Healthy and Wealthy?

The health and economic implications for the UK of mass producing food high in sugar, salt, saturated fat and refined carbohydrates

November 2015

HEALTH ACTION CAMPAIGN
because prevention is better than cure

AGE WATCH
living life, loving life... longer

INTRODUCTION

We have known the health risks of smoking for 60 years – but ten million adults in the UK still smoke. Can we afford to wait another 60 years to tackle the health risks from food high in sugar, salt, saturated fat and refined carbohydrates (S3RC)? These foods increase the risk of obesity, diabetes, heart disease, stroke, depression and some cancers – and cost the NHS £6 billion a year treating the effects of unhealthy diet.

At the same time the food and soft drinks industry employs nearly 3½ million people in the UK - manufacturing products, cooking, serving or retailing; and generates billions of pounds in exports.

Does this mean we face a stark choice – between health and wealth? If so, what are the implications for the health of children in particular? Or is this too simplistic? Can we achieve the mass production and consumption of food that is good for our health and also good for business?

In this report we've reviewed a wide range of evidence to try to find the answer. Some of the questions we've asked to help us reach a conclusion are these:

- Is the food industry, as some believe, more important for health than doctors or the Government?
- Where should responsibility lie for improving health?
- How much does the food industry contribute financially to government income through tax – compared with the costs to government?
- From what we now know could we reduce pre-school obesity in a single Parliament?
- Can we protect children from adolescent obesity and increased risk of preventable illness in later life?
- How can we help adults make informed food choices – for themselves and their children?
- Could the UK achieve global market leadership in the production, sale and marketing of healthier food?

We recognise that factors other than food can also influence our health, like smoking, exercise and alcohol consumption. However food and drink are the two things we absolutely need to survive. This means the quality of that food and drink is of fundamental importance.

Also, the poorer people are, the worse their diet tends to be and the greater the risk of diet related diseases. So the quality of food is important for tackling health inequalities.

Our review findings are informed by and build on a wide range of reports and research findings which have been published by other individuals and organisations in recent years, without which our own report would not have been possible. However, by considering both the health and the economic implications together we hope to shed some fresh light on the issues.

In particular we hope our findings will help achieve progress towards a UK food and drinks industry which is good for business and good for health.

A Health Action Campaign publication

We have examined a wide range of evidence, including research findings in peer review journals; published reports from health bodies, parliamentary committees and consultancy firms; company annual reports; and news stories in the media and the trade press. We have also spent time listening to stakeholders at conferences, in seminars and in meetings. This report summarises our findings.

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We are grateful for all the information and advice we have received from other sources. The final review paper is our own independent report, as are any errors.

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We would welcome your emailed comments on this report at info@agewatch.org.uk

CONTENTS

EXECUTIVE SUMMARY

The implications for health?

The role played by food manufacturers is more important for health than the role played by government and doctors. That's what consumers believe, according to consumer research company dunnhumby in 2014.

So what has changed in the food and drink the industry provides?

- In 1974 we each consumed an average of 267 grams of sugar per week in processed food and drink. By 2007 this had more than doubled to 568 grams.
- People in the UK now spend nearly £30 billion a year on takeaways and fast food.
- 2014 saw record sales of soft drinks in the UK - topping £10 billion for the first time.

Alongside this the UK has become the 'Fat Man' of Western Europe, with male obesity rates quadrupling since 1980. There has also been an increase in illness from some non - communicable diseases (in particular Type 2 diabetes). Is this just coincidence?

The evidence indicates that

- Eating too much food high in S3RC increases the risk of people becoming overweight or obese but undernourished.
- It also increases the risk of diabetes, heart disease, stroke, some cancers and depression and may weaken the body's immune system.
- What we eat and how much is the biggest single cause of obesity – and it starts with what our mothers eat while we're still in the womb.
- However, the vitamins, minerals and fibre found in fruit, vegetables, pulses, nuts and whole grains can reduce the risk of obesity and of non-communicable diseases.

The challenges posed by obesity need no rehearsing. Obesity is a growing threat to public health, the NHS, government finances and the economy. It costs the UK over £45 billion a year in areas such as health, welfare and lost productivity according to the 2014 McKinsey report, *Overcoming Obesity: An initial economic analysis.*

Our children's health

There is increasing evidence that what happens to us in childhood, including what we eat and drink, can influence our health and our weight for years to come. If we consider obesity for instance:

- Obese parents are much more likely to have obese children.
- 82% of obese 11 year olds will go on to become obese adults.
- Obese parents are increasingly not recognising when their children are obese.

What can be done to reverse the rise in obesity and lifestyle related illness?

There are some real challenges here. For instance:

- The chances of an obese man returning to a normal weight this year are 1 in 210.
- Weight management programmes usually have only a limited and short term effect.
- Government measures to combat obesity (like Change4Life and the Responsibility Deal) have slowed the rise but haven't turned back the tide.

With the odds so heavily stacked against those who are already obese is it time to give more emphasis to prevention?

For most people a healthy diet is more effective than dieting (i.e. simply restricting calories) for long term weight control. This is because healthy food makes you feel full quicker and for longer, contains fewer calories for a given volume, provides more fibre and is more likely to have a beneficial impact on our gut microbiota. This is also because our bodies compensate physiologically when we diet and exercise.

Healthy food is also good value, if we compare by volume or by nutrients rather than by calories.

The first 1000 days of life

What we (and our pregnant mothers) eat in the first 1000 days of life, from conception onwards, is particularly important. It can affect our long term health and weight.

Fortunately this is something we can act on.

- Tools like the Froguel Scorecard (developed at Imperial College) can identify which newly born babies are most at risk of obesity.
- We have identified at least eight stakeholders who could, working together with government support, reduce pre-school obesity rates in a single Parliament.

Who is responsible for health?

Each of us must accept some responsibility for our personal health – as must the food and beverage industry and the government.

- Half of UK consumers admit they like to treat themselves to things they know are not good for them.
- When McKinsey reviewed ways of tackling obesity the three interventions they considered likely to have the greatest effect were portion control, reformulation and calorie rich availability. The food and drink industry is key to achieving these.
- Government also has a responsibility - to ensure the protection of those who can't protect themselves, in particular children.

Some implications for government

The financial benefits of the food industry for the government are reasonably clear – jobs and tax revenue, to offset the annual £6 billion NHS costs due to unhealthy diet.

- However, there's also an expensive cocktail, which the July 2015 budget has only just begun to address. Zero hours contracts, part time jobs and low pay all limit income tax and National Insurance revenue. As a result, in-work State Benefits can exceed corporation tax payments.

The 48 largest food and non - alcoholic drinks companies in the UK paid an average of just over £13 million a year in corporation tax in one recent year. This seems a relatively modest level for such successful companies.

The government's Public Health Responsibility Deal with the food industry offers a number of potential benefits, including more rapid action than legislation and avoiding legal challenges by the food industry. After the Food Standards Agency, the Scientific Advisory Committee on Nutrition and the National Institute for Health and Care Excellence had each identified the need to reduce salt consumption, voluntary action across the food industry appears to have achieved a 15% reduction in salt levels over a six year period. This shows what is achievable

through a voluntary approach from the industry.

However, to have credibility as a genuine contribution to public health there need to be agreed targets in key areas like sugar reduction, as well as independent assessment and verification arrangements.

