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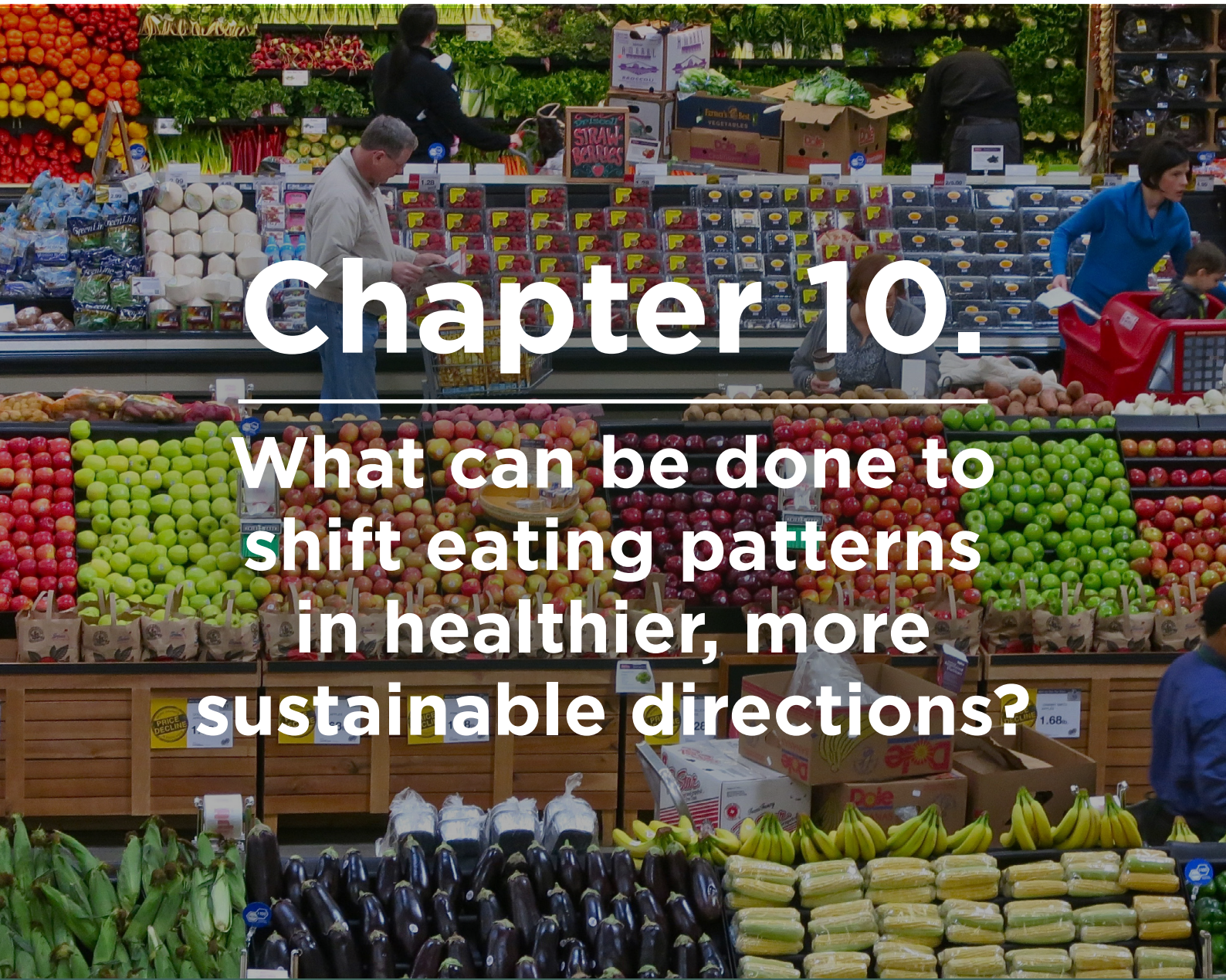
A free and evolving resource to empower informed discussion on sustainable food systems



Chapter 10.

What can be done to shift eating patterns in healthier, more sustainable directions?

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Why should you read this Chapter?

Eating patterns (or diets) are an important point of interconnection in food systems between human health and wider environmental impacts. Shifts in how people consume towards sustainable health eating patterns can bring multiple benefits. And when they are undertaken by whole populations, their overall effects can be considerable.

Although there is much we still don't know, the broad trends of what sustainable health eating patterns look like are known well enough to take action today. However, this presents another difficult challenge: how can eating patterns (at the individual and population scale) be shifted towards those that are healthier and more sustainable?

Understanding this problem and its potential solutions provides a useful primer on the way in which consumption in food systems takes place through a combination of human choices (whether conscious or not), and is influenced by the wider contextual environment that actively constrains and influences these choices.

The chapter addresses the following:

- What influences what we eat and what food we buy? What are consumers' priorities when making purchasing decisions?
- How could a knowledge of these influences inform practice on how to shift diets in more healthy and sustainable directions?
- What might be the unintended effects of shifting diets?

Key points

- The general characteristics of a sustainable and healthy eating pattern are known, but what change this implies at the individual level is far more complex. Lower impact eating can be consistent with good health, but not necessarily; there are multiple possible win-win, lose-lose, win-lose and lose-win dietary patterns.
- Dietary changes are needed globally for health and/or sustainability, but the context and direction of these changes is very different between low-income and higher-income countries, as well as between rich and poor within such countries.
- To shift consumption patterns we need to have a sense of why people do what they do and therefore what interventions would help to change those practices.
- People's consumption patterns are shaped by multiple influences: biological, psychological, societal, technological, regulatory and economic. A number of conceptual models have been drawn to try and illustrate the role of these influences.
- Different typologies of interventions can be categorised: fiscal measures; regulatory and trade interventions; voluntary or industry self regulatory approaches; interventions focusing on the context, defaults and norms of consumption; and information and education raising approaches, or community initiatives.
- Unintended consequences of measures aimed at shifting diets in more healthy and/or sustainable directions are possible, and will need to be carefully thought through, monitored, and addressed. How food substitutions (what people switch their consumption from and two) differ between people, is key.
- Poorly designed meat taxes, for example, could disproportionately affect the consumption lower-income brackets, and may lead people to people eating the same amount of lower quality (and often less healthy, and in some respects, more impactful) meat; or more salty, sugary processed foods, rather than substituting for a healthy mix of plant-based foods.
- There is no one simple measure that can successfully shift diets at the national or global scale. Rather, a constellation of different approaches and strategies, operating across scales and supply chains, and targeted at different people and organisations will be required.
- Much more research into dietary shifts is needed, looking at a whole range of mechanisms and their potential effects on health, the environment, and at other issues such as social equity. Although there is uncertainty, enough is known to take action today.

10.1 Review: what is a sustainable and healthy eating pattern (SHEP)?

- The FAO describes the broad characteristics of sustainable and healthy eating patterns.
- There is no one single dietary pattern that is definitively healthy and sustainable.
- There are many dimensions of sustainability to consider.
- Metrics are needed to assess how diets perform across these dimensions.
- What SHEPs look like 'on the plate' will depend upon on context and need.

