et al., 2018) and associating others with aspects of their identity (e.g. masculinity) (Stephens et al., 2018).

Mental health can also be a driver of consumption. Adults with low levels of well-being, high stress or depression tend to eat less well (Devonport et al., 2019; Russell et al., 2016), and childhood abuse is associated with being obese as an adult (Hemmingsson et al., 2014; Russell et al., 2016).

Habits are an important driver of consumption (Blow et al., 2019; de Ridder et al., 2017; K. H. Ng et al., 2015; Rekhy & McConchie, 2014) and can be difficult to change (Gardner et al., 2011). Habit strength and level of self-regulation will vary between individuals, which will influence their ability to be able to make the food choices they would rationally wish to – for example, to eat more healthily (de Ridder et al., 2017; McDermott et al., 2015; Sleddens et al., 2015). Beyond this, people have to want to change what they eat. Self-regulation strategies in which people control their food intake and change eating patterns are effective only when people want to and are planning to change their eating practices (de Ridder et al., 2017; Sleddens et al., 2015). Although people tend to struggle to prioritise long-term benefits over short-term pleasure, long-term gains are the focus of most healthy eating messages (Evans et al., 2017).

Cultural and social norms can influence eating behaviours

There is some high-quality evidence that cultural and social norms can influence eating practices (Köster & Mojet, 2015; Skeer et al., 2016) and are established early in life. Ethnic differences in dietary intake are seen as early

as 12 months (Sahota et al., 2016) and children copy what parents eat. Lack of knowledge, time and money can affect parents' ability to change their own consumption patterns (Mazarello Paes et al., 2015; Rekhy & McConchie, 2014). Social norms are also ingrained and can be hard to change; for example, people eat larger portions on larger plates due to the social norm of 'cleaning one's plate' (Chandon, 2013).

Individual and social factors interact with contextual factors

Wider socio-economic changes and events can impact on personal values and norms

Individuals do not behave in isolation when making food choices. Socio-economic and environmental context can influence an individuals' ability to exercise choice (Mansfield & Savaiano, 2017), and can also affect values and norms and how these govern behaviour (Hardcastle et al., 2015; Puelles et al., 2016). Economic shocks can also drive changes in consumption. For example, during economic crisis, consumers are more likely to use discount supermarkets and exercise more conscious decision making around price, control and time spent shopping (Puelles et al., 2016). Similarly, one-off events, such as the horsemeat scandal, can affect consumer levels of trust in labelling and information as a whole, having impacts on consumption decisions (J. Barnett et al., 2016). Trustworthiness of food providers is an important driver for consumption for many individuals (J. Barnett et al., 2016; Garnett et al., 2015; Happer & Wellesley, 2019; Jackson, 2010; Jensen et al., 2011; Price et al., 2016; Spencer et al., 2014).

Time and resources are also important contextual factors for consumers

As the pace of life and daily routine has increased in the past years, there are

increasing demands among consumers that the preparation of food is convenient and saves time (Blow et al., 2019; Howse et al., 2018; Jilcott Pitts et al., 2018, 2018; Rekhy & McConchie, 2014). Time and convenience (i.e. food perceived to be 'quick' and 'easy' to cook) are important drivers of consumption choices (Appleton, 2016; Howse et al., 2018; Jilcott Pitts et al., 2018), particularly for lower-income individuals who often lack time (Howse et al., 2018). Lack of cooking skills and/or confidence can also affect consumption, as people that are less confident or able are more likely to consume processed/unhealthy foods (Lam & Adams, 2017; Sprake et al., 2018) and less able to eat diversely (K. H. Ng et al., 2015). However, this evidence tends to come from cross-sectional studies and it is not clear whether educational interventions could be effective in addressing these challenges.

Changes in personal and social circumstances can change practices and affect consumption patterns

There is some evidence that changes to diet are found to happen following social shocks such as divorce, separation, becoming widowed, moving house or having children (O'Neill et al., 2019; Rekhy & McConchie, 2014; Vinther et al., 2016). This can reflect sense of responsibility (e.g. providing 'proper' food for your family) but also exposure to new ideas, for example children bringing new practices, like vegetarianism, into the home (O'Neill et al., 2019), or changes in available income (Thomas et al., 2019). However, there is strong evidence that suggests that changes in personal and social circumstance interact with the preferences and taste of consumers to influence their food-related practices (Bailey et al., 2015; Garnett et al., 2015; Kamar et al.,

2016; Konttinen et al., n.d.; Stephens et al., 2018; Which?, 2013; Wills et al., 2019). The extent to which individuals can make choices based on their preferences depends on their social and personal circumstances, and interrelated factors such as availability and accessibility, cost and convenience, the wider food architecture, and advertisements and educational campaigns (Apostolidis & McLeay, 2019; Kamar et al., 2016; Stephens et al., 2018; Wills et al., 2019).

Given the differences between individuals, segmentation approaches can be useful in analysing consumption practices, but the groupings are typically context specific

Reflecting the wide range of different attitudes and practices across the population, many studies look to divide the population into groups to analyse their consumption practices, which can provide useful insights. Studies use a diverse range of segmentation approaches³². The vast majority of these are based on either practices or attitudes depending on the nature and focus of the study (Apostolidis & McLeay, 2019; Font i Furnols et al., 2011; Hardcastle et al., 2015; Shareck et al., 2018). For example, one study investigated three clusters – meat eaters, meat reducers and vegetarians – and their preference for meat and meat substitutes (Apostolidis & McLeay, 2019). Another study looked at three clusters of eating behaviours, 'impulsive involved', 'uninvolved', and 'rational, health conscious', and their association with consumption of unhealthy food (Hardcastle et al., 2015).

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Segmentation analysis involves dividing consumers into homogeneous groups or 'segments', which are assumed to behave in the same way (C. Barnett & Mahony, 2011).

There are also a few examples focusing specifically on socio-demographics, such as income group (e.g. Smith et al. 2018). However, the extent to which demographic variables are aligned with identified clusters varies. On the one hand, some segmentations find that socio-demographic variables provide a poor explanation of differences in food attitudes and practices (Ghvanidze et al., 2017; Kehlbacher et al., 2019; Piqueras-Fiszman & Jaeger, 2016). For example, consumers have been found to be concerned with nutritional information about food products independently of how price sensitive they are, contradicting other studies that find that price sensitive consumers are less focused on the nutrition content of products (Ghvanidze et al., 2017). In addition, another study investigating emotional associations to food finds that behavioural variables might be more effective at capturing segmentations than socio-demographic differences (Piqueras-Fiszman & Jaeger, 2016). On the other hand, others find that one or more socio-demographic variables are aligned with their segmentation categories (Apostolidis & McLeay, 2019; Font i Furnols et al., 2011; Puelles et al., 2016; Sprake et al., 2018).

Although most segmentation approaches focus on characterising groups in terms of their attitudes and behaviours, there are some novel approaches. For example, one study looks at seasonal and temporal changes in food-related content of two UK magazines over the course of the year, producing three clusters of magazine content reflecting the food behaviour of young women: vegetarianism, convenience eating and weight control (Spencer et al., 2014). Another study investigated differences in food practices and attitudes across different geographical ‘urban foodscapes’ in Newcastle, identifying seven foodscape character types (e.g. fast food takeaway landscape, farmer’s

markets, restaurants serving international cuisine) (Roe et al., 2016). Box 5 below provides an overview of different types of segmentation approaches described in the literature.

However, segmentation approaches are usually highly context-specific and dependent upon the variables included in the analysis and need to be applied to representative population level data in order to make generalisations. For example, one study creates a cluster of the food advertising in different magazines, but only for two magazines and did not investigate the effects of food advertising on the readers of the magazines (Spencer et al., 2014). The segmentation approach using urban ‘foodscapes’ is innovative but based on small scale data from one city in the UK (Roe et al., 2016). In addition, several of the segmentation studies are of moderate quality and lack a statistically significant sample (Apostolidis & McLeay, 2016; Palma et al., 2017; Price et al., 2016; Roe et al., 2016). A review of segmentation approaches emphasises the potential of this type of analysis to help support effective communication of messages and understanding differences and nuances in behaviour and practices (C. Barnett & Mahony, 2011). In addition, segmentation approaches are often used in commercial settings for marketing purposes, and so although they can help to identify consumption patterns, the extent to which they can be applied to the public sector to affect change is less clear (C. Barnett & Mahony, 2011). Therefore, care needs to be taken to reflect on the assumptions and rationale underpinning segmentation methods and that superficial application of segmentations to support policy development and implementation can be counterproductive, and potentially even in tension with the aims of policy action to deliver wider public good.

Box 5 Examples of segmentation approaches found in the literature

Emotional associations: One study investigated emotional association to meals, comparing responses to 'memorable' and 'routine' meals. The study found two clusters: the first cluster, which accounted for the majority of people, showed strong positive and weak negative emotional associations with meals; by contrast, the smaller second cluster showed less difference between the level of positive and negative emotional associations. Psychographic variables, such as level of engagement in meals, and their difficulty in describing feelings, accounted better for these differences than socio-demographic factors (Piqueras-Fiszman & Jaeger, 2016).



Seasonal food behaviours: Another study used glossy magazines, Glamour and Cosmopolitan, to look at different food practices during the year based on food advertising and identified three clusters: 'party time' was related to Christmas and advertising of coffee, cheese, vegetarian meat substitutes and alcohol; 'bikini body' was related to the summer months and had little advertising for conventional food with a strong focus on dieting; 'going steady' was associated with the new year and related to foods consumed every day and convenience products (Spencer et al., 2014).

Meat consumption: In a 2019 study of meat consumption, six segments were identified: price conscious, healthy eaters, taste driven, green, organic and vegetarian consumers. The work finds statistically significant differences between the segments based on gender, age, income and household structure (Apostolidis & McLeay, 2016).

Prestige: A study from 2017 identified four segments based on their prestige-buying practices, i.e. seeking to distinguish oneself from lower-class individuals based on food purchases and weekly fruit and vegetable spending: 'ambitious shoppers', 'utilitarian buyers', 'affluent elitists' and 'prestige lovers' (Palma et al., 2017).

Urban 'foodscapes': Another study used the interactions between food, space and people to determine urban foodscape character segments in the landscape of fast-food takeaway, food outlets and retailers serving international cuisine, and farmer's markets. The first type is residential, easily accessible and visibly cluttered. The second segmentation is marked by cultural symbols and decorations and has a heterogeneous and undistinguished architecture. The final type has the visual characteristics of an open market and is designed for individuals to spend time in the food environment (Roe et al., 2016).

5

Interventions – how can policymakers influence food consumption decisions?

Given the importance of food consumption practices to both health and the environment, and the power of actors in the system from retailers to manufacturers to influence the content and sales of food, it is crucial to understand what levers policymakers have available to influence consumption decisions, and how effective they are. This can help policymakers enable people to make healthier and more sustainable choices. Interventions have been grouped into three overarching categories:



Knowledge and information:

Interventions that affect the knowledge and information available to people about food from advertising to labelling and other information.



Food environment: Interventions that change the food environment – from small changes to the layout and prominence of food to the types of food available in places people spend a lot of time, like at work and in school.



Price and ingredients:

Interventions that change the ingredients of foods that are available or the prices of those foods, making it easier and more economical to make better choices.

There is a continuum here across these possible approaches reflecting the extent to which the different approaches emphasise personal choice and freedoms, and also the potential challenges in implementation. Table 4 below presents a summary of interventions reviewed for this study and evidence of their effectiveness.³³

Table 4 Summary of interventions to change food consumption and evidence of their effectiveness

	Intervention	Effectiveness	Strength of evidence	Comments and caveats	Key sources
 Knowledge and information	School education	Moderate–high	Moderate–high	Interactive/experiential learning is most effective	Jepson et al., 2010; Muzaffar et al., 2018; Rekhy & McConchie, 2014; Dudley et al., 2015
	Education in healthcare setting	Moderate	Moderate–high	Online approaches are likely less effective than phone/in person	Jepson et al., 2010; Kelly et al., 2016; Harris et al., 2011
	Mass media campaigns	Low–moderate	Low–moderate	Limitations to campaign design (e.g. TV only, not online) – better designed campaigns might be more effective	Afshin et al., 2015; Kite et al., 2018; Wakefield et al., 2010
	Labelling in supermarkets	Low–moderate	Moderate but mixed	Traffic light approaches are more effective than just information provision	Afshin et al., 2015; Campos, Doxey, & Hammond, 2011; Cecchini & Warin, 2016; Shangguan Siyi et al., 2015
	Labelling in restaurants/fast-food settings	Low	Moderate but mixed	More studies needed in real-world settings	(Littlewood et al., 2016; Magnusson, 2010; Wright & Bragge, 2018; Long et al., 2015; Sinclair et al., 2014)
	Advertising regulation	Unclear but likely moderate	Low	Limitations in both evaluation and policy design limit our knowledge of effectiveness	Afshin et al., 2015; Chambers et al., 2015; Galbraith-Emami & Lobstein, 2013; Mills et al., 2013
 Food environment	Food provision in schools	Moderate–high	Moderate–high	Mandatory approaches most effective; combining with education approaches also effective	Coyle et al., 2009; Evans et al., 2012; Afshin et al., 2015; Niebylski et al., 2014
	Worksite well-being	Low	Moderate–high	Main effect is on fruit and vegetable intake, more limited evidence on other outcomes; significant variability in intervention design limits generalisability	Afshin et al., 2015; Geaney et al., 2013; Gudzune et al., 2013; Jepson et al., 2010; Niebylski et al., 2014; Schliemann & Woodside, 2019
	Micro environment – placement, portion size	Low–moderate	Low–moderate but mixed	Effectiveness likely depends on context; acceptability of 'nudges' to public also a concern	Bucher et al., 2016; Cadario & Chandon, 2019; Hartmann-Boyce et al., 2018; Hollands et al., 2015; Houghtaling et al., 2019
	Food provision in other public settings	Unclear	Low	Very little evidence identified	Niebylski et al., 2014
	Built food environment	Unclear but likely moderate	Low	No evidence of policy implementation and evaluation identified	Afshin et al., 2015; Beaulac et al., 2009; Cobb et al., 2015; Fleischhacker et al., 2011
 Cost and content of food	Taxes, subsidies and price changes	Low–moderate	Moderate	Understanding of substitution effects limited	Afshin et al., 2017; Eyles et al., 2012; Hartmann-Boyce et al., 2018; Ng et al., 2012; Niebylski et al., 2014; Thow et al., 2010; Andreyeva et al., 2010; Niebylski et al., 2015; Smith et al., 2018; Wright et al., 2017
	Reformulation of food	Moderate	Moderate	Substitution effects unclear; can be driven by other changes (price changes, labelling requirements)	Federici et al., 2019; Grieger et al., 2017; Hashem et al., 2019

Source: RAND Europe analysis. All target participants are adults (19 years old and above) and children (up to 18 years old), except for interventions in schools that target children. Depth of shading of the rows provides an indication of the most promising (darker) and least promising (lighter) interventions based on the current evidence. 'Effectiveness' is defined as the ability to achieve the desired behaviour changes, i.e. to reduce food consumption or otherwise change dietary behaviours and/or increase awareness or knowledge related to healthy/sustainable food consumption.