We also need to consider that unless the ever growing demands on the NHS can be reduced, in a politically acceptable way, it will become unsustainable. The most obvious way of reducing demand is to address the causes of illness, to reduce the number of people requiring treatment, rather than waiting until they fall ill and then treating the symptoms.

A global business opportunity

Tackling obesity and preventable illness through healthier food is a global business opportunity. For example:

- 99% of sales growth in American Healthy Weight Commitment Foundation (HWCF) company members came from lower calorie products – and these now constitute a majority of sales for these companies.
- UK based food and beverage companies have the expertise, from product reformulation to advertising, to make a success of healthier food (and presumably already have contingency plans in place to achieve this).
- Regulation, paradoxically, could prove the spur (and level playing field protection within the UK) for global market leadership, taking advantage of the growing consumer desire for healthier food and growing levels of consumer awareness as to what constitutes healthy food.

There are challenges, such as the time it takes to achieve healthier reformulation. However, the food industry has expertise in reformulation, new food technologies available and access to corporation tax relief for Research and Development. The building blocks are in place for a successful transition to healthier food.

Furthermore, reformulation isn't needed where companies already have healthy products with growth potential, as with the successful expansion of porridge oats sales by a major soft drinks company which had diversified its portfolio.

Our recommendations are therefore as follows:

1 To help tackle obesity, reduce the risk of preventable illness at each key stage in life and reduce pressure on the NHS:

1.1 A multi partner task force to be convened, with a remit to reduce pre-school obesity within the lifetime of a single Parliament, to include:

- More effective and coordinated measures to ensure an appropriate quality and quantity of nutrition during pregnancy, in the early months of life and during weaning.
- Identifying which new born babies are most at risk of obesity and providing targeted support for the parents.

1.2 To reduce obesity in adolescence, as well as longer term preventable illness (such as Type 2 Diabetes), the Responsibility Deal to be updated, in the light of experience, to include

- Targets for overall sugar reduction, to include a specific target for reducing the provision of sugar sweetened drinks.
- A ban on the online advertising to children of food high in sugar, salt, saturated fat and refined carbohydrates (S3RC).
- Arrangements for independent monitoring and assessment.

In the event of appropriate progress not being achieved through voluntary arrangements and self-regulation the government to introduce regulation to achieve this.

1.3 To enable adults to make healthy choices in a less obesogenic environment:

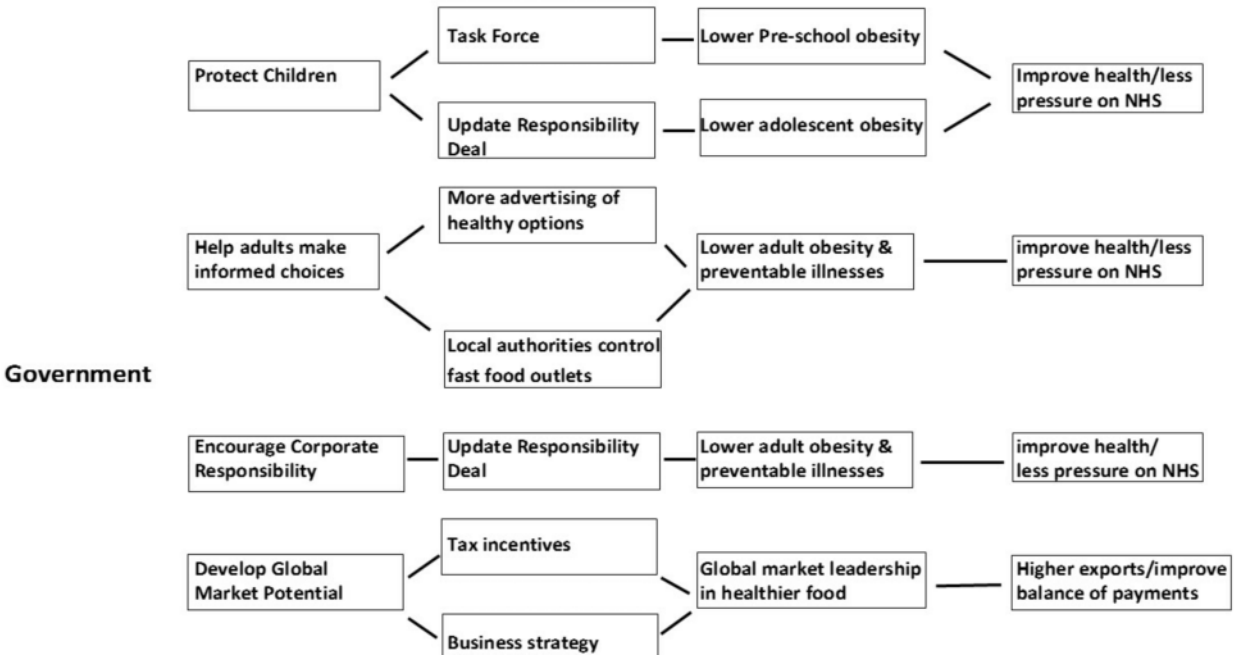
- The advertising budget for Public Health England to be set as a proportion of the UK's commercial advertising expenditure on food high in S3RC, to seek to ensure adults are receiving reasonably balanced communications regarding food whose regular consumption increases health risks.
- Local authorities to be given the discretion to introduce differential business rates, to control the number of fast food outlets and encourage more local businesses which help rather than hinder public health.

2 Achieving Global Market Leadership

To enable the UK to achieve global market leadership in the production, sale and marketing of healthier food – and to help achieve the Chancellor's target of doubling UK exports:

- Current corporation tax relief on Research and Development for the food industry to be amended to prioritise and incentivise the research and development of healthier food.
- The Department of Business, Innovation and Skills to work with the food and beverage industry, universities, health experts, consumer research organisations and consumer groups to develop a business strategy for global market leadership – including identifying any measures the government could reasonably take to assist this, for consideration by Parliament no later than autumn 2017.

What difference can the Government make?



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1. A RECIPE FOR ILL HEALTH?

Nutrient Profiling Score[1] =
(energy + saturated fat + sugar + sodium) – (protein + dietary fibre + fruit & vegetables)

Food Standards Agency

The Nutrient Profiling Score was developed to help OFCOM, the broadcast regulator, assess which foods are healthier when making decisions on the advertising of products to children. For example it identifies saturated fat, sugar and sodium/salt (here in red) as less healthy; and dietary fibre, fruit and vegetables (here in green) as more healthy.

What are the health implications of regularly consuming products high in sugar, salt, saturated fat and refined carbohydrates (S3RC)?

Here is a short selection from the wide range of published evidence:

- According to the UK's Scientific Advisory Committee on Nutrition, in July 2015,[2] higher consumption of sugars and sugars-containing foods and beverages is associated with greater risk of dental caries and greater consumption of sugars sweetened beverages with an increased risk of obesity, which in turn is associated with an increased risk of type 2 Diabetes.

- A large scale, long term study published in *Circulation* in 2012[3] found that consumption of sugar sweetened beverages was associated with a significantly increased risk of Coronary Heart Disease.