10.1.1 The FAO describes the broad characteristics of sustainable and healthy eating patterns

FAO definition of sustainable diets

Sustainable diets are "those diets with low environmental impacts which contribute to food and nutrition security and to healthy life for present and future generations. Sustainable diets are protective and respectful of biodiversity and ecosystems, culturally acceptable, accessible, economically fair and affordable; nutritionally adequate, safe and healthy; while optimizing natural and human resources."

This definition is very comprehensive but:

- It is not clear what such a diet might look like 'on a plate';
- It is not yet clear what combination of metrics could be used to assess whether a diet is sustainable;
- There is therefore a need for metrics to assess how a diet performs across a range of sustainability indicators.

The FAO definition encompasses:

- Nutrition and health.
- Biodiversity protection.
- Optimisation of natural and human resources.
- Affordability and availability.
- Cultural relevance.

This implies that SHEPs should provide the required energy and nutritional content (see Chapter 7 for more on the links between food and health), not negatively

impact biodiversity (for example impacts such as deforestation and negative land-use consequences, overexploitation of marine biodiversity – see Chapter 5), optimise natural resources (for example, optimal food production without causing unacceptable environmental damage – see Chapter 4) and human resources (for example, respect working lives of those whose livelihoods depend on food systems), be affordable and available (see Chapters 4 and Chapter 7 for more on food security) and culturally relevant.

An important question here is: How do we know what this looks like in reality? This chapter discusses the research base and evidence pointing towards what SHEPs might look like in reality.

10.1.2 Lower impact eating patterns can be consistent with good health

Lower impact eating patterns can be consistent with good health

Given the caveats discussed in Chapter 9, a lower environmental impact diet that is also healthy might look like this:

- Sufficient calories to meet energy needs and nutrient diversity.
- Based around tubers, whole grains, fruit and vegetables (mainly field grown, resistance to spoilage, and not requiring energy-intensive transport).
- Meat eaten sparingly, if at all, and all parts consumed.
    - Includes offal (which is generally nutrient rich) but may also include fattier cuts – since overall meat intakes are very reduced overall dietary quality does not suffer unduly.
- Dairy products in moderation or replaced with fortified plant-based alternatives.
- Unsalted seeds and nuts.
- Small quantities of fish, from certified sources.
- Very limited quantities of processed foods high in fats, sugars and salt.

As the studies in Chapter 9 show, diets consisting of less food from livestock and more of the appropriate fruit and vegetables have lower environmental impacts and are consistent with good health. These diets have also been associated with reduced risk of certain negative health outcomes.

More research is needed to understand the characteristics of SHEPs for environmental impacts other than GHGs, such as the sustainability of water use, impact on biodiversity, and so forth.

Additionally, these general principles may not be applicable to all individuals in all parts of the world. In that sense, while we understand what SHEPs might look like, there is no single "ideal" SHEP.

10.1.3 Lower impact eating patterns are not necessarily consistent with good health

Four possible categorisations of eating patterns

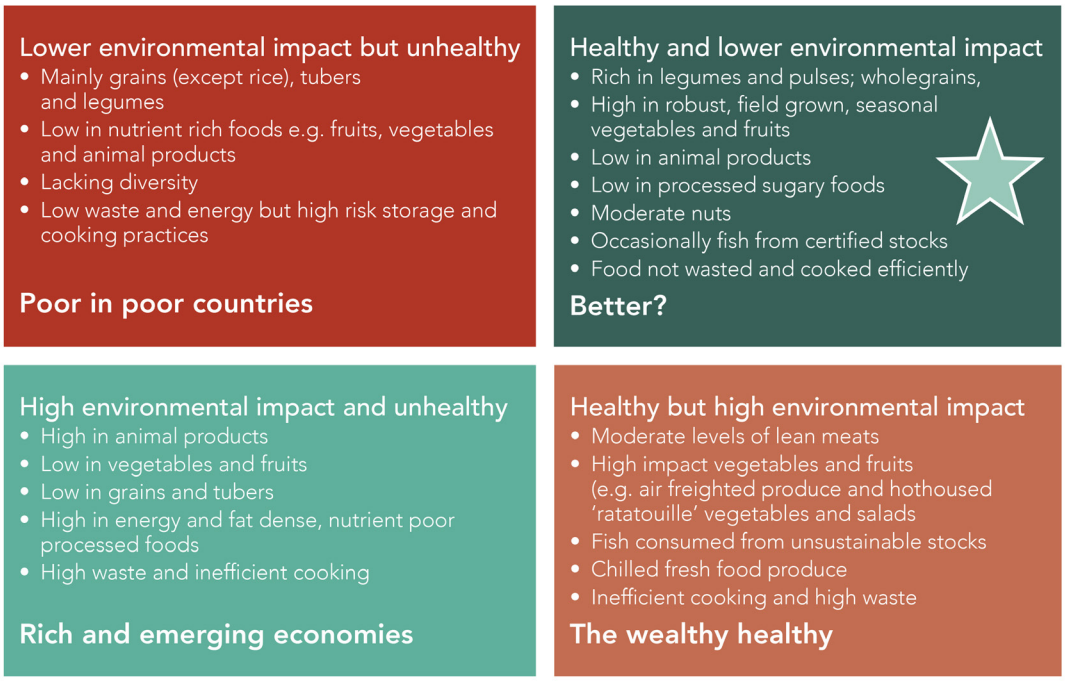

Figure 1: A four part typology and description of diets, according to dimensions of health and environmental impact.

Source: FCRN. (2016).

While there is scope for achieving major synergies, lower environmental impact eating patterns are not necessarily healthy or vice versa.

Win-wins, lose-wins and lose-loses are possible:

Win-lose scenario: unhealthy eating patterns can lead to undernutrition, but have low environmental impacts (as often seen in very low income countries: see Chapter 7).

Lose-win scenario: healthy eating patterns that include foods such as lean cuts of meat, greenhouse grown vegetables, airfreighted vegetables giving high environmental impacts (as sometimes seen in high income groups in developed countries).

Lose-lose scenario: unhealthy eating patterns leading to obesity and non-communicable diseases that are high in meat products, energy dense foods and low in fruit and vegetables, giving rise to health problems and high environmental impacts (see Chapter 7 for more on obesity and non-communicable diseases).

Win-win scenario: healthy eating patterns that include low volumes of meat and certified sustainable fish, high volumes of appropriate vegetables and legumes, giving positive health outcomes and lower environmental impacts. What combination is optimal and how this can be encouraged is not yet fully understood, although the general direction of travel will likely entail less meat, more vegetables and more whole grains and legumes.