Knowledge and information

There are a range of interventions that can affect the knowledge and information available to people to support their decisions and actions regarding food. Provision of information can be at a broad scale, through mass media campaigns or labelling schemes. It can also be more targeted, through learning and skills development in schools or healthcare interventions. Restricting advertising can also change the information addressed to individuals. Based on existing evidence, it appears that more targeted, accessible and understandable information is the most effective in changing consumption.

Mass media campaigns can change knowledge and beliefs, but it's less clear whether they can change actions

There is a lot of evidence to suggest that campaigns can have an impact on intermediate outcomes, such as knowledge and attitudes. However, evidence is still limited as to whether campaigns can influence behaviour change (J Kite et al., 2018). Some studies, however, do suggest potential effectiveness of mass media campaigns (A. Afshin et al., 2015) on increased fruit and vegetable consumption for example (Dixon et al., 1998; Erinosho et al., 2012; Lutz et al., 1999) and in reducing the consumption of unhealthy foods (Jenkin et al., 2014). In the UK, a national campaign targeting salt intake was associated with a reduction in the proportion of adults who reported adding salt at the table, from 32.5 per cent in 2003 to 23.2 per cent in 2007 (Sutherland et al., 2013). There is some evidence that the messenger can shape the effectiveness of campaigns. For example, celebrity endorsements can provide support to media campaigns, although this may be short term. For example, the celebrity chef Jamie Oliver helped to promote the UK government's school meals campaigns around healthy eating in schools (Chapman & Rayner,

2012). Similarly, high-profile campaigns by NGOs, such as the 'Behind the Brands' ranking, pushed food companies to develop policies around sustainability (D. Smith, 2014). There is a paucity of evidence around the impact of other public figures in delivery campaigns.

Existing evaluations vary in quality and there are also limitations in campaign design. Many campaigns continue to target individual behaviours rather than upstream and social determinants of poor diet/obesity, and most campaigns are conducted through television with limited use of new media (J Kite et al., 2018). Mass media campaigns are more likely to be successful when combined with actions to increase availability and access to products and services that enable people to act on the messages received. It is also noted that campaigns are typically more effective when the target behaviour is one-off or episodic (e.g. vaccination) rather than ongoing and habitual as in the case of consumption practices (Wakefield et al., 2010). Media campaigns are also hindered through competition with marketing activities with competing and opposing messages (Wakefield et al., 2010). Information campaigns also rely on personal agency in changing practices and evidence consistently indicates that they tend to have greater impact in individuals with higher socio-economic status, and thus possibly widen inequalities (Friel et al., 2015; McGill et al., 2015).

Food labelling may have some effect on consumption and traffic light approaches are the most effective

There is mixed evidence across several systematic reviews, which on balance suggests that it is likely that food labelling can influence diet (A. Afshin et al., 2015; Campos et al., 2011; Cecchini & Warin, 2016; Shangguan Siyi et al., 2015). Specifically, labelling may help consumers select healthier food products, but

it is less clear that they affect calorie intake or consumption (potentially since several factors in addition to calorie content, e.g. salt content, affects the healthiness of foods, and also due to the 'halo effect')³⁴ (Cecchini & Warin, 2016).

Traffic light schemes³⁵ are more effective than other approaches such as guideline daily amounts (where the proportion of the recommended daily amount of sugar, fat or other food groups contained in a product is provided) (Cecchini & Warin, 2016; Magnusson, 2010). While most of the evidence relates to health, there is some emerging evidence related to labelling for sustainability and other non-health issues, but so far this is very limited (Garnett et al., 2015). For example, carbon labels have been trialled by UK supermarket Tesco since 2008; consumers support the use of such labels but report finding them hard to understand and interpret (Gadema & Oglethorpe, 2011).

Although nutritional labels are associated with a healthier diet, the impact of labelling per se is less clear; it may be that individuals who are interested in healthy eating are more likely to seek out and use nutrition labels (Campos et al., 2011). Use of food labelling information is particularly high among individuals with health conditions and special dietary requirements and notably lower among children, adolescents, older adults and people in lower socio-economic groups (Campos et al., 2011).

Barriers to people using and acting on labelling information include a lack of motivation and attention (Garnett et al., 2015) and not feeling like they have the requisite knowledge to make decisions based on labels (Chandon, 2013; Christoph et al., 2016). Levels of literacy and numeracy may also impact on ability to

engage with labelling information (Malloy-Weir & Cooper, 2017). Box 6 provides an overview of some of the main food labelling schemes in the UK and evidence of their effectiveness.

Labelling in restaurants and fast-food settings can reduce calorie consumption

Evidence on the effect of food labelling in restaurants and fast-food settings is mixed, if largely positive. Several reviews have concluded that there are significant effects of menu labelling in terms of calories consumed (Littlewood et al., 2016; Magnusson, 2010; B. Wright & Bragge, 2018). However, others are more equivocal (Long et al., 2015; Sinclair et al., 2014). There is some suggestion that studies in real-world settings show smaller effects on consumption than in experimental settings (Long et al., 2015). Some evidence suggests that menu labelling with calories alone is less effective than when contextual or interpretive nutrition information is provided (Sinclair et al., 2014). The difference in effectiveness is comparable to the greater efficacy of a traffic light approach in a supermarket setting. It has also been found that labels may only have effects in certain population subgroups, with some evidence that women may use menu labels whereas men do not (Sinclair et al., 2014). Calories consumed are reduced most significantly in restaurant and fast-food settings as a result of food labelling, with smaller changes observed in coffee shops (Littlewood et al., 2016).

Interactive learning in schools can change consumption

Review evidence indicates that education interventions in schools seem to be effective

34 The 'halo effect' describes the tendency of consumers to generalise a piece of information found on a food label to the whole food product (Emrich et al., 2015).

35 'Traffic light' schemes are when foods are labelled as 'red', 'amber' or 'green' based on their content of different food groups such as sugar, salt and fat (Magnusson, 2010)

Box 6 Examples of front-of-pack food labelling interventions used in the UK and their effectiveness**Health-focused nutritional labels**

Guideline Daily Amount labels display information about the product including calories and key nutrients and their percentage contribution to daily adult requirements. The Guideline Daily Amount labelling scheme is non-interpretive, in that it does not provide an evaluative judgement about the nutritional quality of a product.

Front-of-pack traffic light labelling is an intervention introduced by the UK Food Standards Agency in 2006. Traffic light labelling is an interpretive scheme that provides information about key nutrients but aims to also provide advice and help consumers interpret the information using a traffic light scheme. The labels consist of three colour-coded lights that indicate the level of fat, saturated fat, sugar and salt in the product. A red light indicates a high level of the nutrient, an amber light indicates a medium level and a green light indicates a low level. In 2016, traffic light labelling was displayed on approximately two-thirds of UK products (Morrison, 2016).

Sustainability and ethical labels

There are a variety of sustainable and ethical labels on the market. A few examples are provided below:

Red Tractor is a food assurance scheme operated by Assured Food Standards, an independent organisation, and was launched in 2000. The label recognises UK food and drink that has been produced to a high quality across the food chain, and as such is traceable.

Carbon Footprint is operated by the Carbon Trust. It informs consumers about the carbon footprint of a product.

RSPCA Assured is a farm assurance scheme that was introduced by the Royal Society for the Prevention of Cruelty to Animals in 1994. The aim of the scheme is to improve farm animal welfare and offers assured traceability across the whole supply chain. In 2018, there were 1,301 RSPCA Assured labelled products on the market (RSPCA Assured, 2018).

Marine Stewardship Council is a sustainable seafood eco-label that was established by the World Wildlife Fund and Unilever in 1996 and has operated as a not-for-profit since 1999. The label operates as a certification scheme for sustainable fisheries and to help promote sustainable fishing to maintain seafood stocks. In 2018, just under one-third of all seafood bought in the UK retail sector had a Marine Stewardship Council label (Clark, 2019).

Evidence of effectiveness

There is considerable evidence from systematic reviews comparing different types of health-focused nutritional labelling interventions on consumer understanding and behaviour. The evidence suggests that nutritional front-of-pack labels can improve the consumption of healthier food (Campos et al., 2011; Cecchini & Warin, 2016; Shangguan et al., 2019). Traffic light schemes appear to be the most effective at changing consumer practices (Cecchini & Warin, 2016). However, there is likely to be a bidirectional relationship, in that labels may improve diet but use of labels is also likely to be greatest in individuals that are already health conscious (Campos et al., 2011). Moreover, the evidence also consistently indicates that use of labels is greatest in individuals with a higher income and education level, and thus may serve to widen health inequalities.

Box 6 Examples of front-of-pack food labelling interventions used in the UK and their effectiveness (continued)

There is less evidence around the use and understanding of sustainable and ethical labels by consumers. Existing evidence suggests that in general, consumers have limited awareness of sustainability labels and level of use is low (Garnett et al., 2015; Grunert et al., 2014). There also appears to be confusion due to the existence of multiple labels (Grunert et al., 2014). A study investigating the use of carbon labels in the UK found that consumer demand for such labels is high but understanding is low (Gadema & Oglethorpe, 2011). In addition, there appears to be a value-action gap in that consumers report high concern for sustainability and demand for such labels, but this does not translate into a change in practices due to competing issues of perceived quality and price (Grunert et al., 2014). A recent survey commissioned by the Marine Stewardship Council found a high demand (83 per cent) for independent ethical labels but that consumers prioritise price before sustainability (Askew, 2018).

in changing consumption habits (Dudley et al., 2015; Jepson et al., 2010; Muzaffar et al., 2018; Rekhy & McConchie, 2014). Interventions are diverse and tend to focus on developing students' knowledge and skills, and many have a particular focus on increasing the consumption of fruit and vegetables (Jepson et al., 2010; Muzaffar et al., 2018; Rekhy & McConchie, 2014). The most effective interventions are those that have simple and unambiguous messages, are more intensive or longer running and involve wider family members (Rekhy & McConchie, 2014). Most notably, interactive, experiential learning is most effective (Dudley et al., 2015; Rekhy & McConchie, 2014).

However, evaluation evidence suggests that information campaigns to increase the consumption of fruit and vegetables have mostly changed consumption over the short term but not on a sustained, longer-term basis (e.g. effects were not maintained at 12 months) (Rekhy & McConchie, 2014; Upton et al., 2013). Similarly, an evaluation of a cooking intervention delivered in English primary schools found positive impacts on consumption but only

measured effects up to four weeks after the intervention (Caraher et al., 2013).

Nutrition advice and support in a healthcare setting can change eating habits

There is good-quality evidence that providing nutrition counselling and support through general practitioners and other similar settings can help change consumption (Jepson et al., 2010). The mode of delivery also matters. Most evidence is on in-person counselling (Jepson et al., 2010); there is limited evidence that telehealth approaches can be effective (Kelly et al., 2016) and that online, e-learning approaches may not be (Harris et al., 2011).

It is likely that advertising regulation could impact consumption, but currently the evidence is limited

The effectiveness of advertising regulation is currently poorly understood. This is partly due to limitations in the ways in which policies have been implemented, and partly due to a lack of good-quality evaluations of their impact (A. Afshin et al., 2015; Chambers et al., 2015;

Galbraith-Emami & Lobstein, 2013; Mills et al., 2013).

One limitation of policy implementation is comprehensiveness. For example, in the UK, statutory scheduling (restrictions on the times of marketing to children of foods high in fat, sugar or salt) were more than offset by increased advertising of these products in other hours, so that overall exposure to such marketing did not change in children and substantially increased in adults (Jean Adams, Tyrrell, et al., 2012). Another limitation is that regulations are often limited to certain media – for example, many do not cover online advertising (A. Afshin et al., 2015).

Nonetheless, there is strong evidence that advertising influences the food preferences and choices of children (Cairns et al., 2009), and more limited evidence that this may be true for adults too (Mills et al., 2013). This implies that advertising regulation could be effective. Indeed, there is evidence that advertising restrictions are associated with a moderate reduction in smoking (Wilson et al., 2012).

Food environment

Changing the availability of food through adjustments to the food environment is another policy approach to changing consumption that is now receiving more attention. This can include changes in provision of food in places that people spend much of their time – schools, hospitals and the workplace – as well as changing the built environment and the types of food outlets readily available to people where they live. Changes can also be made to the environment on a ‘micro’ level – for example, changing the placement of food or portion size within shops, restaurants and other food outlets. Changes in the food environment seem broadly effective in changing food consumption, though the evidence in some settings (the built

environment, public settings other than schools – e.g. hospitals) are too limited to draw any concrete conclusions.