- Three systematic reviews published in the BMJ in 20134 found that cutting down on salt and, at the same time, increasing levels of potassium in our diet (for example through fresh fruit, vegetables and pulses) will have major health and cost benefits across the world – by lowering blood pressure and reducing the risk of stroke and heart disease.

- The NHS5 advises that eating a diet high in saturated fat can raise the level of cholesterol in the blood and that having high cholesterol increases the risk of heart disease. Saturated fat is the kind found in pies, cakes and biscuits, fatty cuts of meat, sausages and bacon, butter, lard, cheese and cream. There is currently debate as to whether the harmful effects of saturated fat and of cholesterol have been exaggerated. Until there are definitive conclusions it seems safer to eat saturated fats in moderation.

- Refined carbohydrates (like white flour used in many different types of food and savoury products; and white rice) can increase the risk of diabetes, which in turn increases the risk of heart attack and stroke. For example a 2013 systematic review concluded, 'Our results support public health recommendations to replace refined grains with whole grains and suggest that at least two servings of whole grains per day should be consumed to reduce type 2 diabetes risk'.6

- Sugary drinks are a particular problem. It has been known for some time that they add calories, usually

without fibre or nutrients, so don't make you feel full and potentially lead you to consume more calories than you realise, as in an often cited systematic review from 2006.[7] This has led the World Health Organisation to conclude, 'Heavy marketing of sugar-sweetened beverages contributes to the obesogenic environment.'

- This increases the likelihood of overeating and so becoming obese, with all the attendant health risks, including type 2 diabetes, several types of cancer, liver disease, kidney disease, osteoarthritis and pre-eclampsia.[8]

There may also be implications for mental health. A five year study into civil servants in the UK, published in 2010, found that people who regularly ate processed, high-fat and high-sugar foods were about 60% more likely to develop depression[9] although further research is needed to ascertain if there is a causal relationship.

In the same year a European study found participants who followed a traditional Mediterranean diet (with its vegetables, fruit and nuts, cereal, legumes, and fish) were less likely to develop depression.[10]

'After adjustments for age, socioeconomic status, education, and health behaviours, a "traditional" dietary pattern characterized by vegetables, fruit, meat, fish, and whole grains was associated with lower odds for major depression or dysthymia (mild but long term depression) and for anxiety disorders.'

Association of Western and traditional diets with depression and anxiety in women. American Journal of Psychiatry 2010[11]

Conversely, a range of studies indicate the health benefits of food such as vegetables, fruit, pulses and whole grains. This is likely to be due, at least in part, to the vitamins, minerals and fibre they contain. Here is a short selection from the published evidence:

- Research by University College London, published in 2014 found that eating seven or more portions of fruit and vegetables a day reduced the risk of death from heart disease and cancer by 31 per cent and 25 per cent respectively.[12]

- Pulses provide protein and fibre, as well as being a significant source of vitamins and minerals. Research is beginning to suggest their value in reducing cardiovascular risk factors and in helping patients with diabetes.[13]

- A 14 year study of 100,000 people in the USA, conducted by Harvard University and published in 2015, found that participants who ate the most whole grains, such as porridge, brown rice, corn and quinoa had lower total and cardiovascular disease mortality, independent of other dietary and lifestyle factors.[14]

- When vegetables, fruit and pulses are combined (including with other food beneficial to health, like olive oil and nuts, as in the Mediterranean Diet) this is associated with a number of health benefits.[15] For example a systematic review published in the BMJ in 2008 concluded that greater adherence to a Mediterranean diet is associated with an overall reduction in mortality and a 13% reduction in the incidence of Alzheimer's Disease.

As indicated earlier, this kind of diet is also associated with lower risk of depression.

> *'A healthy diet helps protect against NCDs (non-communicable diseases), including diabetes, heart disease, stroke and cancer. Unhealthy diet and lack of physical activity are leading global risks to health.'*
>
> *World Health Organisation*

Context is obviously important. An occasional fizzy drink or bag of crisps is unlikely to increase our health risk, in the same way that an occasional cigarette probably won't give us lung cancer.

However, what seems clear is that eating too much food high in S3RC and eating too little vegetables, fruit, pulses and wholegrains increases the risk of:

- Becoming overweight or obese
- But undernourished
- And cumulatively increases the risk of serious illness

This is likely to be a growing health risk because:

- There has been a significant growth in the consumption of snacks and fizzy drinks in recent decades. For example average sugar sweetened beverage consumption among UK adults rose from an average of 113kJ/day in 1986/7 to an average of 209 kJ/day in 2008/9.[16] That is an increase of 85%.

- In 1974 we each consumed on average 267 grams of sugar per week in processed food and drink and eating out – but this had more than doubled, to 568 grams per week by 2007 (according to the International Association for the Study of Obesity).

- People in the UK now spend nearly £30 billion p.a. on takeaways and fast food.[17]

We'll consider the implications, for obesity in particular, in the next few sections of the report.

We also need to consider the implications for health inequalities. In its *Food Poverty and Health* Briefing Statement the Faculty of Public Health notes, 'In the UK, the poorer people are, the worse their diet, and the more diet-related diseases they suffer from. This is food poverty.' So improving the quality of food available to people generally is likely to make a significant contribution to reducing health inequalities in the UK.

2. A CLEAR AND PRESENT DANGER

The challenges posed by obesity need no rehearsing. It is a growing threat to public health, the NHS, government finances and the economy – costing over £45 billion a year according to a recent McKinsey report.

> 'Today obesity is jostling with armed conflict and smoking in terms of having the greatest human-generated global economic impact.'
>
> *Overcoming obesity: An initial economic analysis McKinsey Global Institute 2014*

Here are a few points to reflect on:

- The UK has become the 'Fat Man' of Europe, with higher rates of obesity than any other country in Western Europe.
- In 1980 just 6% of men in the UK were obese. Since then male obesity rates have quadrupled. For women obesity rates have tripled (from 8% to 25%).
- On average obese men aged 20–39 will die 5.9 years early, after experiencing 11.8 years of poor health. The figures are broadly similar for women aged 20–39.[18]
- Obese parents are twice as likely to have obese children.[19]
- Obesity increases the risk of Type 2 diabetes significantly. It is believed to underlie 2/3 of cases in men and 3/4 in women.
- In turn Type 2 Diabetes significantly increases the risk of angina, heart attack, heart failure, stroke, renal replacement therapy, minor amputation (below the ankle) and major amputation (above the ankle).[20]
- Obesity itself increases the risk of heart attack, stroke, several cancers, non-alcoholic fatty liver disease, osteoarthritis and a number of other conditions.[21]
- Obese people have a 55% increased risk of developing depression. (2011 National Obesity Observatory – Obesity and Mental Health).[22]
- Obese employees are more likely to take long term sick leave.
- According to Crossland Employment Solicitors[23] 45% of British employers surveyed were less inclined to recruit an applicant if he or she were obese. 61% said they would worry about the potential costs associated with the side effects of obesity.
- Obese people are less likely to be in employment than those of healthy weight, with associated welfare costs.

Obesity is clearly one of the major health risks we face. However, are products high in S3RC to blame? Or is it a complex mix of other factors?

To answer this question we've applied the test of time and then cross checked this against published research findings.