10.1.4 The same principles apply in developing countries but in a different context

For developing countries, the same principles apply, but the context is different

- In practice the same principles apply for potential win-win SHEPs, although the direction of dietary change is different.
- In high-income countries people need to eat less overall, and less of the foods that have a high impact.
- In low-income countries, the nutrition transition has had both negative and positive impacts on nutrition. Over consumption and poor 'Western' style diets are now causing growing problems, even while large numbers remain hungry and undernourished.
- Undernourished people need to consume not only more food but a greater diversity of foods (including fruits, vegetables, legumes, nuts and animal products).
- Those who consume "Western' style diets in low-income countries may need to consume less overall, and less of the foods that have a high impact.
- Policies are needed to ensure that the nutrition transition is positive, resulting in healthy outcomes, rather than in overconsumption.
- More research is needed on SHEPs and transitions in developing countries.

For developing countries, the context changes although the same principles exist. We know what SHEPs broadly speaking might look like, and the challenge is how to make the transition towards this for those suffering from (a) undernutrition and micronutrient deficiency and (b) overconsumption and associated diseases, and of course those with healthy eating patterns that have high environmental impacts.

See Chapter 7 for more information on the nutrition transition in developing countries.

10.2 What are the influences on our food choices?

- People's consumption patterns are shaped by multiple influences - biological, psychological, societal , technological, regulatory and economic. A number of conceptual models have been drawn to try and illustrate the role of these influences.
- To shift consumption patterns we need to have a sense of why people do what they do and therefore what interventions would change those practices.
- Theories of change are based variously on assumptions that our choices can be influenced by rational, contextual, structural and identity-oriented factors.

10.2.1 Conceptual models of influences on people's food consumption.

The influences on consumption are multiple

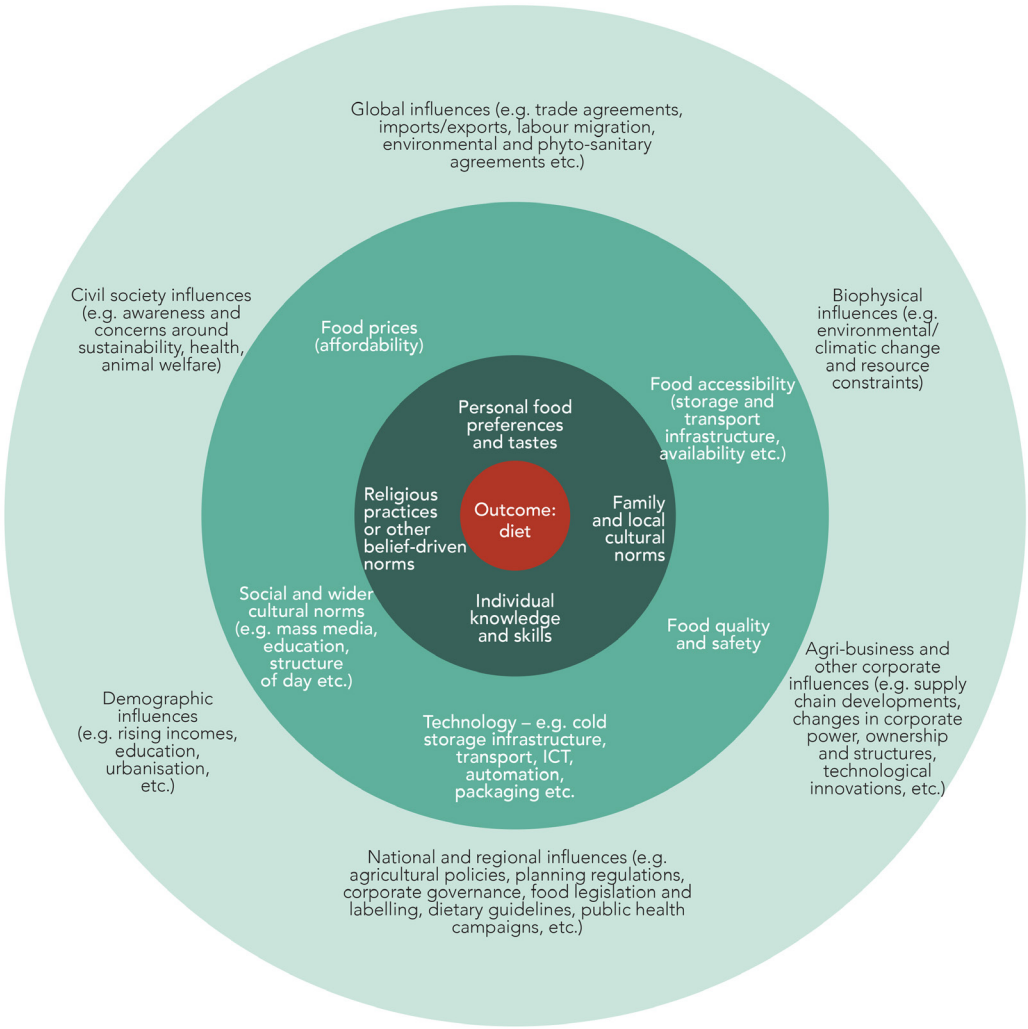

Figure 2: The many influences on diet – both proximate and indirect.

Source: Finch, J. and Garnett, T. (2016) unpublished.

The health impacts of consumption patterns are influenced by many factors, not just food security. These include: levels of economic development, agricultural policy, pricing strategies, changes in how food is produced and distributed, marketing and media, values and aspirations, nutritional knowledge and access to information, and traditional attitudes to food and health. The role of policy is crucial – it shapes the overarching social, infrastructural and economic influences on consumption and the extent to which health consequences are addressed.

Nutrition-related health outcomes are therefore impacted by factors other than just food security, being multi-level, multi-sectoral, and multi-cultural. Some of these factors, relating to socioeconomic status and lifestyles are discussed later in this chapter.