Changing the food available in schools can have a significant impact on children's consumption

The provision of fruit and vegetables in schools may increase overall fruit consumption according to an evaluation of one programme in the US, although a systematic review of 27 programmes found only moderate increases in fruit consumption (Coyle et al., 2009; Evans et al., 2012). Other interventions focus on the healthiness of school meals, i.e setting standards or developing guidelines on the nutritional content of school food provision, and changing school food procurement in line with healthier eating. Overall, the interventions are generally effective in increasing intake of healthy foods and reducing intake of unhealthy foods (Afshin et al., 2015; Niebylski et al., 2014), and one systematic review found that interventions that focused on restricting unhealthy foods (e.g. through restrictions or bans) were generally effective in decreasing levels of being overweight/obese (A. Afshin et al., 2015).

Governmental and school policies appeared more effective compared to voluntary programs, and changing procurement policies seems more effective than setting nutrition standards (A. Afshin et al., 2015). Interventions that bring together changes in food provision with educational interventions are found to be particularly effective in improving children’s consumption and health (Evans et al., 2012; Niebylski et al., 2014).

Worksite well-being programmes can have impacts on consumption, specifically fruit and vegetable intake

There is strong evidence that worksite well-being interventions can have a small positive effect on healthy eating, most notably on fruit

and vegetable intake (Afshin et al., 2015; Geaney et al., 2013; Gudzune et al., 2013; Jepson et al., 2010; Niebylski et al., 2014; Schliemann & Woodside, 2019). There is also some evidence that workplace well-being initiatives can impact on wider outcomes such as preventing weight gain, reducing fat intake, aiding weight loss and reducing cholesterol (Gudzune et al., 2013; Schliemann & Woodside, 2019).

However, not all programmes are equally effective and there is significant variation in the nature of the wellness programmes making it difficult to draw overarching conclusions. The quality of evaluations is also poor, with limited duration of follow-up, small sample sizes and other issues limiting the strength of the evidence particularly in terms of long-term outcomes. More evidence is needed on the characteristics of effective workplace interventions (A. Afshin et al., 2015; Geaney et al., 2013; Gudzune et al., 2013; Schliemann & Woodside, 2019). Emerging evidence suggests that interventions are more likely to be effective when tailored for the workforce in question and to capitalise on the social and environmental context of the particular workplace, as well as when multifaceted and supported by management (Schliemann & Woodside, 2019).

There is little research on the effect of changing food provision and procurement in other public settings such as hospitals

Some individual studies show positive effects when improving the quality of food provided in hospitals and in food delivered at home to low-income older people (M. L. Niebylski et al., 2014). There are also studies using university canteens and other settings as experimental settings for changes in food placement (e.g. Hollands et al., 2015; Walmsley et al., 2018), but there are no identified studies looking at changes in procurement policy in these wider settings.

There is growing evidence that the local food environment can affect consumption. Policy actions to address the built food environment have not been widely implemented or evaluated

There is very limited evidence on the impact of policies aiming to regulate or change the environment in terms of density or prevalence of fast-food outlets or to address food deserts. There is a strong association between obesity and access to unhealthy food – for example, through a high concentration of unhealthy fast-food outlets. However, many studies are cross-sectional so the direction of causality is unclear and the correlation may be mediated by socio-economic status and educational attainment (A. Afshin et al., 2015; Beaulac et al., 2009; Cobb et al., 2015; Fleischhacker et al., 2011). In addition, although there are few longitudinal studies (A. Afshin et al., 2015; Cobb et al., 2015), emerging evidence indicates that the local food environment may have moderate effects on consumption (Caspi et al., 2012). However, there are some limitations in the evidence, in part due to the low quality of many existing studies (Cobb et al., 2015), and also because understanding and measuring what constitutes the relevant environment can be challenging (Williams et al., 2014). This needs to be better understood to support effective policy development. There are no examples of evaluations or reported implementation of policy interventions addressing the built food environment in the academic literature.

Changes in the micro environment, or ‘nudges’, such as food placement and portion size, can be effective in some contexts

There is mixed evidence of the effectiveness of changes to the micro environment – the specific ways in which food is presented and located within a food outlet – on changing food consumption. Most evidence looks at portion

size and food placement in different settings (e.g. supermarkets, canteens). On balance, it is likely that there are some moderate effects on consumption from these types of 'nudges' (Bucher et al., 2016; Cadario & Chandon, 2019; Hartmann-Boyce et al., 2018; Hollands et al., 2015; Houghtaling et al., 2019).

Evidence suggests that these types of interventions may work better in some contexts than others. For example, some studies show significant effects of changes in food placement in schools (Driessen et al., 2014) and changes in prominence and portion sizes for meat (Bianchi et al., 2018). The use of end of aisle displays and shelf placement in supermarkets is known to increase sales, with an estimated 30 per cent of supermarket sales coming from aisle ends, although this likely interacts with price, price promotion and number of display locations among others (Garrido-Morgado & González-Benito, 2015; Glanz et al., 2012; Nakamura et al., 2014). However, other studies looking at placement and portion size in a range of settings including self-service restaurants and grocery stores found no conclusive evidence on changes in consumption (Skov et al., 2013; Walmsley et al., 2018).

Evidence and conclusions on the effectiveness of changes to the micro environment are in part limited by a lack of good quality studies and the fact that many studies are conducted in a lab rather than a real-world setting (Bucher et al., 2016; Driessen et al., 2014; Hartmann-Boyce et al., 2018; Skov et al., 2013). The acceptability of nudges to consumers is also a possible concern (Cadario & Chandon, 2019; Diepeveen et al., 2013). For example, the acceptance of a nudge has been found to be inversely related to its effectiveness, with less acceptance of for example portion and package size reductions compared with those that act to inform consumers (Cadario & Chandon, 2019). However, approval increased

with perceived effectiveness, suggesting that individuals are poor judges of which nudges are effective (Cadario & Chandon, 2019). More generally, there is also less support for interventions perceived as more intrusive and that target individuals rather than businesses (Diepeveen et al., 2013).

Cost and content of food

Changing the cost and content of food available is another possible policy measure that can change consumption. There is some evidence that these approaches can be effective; although in the case of price changes, the difference in price has to be quite significant to make an impact and this depends on the income level of the person. However, understanding of the overall effectiveness of these changes is limited by the complexity of possible substitution effects; when content or cost of foods change, industry and consumers may change their behaviour but not necessarily in the way that is intended.

Food taxes and subsidies can affect consumption, but the changes in price need to be relatively large to make a difference

Systematic reviews suggest that taxes and subsidies can affect purchasing and consumption, encouraging the consumption of healthier foods and reducing the consumption of less healthy options (Afshin et al., 2017; Eyles et al., 2012; Hartmann-Boyce et al., 2018; Ng et al., 2012; Niebylski et al., 2014; Thow et al., 2010). However, the size of price changes needs to be quite significant (at least 20 per cent) to make a difference (Andreyeva et al., 2010; Niebylski et al., 2015; Smith et al., 2018; Wright et al., 2017). There is evidence that subsidies might lead to bigger changes in consumption than taxation. A meta-analysis suggests a 10 per cent subsidy/price reduction

increases consumption of healthy foods by 14 per cent, while a 10 per cent tax/price increase reduces consumption of unhealthy foods by 7 per cent (Afshin et al., 2017). Moreover, the evidence typically shows data for purchasing decisions (which is used as a proxy for consumption) but there is less evidence on actual consumption (A Afshin et al., 2017; Hartmann-Boyce et al., 2018). Evidence suggests that consumption of food away from home and soft drinks, juice and meats more generally may be most responsive to price changes (Andreyeva et al., 2010).

The impact of taxes is mixed and socio-economic factors also affect response to policy actions. Price changes through taxes or subsidies are regressive and disproportionately have more impact on those with lower incomes (Barrett et al., 2017; McGill et al., 2015) because they spend a larger proportion of their income on food and because they tend to buy relatively cheaper foods (Jensen et al., 2011; Thow et al., 2010). However, some studies argue that this cost may be outweighed by the health benefits that tend to be larger for lower-income groups given higher levels of consumption of products such as sugary drinks (Barrett et al., 2017; McGill et al., 2015). These groups are also less likely to engage with labelling (Campos et al., 2011).

Impacts of taxes and subsidies on the food system as a whole can be complex and are not fully understood

An important limitation of studies investigating taxes or subsidies is that many of these are based on models that may in some cases not consider shifts in consumption within or across food categories in response to taxes and subsidies (An, 2013; Garnett et al., 2015; Thow et al., 2010). Substitution is an important issue that is not fully understood. Taxes/price increases can lead to substitution at two levels: consumers may buy different (and potentially

also unhealthy) foods; and producers may replace a particular target product with other unhealthy content (for example, reducing sugar but increasing fat). These behaviours are not well understood and typically not incorporated into modelling studies (Eyles et al., 2012; Smith et al., 2018; Thow et al., 2010).

However, some studies do account for these cross price effects, and still show that taxes may have an effect on consumption (e.g. Briggs et al. 2016). In addition, there are some studies based on real-world data, showing for example that the sugar levy has decreased the sugar content of sugar-sweetened beverages by 22 per cent (Public Health England, 2019) and comparably that minimum pricing on alcohol in Scotland is delivering the intended reductions in alcohol sales (O'Donnell et al., 2019).

The way that financial instruments affect supply chains are complex and may vary. Subsidies at early stages in the supply chain (e.g. agricultural subsidies) are not a good predictor of consumption patterns (Alston et al., 2008; Garnett et al., 2015). Where the costs of other interventions are borne is sometimes unclear and costs may or may not be passed on to the consumer as intended, e.g. by shifting to other products.

Reformulation of foods may alter consumption and a number of policy approaches can motivate industry to change the content of their products

Changing the content of food, reducing fat or sugar for example, can be effective in changing intake and producing positive health outcomes (Federici et al., 2019; Grieger et al., 2017; K. M. Hashem et al., 2019). The evidence is stronger for salt reduction than for sugar and fats, and evidence is based on modelling studies that might not take into account substitution as noted above (Federici et al., 2019; Grieger et al., 2017; K. M. Hashem et al., 2019).

There is a diversity of approaches to encourage industry to change its behaviour, each with varying levels of effectiveness. Voluntary approaches, such as the Public Health Responsibility Deal³⁶ are one way of implementing these changes, but industry responses to this are mixed; an evaluation of this programme suggests that companies have not used the most effective strategies and overall the programme has had low additionality (see Section 5.4 for more detail on the Responsibility Deal) (Knai et al., 2015; Reeve & Magnusson, 2015). Regulatory approaches, including restrictions and standards, pricing, and labelling requirements, can also drive industry to reformulate products (Hendry et al., 2015; Hyseni et al., 2016; Shangguan et al., 2019). In particular, 'upstream', population-wide mandatory approaches, such as maximum limits or restrictions, seem to be the most effective in driving significant changes in consumption, such as reductions in salt consumption and levels of trans fats in food (Hendry et al., 2015; Hyseni et al., 2016). Labelling can also drive reformulation through a desire to show healthier content of food (Mhurchu et al., 2017).

Case studies

This section presents four brief case study examples of specific interventions used in the UK to influence food consumption decisions and the evaluation evidence on their effectiveness. The specific case study examples represent a selection based on the availability of evaluation evidence in the literature. The aim was to present interventions that have been applied on a wider scale and draw lessons from these. It is notable that

most of the included interventions are aimed at changing consumption to improve health. This reflects the level of evidence available in the literature. It is difficult to identify good-quality evaluation evidence on interventions aiming to improve sustainable or ethical consumption. The case studies were also chosen to provide examples across the three intervention categories aimed at targeting: knowledge and information, food environment, and cost and content of food. Three of these are national level interventions and one was targeted at the north east of England. The case studies highlight examples that worked and some that did not, with evidence as to why.



The Public Health Responsibility Deal

What is the intervention?

The Public Health Responsibility Deal was an initiative launched in March 2011 by the Department of Health (now the Department of Health and Social Care) (Department of Health, n.d.). The PHRD has since closed with the initiatives being taken forward through other government policy such as the Childhood Obesity Plan.

What is the target population and what did the intervention aim to do?

The Responsibility Deal was a national-level public–private partnership that aimed to encourage food companies (e.g. retailers, manufacturers, caterers and out-of-home outlets) and other actors (e.g. third sector and non-governmental organisations) to contribute to improving public health. It involves voluntary agreements between the government and

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The Public Health Responsibility Deal was a voluntary approach in which businesses and other organisations could sign up to commitments that would improve public health. Launched in March 2011, partners signing up set out a series of pledges that they commit to deliver, spanning topics such as food, alcohol, physical activity and health at work (Knai et al., 2015).

various actors (i.e. corporate sector, academia and voluntary organisations) to commit and sign up to achieving actions set out in pledges in the areas of food, alcohol, health at work and physical activity.

What is the category of intervention?

In the area of food, there were eight pledges, each proposing a number of interventions across the different categories of policy interventions identified for this study (knowledge and information, food environment, and cost and content of food), and each having varying numbers of signatories. Organisations that committed to a pledge were asked to develop a delivery plan and report on their progress in the spring of each year.

What was the effect of the intervention?