3. WHAT CAUSES OBESITY? THE TEST OF TIME

> '40 years ago tomorrow, a restaurant opened that changed how we eat: the first Mc Donald's in Britain.'
>
> *Harry Wallop, The Telegraph November 2014*

Many causes of obesity have been suggested. The most popular is eating too much and moving too little. Other suggested causes include our genes, some medical conditions (like an underactive thyroid gland), some medications (like some anti-depressants), emotional factors, age, alcohol and lack of sleep.

One useful check for any suggested cause is the test of time. What has changed significantly since the early 1980's, when obesity rates first began their rapid rise in the UK, which might potentially explain that rise?

The biggest and clearest change is in what we eat and drink, where, when and how. Examples include significant increases in:

- The availability and consumption of snacks and carbonated drinks (often consumed in addition to the main meals of the day) – for example following the introduction of 2 litre bottles of Coca Cola in 1978.
- Ready meals (following the introduction of the microwave in 1984).
- Takeaways and meals in fast food outlets (as already indicated this is now a £30 billion a year market in the UK).

What these trends have in common is a rise in food which is calorie rich but nutritionally poor (and often relatively cheap and widely available) - potentially leading to people becoming overweight but undernourished. They also make 'mindless eating' easier i.e. when people eat without thinking and without necessarily being hungry, simply because the food is available.

The way we experience the early months and years of life has also changed - for instance:

- Fewer natural births.[24]
- Less breastfeeding (now the lowest rate in Europe).[25]
- More babies born to mothers who are obese.[26]

This could also be a potential cause.

Alcohol consumption rose during the 1980's and 1990's at a time when obesity rates were rising (although it has since fallen back over the last ten years or so). Might the 'hidden calories' in alcohol also be a cause?

One possible other change is in employment. More women are now in employment and the traditional lunch hour has largely disappeared. This (along with technical developments such as the microwave) could help explain the rise in the consumption of ready meals and fast food. However, any health impact is likely to be dependent on the quality, content and portion size of the ready meals and fast food available, which brings us back to what we eat and drink.

These changes over time match closely with research findings i.e.

The reasons why diet is so important are becoming clearer. They include:

- Which foods make us feel full (so stop eating) and which don't.[27]
- Which foods are high in calories but low in nutrients - and vice versa.[28]
- Which food and drink contains 'hidden' sugar/calories.[29]
- The different effects of fruit juice compared with actual fruit.[30]
- Which foods make us feel thirsty and possibly tempted to consume more calorie rich fizzy drinks or alcohol.[31]
- Which foods do and don't contain much fibre.[32-35] (although the benefits appear to be for adults, as studies in children show less evidence that fibre influences body weight).
- What effects different foods have on our gut microbiota.[36]

Taken together these research findings help explain why:

- Food high in S3RC is particularly likely to lead to weight gain.
- Conversely vegetables, fruit, pulses and whole grains are particularly likely to help control weight.

What happens in the first thousand days of life is particularly important for long term health – and weight.

For example the following all seem to help or be associated with long term health and weight**:**

- A healthy diet during pregnancy (and not trying to 'eat for two').
- Natural birth rather than Caesarian[37, 38, 39] (possibly in part because the way the baby is compressed during natural birth may influence which genes are "switched on.")
- Breastfeeding[40]– with the UK having the lowest rate of breastfeeding in Europe [41].
- Healthy diets during infancy.
- Encouraging children to be active from early age.
- Finding alternatives to food for comfort and to encourage good behaviour.

The converse also applies i.e. eating too much unhealthy food during pregnancy, Caesarian birth, not breast-feeding, unhealthy diets during infancy and using food to comfort and reward all appear to increase the risk of obesity and of longer term health problems. We provide fuller research evidence on this later in the report.

Emerging research into epigenetics (the way our environment and lifestyle can influence the way our genes are expressed and function) and the potential importance of a diverse gut microbiota for our health and weight may also help explain why factors very early in life might be particularly important.[42]

Alcohol is a bit more complicated.

Alcoholics are rarely overweight, as they tend to neglect eating and the alcohol affects the way their liver metabolizes and stores energy.

However, regular alcohol consumption alongside food tends to add 'hidden calories' so is a possible contributory factor. For example a survey for the Royal Society for Public Health found that most people interviewed didn't know or incorrectly estimated the calorie content of a large glass of wine or a pint of lager.[43]

Suggested causes that don't stand the test of time – and aren't supported by research

Other suggested causes of obesity don't stand the test of time i.e. there has been no significant change since the 1980's. Furthermore research tends to confirm this. For example obesity appears to cause an underactive thyroid gland rather than being caused by it.[44] The fact that humans age and grow old isn't new. It has been true

throughout human history. Some people may turn to 'comfort food' when unhappy, stressed or depressed but there's no convincing evidence that people are significantly unhappier now than in the 1980's. For example between 1991 and 2009, suicide rates among males and females fell by more than 10 per cent.[45]

'There are 32 known genes for obesity but every single one of them together predicts just 1.5 per cent of your BMI.'

Professor Atul Singhal, Head of the Childhood Nutrition Research Centre, UCL

Does exercise make a difference?

Exercise as a possible factor is another interesting example. Media stories and public perceptions suggest we're now leading more sedentary lifestyles.

This is true if we compare current levels of physical activity with the 1960's, when, for instance there were fewer cars and children walked to school more often. This helps explain Public Health England's assessment that people in the UK are 24% less active now than in 1961 – a figure taken from their 2014 report *Everybody active, every day*.

However research also suggests that overall levels of physical activity have remained about the same since the early 1980's[46] i.e. the period when obesity rates first began their significant increase.

For some people work may now, on average, be more sedentary. However there has been an increase in leisure time physical activity. This can be seen, for example, in increased gym membership and increased participation in marathons, fun runs and other challenge events. Cycling is another example. In 2010, for example, 3.7 million new bikes were sold in the UK. There has also been an increase in commuting by bike, with the number of London residents cycling to work having doubled between 2001 and 2011 (from 77,000 to 155,000) and with substantial increases in many other cities.[47]

Exercise has many health benefits and should be actively encouraged, not least in obese people as they are less likely to exercise. The health benefits of exercise have been known for decades. This was first identified scientifically, in a study comparing sedentary bus drivers with more active bus conductors, in the 1950's. This found lower rates of cardiovascular disease in the bus conductors.[48] Many subsequent studies have confirmed the importance of exercise for health.

Exercise may also make some contribution to controlling weight. For example a study of commuters published in the BMJ in 2014 found that men and women who commute to work by active and public means of transport had lower BMI and percentage body fat than their counterparts who used private transport - equivalent to around 3 kilograms less weight for the average male studied and to around 2.5 kilograms for the average female studied.[49] However, overall the evidence suggests that what we eat is more important than how much we exercise when it comes to weight control.

This is in part because of the amount of exercise required to burn off the calories in food. For example you would need to swim for an hour to counter the calorific effect of two slices of pizza, or to mow the lawn for 75 minutes to counter the calorific effect of a Big Mac (and to carry on mowing if you also ordered fries with your Big Mac).