Another way of looking at the influences on consumption

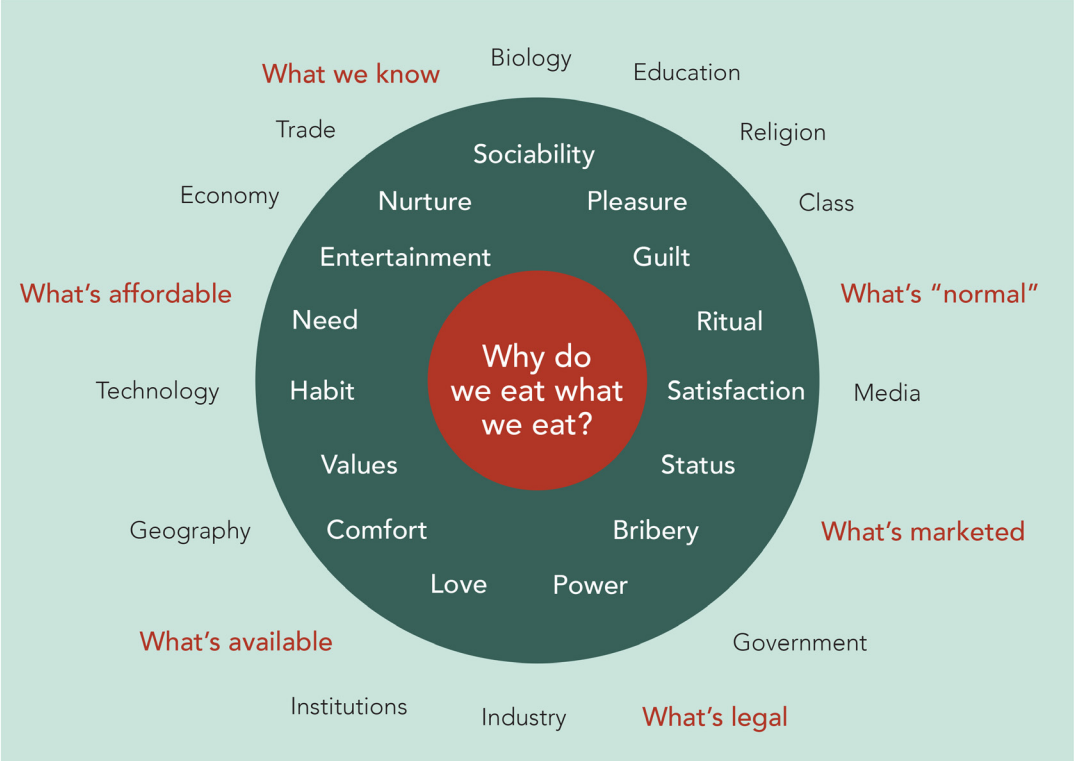

Figure 3: The many influences on diet - key questions.

Source: Garnett T (unpublished).

Our food consumption patterns are influenced by many factors. Key factors include price, availability, knowledge, social norms, industry marketing and regulation. Thus our choices are influenced by affordability, availability, social norms, marketing and other information sources.

Other influences on our eating patterns include the habitual and ritual nature of many consumption practices, religious beliefs and taboos, the pleasure we gain from food or particular types of food, or settings in which they are consumed, and many other factors.

As an overarching point, we live in a highly consumerist society – food is just one part of this. Approaches to understanding and shaping our eating patterns need to take account of these wider societal influences, structures and norms. For example, rebound effects could occur when, for example, someone makes a sustainable food choice but feels they have "done their bit" and subsequently acts in an unsustainable way in other aspects of their life.

Leakages can occur whereby, for example, reduced consumption of meat within a country leads to increase exports of meat – in other words, consumption goes down, but production stays the same. The production-consumption relationship is complex and a full understanding of how they impact each other, beyond simple supply and demand, and across different consumption-production categories (food and non food) is lacking.

And another one showing the individual, societal and material (ISM) influences on consumption practice

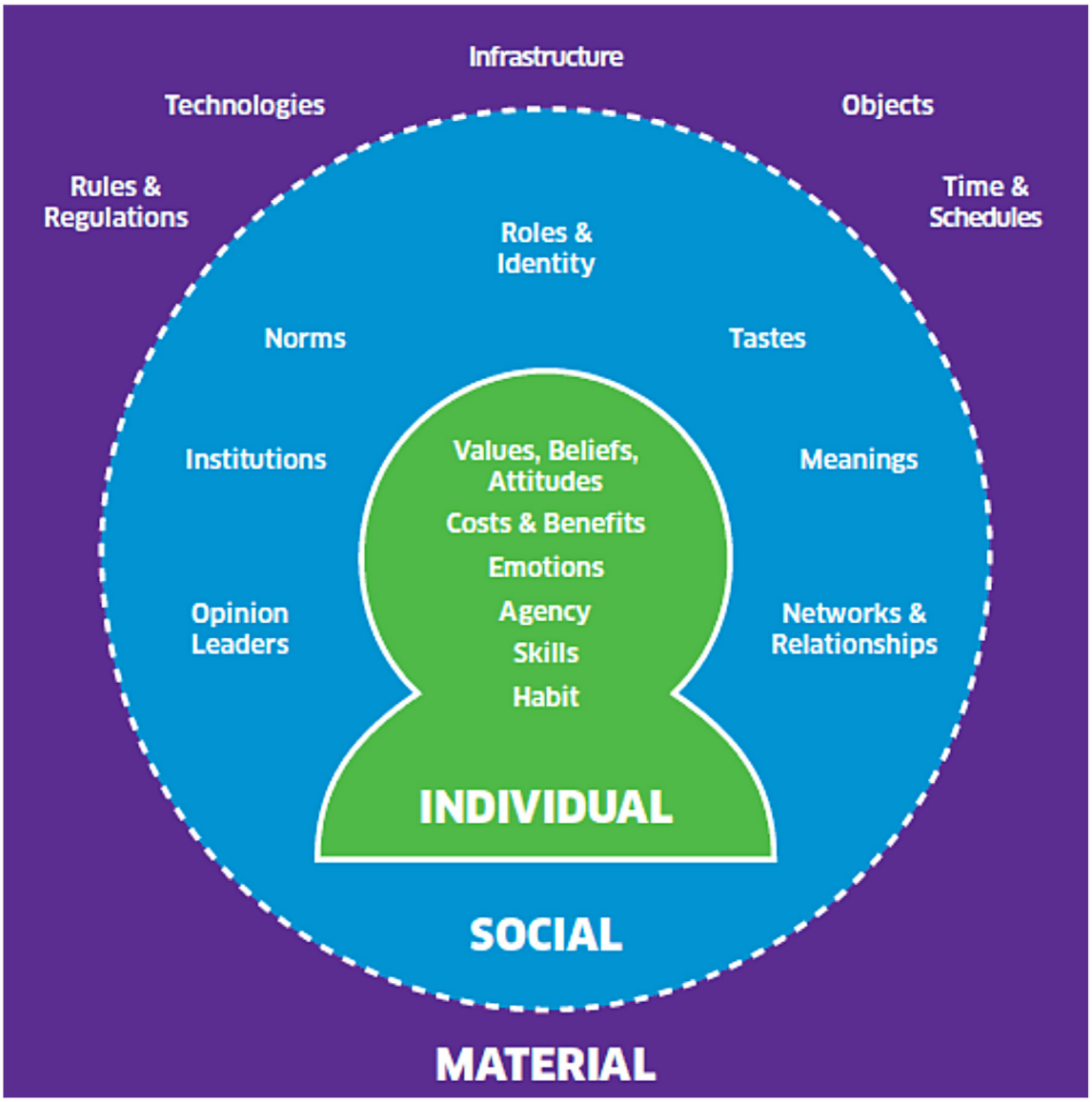

Figure 4: Influences on human behaviour according to three levels of analysis: individual, social, and material.

Source: Darnton and Evans (2013).

People's consumption practices are influenced by individual factors (such as individual values, skills, costs), by social factors (e.g. social norms) and by material factors (such as regulations, technologies).

This tool maps the individual (I) influences on consumption (e.g. values, skills, emotions), the societal (S) influences (e.g. institutions, norms, networks), and the material (M) influences such as rules and regulations, physical infrastructure, technologies and the timings and schedules that shape the day.