An evaluation of six food pledges was conducted in 2015 (Knai et al., 2015). The authors evaluated the following pledges: out-of-home calorie labelling, salt reduction, calorie reduction, front-of-pack nutrition labelling, fruit and vegetable consumption, and saturated fats. Each of these pledges contained various interventions to promote greater/increased consumption of a healthier diet, including interventions to reduce food consumption of less healthy food/drink/ingredients, change dietary practices, and increase awareness or knowledge related to healthier food consumption. Examples of interventions under these pledges include: provision of information at point of choice; reformulation activities around salt and saturated fat; reformulation of recipes and menus; and prominently promoting fruit and vegetables in retail. An evaluation of the pledge on reducing levels of trans fatty acids in the food supply was conducted in 2017 (Knai et al., 2017).

Knai et al. (2015) aimed to determine the effectiveness and added value of these various interventions and used the concept of 'additionality' to establish the counterfactual.³⁷ 'Additionality' was defined as the extent to which a given activity was brought about by the Responsibility Deal versus it would have happened anyway or was already happening. The counterfactual was derived from assessing organisations' delivery plans to ascertain what actions organisations would have taken in the absence of the Responsibility Deal.

The interventions may not reflect the most effective strategies to improve diet:

The authors found that the majority of Responsibility Deal food pledges included in the evaluation consisted of interventions that focused on knowledge and information provision, which do not reflect the most effective strategies to improve diet (e.g. out-of-home calorie labelling and front-of-pack nutrition labelling versus reformulation of products to reduce salt). They also found a lack of interventions around reducing sugar intake, reducing the marketing of less healthy foods and pricing (e.g. taxes and subsidies), all of which have a growing evidence base around their effectiveness at encouraging healthier choices. The authors concluded that pledge implementation is unlikely to have much effect on encouraging the consumption of healthier diets in England.

Progress reports were of poor quality or unavailable: Some of the interventions mentioned in the delivery plans included in the study may have been effective at improving the consumption of healthier diets if implemented correctly. However, the authors found it hard to evaluate whether targets were being met due to the poor quality or unavailability of progress reports. Therefore, the authors highlighted

the importance of designing well-defined, quantitative targets that are evidence-based to ensure that once implemented, public health policies have a positive effect on population health.

The Responsibility Deal was found to have low additionality: Moreover, where the authors could assess, they found that the Responsibility Deal had relatively low additionality, in that most of the interventions included in the research were likely not developed as a result of the Responsibility Deal programme. Only 26 per cent of interventions were 'likely' brought about by the Responsibility Deal, suggesting that organisations had mostly committed to interventions that had already happened or were already underway when the Responsibility Deal started.

A range of factors are required for a voluntary approach: The authors highlight that a number of factors are important to ensure the success of a voluntary approach (as opposed to a regulatory measure), many of which were not met by the Responsibility Deal. These include: having well-defined, evidence-based quantitative targets; involvement of public and civil society organisations in the development and monitoring of the pledges; and clear sanctions for not demonstrating progress against targets. In the case of the Responsibility Deal, the majority (95 per cent) of signatories were from the corporate food sector, which raises concerns about the motivations to promote health objectives.



Food for Life schools programme

What is the intervention?

The Food for Life schools programme is an initiative launched in 2007 that is led by the Soil Association in collaboration with other charities, including Focus on Food, Garden

Organic, the Health Education Trust and the Royal Society for Public Health.

What is the target population and what did the intervention aim to do?

Food for Life is a national programme that initially started as a school-focused initiative to improve food in schools but in its second phase has also expanded its remit to other settings (e.g. hospitals, workplaces, care homes and universities). The aim is to promote the micro food environment or define food culture in these settings to make food healthier and more sustainable. The programme adopts a 'whole settings approach', with schools, nurseries, hospitals, care homes, food providers and the wider community working together to implement the programme. As of June 2015, 5,208 schools, 31 workplaces, 20 hospitals and 2 care home groups across England were enrolled in the programme.

What is the category of intervention?

The initiative spans several policy categories, including providing knowledge and information and changing the food environment. The programme adopts a 'whole settings approach' and focuses on four objectives: (1) support around access to healthy and sustainable food; (2) providing skills and knowledge; (3) enabling a change in food culture within schools; and (4) enabling a change in culture across the wider health and education systems. A key mechanism is to encourage all school stakeholders to be involved (i.e. pupils, staff, parents and the wider community). The programme employs two mechanisms that work together to achieve these objectives. One is an awards scheme to encourage schools to make changes to promote a culture of good food. The scheme aims to encourage changes to people and the environment both within and beyond schools. Schools work towards bronze, silver and gold awards. To date, 1,087 Food for



Life awards have been achieved by schools. The programme also uses a Food for Life Catering Mark to encourage school caterers to improve the quality and provenance of school meals. The label is recognised as a sign of food quality and sustainability and acts as an accreditation mechanism.

What was the effect of the intervention?

Two evaluations of the Food for Life programme have been conducted: Phase 1 between 2007 and 2011 and Phase 2 between 2013 and 2015. The Phase 1 evaluation focused on evaluating the programme in schools, and Phase 2 expanded to cover settings beyond schools, including hospitals, workplaces, care homes and universities.

The Phase 1 evaluation found overall that the programme was having a positive impact on pupils and schools. Specifically, it resulted in improved awareness of food, sustainability and healthy eating; positive trends in school

performance and pupil behaviour; and commitment to the provision of better-quality school catering, among others. It was also found that the whole school approach produced benefits that were greater than if it had been a single component programme.

The programme has helped to promote long-term changes in the food culture of schools that engaged: The Phase 2 evaluation, using a survey of schools and case studies, found that Food for Life has continued to have a positive impact on food cultures within schools and remains relevant to schools. The programme helps to facilitate a sustained engagement in school food activities. Schools that engaged with the programme show long-term changes in their food culture, with the programme becoming embedded in their ethos. A number of factors facilitated these positive changes, including having commitment from school staff, in particular school leaders. Embedding

the Food for Life ethos was also found to protect against staff turnover.

The programme has promoted healthier practices: Pupils in Food for Life schools consumed more fruit and vegetables than pupils in comparison schools. There was also a 'spillover' effect in that fruit and vegetable consumption was also higher at home, showing a positive spread of the programme into the wider community.

The programme has successfully scaled up to other settings beyond schools: There is potential for the programme to extend beyond the school setting (e.g. nurseries, care homes and hospitals), with evidence that the programme has helped to improve the quality of the food served.

The programme provides a positive social return on investment: The evaluation found that for every £1 spent on Food for Life, there is social value of £4.41 created over a three-year period in terms of the value created for health, education and the environment.

There were several challenges with the programme: The evaluation found that there are some challenges associated with achieving sustained impacts from the Food for Life programme. Achieving long-term impact may depend on several factors, such as the initial motivation for engaging with the programme. Factors likely to promote long-term engagement include a committed leadership and embedding the food policy within the school through committed staff. If the main motivation is to gain an award, then this is less likely to deliver long-term impacts. Results also showed that it seems more difficult to engage and maintain the commitment of secondary schools. The evaluation also speculated that schools with the most long-term positive impact and progress may be those that had a pre-existing commitment to this priority. Financial barriers prevent all organisations

from investing in Food for Life, particularly those supporting some of the more vulnerable individuals. Healthy and sustainable food is not always the cheapest option and a legacy of catering systems driven by low cost provision prevents the switch to healthier options. The motivation to drive change often relies on having a leading figure, which may not always be present, and also renders progress vulnerable to changes in personnel. Another challenge is around the delivery of the whole settings approach, with some organisations choosing to only deliver certain aspects of the programme, which acts to prevent embedded and long-term change.



Change4Life convenience store programme

What is the intervention?

The Change4Life convenience store programme is an initiative launched in 2008 by the Department of Health (Department of Health, 2010). It is part of the wider Change4Life programme, a national health promotion programme.

What is the target population and what did the intervention aim to do?

Change4Life aimed to increase the provision of fresh fruit and vegetables in convenience stores, particularly in deprived areas. Located at the heart of many deprived communities, convenience stores are often important outlets for low-income individuals but also those individuals who use it for 'top-up' shopping. A pilot phase of the project was conducted in the north east of England, an area with high deprivation and high use of convenience stores.

What is the category of intervention?

The intervention spans across several policy categories; it aims to primarily improve the

food environment (by increasing access to healthy food) but also provide knowledge and information to increase awareness of healthy diets. The policy had three main objectives:

- To increase the access and availability of fresh fruit and vegetables in deprived areas.
- To increase the sales of fresh fruit and vegetables, through increased range, quality and better communication in shops.
- To improve awareness of fruit and vegetables to consumers through the Change4Life brand.

Interventions were introduced in two categories: intensive interventions in 17 'demonstration' stores and less intensive in 70 'roll-out' stores. A wide range of interventions were introduced: provision of chiller cabinets to help shops stock a wider range of fruits and vegetables; changes to the shop layout to place fruit and vegetables more prominently at the front of shops (also to address 'impulse' buys); expanding the space for fruit and vegetables; and promotional activities such as provision of a leaflet to houses within a one-mile radius of the shops to raise awareness of the new scheme. Both types of stores had similar interventions but these were slightly less extensive for the roll-out stores.

What was the effect of the intervention?

Several evaluations of the programme were conducted. A small-scale evaluation during the early phases of the programme was conducted in 2010 (Department of Health, 2010). An evaluation into the long-term implementation of the programme was conducted in 2012 (Jean Adams, Halligan, et al., 2012). It should be noted that there was considerable variation between the types of stores that were involved (e.g. size, business model, existing links with the community) but nonetheless the evaluation

concludes that the overall pattern of change was consistent across stores.

The intervention is unlikely to have had long-term effects on customers' consumption of fruit and vegetables

of fruit and vegetables: The early-stage evaluation concluded that the programme was effective at achieving its objectives, suggesting that there was an improvement in customers' perception of the quality, selection and visibility of fruit and vegetables, and sales of fruit and vegetables increased. However, the evaluation conducted two years after initial implementation concludes that overall the intervention is unlikely to have had a substantial or long-term effect on customers' consumption of fruit and vegetables.

The intervention was found to have low fidelity:

There was low availability of branded Change4Life, point-of-sale materials and equipment (e.g. a branded chill cabinet) and these were not used appropriately by all stores. In addition, this equipment was not long lasting and was not replaced, and there was a lack of financial support for food waste in the early stages. The evaluation found a number of possible reasons for why the intervention was unsuccessful.

There was poor communication between stakeholders:

There was evidence that one barrier to successful delivery of the intervention was communication with different actors, and particularly between local level teams and national level oversight. Better communication, both at the outset and on an ongoing basis, could improve the chances of success for this type of intervention (Adams et al., 2012).

There was a lack of clarity around roles and responsibilities:

There was some lack of clarity regarding the intended links between health workers, schools and community organisations. It was suggested that this was because a number of aspects of the intervention were added retrospectively (e.g.

the health worker component), which led to lack of clarity around roles and responsibilities.



The Soft Drinks Industry Levy

What is the intervention?

The Soft Drinks Industry Levy (SDIL) is an initiative that was announced by the chancellor of the exchequer in March 2016 and came in to force, through legislation, in April 2018 (Public Health England, 2019).

What is the target population and what did the intervention aim to do?

SDIL or the 'sugar tax' is a legislated national level initiative that aims to encourage individuals to reduce their consumption of sugar.

What is the category of intervention?

The main aim of the policy is to encourage the reformulation of soft drinks to reduce their added sugar content. It does this via a two-tiered 'levy' or tax on manufacturers and importers of specific soft drinks (excluding some products such as fruit juice, milk-based drinks and alcohol). There is a charge of 18p per litre if the drink contains 5g of total sugar or more per 100ml and 24p per litre if the drink contains 8g of total sugar or more per 100ml. Other objectives of the policy were to:

- Reduce the portion size of a product likely to be consumed in a single occasion
- Shift consumers' purchasing patterns towards lower or no added sugar products.

What was the effect of the intervention?

Early evidence suggests that the levy has reduced the consumption of sugar from drinks subject to the levy: In 2019, Public Health England published the second progress report for the sugar reduction programme, which it oversees on behalf of government. The report also included data on changes seen in drinks that are subject to the SDIL (Public Health England, 2019) between 2015 and 2018. Specifically, the report states that there has been a 28.8 per cent reduction in total sugar content per 100ml for purchased retailer own brand and manufacturer branded soft drinks that are subject to the levy. A similar reduction was seen for drinks sold through the out-of-home sector. Although there has been an increase in sales of drinks subject to the levy of 10.2 per cent, there has been a reduction in total sugar content of the drinks sold of 21.6 per cent. There has also been a shift in sales towards lower sugar products (below 5g per 100ml) that have no levy attached. The calorie content of drinks subject to the levy fell by 20.5 per cent. Analysis by socio-economic group of head of household shows that the total sugar purchased per household from drinks subject to SDIL has decreased in all groups, but this reduction is smallest in the lowest socio-economic group. The report states that the analysis has not accounted for other factors that could be causing this difference, such as price changes and household characteristics (such as size and family composition) but concludes that further analysis is required to understand the observed changes.

6 Reflections – what does the evidence say about food consumption in the UK, and what should policymakers do next?

This chapter reflects on the evidence regarding the trends and drivers of food consumption and their implications for policy, as well as the different interventions to change consumption and evidence of their effectiveness. The chapter first summarises the key messages on food consumption arising from the evidence in the literature. It then presents an overview of different interventions and evidence of their effectiveness. Finally, the chapter concludes with a summary of key evidence gaps in the existing literature and, based on this, proposes a number of possible priority areas for action and for further research.

What do we know about food consumption?

Food matters – the food individuals eat influences health and the environment

Unhealthy and nutritionally poor diets lead to ill health, including cardiovascular disease, diabetes, cancer, obesity and associated poor health and mortality (Ashkan Afshin et al., 2019; WHO, 2014). The current food system and people's food practices have negative impacts on the environment, leading to greenhouse gas emissions, deforestation and biodiversity loss (Garnett et al., 2015). Addressing these complex challenges requires changing how food is produced to ensure it is more sustainable, and,

importantly, changing consumption to ensure it is healthier and more sustainable.