Researchers have also found physiological reasons for exercise's lack of significant, long term effect on weight. Essentially it seems that our bodies are programmed to compensate and return us to our previous weight. As a

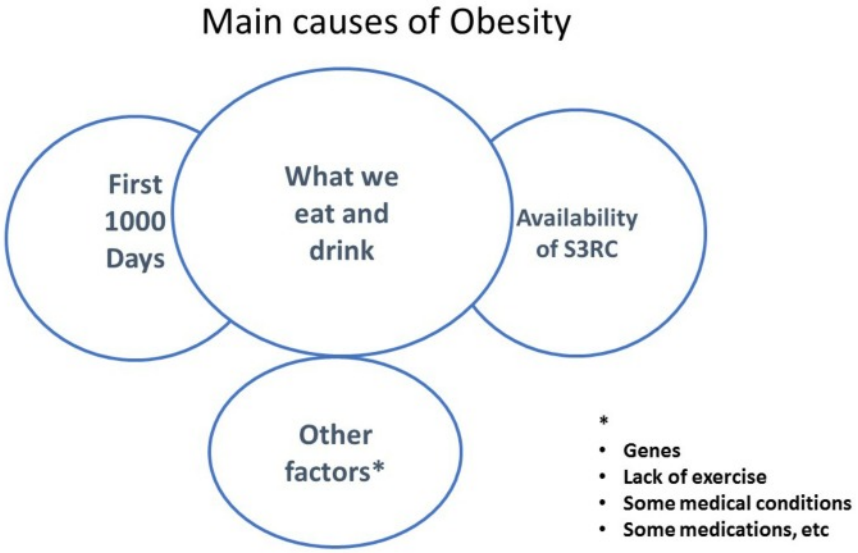
a 2014 study into athletes observed, ‘Changes in energy expenditure, mitochondrial efficiency, and circulating hormone concentrations work in concert to attenuate further weight loss and promote the restoration of baseline body mass.‘ [51]

> ‘Studies conducted among a variety of populations refute the commonly held belief that higher levels of energy expended in free-living physical activity translate into less weight being gained.’[50]
>
> *Physical activity does not influence obesity risk: time to clarify the public health message Amy Luke and Richard S Cooper International Journal of Epidemiology 2013*

This means exercise should be actively encouraged to help maintain health in its own right and to assist with weight control rather than as the main means of tackling obesity.

What we eat and drink is the big issue.

It is what we (and our pregnant mothers and mothers to be) eat and drink that has the biggest influence on our weight – and the first thousand days of life, from conception onwards, are a particularly formative period.



Simply counting calories isn’t enough. Where the calories come from is important. Consuming a can of cola a day or a tablespoon of olive oil will result in a similar calorie consumption – but the long term health implications of each will be very different.

In principle it is possible to consume so many calories from healthy food that you become obese. However, as explained earlier, healthy food tends to make you feel fuller quicker and for longer. In practice therefore people who are obese in the UK are unlikely to have been consuming too many vegetables, fruit, pulses and whole grains. It is food high in S3RC which is usually the culprit.

> ‘A calorie is not just a calorie and it is naïve for anyone to think that the complex hormonal and neurological appetite systems of the body respond to different substances in the diet in identical fashion.’
>
> *Professor David Haslam Chairman, National Obesity Forum*

4. GIVING PRIORITY TO PREVENTION

The chances of an obese man achieving a normal weight this year are 1 in 210 and the chances of an obese woman achieving a normal weight this year are 1 in 124. Over a nine year period the odds improve. However fewer than 2 in 100 obese men and 3 in 100 obese women will achieve a normal weight during this time.[52]

With the odds so heavily stacked against those who are already obese is it time to give priority to prevention?

> 'Lifestyle modification, specifically changes in diet, physical activity, and exercise, is considered the cornerstone of obesity management. However, for most overweight people it is difficult to lose weight permanently through diet or exercise. Thus, prevention of weight gain is thought to be more effective than weight loss in reducing obesity rates.'[53]
>
> *Dr Barbara Strasser University for Health Sciences, Medical Information and Technology, Austria* 2013

Conventional weight management programmes (combining diet, exercise and group support) typically lead to short term weight loss, only for the weight to come back over the longer term. People may even put on more weight than they lost.

This isn't necessarily due to lack of will power or slipping back into bad habits (although that can sometimes be an issue). As explained earlier it seems there is a physiological reason, with our bodies seeking to compensate for dieting and exercise.[54]

> 'Long-term multicomponent weight management interventions were generally shown to promote weight loss in overweight or obese adults. Weight changes were small however and weight regain was common.'[55]
>
> *The clinical effectiveness and cost-effectiveness of long-term weight management schemes for adults: a systematic review.* 2011

The limited long term impact of weight management programmes suggests we need to focus more on prevention if we are to reduce obesity levels**.** Recent research on childhood obesity suggests a possible way forward here. This is because there seem to be two distinct types and phases of childhood obesity[56] i.e

- From an early age in the children of obese parents (as a result of parental diet, lifestyle and lack of perception of childhood obesity).
- From adolescence across the whole age group (as a result of becoming a consumer in an obesogenic environment).[57-58]

This suggests interventions to tackle these two factors (parental lifestyle and an obesogenic environment) are likely to have greatest impact.

Applying what we know means the UK could reduce pre-school obesity rates in a single Parliament. This would be a significant achievement and begin to reverse the rise in obesity, on a prevention is better than cure basis.

As the Infant and Toddler Forum identified in *Early Nutrition for Later Health*, 'longstanding and widespread impact of poor nutrition on the health of the UK population can best be addressed by a life-course approach which, ideally, begins before conception, carries on through pregnancy and is maintained throughout the early years.'

5. DIET VERSUS DIETING

> "What happens to people on diets in the long run? Would they have been better off to not go on a diet at all? We decided to dig up and analyse every study that followed people on diets for two to five years. We concluded most of them would have been better off not going on the diet at all. "
>
> *Traci Mann, Associate Professor UCLA 2007*

If diets worked the diet industry would go out of business. A long term US study published in 2007[59] found that a third to two third of dieters put back on more weight than they lose.

One reason for this is that our bodies aren't passive bystanders. They actively work to achieve homeostasis or equilibrium. We see this, for instance, in the way that our bodies usually manage to maintain a constant temperature whether it is hot or cold outside. As explained earlier, in the same way our bodies seek to compensate and bring our weight back after we diet or exercise.

Some researchers even argue that dieting may actually be **causing** obesity. For example our appetite regulating hormones can be upset when we go on a diet for at least a year afterwards. That's according to Australian research published in 2011.

> "Our study has provided clues as to why obese people who have lost weight often relapse. The relapse has a strong physiological basis and is not simply the result of the voluntary resumption of old habits."
>
> *Professor Joseph Proietto University of Melbourne*

This echoes earlier research, like the classic US study by Dr Jules Hirsch, which found that as we eat less our metabolism slows down to stop the weight coming off.[60]

Conversely, a healthy diet (low in S3RC – and high in vegetables, fruit, pulses and whole grains) can help us manage our weight. Here we're referring to diet in the traditional sense of what people normally eat, as opposed to dieting.

That's because a healthy diet:

- Helps us feel full quicker and keeps us feeling full longer, in part due to higher levels of fibre - so we don't eat as much,[61] and contains more of the nutrients we need[62], but is also lower in calories for a given volume of food.
- Has a prebiotic effect and encourages more diverse gut microbiota (which research is starting to suggest is likely to be good for both our health and our weight – although more research is needed in people to be sure of this).[63]

One review of 50 studies estimated that increasing fibre intake by 14 g. per day was associated with a 10% decrease in energy intake and a 2 kg. weight loss over about a 4-month period.[64] Studies also show that eating more fibre reduces the risk of type 2 Diabetes.[65]

This reinforces the value of eating a healthy diet for weight control as well as for the wider health benefits.