10.2.2 Different drivers of behaviour inform four theories of how food choices may be changed

Theories of change emphasise different drivers

Broadly speaking four theories of change could be applied: (separately or in combination)

1. People behave rationally

- Factors such as price mechanisms and wellbeing govern choices.
- Potential interventions: fiscal and awareness campaigns.

2. People are context- & biologically driven & impulsive

- Choices are driven more by impulse than rational decisions.
- Potential interventions: choice architecture, advertising, target interventions aimed at changing or reinforcing default behaviour.

3. Societal structures drive our actions

- Influences include availability and price of certain foods, societal structures around time use, technologies & institutions.
- Potential interventions: regulatory and system change.

4. People want identity

- What we eat expression of identity and values.
- Potential interventions: realigning values and social norms.

None of them alone is 'correct' – composite perspectives needed.

Overlap exists between these theories, and change could best be achieved by doing all of them.

Theories of change could be categorised into four broad categories, focusing on individual actions (as either 1. rational or 2. context-driven / impulsive) and societal influences (3. society as a driver of consumption patterns, or 4. our identity within society as a key driver).

As an example, a person may hypothetically reduce processed meat consumption for price and/or health reasons (rational); because people close to them have made similar changes (identity); because their local food store has reduced its range of processed meat products (societal structure); or because their work canteen has stopped serving processed meats at lunch (context). Clearly there is overlap between all of these drivers of change (for example, reduced consumption of meat could be influenced by both the rational and identity-based example, by both the structural and context example, or a combination of all four.

10.2.3 Purchasing decisions are based on a hierarchy of priorities

What do people prioritise when making conscious purchasing decisions – and what level of knowledge do they have?

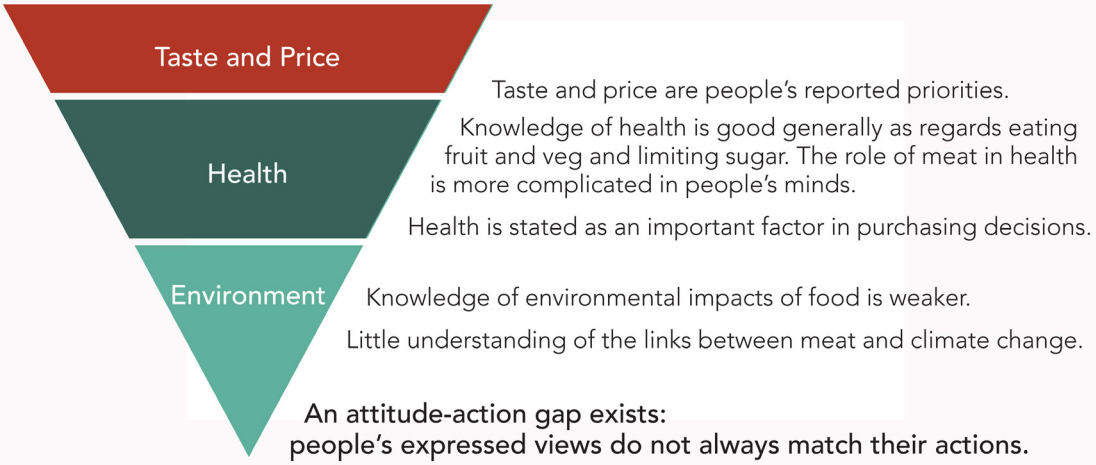

Figure 5: Priorities when making purchasing decisions.

Source: Garnett, *et al.* (2015).

Most surveys of people's priorities are in high income countries or among more educated consumers globally, so these findings are not necessarily applicable to all socioeconomic groups in all regions.

Studies show that price and taste are the key conscious motivators in food consumption, although consumers are aware of, and place some importance on, the link between fruit and vegetables and health.

With regard to the environment, consumers want their food to be sustainable, but it is not a priority for them. Awareness of the link between meat and environmental impact is low. There is, however, some evidence for changes in consumption when people understand the impacts, although this is often attributable to price and health factors. A strong association has been suggested between meat consumption and cultural factors and especially with regard to concepts of masculinity.

In many countries the availability of cheap meat-based foods, combined with these cultural factors, may present a significant barrier to shifts towards less meat consumption.

Public awareness of local food and organic food is generally higher, and while there are certain advantages attributed to both locally-sourced and organically-grown food, there is a lack of research consensus. The benefits of both can be context-specific (see Chapter 3 for more information on the transport impacts of food, and Chapter 4 for more about organic farming's role in sustainable food production).

There is a lack of research into public attitudes specifically relating to reduced sugar intake – even though awareness levels are good.

10.3 What interventions could potentially shift our eating patterns in sustainable directions?

Different typologies of interventions can be categorised:

- Fiscal measures.
- Regulatory and trade interventions.
- Voluntary and industry approaches.
- Interventions focusing on the context, defaults and norms of consumption.
- Information and education raising approaches.

A recent literature review looks at the range of possible interventions

Question

"What does the evidence have to say

about effective ways of shifting people's consumption practices to improve health & environmental sustainability outcomes?"

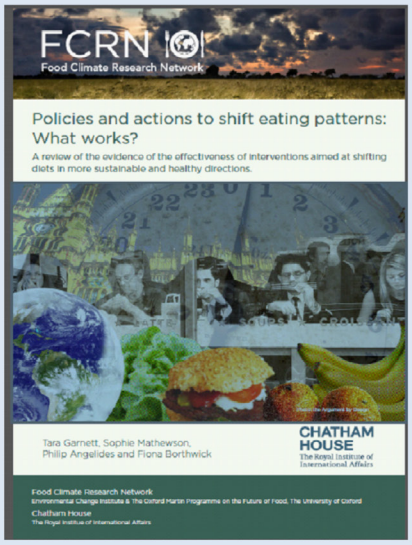

Figure 6: A study on policies and actions to shift eating patterns.

Source: Garnett, *et al*. (2015).

The Food Climate Research Network and Chatham House carried out a literature review of interventions, classified into a typology. The material in this section is largely based on that research.

10.3.1 Different typologies of interventions can be categorised

Different typologies of interventions can be categorised

	Approach	Examples – existing and theoretical
1	Restrict, eliminate or incentivise choices through fiscal measures.	GHG-linked production and consumption, incentives and disincentives (e.g. payments for ecosystem services, nitrogen taxes), health taxes and subsidies, food related social security support for healthy and sustainable food, carbon trading.
2	Change the governance of production or consumption.	Macro-economic policies and agreements, emission caps, national public procurement and planning policies, standards, rationing, bans.
3	Encourage collaboration and shared agreements.	Voluntary industry agreements, supply chain agreements, certification schemes, supply chain or basket of goods reporting.
4	Changing the context, defaults and norms of production or consumption.	Advertising and marketing changes, changing the choice architecture, nudge, store layouts, catering provision and promotions, Meatless Monday.
5	Inform, educate, promote or empower through community initiatives, labelling and other means.	Labelling (e.g. carbon and health labelling), gardening or cooking projects, media or other campaigns, education programs.