A minority of consumers increasingly care but most diets still fall short of nutritional guidelines and many consumers do not always act in line with their beliefs

There is good evidence that policymakers are increasingly aware of the negative environmental impacts of food production systems (Apostolidis & McLeay, 2016; Lang & Mason, 2018) and some consumers are increasingly aware of the health and sustainability issues related to their food practices (FSA, 2019b, 2019a; WRAP, 2015). This is reflected in the increasing sales of ethical and sustainable produce, and increasing numbers of plant-based, particularly vegetarian and 'flexitarian', diets (George, 2019).

There is strong evidence to suggest that although diets are slowly becoming less unhealthy, UK consumption still falls well short of nutritional guidelines. Trends show small reductions in the consumption of salt and sugar, and even slight reductions in the consumption of fruit, vegetables and fibre. The UK population also consumes some of the highest amounts of processed and ultra-processed food in Europe (Carlos Augusto Monteiro et al., 2018).

Although survey evidence indicates that an increasing number of individuals consider ethics, sustainability and health to be important

issues, these are still likely to be a minority and individuals do not always act in line with their views and beliefs. Factors such as income, price and perceived quality are currently some of the main barriers to sustainable and ethical consumption. Moreover, there remains a majority of the population that lacks awareness and understanding of how their food practices (e.g. meat consumption) impact the environment, and who demonstrate resistance to the idea of personal change in food practices (Garnett et al., 2015).

There are predictable socio-economic differences across broad consumption trends but the impact of wider socio-demographic factors is less clear

There is strong evidence, including both academic and from surveys, that broad consumption trends in the UK – particularly

around healthy diets and socially responsible consumption – are predictably modulated by socio-economic differences. However, it should be noted that on average all socio-economic groups continue to consume an unhealthy diet. The literature also indicates that there are a variety of socio-demographic differences observed across these trends, including around age and gender; however, the evidence around the impact of these is less strong or mixed, and studies are not always adequately controlled. There is some evidence to suggest that younger consumers are more likely to eat outside of the home, shop online and to eat more sustainably, but good-quality academic studies around these questions are lacking. Table 5 provides a summary of the evidence in the literature reviewed on socio-demographic differences in food consumption practices.

Table 5 Availability (volume) of evidence in the literature on socio-demographic differences in food consumption practices and response to interventions.

	Factor	Evidence base	Quality of evidence	Availability of academic evidence	Key sources
Trends	 Diet	Lower incomes, economic deprivation and lower levels of education are associated with a poorer diet and being overweight/obese	High	Widely covered	Barrett et al., 2017; Barton et al., 2015; Cribb et al., 2011; de Ridder et al., 2017; Defra, 2017; Pechey & Monsivais, 2016; Wrieden et al., 2013
		Women tend to have slightly greater consumption of healthier foods and pay more for healthy foods	Moderate	Some evidence	Balcombe et al., 2010; Christoph et al., 2016; Defra, 2017; Micha et al., 2015; Rekhy & McConchie, 2014
		Older individuals tend to consume healthier foods overall, although it is not clear whether this is a true age effect or a cohort effect	Low–moderate	Some evidence	Appleton et al., 2017; Lam & Adams, 2017; Micha et al., 2015

	Factor	Evidence base	Quality of evidence	Availability of academic evidence	Key sources
Drivers	 Out of home	The out-of-home food environment (including for example restaurants, takeaway and fast-food places) is increasingly a major part of the diet of younger adults and adolescents compared to older adults, whose preferred location is home	Moderate	Some evidence	Adams et al., 2015; Nielsen, Siega-Riz, & Popkin, 2002; Tyrrell et al., 2017
	 Beliefs and values	Individuals with health and environmental concerns tend to be female and younger	Low	Some evidence	Latvala et al., 2012; Su et al., 2019; WRAP, 2015; YouGov: Eating Better, 2019
		Ethically certified food is more commonly purchased by older consumers (aged 55 or more)	Low	Not widely covered	Mintel, 2019a
	 Price	Costs shape what people can afford to eat; those in low-income groups often have less expensive food expenditure practices, consume less healthy food and less fruits and vegetables	High	Widely covered	Appleton, 2016; Barton et al., 2015; Darmon & Drewnowski, 2015; de Ridder et al., 2017; Griffith et al., 2015; Hawkesworth et al., 2017; Levin, 2014; Levin et al., 2012; Thomas et al., 2019; Townshend & Lake, 2017; Whybrow et al., 2018
	 Marketing and advertising	There is strong evidence that advertising negatively influences the food preferences and choices of children and young people	High	Widely covered	Boyland et al., 2018; Buchanan et al., 2018; Cairns et al., 2009; Chambers et al., 2015; Griffith et al., 2015; Happer & Wellesley, 2019; Kamar et al., 2016; MacGregor & Bicquelet, 2016
Individual/ social differences	 Time and convenience	Time and convenience (i.e. food perceived to be 'quick' and 'easy' to cook) are important drivers of consumption choices, particularly for lower-income individuals who often lack time	Moderate	Some evidence	Appleton, 2016; Howse et al., 2018; Jilcott Pitts et al., 2018

	Factor	Evidence base	Quality of evidence	Availability of academic evidence	Key sources
Interventions	 Knowledge and information	Information campaigns also rely on personal agency in changing practices, and evidence consistently indicates that they tend to have greater impact in individuals with higher socio-economic status and thus possibly widen inequalities	High	Widely covered	Chandon, 2013; Christoph et al., 2016; Friel et al., 2015; Garnett et al., 2015; McGill et al., 2015
		Use of food labelling information is particularly high among individuals with health conditions and special dietary requirements and notably lower among children, adolescents, older adults and people in lower socio-economic groups	High	Widely covered	Campos et al., 2011
	 Cost and content	Labels in restaurants and fast-food settings may only have effects in certain population subgroups, with some evidence that women may use menu labels whereas men do not	Low-moderate	Not widely covered	Sinclair et al., 2014
		Price changes through taxes or subsidies are regressive and disproportionately have more impact on those with lower incomes because they spend a larger proportion of their income on food and because they tend to buy relatively cheaper foods; even where taxes are regressive, those on lower incomes may still benefit proportionately more from subsidies on fruit and vegetables if they buy them	Moderate	Some evidence	Barrett et al., 2017; Jensen et al., 2011; McGill et al., 2015; Thow et al., 2010

Source: RAND Europe analysis. This table is a summary of the evidence on socio-demographic differences in food consumption cited in the literature reviewed. It serves to highlight the differences and nuances in behaviour and practices related to food. It is not intended as a segmentation and cannot be used to draw predictable conclusions about consumption behaviour.

The food environment is changing but the full impact of this on consumption is unclear

The food environment is changing and becoming increasingly diverse and fragmented, with impacts on what people eat. In particular, the growth of the out-of-home sector is significant, with implications for the consumption of salt, sugar and fat (Caraher & Hughes, 2019). In addition, although most consumers continue to source their food from large 'traditional' supermarkets, other forms of retailer (e.g. mini supermarkets) are increasing in popularity (FSA, 2019b). In particular, individuals are increasingly shopping for food online and using food delivery services, including supermarket home delivery and other forms of home delivery (e.g. vegetable boxes, Hello Fresh and Amazon Fresh). Although use currently remains low, this is a trend that is predicted to increase (FSA, 2019b).

Despite the increasing importance of the online grocery shopping market, there is currently a lack of research evidence around the impact of digitalisation and its influence on consumption (Dablanc et al., 2017). The evidence around how online shopping and home delivery affects consumption and consumer diets is lacking. To date, studies that have found mixed results, with some evidence that online shopping can drive both healthy and unhealthy choices. For example, shopping online can reduce the likelihood of buying unhealthy foods due to a reduction in impulse purchases and can be a way to overcome healthy food accessibility challenges. However, it can also increase the chances of buying unhealthy products, since consumers may be more reluctant or able to buy fresh products online (Jilcott Pitts et al., 2018). It is also not clear to what extent online consumers differ from offline consumers in terms of other factors such as price sensitivity (e.g. propensity to engage with offers) (Munson et al., 2017).

The food environment, which is likely shaped by powerful food system actors, is a significant driver of consumption

There is strong and consistent evidence that, in addition to price and perceived value for money as some of the primary drivers, the food environment in terms of availability, marketing and advertising has a significant influence on consumption (Public Health England, 2017). Although many individuals are aware that eating a healthy diet and being physically active is necessary, they are constrained by the current food environment. There is a strong association between obesity and access to unhealthy food – for example, through the built environment (e.g. through a high concentration of fast-food outlets) (Public Health England, 2017). The micro environment (e.g. through food placement and portion sizes) can also influence consumption; the use of end of aisle displays and shelf placement in supermarkets is known to impact on purchasing decisions (Glanz et al., 2012). Manufacturers, retailers and transnational food corporations play a big role in encouraging the consumption of unhealthy and processed foods. For example, marketing and advertising by industry and retailers has a significant effect on food purchases, particularly driving the consumption of unhealthy food in children and young people (Buchanan et al., 2018; Griffith et al., 2015; MacGregor & Bicquelet, 2016). However, retailers can also be key actors in promoting healthy food environments (Roberto et al., 2015). Given the mixed evidence and lack of controlled studies, more good-quality research is needed on the impact of specific food system actors.

Food decisions are not always consciously deliberated and are determined by culture, social environment and sense of identity, and what we eat is often a matter of habit and convenience

Although there are a number of broad trends that affect consumption, there are a myriad of cultural, societal and personal factors that lead to different ‘food publics’ with different values and practices. In addition to socio-economic status (e.g. income and education), demographic factors such as gender and age also strongly affect values and beliefs, leading to differences in terms of health and sustainable consumption. Food decisions are not always the outcome of conscious deliberation; habit, time and convenience are also powerful drivers of consumption and can make it difficult for many individuals to exercise choice and change consumption. Therefore, it is particularly important for policy responses to take into account these personal factors. However, population segmentation approaches, which could be used to determine appropriate responses, are usually highly context specific and need to be used with caution in their application to policy design and implementation.

Overview of interventions and their likely effectiveness

Knowledge and information can increase awareness but the ability to change behaviours is limited by social, economic and personal factors

Although some individuals do exercise choice using information such as food labels, their ability to choose is limited by cost, time and wider influences both in terms of the food environment and at a personal level. In addition, food decisions are not always conscious and therefore may not be actively information driven. Mass media campaigns can increase awareness, particularly if they are

targeted and have an influential messenger, but there is less evidence that they can change behaviours. Similarly, food labelling does seem to help some consumers choose healthier products, but their use may also be limited to health-conscious individuals, with lower use in children, adolescents, older adults and individuals of lower socio-economic status. Consistent evidence indicates that provision of knowledge and information may have a greater impact on individuals with higher socio-economic status, and may possibly serve to widen inequalities if used in isolation (Friel et al., 2015; McGill et al., 2015). Therefore, policies around education and information provision alone are unlikely to be sufficient to change behaviours (since these are contingent on action by individuals). Although there is scope to use the provision of knowledge and information to raise awareness, for example of sustainability issues around consumption, their use should be combined with other approaches to enable collective behaviour change across all population groups.

Policymakers can help to provide environments that enable people to make healthy and sustainable food choices more easily

There are a variety of interventions that can affect the food environment, spanning from the provision of healthy foods in public settings, to changes to the built food environment (e.g. the availability of fast-food outlets) and ‘nudges’ to change consumer behaviour through the micro environment (e.g. the presentation of food in supermarkets). Changing the food environment through this spectrum of interventions broadly seems effective at changing consumption practices, but there is currently a lack of good-quality studies. There is good evidence that interventions in settings such as schools and the workplace can help to increase fruit and vegetable consumption, but evidence is lacking for other public settings

such as hospitals or universities. Although there is an association between access to unhealthy food and obesity, few policies that address the built food environment have been implemented or evaluated. ‘Nudges’ to change consumers’ purchasing behaviour by altering food placement and portion size appear to be effective in certain contexts, such as in supermarkets and in schools, but the evidence is limited by a lack of good-quality studies.

Changing the cost and content of food can be effective at changing consumption but the complexity of possible substitution effects is not yet fully understood

The evidence suggests that subsidies and taxation can encourage the consumption of healthier foods. However, data are mostly based on modelling studies rather than real-world data. Therefore, more good-quality evidence is needed to better understand some of the complex substitution effects. The evidence also suggests that the size of the price change needs to be significant (at least 20 per cent) to drive changes. Generally, initiatives to encourage the reformulation of food – to reduce the content of salt, sugar and fat – also appear to be effective at encouraging healthier consumption. Emerging evidence indicates that the SDIL has reduced the consumption of sugar, although possible substitution effects remain unknown. Contrary to expectation, initial evaluation results of SDIL found that the reduction in sugar consumption has been smallest in individuals from lower socio-economic groups (who are expected to be affected the most by price increases). This discrepancy between expected effects of price increases and observed behaviour suggests that other factors than price may influence the effects of subsidies and taxation. The evidence so far suggests that ‘upstream’, population-wide mandatory approaches, such as maximum limits or restrictions, seem most effective in driving

significant changes in consumption compared with voluntary approaches.

There is often little evidence on the longer-term outcomes of interventions

Studies and evaluations often do not take into account the longer-term outcomes of specific interventions. Most interventions are evaluated within a short timeframe, which limits the ability to assess whether their effectiveness is long lasting. Another limitation is that many evaluations focus on intermediate rather than ultimate outcomes – for example, looking at changes in views or awareness rather than actions. Building the evidence base through more comprehensive evaluations and more longitudinal studies that enable us to look at active changes in behaviour would support more evidence-based interventions in this space.