6. PERSONAL RESPONSIBILITY

> 'Half of UK consumers like to treat themselves to things they know are not good for them.' [66]
>
> *Mintel 2011*

If this is just an occasional treat then there are no serious health implications. The problem comes when we start to 'treat' ourselves on a regular basis or when we slip into 'mindless eating' while we're doing other things, like watching the TV or surfing the internet.

That's when we need to consider the bigger picture. Do we want to stay healthy and independent for as long as possible? Do we want the NHS to remain a free, affordable public service or to collapse under the weight of lifestyle related illness?

If so, we each need to take some responsibility for looking after our health and our weight – and helping our family and friends do so too. Eating a healthy diet is an important contribution. And as parents, from conception onwards, it can help our children grow up a healthy weight and improve their prospects of good health as adults.

We usually know, at least in broad terms, what food is good for us and what food isn't. So we need to act on what we know – and remember that diabetes, heart attack, stroke, cancer and depression are potentially lurking in the food that seems so tasty or convenient if we eat it regularly.

Fortunately there is potential to re-educate our taste. For example people who stop taking sugar in their tea often find that sugary tea, which they had happily drunk before, soon starts to taste too sweet. And, if we're short of time, it is worth remembering that nature provides a range of healthy fast food, like fruit and nuts.

It is widely recognised that we live in an obesogenic environment. However this doesn't absolve us from personal responsibility. In fact it makes it even more important that we exercise such responsibility.

Having said this, it seems reasonable to protect children, at least below the age of consent – and we return to this point later.

People also need to be able to make informed decisions. The following can help in particular:

- Budgets for advertising unhealthy food and drink shouldn't significantly exceed budgets for advertising healthy alternatives. This may need to be addressed in part through the Public Health Responsibility Deal, in particular as regards advertising aimed at children.

- A complementary approach would be to link the advertising budget for Public Health England (PHE) to that for the commercial advertising of food high in S3RC i.e. the higher the advertising budget for unhealthy food the higher the budget for PHE advertising and the lower the advertising budget for S3RC the lower the budget for PHE advertising.

- Clear, consistent, easy to understand information on labels about what the food and drink we are presented with contains and what the health consequences might be – including the food and drink provided by takeaways and fast food outlets.

7. FOOD INDUSTRY RESPONSIBILITY

> 'A more ambitious approach is needed to secure a fully coordinated industry response. This may require regulation or standardization to level the playing field for industry.'
>
> *Overcoming obesity: An initial economic analysis McKinsey Global Institute*[67]

When McKinsey reviewed ways of tackling obesity the three interventions they considered likely to have the greatest effect were:

- Portion control
- Reformulation
- Calorie rich availability

The food industry is key to achieving these three changes – from food manufacturers through to restaurants, takeaways and fast food outlets.

McKinsey identified that the voluntary Responsibility Deal had secured impressive commitment from a range of manufacturers, retailers, food-service providers and restaurants and noted that progress had been achieved on reformulation, labelling and marketing.

However, they also identified that because this was a voluntary scheme a number of companies hadn't signed up and that the scheme had failed fully to shift defaults in the food and beverage industry.

McKinsey though, make an interesting point i.e. that there may be a prisoner's dilemma inhibiting industry innovation. For example if a single company goes it alone on reformulation or on moving the focus of its advertising from high calorie products to low calorie products it may see itself as taking a business risk. In this context it argues that the industry needs help from government, to ensure that all players agree to take action – and that this may require regulation or standardisation to level the playing field for industry.

Our own assessment, which we explain further later in our report, is that such regulation or standardisation is likely to have not just benefits for public health but also benefits for the food industry itself, creating potential competitive advantage in the evolving and increasingly health conscious global market place.

In this sense opposition to such moves by the food industry, its representative bodies and its lobbyists would be likely to prove short sighted.

One further point is corporate responsibility. If we are to expect individuals to take more personal responsibility for what they eat, then it is only fair to expect companies to take more responsibility for the products they supply.

8. GOVERNMENT RESPONSIBILITY

> 'Interventions focused on encouraging individuals to change their behaviour with regard to diet and physical activity need to be underpinned by broader, population-level measures. Whilst both are important, population-level interventions have the advantage of impacting on far greater numbers than could ever benefit from individual interventions. We recommend that the next Government prioritises prevention, health promotion and early intervention to tackle the health inequalities and avoidable harm resulting from poor diet and physical inactivity'.[68]
>
> *House of Commons Health Committee March 2015*

Governments are often reluctant to be seen in a Nanny State role, even though there is a positive story to tell from previous state interventions to improve public health, from the creation of the NHS to compulsory seat belts and crash helmets.

However, there is probably cross party consensus on the need to intervene when other people are placed at harm's risk as a result of an individual's actions (as with drug dealers or even passive smoking). And governments would normally agree that young children need to be protected.

Sadly, we know that obese parents are more likely to have obese children[69] and increasingly don't recognise that their children are obese.[70] Is it then fair to say that other people are being placed at risk as a result of their actions and that these people, being young children, deserve protection? A useful precedent here is action on passive smoking, where the rights of adults to make lifestyle choices are tempered by action to avoid harm to others.

The government has a responsibility to ensure the protection of those who can't protect themselves – in particular children.

Local government also has some responsibility, since responsibility for public health has been devolved to it. However, expectations here need to be realistic. Local authority budgets are under serious pressure and they may need enhanced powers (for instance to set differential business rates) if they are to encourage a less obesogenic environment locally.

Governments may also wish to consider what legacy they are leaving. We now know enough about the causes of obesity to start to address these causes, as opposed to just managing the symptoms. There is an opportunity to turn back the tide and start to reduce obesity levels. This would make us the first country in the world to achieve this – a major achievement any government could be rightly proud of.

Legislation for Public Health – A Case Study

In 1965, 8000 people a year died on Britain's roads. The Road Safety Act brought in breathalysers, extended the trial 70 mph speed limit and made it compulsory for all new cars to have seat belts.

At the time these moves were denounced, in some quarters, as an assault on personal freedom.

By the end of the century, with nearly three times as many cars on the roads, the number of people being killed each year is less than half that for 1965.

This means that the legislation didn't undermine the future of the car industry, as evidenced by the fact that there are now many more cars on the roads.

It also means we're probably now saving around 20,000 lives a year (and presumably many more non-fatal injuries).

Where government action can save lives without infringing fundamental human rights on the one hand or harming business on the other, might this at least be worth considering?

Source: Andrew Marr History of 20th Century Britain

Public opinion also seems to be moving in this direction. From MPs, policy shapers, journalists and non-government organizations (NGOs)[71]to ordinary people we've undertaken pilot research with, there seems to be an increasing understanding that we need to tackle the root causes of ill health not simply wait until people are ill and then treat the symptoms.

For example the National Obesity Forum advises that 82% of obese 11 year olds will go on to become obese adults. If we can address childhood obesity, protecting those not able to protect themselves, for instance by reducing the sugar and fat content in cereals and other food children eat we can change their taste for the future. Habits and tastes developed early in life are likely to persist throughout adult life.