Figure 7: A typology of interventions for shifting eating patterns.

Source: Adapted from Garnett, *et al.* (2015).

Different mechanisms are available for interventions, including taxation/subsidies, consumer information, voluntary agreements, and regulatory mechanisms. Each of these involve trade-offs in different ways, have inter-dependencies, and an overlap exists between them.

Most of the research on this topic is from developed countries, and based upon both modelling and empirical research.

10.3.2 Fiscal measures

Examples of fiscal interventions

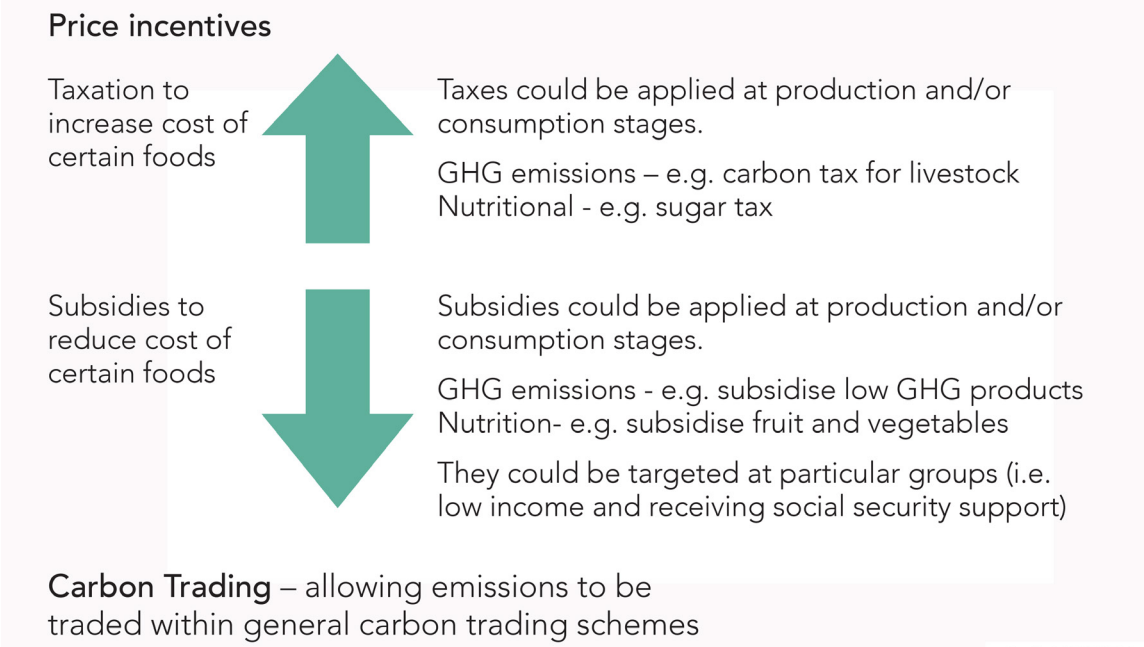

Figure 8: Fiscal interventions to shift eating patterns.

Source: FCRN.(2016).

Taxes could be applied to foods that have a high negative health or environmental impact, or both. Examples might be a carbon tax applied to livestock; although there are complications with monitoring and applying a specific carbon tax where uncertainties exist (see Chapter 3 for different factors contributing to GHG emissions from food systems). A sugar tax could be applied to influence purchasing of food and drinks high in sugars, although this does not necessarily lead to reductions in GHG emissions, since sugar has a relatively low GHG footprint. There are, however, other environmental concerns arising from sugar production.

An alternative or complementary approach would be to subsidise the production and/or consumption of foods that are nutritionally beneficial and have low environmental impacts, for example legumes, pulses and certain fruits and vegetables.

Identifying the balance between health and environmental impact is complicated however, and can lead to trade-offs and unintended consequences. Targetting just one food may cause changes in consumption of other foods that may generate worse, or differently bad outcomes. Substitution effects are discussed in Section 10.4.

Fiscal interventions – research findings

Research overview:

- Most research into the impact of food taxes on environmental outcomes has been model-based since so far there have been few real-life environment oriented interventions.
- There has been more focus on health-oriented taxes, but data are only beginning to emerge (for example from Mexico's soda tax, which was introduced in January 2014: soda sales were 12% lower in December 2014 than in December 2013, although the health effects of this are not yet clear).
- Taxes have an effect but:
    - Are usually regressive (greater impact on purchasing patterns of poor people).
    - Substitution effects are not clear (this concept is is introduced in Chapter 8).
    - May be more effective in combination with subsidies – may be targeted (although see Briggs, et al. (2016)).
- Health-environment trade offs are possible (see later in this chapter for more on this).
- Taxes may affect the supply chain and profitability of different actors along it, negatively, and so there is often industry opposition.
- As with any intervention in eating patterns, other influences on consumption need to be considered, such as social norms and culture.

There has been more model-based than real-life research, although real-life examples from Mexico and France have however shown reductions in consumption of target foods from taxation, but the extent of the impact needs to be more clearly understood.

The majority of model-based research and real-life interventions have been focused on health, rather than the environment or health/environment combined.

A common finding in research has been that such taxes can be regressive in nature, disproportionately impacting poorer households without necessarily bringing about the intended health benefits. For example, a tax on sugar could result in poorer groups continuing to buy products high in sugar, and cutting back their spending on other more important things. Taxes and subsidies need to be relative to the socioeconomic context, and allow for positive alternative consumption patterns.

Consumer behaviour is influenced by both price elasticity and substitution effects (see later in this chapter for more on substitution effects and trade-offs).

Some research suggests that a tax of at least 20% is required to have a worthwhile impact.

It is also important to recognise that a tax or subsidy targeting health might not benefit the environment (for example, taxing drinks with high sugar content has more health benefit than environmental due to the relative low GHG impact of sugar).

Taxes could provide government revenue to be applied to other health interventions and services.

It has also been suggested that taxes would harm producers of the taxed products.

Some people question the logic of designing interventions such as taxes and subsidies that target entire populations, to address the needs of particular groups and suggest that more specific targeted efforts and policies might be more effective (for example interventions targeting the most at-risk groups).