Possible priority areas for further consideration by policymakers

There are a number of different trends, drivers, individual differences and interventions related to food and food consumption that are dealt with in the academic literature. However, there are still significant gaps in the evidence base. Some factors have high-quality evidence but are not extensively written about in the academic literature. Other factors have low- or moderate-quality evidence in the academic literature. Table 6 gives an overview of areas explored in the literature on food consumption behaviours and practices and illustrates both the quality and availability of the evidence for each factor. Building on this, we identify a number of key evidence gaps in the existing literature in Box 7. Based on these key evidence gaps, there are a number of priority areas that policymakers could consider, which are presented below and summarised in Box 8.

Table 6 Availability (volume) of evidence in the literature on food consumption practices and interventions

	Factor	Evidence base	Quality of evidence	Availability of academic evidence	Relevant to chapter			
					Trends	Drivers	Individual/social differences	Interventions
Trends	 Demographic variables	Analyses do often not control for the interaction of these with other factors	High	Strong	✓			
	 Ethical and environmental concerns	Unclear whether these concerns influence consumption A value-action gap persists	High	Strong	✓	✓		
Drivers, individual/social differences	 Online purchases	The role of increased online and out-of-home purchasing is not well understood	Moderate	Not widely covered	✓	✓		
	 Built and micro food environment	Growing but mixed evidence base on the impact of the built environment on consumption	High	Not widely covered		✓		✓
	 Food actors	High-quality but not extensive evidence on the relative importance of different actors	High	Not widely covered		✓		
	 Food information	Strong evidence on the type of information that is provided to food consumers, but a lack of academic evidence exploring the type of information that can change food practices	High	Some evidence		✓		
	 Country of origin	Consumers state the importance of the provenance of food when choosing certain food products (particularly meat) but there is not a lot of evidence	Moderate	Not widely covered	✓	✓		
	 Food quality	There is moderate evidence that perceived food quality is an important driver for consumer choice	Moderate	Some evidence		✓		
	 Online purchases	The role of the changing digital landscape and its influence on food consumption is not widely covered	Moderate	Not widely covered	✓	✓		
	 Segmentation	Often specific to a particular context and not always generalisable across a population	Moderate	Not widely covered			✓	
	 Supply-side technologies	Limited evidence that consumers consider technologies in food production processes when making food-related decisions	Low-moderate	Not widely covered		✓		
Interventions	Mass media campaigns	Evidence is still limited regarding whether it can influence behaviour change Limitations to campaign design (e.g. TV only, not online); better designed campaigns might be more effective	Moderate	Not widely covered	✓			✓
	 Food labelling	Evidence on the effect of food labelling in fast-food settings, supermarkets and restaurants is mixed	Low-moderate	Some evidence	✓			✓
	Advertising regulation	Can impact consumption but the evidence is limited Limitations in both evaluation and policy design limit our knowledge of effectiveness	Low-moderate	Some evidence	✓			✓
	Food provision and procurement in other public settings	Little research on the effects Very little evidence identified	Mixed	Not widely covered		✓		✓
	 Changes in the micro environment	Mixed evidence and effectiveness of these interventions depends on context	Low	Not widely covered	✓			✓
	Built food environment	Policy actions to address the built food environment have not been widely implemented or evaluated	Low	Not widely covered	✓			✓
	 Reformulation of food	Substitution effects unclear; can be driven by other changes (price changes, labelling requirements)	Moderate	Not widely covered	✓			✓
	Taxes and subsidies	Understanding of substitution effects limited	Moderate	High	✓			✓

Source: RAND Europe analysis.

Box 7 Summary of key evidence gaps in the existing literature**Trends**

- The effect of demographic variables on consumption is not well understood as analyses are often not adequately controlled for the interaction of these variables with other factors (e.g. correlation between age and wealth).
- Research indicates some differences in consumer practices when shopping online compared to offline, but the overall effects of the changing food environment on consumption, such as increased online and out-of-home purchasing, is not well understood. For example, patterns and frequency of use of different types of outlet are not clear, and the ways in which food options are presented affect consumption in an online setting are not well established.
- The extent to which ethical and environmental concerns influence consumption is unclear beyond information on purchasing data on specific food types (e.g. Fairtrade). Similarly, though some consumers increasingly care about the provenance of their food and production methods, the relative importance of these considerations and their influence on consumption are unknown.
- A value-action gap persists and there is some evidence on why this might be the case; however, there is very little evidence on how and when that gap can be closed.

Drivers

- The role of digital technology, both in terms of a route to purchase food, and as a source of information and a vehicle for advertising, is not well understood and is likely to continue to increase in importance. More evidence is needed on how new technologies and new and existing platforms (e.g. social media) impact on consumption.
- Although there is a growing evidence base on the influence of the built and micro environment on consumption, there are still important gaps that require further investigation, such as the impact of socio-demographic differences in access to fast-food outlets and the impact of planning policies on consumption.
- Although the literature cites a variety of food system actors as being important in influencing the food environment and consumption practices, there is no evidence on their relative importance.

Social differences

- Some of the evidence around social differences in consumption comes from cross-sectional data, which means it is unclear whether interventions could effectively address those differences by changing those personal factors or circumstances. More longitudinal data would be helpful to better understand whether interventions can be effective in changing consumption.

Box 7 Summary of key evidence gaps in the existing literature (continued)

Interventions

- Many evaluations of the effectiveness of interventions are limited to short-term or intermediate outcomes, which limits their usefulness. Examples include evaluation of healthy eating campaigns, which often look at changes in attitudes or knowledge rather than consumption; and evaluations of workplace well-being initiatives, which often have a poor evaluation design, small sample sizes and only short-term follow-up. More long-term evaluations looking at ultimate intended outcomes are needed. More generally, the quality of evaluations could be improved.
- Interventions aiming to change information availability, either through healthy eating campaigns or restriction of advertising, often focus on traditional media and do not target new media. This may limit their effectiveness and makes it difficult to establish whether these types of interventions could work if they were more comprehensive.
- Most evidence on interventions is focused on health outcomes rather than other types of consumption behaviours (e.g. more sustainable or ethical consumption).
- There is some suggestion that studies in real-world settings may show different effects on consumption than in experimental settings, typically with smaller effects seen in a real-world context. More real-world data is therefore needed. Examples here include provision of calorie information in food outlets and changes in food pricing.
- There is very limited evidence on the effect of changes in the food available in settings such as hospitals or food delivered at home to low-income, older people. Given that changes in provision in schools and, to a lesser extent, workplace settings have an effect on consumption, this merits further investigation.
- There is very limited evidence on the impact of policies aiming to regulate or change the environment in terms of density or prevalence of fast-food outlets or to address food deserts. There is a strong association between obesity and access to unhealthy food, for example through a high concentration of unhealthy fast-food outlets. However, many studies are cross-sectional so the direction of causality is unclear, and the correlation may be mediated by socio-economic status and educational attainment. This needs to be better understood to support effective policy development. There are also no examples of evaluations or reported implementation of policy interventions addressing the built food environment in the academic literature, which is an important gap.

A ‘whole systems’ approach is needed to change food consumption

Taken together, the evidence suggests that a combination of coordinated and complementary approaches across the spectrum of policy categories is likely to be

most effective at changing consumer diets and related practices rather than isolated interventions (Apostolidis & McLeay, 2016; de Bakker & Dagevos, 2012; Mozaffarian et al., 2012; Nederkoorn et al., 2011). There is a myriad of complex and interacting drivers

that influence the actions and decisions that individuals take, and targeting these in isolation is unlikely to be effective. Therefore, although information can serve to raise awareness and even change values (as in the case of the increase in socially and ethically responsible diets), other factors such as income and price remain important barriers to behaviour change, and likely require additional policy responses to address. In addition to economic factors, many other factors (including habit, time and convenience) impact on consumption, with food decisions often far from purely conscious and knowledge led. There are also important socio-demographic differences, individual differences and continued inequalities across the trends, drivers and likely responses to policy that need to be taken into account. In particular, the evidence strongly suggests that policies around education alone are unlikely to be sufficient to change actions and may even serve to widen inequalities (since these are contingent on action by individuals). Therefore, combining information and knowledge provision with population-level approaches focusing on the food environment, and the cost and content of food, could help to promote healthier food choices across the population.

Figure 11 shows a conceptual framework that illustrates the multitude of drivers of food consumption and their interaction. Drivers include individual level, at the level of the food environment and wider, contextual drivers. The figure highlights the importance of targeting multiple drivers, both at the individual level but also the food environment, in order to change practices.

Invest in evaluations of the effectiveness of interventions that target the wider (and changing) food environment

Despite awareness by a majority of individuals of the need for a healthy diet, for most people the ability to change is limited by their environment.

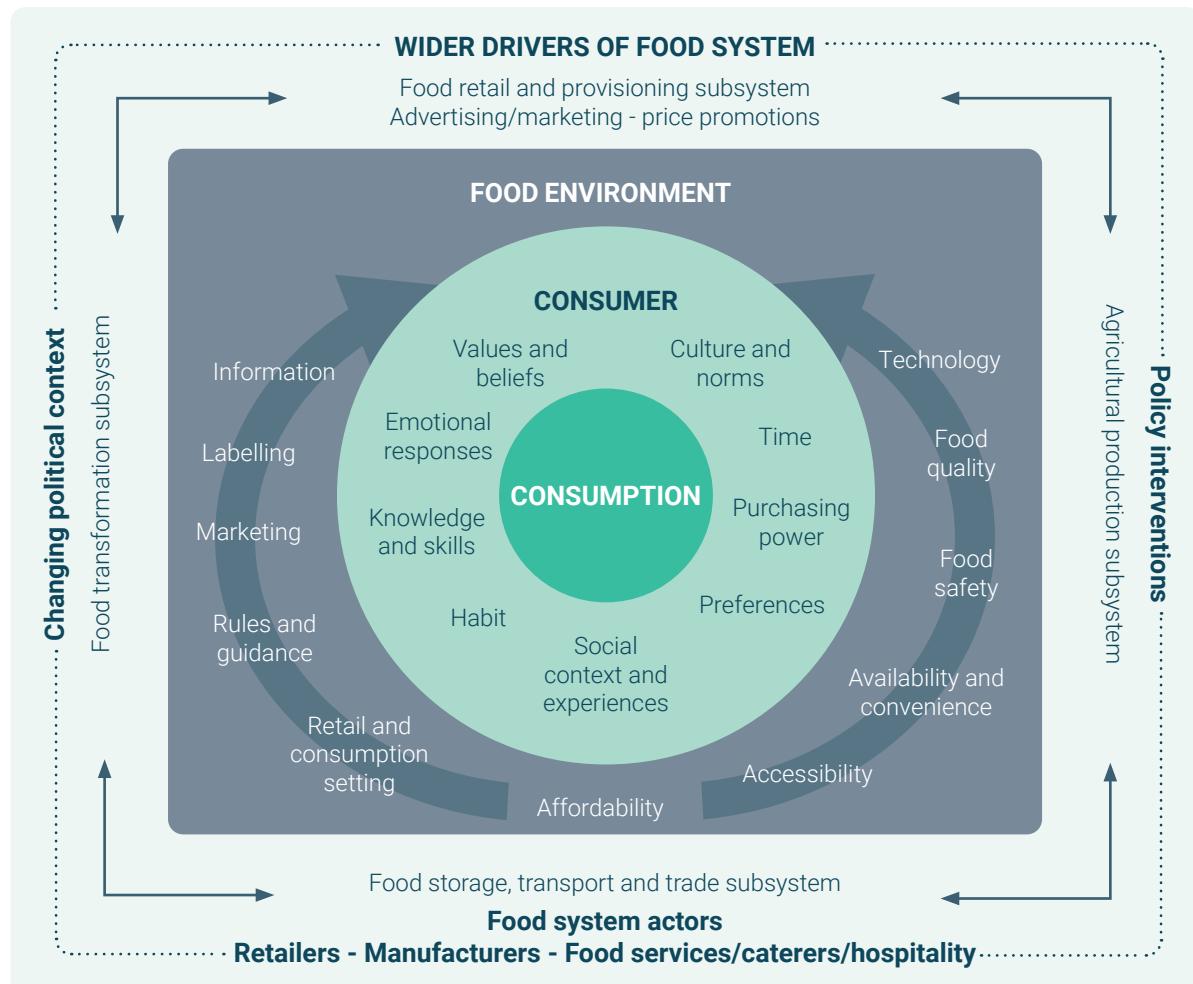
Interventions are increasingly targeting the content of food (directly or indirectly such as through taxes) – for example, the soft drinks industry levy and reformulation as part of the PHRD – and emerging evidence suggests that some of these are effective, particularly when mandatory. However, to date, there are few policies or examples of evaluations that target the built and micro environment and the availability of unhealthy food. Although there is strong evidence to suggest that product placement in supermarkets has a strong influence on purchase decisions, evidence and conclusions on the effectiveness of changes to the micro environment are in part limited by a lack of good-quality studies and the fact that many studies are conducted in a lab rather than a real-world setting (Bucher et al., 2016; Driessen et al., 2014; Hartmann-Boyce et al., 2018; Skov et al., 2013).

Both policy and research as yet does not effectively reflect changing modes of consumption and information sources, particularly in relation to online and out of home. For example, most media campaigns are conducted through television (J Kite et al., 2018), with evidence on the use of newer, online media lacking (James Kite et al., 2016). Evidence on the purchase of food through online routes is also currently limited. Both policy and research need to progress to ensure adequate information is available and appropriate policy responses are in place to reflect our changing food environment.