The Responsibility Deal has been an interesting experiment, which seems to have achieved some success in reducing salt levels in food.

However, if continuing progress is to be achieved then we need the Responsibility Deal to be successful for sugar and for portion size too. And we need independent verification – to avoid the sort of problems the media have identified, such as companies reducing sugar in some existing products while, at the same time, introducing new products, like breakfast bars and breakfast drinks, with even higher sugar levels than the cereals they are intended to replace.

Government also has a number of incentives at its disposal. For example it already provides over a billion pounds a year corporation tax relief on food and drink industry Research and Development costs. One practical incentive would be to amend the scheme to prioritise research and development into the mass production of healthier food.

A further question is whether it is reasonable to ask government to try to ensure a level playing field when it comes to the country's health.

For example the government's Change4Life advertising budget for the UK was £10.9 million for 2013/14.[72] That is £10.9 million to encourage healthy lifestyles.

This compares with the estimated £1 billion budget for advertising by the food industry in the UK (much of which is committed to promoting products high in S3RC). This means government support for healthy advertising is dwarfed by commercial advertising for unhealthy products.

One way of levelling the playing field, as we propose elsewhere, is to limit the advertising of food high in S3RC to children – including online advertising.

Continuing with the point that government has an important role to play in protecting the most vulnerable, not least young children, what might this mean in practice?

9. SAVING OUR CHILDREN

"We need to tackle the causes. An obese child is going to become an obese adult and an obese adult is going to have obese children, so we've got a very, very vicious downward generational spiral that we need to nip in the bud."

Professor Neena Modi, President, Royal College of Paediatrics and Child Health -The Times 26th May 2015

Does obesity start in the womb? It certainly looks as if a range of factors early in life are important. For instance:

- The quality and quantity of nutrition during pregnancy seems to make a difference, with babies who receive too much or too little food in the womb at increased risk of obesity – and the developing field of epigenetics helps explain why this may be the case.[73]
- Natural birth appears to reduce the risk of obesity compared with caesarean section. Where caesarean sections are medically necessary there's the possibility of protection being achieved through vaginal inoculation. This is unofficial practice in some Nordic hospitals and is currently being clinically trialled in Puerto Rico.[74]
- Breastfeeding may also reduce the risk of obesity.[75] The BBC reported in March that 25% of mothers don't breastfeed, that half of those who do have given up by 6 weeks and that a main problem expressed by mothers is lack of support when they have problems breastfeeding.
- Antibiotics kill off gut bacteria which may help protect against obesity, so perhaps this could also be taken into account when prescribing antibiotics for children.[76] In August 2015 NICE issued guidance aiming to avoid 10 million inappropriate antibiotic prescriptions a year - suggesting such an approach has wider benefits.[77]

A range of interventions in the early months of life were proposed by Professor Mary Rudolf, in order to help tackle obesity, based on her review of the research.[78] In particular

- Encourage responsive feeding.
- Encourage positive family mealtimes.
- Find alternatives to food for comfort and to encourage good behaviour.
- Encourage exclusive breast feeding for 6 months.
- Introduce solid foods at 6 months.
- Ensure portion sizes are appropriate for age.
- Increase acceptance of healthy foods – including fruit and vegetables.
- Reduce availability and accessibility of energy dense foods in the home.
- Reduce consumption of sweet drinks and increase consumption of water.

'For each extra can or glass of a sugared beverage consumed per day the likelihood of a child becoming obese increases by 60 per cent.' [79]

Frieden & Brownell, New England Journal of Medicine, 2009

'The promotion of energy-rich and nutrient-poor products will encourage rapid weight gain in early childhood and exacerbate risk factors for chronic disease in all children, especially those showing poor linear growth.'[80]

Child and adolescent obesity: part of a bigger picture Dr Tim Lobstein et al The Lancet 2015

Action to reduce the risk of obesity during the first thousand days of life has many advantages:

Focusing on measures early in life means reductions in obesity rates among pre school children should be achievable in the lifetime of a single Parliament.

Those most at risk are identifiable**.** The Froguel/Imperial College scorecard can be used by GPs and health or social workers to work out where they should concentrate help. It uses the birth weight of the child, the BMI of the parents, the number of people in the household, the mother's professional status and whether she smoked during pregnancy to identify which families need most support to avoid their children becoming obese.[81]

There is potential to create a coalition of the willing to act here, including:

- Paediatricians, as the President of the RCPCH has explicitly called for early intervention to prevent obesity.
- Midwives, as *Midwifery 2020*[82] envisages an increased public health role.
- GPs and other health professionals , as the BMA's *Food for Thought* report[83] focuses specifically on the needs of children and calls for healthcare professionals to acquire a comprehensive understanding of nutrition, supported by adequate training and education opportunities.
- The HENRY programme in deprived areas appears to have helped health professionals develop a wider range of skills to address childhood obesity and led to a reported increase in vegetable consumption, reduction in sugar sweetened beverages and improvement in children's eating behaviour – as well as leading some health professionals to make changes in their own lifestyle.84
- Health Trainers are another resource, who seem to be making a difference in more deprived communities, like a 2/3 increase in people eating 5 day and over half reducing unhealthy food.85
- Clinical Commissioning Groups (CCGs) – for instance through opportunities for pilot action research projects focusing on early interventions.
- The Northern Power House – providing opportunities for more joined up thinking and more focus on prevention.
- Local authorities, given their public health responsibilities and local focus, knowledge and contacts.
- Working in partnership with organisations such as Mumsnet, Family Lives and The National Childbirth Trust (as well as companies like Mothercare) would further increase the range and scale of support that could be made available early in life.

It may also be useful to work with manufacturers of baby foods. A study by Glasgow University in 2015, published in *Maternal & Child Nutrition*, looked at 329 commercial baby foods (CBFs) containing fruit and vegetables in their name. It found, 'The F&V content of CBFs mainly consists of fruits and relatively sweet vegetables which are unlikely to encourage preferences for bitter-tasting vegetables or other non-sweet foods. F&V contribute significantly to the total sugar content, particularly of savoury foods.'

> "The risk is that while parents may think commercial baby foods are introducing their children to healthy vegetable tastes, actually they are mainly reinforcing preferences for sweet foods.
>
> "Infants usually accept new foods and tastes well if vegetable tastes are introduced early, and this early experience influences food preference later in childhood."
>
> *Dr Ada Garcia, Glasgow University*

In other words there is a valuable range of stakeholders who could be encouraged and supported to work together to achieve real improvements and a cumulative effect here.

Evidence to help support their work is likely to become increasingly available, for instance through the findings from a research project in the US, involving seven clinical centres and funded by the National Institutes of Health, as the findings become available. This is the Lifestyle Interventions for Expectant Moms (LIFE – Moms) project.[86]

Among the intervention strategies being tested are home visits by parent-educators, intervention delivery in the obstetrics-gynaecological setting, and use of smartphones.