10.3.3 Regulatory and trade interventions

Regulatory and trade interventions

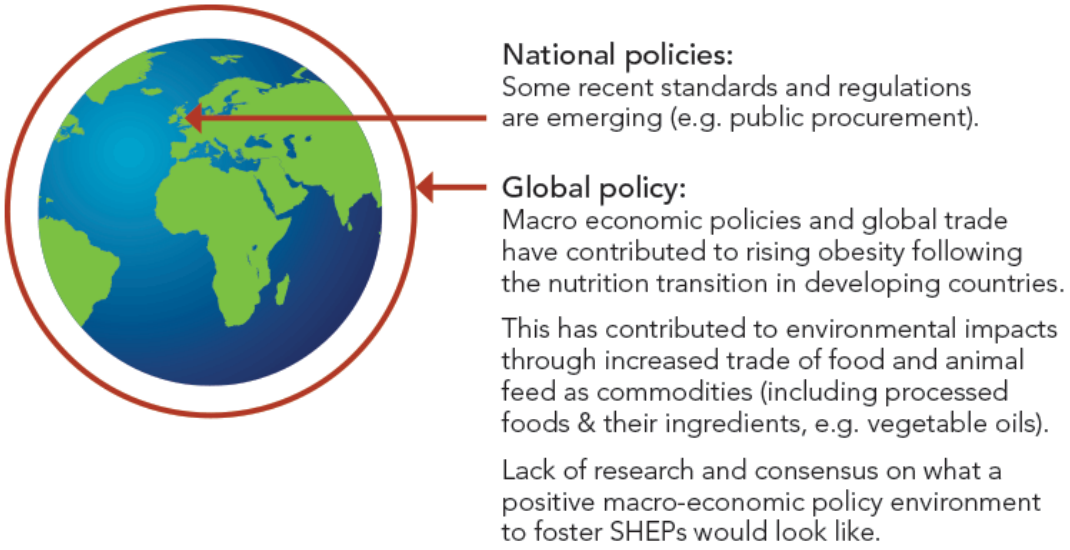

Figure 9: Regulatory and trade interventions effects on dietary patterns.

Source: Gill, *et al.* (2015).

Globalisation of the food system, combined with subsidies (especially prior to 1980s) and the growth in cheap processed food and meat, have contributed to food-health problems. This has been linked to the rise in obesity across regions (see Chapter 7). How these factors have impacted the environment is less understood.

There is a role for government policy with regard to food retail incentives, but this needs to be placed in the context of wider socio-economic and behavioural influences. A good example of this is the concept of "food deserts", where a prevalence of outlets selling processed foods and a lack of healthy food may contribute to obesity levels in poorer areas of cities – though evidence for this phenomenon is mixed.

Some government standards have been introduced, such as the UK 2014 Plan for Public Procurement, focusing on healthy, nutritional and responsibly sourced food with an emphasis on seasonal fruit and vegetables.

A few governments have produced guidelines for sustainable healthy eating patters that may influence future policy. So far only four countries have official guidelines: Sweden, Germany, Qatar, and Brazil; quasi-official guidelines have been produced in the UK, Netherlands, Estonia, France and there is also a Nordic-region wide guideline (the Nordic Nutrition Recommendations).

National policies also need to be integrated with macro-economic policies to ensure that global trade agreements support appropriate availability and accessibility of foods that contribute to SHEPs.

Overall, there is a need for more research to understand how macro-economic policies can contribute positively to healthy sustainable food consumption.

10.3.4 Voluntary and industry approaches

Certification and voluntary industry approaches

Research overview:

- **Nutrition labelling is an established approach, but unclear whether labels result in healthier purchases or whether health-oriented people are more likely to use labels to seek out healthier foods. We also need to factor in the awareness-action gap.**
- **A number of food products are now certified as for example organic, sustainably sourced (e.g. fish), ethical (e.g. Fair Trade).**
- **Certification has a role but is not the solution. The more inclusive certifications schemes are, the greater the risk of diluting their value. Monitoring and evaluation of impacts in the field is often lacking. Market demand for certification needs to increase to incentivise producers to become certified.**
- **Voluntary industry agreements have been mainly health focused, e.g. sugar and salt. There is also self regulation by industry on advertising.**
- **The more 'voluntary' they are, generally the less effective.**
- **Voluntary agreements generally are most effective when there is a level of coercion, a threat of future regulation and where there is commercial benefit.**
- **Voluntary approaches alone not sufficient – a policy steer is also needed.**

Nutrition labelling is increasingly widespread, but it is unclear whether such labels are driving healthier eating habits.

Many food products can now be certified under different labels, such as Fair Trade, Marine Stewardship Council (seafood), Freedom Food (animal welfare in the UK), various organic certifications, and an emerging concept of carbon footprint labelling. The evidence for both high consumer awareness and actual impact is unclear.

An example of voluntary agreements comes from the UK's Waste Resources Action Programme (WRAP), where participating companies agree to reduce and manage food waste and in their future planning, to focus more widely on how we consume food.

Pledges have also been implemented whereby companies agree to, for example, reduce the amount of salt in various products.

While voluntary agreements and labelling can play an important role, on their own their impact tends to be limited.

10.3.5 Interventions focusing on the context, defaults and norms of consumption

Context, defaults and norms of consumption

Research shows:

- **Children are influenced by advertising of food products. It affects their knowledge, liking and consumption of these advertised foods. Foods heavily advertised to children are often high in sugar and salt.**
- **Regulation needs to keep up to date with technology (for example the growth of social media means that influential advertising channels are evolving rapidly, making regulation difficult).**
- **Some positive evidence for nudging and choice architecture, but long-term impacts as yet unclear.**
- **School based interventions have potential if they are holistic - including changes in school meal standards, cooking and gardening projects, and engagement of children, staff and parents.**

Children have been shown to be particularly responsive to advertising of foods high in salt, sugar and fats. While regulation has some effect, regulators and regulations need to keep up to date with the changing avenues for advertising (including via social media), and be aware of 'workarounds' from the food industry.

Choice architecture and nudge approaches (design of different ways in which choices can be presented to influence decision making, for example smaller plate size to reduce portion size in buffets) have been shown to have some positive effect, although the long term impact of such interventions is unclear. There is also some evidence for compensatory behaviour cancelling out positive change (for example, people buying more food but in smaller portions).

One setting that shows potential for change is school lunches (for example, the Soil Association's Food For Life Partnership, and Meatless Mondays in catering). These approaches tend to combine choice architecture and social norms (changing lunch culture, making healthy & sustainable food the default choice) with voluntary industry commitment and certification schemes.

10.3.6 Community initiatives

Community initiatives

- Developed country initiatives include community supported agriculture (CSA), farmers' markets and cookery projects. There is a lack of evidence of the impacts of these interventions on healthy sustainable diets.
- There are many initiatives in developing countries including home gardening schemes, small-scale fisheries and animal husbandry. But similarly, good quality research into effectiveness is lacking.
- Note that a lack of evidence means there is insufficient research available – not evidence of no impact.

In urbanised developed countries, there has been a growth in community initiatives such as farmers' markets, school based growing schemes and community supported agriculture. Evidence does point to some benefits as regards re-connecting people to the value of food, and introducing more people to fresh food, but there is a lack of evidence on how these developments might actually influence a shift towards SHEPs. With regard to farmers' markets, it might very much depend on the type of food sold – the foods on offer (that include jams and cured meats) are not guaranteed to be both healthy and have a low environmental impact.

In developing countries, there are many initiatives aimed at increasing access to healthy foods, such as school, home or community gardening schemes but again structured evaluation of their effectiveness is lacking. That is not to say these is a lack of effectiveness, but that research is thin on the ground and that impacts are inherently hard to quantify.