Gather real-world evidence around subsidies, taxes and reformulation programmes to better understand potential substitution effects

Although emerging evidence shows that prices, subsidies and reformulation of foods can positively change consumption, it is important to conduct more real-world evaluations and studies to better understand the impacts of these policies. Currently, our understanding

Figure 11 Conceptual framework illustrating the drivers of food consumption and their interaction



Source: RAND Europe analysis.

of the overall effectiveness of these types of interventions is limited by a lack of understanding of possible substitution effects. Studies based on real-world data – for example initial evaluations of the SDIL and minimum pricing on alcohol – are showing positive emerging effects. Similarly, reformulation initiatives can adopt different approaches with varying levels of success; whereas voluntary programmes have led to mixed responses from industry, mandatory

regulatory approaches, including restrictions and standards, pricing and labelling requirements, seem most effective in driving significant changes in consumption. However, these are only initial evaluations, and many studies are based on modelling, which may not adequately account for substitution effects. Therefore, more evaluations of this type of initiative that take into account substitution effects are warranted.

Collect evidence on longer-term outcomes and more longitudinal data

It is notable that there is relatively limited good-quality evaluative evidence on the effectiveness of interventions available in the literature. In particular, we note that most evaluations of interventions only include short-term follow-up and many often look at intermediate rather than final outcomes. For example, evaluations of healthy eating campaigns may only look at changes in attitudes rather than changes in consumption, and we know from wider literature that these are not always aligned. Even when ultimate outcomes such as health consumption are analysed, these are often only in the short term. For example, evaluations of changes in consumption after healthy foods are made more prominent in a canteen setting often only look at the period immediately following the change is made. Whether those healthier behaviours persist over the long term is not clear.

In identifying the case studies, it became apparent that there are relatively few large-scale interventions that have been evaluated, and that most of those that have tended to be health interventions, rather than interventions aiming to improve ethical or sustainable consumption practices. What is also largely absent is longitudinal data on consumption. This is problematic since it is difficult to draw effective conclusions on what might change consumption practices based on cross-sectional data. For example, we may have evidence that those with better cooking skills are more likely

to eat a diverse (and typically healthier) diet. However, this does not necessarily mean that an educational intervention to improve cooking skills will improve or diversify the consumption practices of individuals, since it may be that the relationship between cooking skills and dietary choice is related to underlying attitudes, preferences or salience. Longitudinal data would help us to better understand how changes, whether personal, societal, economic or due to interventions, causally influence consumption.

Improving the evidence base through longer-term follow-up and increased longitudinal data would not just help us to understand whether existing interventions are working or what the trends are. It would also enable us to better design policies that are effective at changing consumption. There also is likely to be scope for learning across contexts and purposes. For example, if we have conclusive evidence on how and when changes in pricing affect consumption of unhealthy products, it is likely that there will be learning from this to support the development of policies aiming to affect the consumption of less sustainable or ethical foods, if desired. It is, however, important to emphasise that conducting longitudinal research should form an ongoing activity alongside implementing interventions to address food consumption. Therefore, interventions with evaluation built in from the beginning can, and should, be implemented alongside investment in longitudinal research.

Box 8 Summary of possible priority areas for further consideration by policymakers

Priority area 1: A 'whole systems' approach is needed to change food consumption

- A combination of coordinated and complementary approaches across the spectrum of policy categories is likely to be most effective at changing consumer diets to ensure they are sustainable, affordable and healthy.
- Combining individual-level policies (e.g. information and knowledge provision) with collective, population-level approaches (e.g. focusing on the food environment, and cost and content of food) could help to promote sustainable, affordable and healthier food choices.

Priority area 2: Invest in evaluations of the effectiveness of interventions that target the wider (and changing) food environment

- Although individuals are often aware that eating a healthy diet and being physically active is necessary, many are constrained and influenced by their food environment (i.e. the availability of food, marketing, advertising, food placement and portion sizes).
- More evaluations of interventions, supported by good-quality real-world data, are needed that target the built and micro food environment (including online and out of home) to address the availability of unhealthy food.

Priority area 3: Gather real-world evidence around subsidies, taxes and reformulation programmes to better understand the potential substitution effects

- Understanding of the overall effectiveness of prices, subsidies and reformulation of foods is limited by a lack of understanding of possible substitution effects.
- It would be important to conduct more real-world evaluations and studies to better understand the impacts of these policies.

Priority area 4: Collect evidence on longer-term outcomes and more longitudinal data

- Most evaluations of interventions only include short-term follow-up and many often look at intermediate rather than final outcomes.
- Collecting longitudinal data and evidence on the longer-term outcomes of interventions would help to better understand what factors can result in changes in consumption practices. This should form an ongoing activity alongside implementing interventions to address food consumption.



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Annex A. Approach and methodology

Aims and overarching approach

RAND Europe was commissioned by Defra to provide a state-of-the art review of consumer attitudes and practices³⁸ to food in the UK, in support of Defra's broad programme of work across food and consumers. The review is not intended to feed into any one specific stream of work, rather to provide a resource that Defra can draw upon to inform their overall strategy and support multiple strands of work. The objectives of the study are to identify the strengths of existing evidence regarding:

- The drivers of consumer food practices.
- The trends related to food consumption³⁹ patterns in the UK, including international comparisons.
- The role of information in food consumption practices.
- The role of different food systems actors (e.g. producers, retailers, service providers) and their relationship to consumer practices.
- The role and relevance of socio-economic and socio-demographic factors in food practices and consumption patterns.
- The trends related to the changing food environment (including the out-of-home sector, online retail models and other food consumption models) and associated opportunities and challenges.

We combined these elements to identify four overarching aims and objectives, which are to collate evidence on:

1. Trends related to consumer food practices and attitudes and to the changing food environment (e.g. out-of-home sector, online retail models) in the UK and through international comparisons.
2. Drivers of consumption (e.g. the role of information or food system actors).
3. Policy interventions that can influence food consumption decisions.
4. Differences between groups, or 'food publics' (Darnton, 2016), across the trends, drivers and policy interventions (i.e. segmentation).

The focus of this study is on identification of existing evidence and evidence gaps within high-quality (primarily academic) literature. The study approach consisted of a rapid evidence assessment (REA). REAs are similar to systematic reviews in taking a robust and replicable approach to searching and reviewing the literature. However, they take a slightly more pragmatic approach to the scope and coverage of literature, limiting study inclusion by using a range of criteria that can be adjusted in response to the volume of literature identified, enabling them to be conducted within a more limited timeframe. The remaining sections set out our approach across five tasks:

1. Scoping
2. Conducting searches
3. Screening
4. Extraction and quality review
5. Analysis.

An overview of the range and nature of the literature included is provided in Section A.7. Finally, in Section A.8 we set out some caveats and limitation of the approach.

Scoping

In order to finalise and refine the study methodology and approach, the study team engaged with Defra, an expert advisory group and wider stakeholders. We aimed to ensure the focus and remit of the review addresses policy issues of interest to key actors, does not duplicate other ongoing efforts, and provides useful and actionable outputs and evidence to support policy and decision making.

We engaged with 17 stakeholders, including: stakeholders from industry, consumer groups, charities, and policymakers likely to have an interest in the outcomes of this work; and academic experts. The aim of this engagement process was to: (1) understand the existing policy and research landscape in this area; (2) identify other ongoing work within Defra in order to ensure that this study is complementary to other efforts; (3) identify evidence that would support decision makers outside of Defra; and (4) discuss key issues, topics of interest and any areas of controversy we should be aware of. The interviews with non-academic stakeholders in particular were used to identify any sources of non-academic literature, surveys and information, and new and emerging trends we should be aware of.

Interviews were conducted by telephone and lasted up to one hour. The interviews were semi-structured, thereby ensuring a similar set of questions were asked of all interviewees but

allowing for emergent issues to be explored. Table 7 lists the industry, consumer and policy stakeholder organisations we spoke with.

At inception, we also held telephone meetings with four of our expert advisors and a face-to-face workshop with one (Table 8). The aim of these meetings was to collect input on our study design, with a particular focus on:

- The scope, focus and coverage of our literature review and conceptual framework.
- Existing key sources that should be included in the literature review.
- Examples of relevant interventions that may not be codified in the literature (e.g. new and emerging initiatives).
- Key stakeholders from government, industry, charities and the private sector in this area that we should consult.

Table 7 Stakeholder organisations consulted during the inception phase

Organisation
Academia
Centre for Food Policy, City, University of London Cardiff University
Charities and member organisations
IGD Caroline Walker Trust British Nutrition Foundation
Consumer organisations
Which?
Government
Public Health England Food Standards Agency Social Science Expert Group Defra
Industry
The Food and Drink Federation

Table 8 Expert advisory group

Name	Role	Department and University
Professor Monique Raats	Director	Food, Consumer Behaviour and Health (FCBH) Research Centre, University of Surrey
Dr Lada Timotijevic	Principal Research Fellow	Food, Consumer Behaviour and Health (FCBH) Research Centre, University of Surrey
Dr Bernadette Egan	Senior Research Fellow	Food, Consumer Behaviour and Health (FCBH) Research Centre, University of Surrey
Dr Alizon Draper	Reader Head of Division	Public Health Nutrition Food, Nutrition & Public Health, University of Westminster
Dr Ariane Kehlbacher	Lecturer	Food Economics, University of Reading

All consultations with both academic experts and wider stakeholders were conducted under the principles of informed consent in line with the requirements of the EU General Data Protection Regulation requirements and the Ethical Assurance for Social Research in Government principles. Interview notes were solely for the reference of the research team and participants were only acknowledged for their contribution in the report with their express permission.

Conducting searches

We developed a search strategy with expert input from RAND Knowledge Services and based on the feedback from the stakeholder consultations in the scoping phase (Table 9). The search was conducted in the following

databases: Scopus, Academic Science Complete and PubMed. For all searches, the publication timeframe was restricted to 2009 onwards to capture literature from the past ten years, and only high-quality academic publications (books, book chapters, articles and reviews) published in English were considered. Beyond the formal searches, we also used 'snowballing' to identify additional articles from reference lists of selected articles. A total of 3,063 potentially relevant studies were identified for screening.

Screening

We screened articles by title and abstract for relevance against predefined inclusion and exclusion criteria (Table 10).

Table 9 Search strings for the rapid evidence assessment

	Topic	Search terms
1	Consumer practices and attitudes	TITLE-ABS-KEY ((consum* OR customer* OR public*) w/3 (TITLE-ABS-KEY (attitude* OR opinion* OR choice* OR decision* OR perception* OR practice* OR behavio* OR demand* OR buy* OR purchas* OR preference* OR value* OR plan* OR prepar*)))
2	Food	TITLE-ABS-KEY (food* OR diet*OR eat* OR meal)
3	Trends	TITLE-ABS-KEY (trend* OR pattern* OR change* OR shift* OR evolution OR longitudinal)
4	Drivers	TITLE-ABS-KEY (driver* OR cause* OR factor* OR reason* OR determinant* OR influenc*)
5	Typologies	TITLE-ABS-KEY (typolog* OR segment* OR social OR economic* OR socio-economic* OR cluster* OR income OR demograph* OR educat* OR employ* OR occupation* OR geog* OR ethnic* OR religio* OR cultur* OR age)
6	Environments	TITLE-ABS-KEY (environment* OR access* OR availab* OR home OR online OR courier* OR "out of home" OR out-of-home OR deliver* OR retail* OR takeaway* OR take-away* OR convenien* OR prepar*)
7	Country	ALL ("United Kingdom" OR UK OR Scotland OR England OR Wales OR "Northern Ireland" OR "Great Britain")
8	Interventions	ALL (intervention* OR program* OR package* OR initiative* OR scheme* OR regulat* OR inform* OR educat* OR incentive* OR levy OR tax* OR label* OR certif* OR accredit* OR assurance*OR policy OR policies OR claim OR financ*)

Search strings were: (A) (1 AND 2 AND (3 OR 4 OR 5 OR 6) AND 7); (B) (1 AND 2 AND 8)

Table 10 Inclusion and exclusion criteria for the literature review

Criterion	Include	Exclude
Topic relevance	Studies addressing trends in consumer attitudes and practices in relation to food consumption, drivers of those practices (including different actors), differences by consumer groupings/segmentation, policies/interventions to change food consumption and their effectiveness	Studies addressing impact of food, diet, or consumption patterns on health and health-related behaviours (exclusion does not include health as a driver of consumption) Studies addressing the relationship between socio-economic factors and health
Geographical location	UK, or UK with international comparators	Non-UK
Year of publication	2010 onwards	2009 or earlier (with some exceptions, e.g. any seminal studies referenced in multiple publications within the ten-year timeframe)
Study characteristics	Academic publications, focusing on empirical evidence or syntheses	Purely theoretical/conceptual work or opinion pieces Non-academic publications (with some exceptions, e.g. good quality reviews in the grey/industry literature)
Language	English	Other languages

The inclusion/exclusion criteria were applied in three stages:

1. Criteria were applied on the titles. Those appearing to fit the criteria, or where there is uncertainty, were included.
2. The abstracts of these titles were read and inclusion criteria applied again. Those fitting the criteria or those where there was uncertainty were included. In these first two stages, we were overinclusive to avoid excluding potentially relevant studies.
3. Reviewers retrieved full reports of studies passing the first round. Each criterion was then applied again at the full text level.

Following screening, a total of 484 studies were identified as meeting these initial inclusion and exclusion criteria. Due to the volume of literature identified, we further restricted

our inclusion criteria to make the extraction and review process more manageable. We identified a particularly high volume of studies looking at policy interventions. Therefore, we limited our review of policy interventions to a 'review of reviews', covering only good-quality reviews of policy interventions and excluding primary studies. However, at the analysis stage, any key primary studies identified in reviews were explored further where required. This led to a total of 203 publications meeting the inclusion and exclusion criteria.

Extraction and quality review

In this stage, information was extracted from each included publication to facilitate cross-analysis against the key study questions and themes, and the quality of the studies included assessed to inform that analysis.