10.4 What are the possible unintended consequences of changing diets?

10.4.1 Multiple possible changes in diet may have unintended negative consequences

Hypothetical example: Potential unintended consequences arising from measures to reduce people's meat consumption

Intervention effect	Change in practice	Outcome
Doughnut effect	People eat less meat but more refined, processed carbohydrates.	Low GHG emissions but poor nutritionally and have other environmental downsides.
Blueberry effect	People eat less meat but eat more high impact fruits and vegetables (air freighted beans, berries and cherries, hothoused ratatouille vegetables).	Possibly good for health but potentially even higher GHG emissions than meat.
Sausages effect	Higher meat prices cause people to cut down on their meat spending but maintain quantity by eating less healthy meats such as sausages or fatty mince.	Higher meat prices cause people to cut down on their meat spending but maintain quantity by eating less healthy meats such as sausages or fatty mince.
Red to white effect	GHG oriented policies lead to people shifting from red meat to poultry and pork.	GHG reductions are reduced, mixed health impacts, potentially negative for resource efficiency, biodiversity, soy dependence and animal welfare.
Meat-shoring effect	Higher meat prices cause people to increase spending on meat but cut down on fruit and veg intakes.	Negative outcomes for health and for the environment.
Welfare effect	People maintain their regular levels of meat consumption but buy lower welfare meat instead.	Environment impacts mixed, impacts on health neutral or negative, on animal welfare probably poor.
Halo effect	People eat more sustainably but feel justified in buying a new gadget or flying off on holiday.	Impacts on health positive; on environment depends on substitute consumption practice.
Bin-it effect	People buy the 'right' foods but end up not eating them and throwing them away.	Increase in food waste and associated environmental costs.
Leaky system effect	Depends on health impacts of employment changes and envtl impacts of substitute activity.	Depends on health impacts of employment changes and envtl impacts of substitute activity.
Employment effect	People eat a more sustainably; livestock farmers go out of business and remain unemployed or are employed in other sectors (e.g. rural tourism, service industries)	Depends on health impacts of employment changes and envtl impacts of substitute activity.

Figure 10: Unintended effects of measures to shift dietary behaviours.

Source: Adapted from Garnett T (2014). Changing consumption: How can we change the way we eat? A discussion paper. Food Climate Research Network, University of Oxford.

There are many potential consequences of interventions, some intended, some unintended. These potential consequences and possible trade-offs need to be considered when planning interventions.

For example, the "doughnut effect": when making changes in eating patterns people might substitute high impact foods such as meat for lower impact processed refined foods that have less nutritional quality and other environmental issues (e.g. grains or oils that drive land-use change). Similar substitution effects could occur between types of meat, or from unprocessed meat to unhealthy cheaper processed meats.

10.4.2 The substitution effect must be considered

Substitution effects need to be understood and monitored

The substitution effect in this case refers to a change in consumption patterns in response to an interventions, such as a change in price. The substitution can be positive or negative.

Two potentially positive examples:

- If the price of meat increased, people might eat less meat, and more legumes and diverse vegetables, providing good nutrition and lower environmental impacts.
- If the price of fruit and vegetables was reduced, people might eat a greater proportion and diversity of these products in their diets, providing good nutrition and potentially lower environmental impacts.

Two potentially negative examples:

- If the price of meat increased, people might in response maintain the same volume of meat consumption, but buy cheaper, less healthy meats. This might not reduce GHG emissions, and might worsen health problems.
- If a carbon tax were applied to GHG emissions, people might in response eat more "high-sugar" processed foods because the price of such foods would be relatively low (sugar has a low GHG profile). This could have negative health consequences.

10.5 What conclusions can we draw and what further research questions need answering?

- SHEPs need to be taken seriously by policy makers and composite approaches to promoting them are needed.
- Composite interventions should combine macroeconomic, fiscal, societal and cultural influences.
- There is potential to shift consumption patterns exist, but so far there has been a lack of concrete interventions and therefore evidence of effectiveness is lacking.
- Substitution effects and trade-offs are to be expected, and need to be better understood and thereby avoided when designing interventions.
- Further research questions need to focus on integrated solutions, macro and local initiatives.
- More focus and research is needed into possible pathways for SHEPs in developing countries.

Composite approaches are needed: No one approach will do everything. A mix of regulatory, fiscal, voluntary, and other approaches is required.

Consumption matters: Sustainable healthy eating patterns must be taken seriously. See Chapters 3 and 5 for the environmental impacts of food systems; see Chapter 7 for more on food and health.

Don't leave it to the individual: There is a lack of evidence for individuals taking action, and attitude-action gaps are evident. Public understanding of the environmental impacts of food is low.

Don't leave it to industry goodwill or enlightened self-interest: Some in the food industry are acting but their efforts alone are not enough.

Governments need to govern: Policy makers need to create a strong regulatory and fiscal framework, and international trade needs to reflect the importance of sustainable healthy diets.

Work in schools: School-based interventions show promising health results, and their actions now need to incorporate an environmental focus.

Lack of evidence is no excuse for inaction: action generates evidence.

Monitoring & evaluation essential: more focus is needed on mechanisms to track the impact of interventions and inform refinements.

A whole supply chain approach is needed : While there are health and environmental win-wins there can be trade-offs too as seen with the different health and environmental impacts of sugars and meats. There will also be food system trade-offs, and the different interests of different stakeholders need to be recognised.

What are the next steps for research?

- Can we design interventions with both health and environment as objectives?
- What are the substitution effects following consumption changes?
- What are the links between production-consumption and health-environment relationships?
- How do interventions aimed at fostering lower environmental impact and healthy diets, affect jobs, livelihoods and economic development?
- How do we make decisions about trade-offs?
- What are the positive macro-economic influences on consumption and levers for change?
- What are the influences on consumption in low- and middle-income countries?

More integrated studies are needed: most of the studies reviewed came from the health literature or (to a lesser extent) from the sustainability literature. There were very few studies that sought to investigate the effects of interventions on both health and sustainability outcomes. More cross-disciplinary collaboration and research here is required.

Substitution effects need to be explored: how do different interventions (particularly but not only those that influence price) affect our consumption of non-targeted foods, and how do the effects of interventions vary by population group?

Understanding the production-consumption, health-environment relationship: studies need to look at the effect of consumption targeted interventions on producers and vice versa. They also need to consider the impacts on both health, and the environment in the country where the intervention is undertaken, and any risks of 'leakage' of impacts in other regions.

Designing macro-economic policies for health and sustainability: Analysis of what a health- and sustainability-promoting agricultural, trading, investment and market development regime might look like has not yet been undertaken. This is clearly an area – albeit vast – that merits further research and could lend itself to model based exploration. Understanding the influences on consumption in middle- and low-income countries and the potential levers for change: as highlighted, most of the work on the sustainable healthy eating agenda, on the drivers of consumption and on the intervention options is undertaken in and for high-income countries.

Understanding of how and why people consume in low and middle income countries, how this is changing and why, and what the intervention levers are for change, is conspicuous by its absence. This needs to change.

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