Following piloting, researchers independently recorded data about each selected paper meeting the inclusion criteria, including both general information on the publication and information on the elements of each study question it addresses. We captured information from each included study in a standard template in Excel covering the different elements of our conceptual framework and in line with the aims and objectives of this study:

1. General information about the evidence source
 - Author, year and study title
 - Brief summary
 - Study type (e.g. experimental/randomised controlled trial, cohort/longitudinal, cross-sectional/factorial, meta-analysis, synthesis)
 - Methodology (e.g. qualitative data collection, quantitative data collection, mixed methods)
 - Publication type (e.g. journal article, review, book chapter)
 - Coverage of study (temporal, geographic)
2. Evidence on trends in consumer practices and attitudes
 - Trends in types of food purchased/consumed
 - Trends in attitudes, values and beliefs
 - Trends in channels through which food is purchased/consumed
 - Trends in purchasing frequency and volume
 - Other trends

- International comparators (examples of international practice in measuring trends)
- 3. Evidence on drivers of food consumption
 - External drivers
 - Personal and household level drivers
- 4. Policy interventions (including evidence of effectiveness)
 - Type of policy intervention
 - Description of the intervention and application
 - Evidence of effectiveness
- 5. Segmentation
 - Approaches to segmentation
 - Evidence on validity
- 6. Quality review (Table 11)
- 7. Other comments

In parallel to the data extraction, we also reviewed the methodological quality of included studies. Quality appraisal helps to identify variation in quality and relevance between studies. There is no one perfect approach to quality review and the approach taken depends on the nature of the studies to be reviewed.

Following feedback from our expert advisors, we assessed the methodological quality of included studies against the following quality criteria⁴⁰ (Table 11) using a RAG/traffic light system (green: addressed clearly; amber: addressed but some gaps; red: poor/not addressed).⁴¹

⁴⁰ Adapted from Sirrieh et al., 2012.

⁴¹ Good-quality sources in this context are considered to be those where the rating against the criteria set out for our quality review is predominantly 'green' (though likely with some 'amber' elements in most cases) and there are no 'red' characteristics.

Table 11 Criteria for quality review of studies

Stage	Examples of criteria	Red	Amber	Green
Study design: is the study well designed to meet the research aims/questions?	Statement of aims/objectives in main body of report	No mention	General reference to aims/objectives at some point in the report	Explicit statement of aims/objectives in main body of report
	Clear description of research setting/scope of review	No mention	General description of research problem in the target population, e.g. 'among young people buying food online'	Specific description of the research problem and target population in the context of the study, e.g. 'young people aged 12–18 in London purchasing food from online courier services'
Sample: is the sampling approach appropriate and well justified?	Evidence of sample size considered in terms of analysis (statistical power) (quantitative studies only)	No mention	Basic explanation for choice of sample size Evidence that size of the sample has been considered in study design	Explicit statement of data being gathered until information redundancy/saturation was reached or to fit exact calculations for analytical requirements
	Representative sample of target group of a reasonable size	No statement of target group	Sample is limited but represents some of the target group or representative but very small	Sample includes individuals to represent a cross section of the target population, considering relevant factors

Stage	Examples of criteria	Red	Amber	Green
Data collection: is the data collection approach appropriate and well justified?	Description of procedure for data collection	No mention	Brief or incomplete description of data collection procedure but with limited detail, or states some stages in details but omits others	Detailed description of each stage of the data collection procedure, including when, where and how data were gathered
	Rationale for choice of data collection tool(s)	No mention	Basic, limited explanation of rationale for choice of data collection tool(s), e.g. based on use in a prior similar study	Detailed explanation of rationale for choice of data collection tool(s), e.g. relevance to the study aims and assessments of tool quality either statistically, e.g. for reliability and validity, or relevant qualitative assessment
	Detailed recruitment data	No mention	Some recruitment information but not complete account of the recruitment process, e.g. recruitment figures but no information on strategy used	Complete data regarding number approached, number recruited, attrition data where relevant, method of recruitment
	Statistical significance tests used and/or effect sizes computed (quantitative studies only)	No statistical testing	Limited or flawed statistical assessment used	Suitable and thorough statistical assessment used
	Fit between stated research question and method, format and content of data collection	No research question stated	Method, structure or content of data collection only addresses some aspects of the research question, or there is a more suitable alternative that could have been used or used in addition	Method, structure or content of data collection selected is the most suitable approach to attempt answer the research question

Stage	Examples of criteria	Red	Amber	Green
Analysis: are data appropriately analysed and findings adequately corroborated?	Good justification for analytical method selected in light of research questions	No mention	Basic explanation for choice of analytical method, and reasonable fit to research questions	Detailed explanation for choice of analytical method based on nature of research question(s)
	Assessment of reliability of analytical process (qualitative studies only)	No mention	Limited attempt to assess reliability, e.g. reliance on one method	Use of a range of methods to assess reliability, e.g. triangulation, multiple researchers, varying research backgrounds
Interpretation: does the interpretation of the findings adequately reflect the assumptions made, limitations of the method and any issues related to generalisability?	Strengths and limitations critically discussed	No mention	Limited discussion of some of the key strengths and weaknesses of the study but with some issues omitted	Discussion of strengths and limitations of all aspects of study including design, methods procedure, sample and analysis Alternative explanations for the data considered and the generalisability of the conclusions explored/justified

These criteria were chosen as they have been developed to assess studies with diverse research designs (i.e. qualitative, quantitative, mixed method). Out of these, 11 of the criteria apply to qualitative studies and 10 apply to quantitative studies, but all 12 items are applicable where mixed methods have been employed. The quality criteria were piloted by the study team across a sample of studies to ensure consistency of application. Each of the three team members then applied the criteria independently to each study, assigning a rating across all 12 criteria.

Analysis

Evidence was brought together using a framework synthesis approach based on the

framework set out in our evidence extraction approach in Section A.5.

Each element of the framework was explored initially by a member of the study team to identify the key trends and issues emerging. The findings were then discussed with other members of the team and then further explored. Through an iterative process of analysis and discussion we were able to identify a set of key emerging findings that are set out in this document.

As well as analysing the literature identified, we also used targeted searches to explore in further depth any specific areas emerging as potentially important, or to test whether additional information could be identified to address specific gaps. These targeted

searches, conducted in Google Scholar, focused primarily on identifying systematic reviews and, though not included in the formal extraction and quality review process, all sources identified in this way were carefully reviewed for the quality and robustness of their approach. Examples of targeted searches conducted include 'obesogenic environment systematic review' and 'systematic review workplace wellness'. These targeted searches, together with evidence identified to support other elements of the study such as the introduction section, contributed an additional 25 sources to the review overall.

This study sets out emerging findings based on our internal review of the literature. This will be further tested in the next stage of the project through an interim workshop with Defra, discussion with our expert advisors and further

expert consultation. This will help us to hone and refine our final messages to ensure they provide a nuanced and balanced picture of the existing evidence.

Summary of the literature identified

Following screening and quality review, a total of 169 sources (including existing reviews) were reviewed. Figure 12 shows a flow diagram showing the steps taken during the systematic search to arrive at the final number of articles.

Included studies consisted of 157 academic sources (journal articles, book chapters and conference proceedings) and 12 grey reports (6 policy and industry reports, surveys). Table 12 shows the breakdown of studies included in the analysis.

Figure 12 Flow diagram summarising number of studies identified and excluded at different stages in the review process

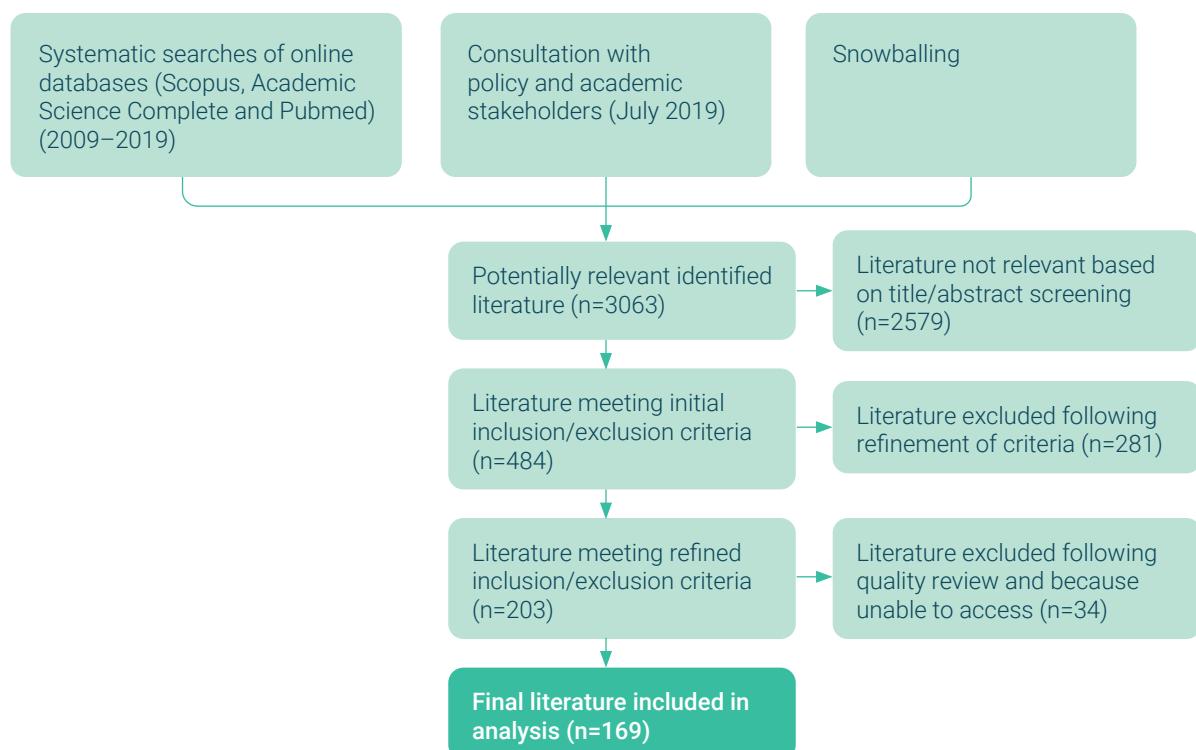


Table 12 Summary of study types and methodologies

Publication type	Study type	Method
157 academic sources	59 reviews	37 non-systematic reviews (e.g. evidence syntheses, narrative reviews) 16 systematic reviews 5 meta-analyses 1 commentary
	94 empirical research	68 quantitative studies 16 qualitative 10 mixed method
12 'grey' literature reports	6 surveys 6 policy and industry reports	–

Of the 169 included studies, relatively few were poor quality. Thirty-three received three or more 'red' ratings on the quality criteria, and only ten received six or more 'reds'. These sources were used minimally and as supplementary material in the analysis conducted. Sixty-one high-quality studies, with six or more 'green' ratings were identified. These studies were particularly prioritised in our studies. However, the overall assessment of the strength of the evidence was qualitative, taking into account both the quality of individual studies, the number of studies reinforcing the point and, particularly, the existence (or otherwise) of prior systematic review evidence suggesting confidence in a particular finding. These factors have been combined together to give an overall assessment of the status of the existing evidence across different areas.

In addition to these systematic searches, a number of targeted searches were conducted at the analysis stage, as described in Section A.6. This contributed an additional 25 sources, primarily systematic reviews.

Caveats and limitations

The analysis presented here is subject to a number of caveats and limitations related to the approach, the scope of the literature and the analysis. Key caveats and limitations are outlined below.

Comprehensiveness of the search strategy

The study takes a REA approach rather than applying a systematic review. This places limitations on the coverage of literature included in the study. There may be important studies that have not been included, either because they were not identified through our search strategy or because they fell outside of our inclusion criteria (e.g. by date). We note that the volume of literature in the field here has been a significant challenge and we have had to place additional limitations on the scope of our approach to make the study feasible within timeframes – for example, by focusing on reviews of policy interventions. However, we are confident, based on the approach taken and our expert consultation process, that our analysis provides

a fair and relatively representative picture of the current state of the evidence.

Focus on academic literature

Through our interviews at the scoping stage, we were advised that the focus on academic literature may have some limitations. For example, there may be evidence on new and emerging trends in consumption, as well as on policy interventions, in industry research and grey literature that is not captured in academic literature, and these other sources may offer different approaches and perspectives (for example, on segmentation). However, following discussion with Defra we determined that the primary focus of this work should be on academic literature both to address gaps in their knowledge with regard to this literature and to ensure our focus on high-quality work. We have, however, attempted to address this limitation by drawing on some reviews from the grey literature and snowballing to include wider key sources. Regardless of the source of evidence, all included literature was subject to quality review ensuring that even where non-academic sources are used, we have assessed the quality and reliability of the evidence and take this into account in our assessment of the final message communicated in our report.

Depth and comprehensiveness of analysis

Because of the complexity and richness of the literature, it is likely that there are a number of elements even within the studies included that

have not been fully explored within the scope of this report. We have balanced length and complexity with comprehensiveness, aiming to provide an overall picture of the key emerging issues with a focus on the study questions identified for this work.

Emphasis and bias

In any analysis, there is potential for the biases of those conducting the analysis, whether conscious or subconscious, to influence the final output. Consultation, though beneficial in many ways, also runs the risk of skewing findings and analysis based on the particular views of those consulted. We have used clear methodological approaches such as a formal extraction template to help try and ensure a consistent approach to the identification and prioritisation of information across the study team. We have also been careful to reflect on the input of expert informants in light of their particular opinions and viewpoints. However, we inevitably will have focused on those issues of most interest to Defra and to others consulted, and our thinking has been shaped by the conceptual framework developed at the outset and the views and input of our expert advisors. We anticipate this has largely been beneficial in providing guidance and structure within what is a vast and complex literature. However, there may also have been implications for the coverage and emphasis of the review.