Other studies, for which findings are already available and potentially relevant include:

- The Healthy Beginnings Trial in Australia: Eight home visits by community nurses helped reduce the onset of childhood overweight and obesity by age two in socially and economically disadvantaged areas of Sydney[87] although the researchers found that obesity prevention programmes needed to be continued to avoid overweight and obesity rates returning by age five.
- The Melbourne Infant, Feeding, Activity and Nutrition Trial (InFANT): There were positive results arising from the intervention, which involved six 2-hour dietitian-delivered sessions, a DVD and written resources from infant age 4-15 months. However the effects varied depending on the age and level of education of the mothers. The intervention effects on vegetable (positive effect) and sweet snack consumption (negative effect) were greater in children with higher educated mothers while intervention effects on water consumption (positive effect) were greater in infants with lower educated mothers. This suggests the value of more tailored approaches, rather than a 'one size fits all' approach.[88]
- The Healthy Homes, Healthy Families pilot study in the US:89. This was a parent-driven home-based intervention that incorporated tailored written materials and a video, as well as nutrition information, along with an age-matched children's exercise video. This intervention appeared to be effective in changing some aspects of children's behaviour and their home environments through changes made by parents.

'We have 140,000 children in the UK that are so obese that if they were adults they would be immediately eligible for surgery. At the moment there is not one local authority or one CCG that has investment plans in place to tackle that problem.'

Professor Paul Gately, Leeds Metropolitan University, Director of MoreLife, speaking at a Policy Exchange policy debate on childhood obesity in 2015

A healthy diet (as regards both quality and quantity) is a vital part of the equation here, for both mother and child. For instance eight of Professor Rudolf's nine proposed interventions are food related. However the greatest impact is likely to be achieved by combining healthy diet with the other actions identified and in particular by healthcare professionals and other stakeholders working in partnership to optimise results – providing information, advice and support for young mothers, ideally informed by training in health behaviour change techniques.

One bonus is that focusing on children in the early months of life also enables us to reach adults**.** Pregnancy is a time when mothers to be expect to receive information and advice from health professionals. And our own research into health behaviour change suggests that having children is one of the triggers that can lead adults to adopt healthier lifestyles, meaning they may be particularly open to health messages at this stage in their lives.

Whereas 'pester power' has traditionally been seen as children pestering their parents for things like sweets some parents report that teaching about healthy food at primary school has led their children to encourage them,

If we can significantly reduce obesity in the early years of life there will be significant long term benefits.

However, one more challenge lies ahead during childhood i.e. adolescence[90] when children become consumers in their own right without yet having adult maturity or tastes and while vulnerable to online marketing in particular.

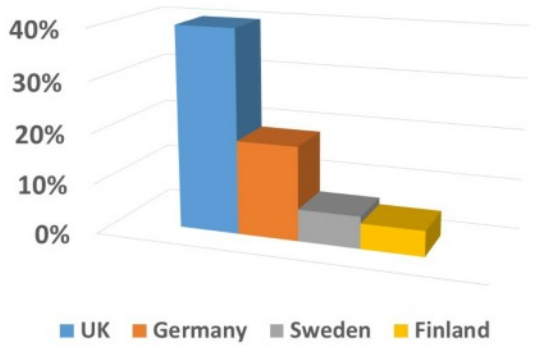
> 'Less authoritarian parent/child relationships and children's own growing spending power contribute to the finding that children increasingly control their own eating patterns. And children like the taste of HFSS (high in fat, sugar and salt) foods.'[91]
>
> *Child Obesity – food advertising in context OFCOM 2004*

> 'Between April and July 2011 we conducted a content analysis of food brand and product websites. We found clear evidence of HFSS products being heavily marketed to children online, with websites employing a variety of techniques to increase their appeal to a young audience.'
>
> *The 21st century gingerbread house How companies are marketing junk food to children online British Heart Foundation.*[92]

Here we probably need interventions along the lines McKinsey identified as likely to have the greatest impact in their 2014 report i.e. to ensure:

- Portion control
- Reformulation to provide healthier food
- Reduction in the availability of high calorie food and beverage

Percentage of 11-15 years olds who drink sugary drinks at least once a day



Source: Local government association – Tackling the causes and effects of Obesity

This needs either voluntary action by the food industry (e.g. building on and significantly strengthening the Public Health Responsibility Deal) or, if this is not achievable, government regulation.

Hopefully the food industry will recognise that it is in its own best long term business interests to be seen as part of the solution rather than part of the problem.

If not, the government would be justified in introducing regulation in relation to the food provided and advertised to children – on both health and economic grounds (as we explain in more detail in the second half of this report) – in particular to protect those unable to protect themselves.

10. SAVING THE NHS

> 'The future health of millions of children, the sustainability of the NHS, and the economic prosperity of Britain all now depend on a radical upgrade in prevention and public health.'
>
> *NHS Five Year Forward View 2014*

Unless demand for the NHS can be reduced, in a publicly acceptable way, it will become unsustainable and thus a political liability for the government of the day.

The NHS Five Year Forward View[93] identifies that a combination of growing demand, no further annual efficiencies and flat real terms funding could, by 2020/21, produce a mismatch between resources and patient needs of nearly £30 billion a year.

It goes on to estimate that if the NHS could make savings of 2-3% per annum that gap would fall to £8 billion – and the Chancellor has committed to increasing NHS funding by this amount in his 2015 budget.

However, achieving £22 billion of efficiency savings is likely to prove a significant challenge, given that:

- Savings achieved between 2005/06 to 2011/12 were only an estimated 1.5% per year.
- Many of the 'easy' savings have presumably already been made.
- The projections don't allow for possible unplanned adverse events. It is to be hoped that there will no global pandemic that increases demand for NHS services significantly and no global financial crisis that might put the government's ability to maintain its funding commitment at risk. However, we cannot rule out the possibility of some significant adverse event over the next five years.
- Continuing pay restraint for hospital staff is likely to impact on recruitment and retention, resulting in higher demand for expensive agency staff.
- The invention of new drugs and developments in equipment and surgical techniques are continuing to expand the range and scope of what is possible in health care - but usually also lead to higher spending.94
- Rising patient and government expectations, including the push for the NHS to be fully operational seven days a week.
- Almost 90% of acute hospital trusts were forecasting a deficit for 2015/16.

- The estimated funding gap for adult social care over the same period is £4.3 billion. This is likely to have a knock on effect on the NHS, as seen for instance through increased A & E admissions and also 'bed blocking' by elderly patients for whom there isn't adequate provision in the community.

> 'It's going to be a huge challenge for the NHS and will mean providing a level of savings that have never been achieved in the past.'
>
> *Paul Briddock Director of Policy, the Healthcare Financial Management Association*

If funding is unlikely to rise beyond the Chancellor's existing commitment, and if the unprecedented level of efficiency savings proposed may not be achieved in practice, then the only obvious remaining alternative is to reduce demand on the NHS – the third option in the NHS *Five Year Forward View*.

However the UK has an ageing population. This is a demographic which can't quickly or easily be reversed – and which will increase rather than reduce demand on both the NHS and adult social care.

If we can't reverse the current demographic trend, then the most obvious way of reducing demand is therefore to address the causes of illness, to reduce the number of people requiring treatment, rather than waiting until they fall and then treating the symptoms.

For example in 2013/14 the NHS issued 45 million prescriptions for diabetes, at a net cost of £803 million.[95] There is a seven times greater risk of diabetes in obese people compared to those of healthy weight, with a threefold increase in risk for overweight people.[96]

In the case of illnesses caused by food high in S3RC this means tackling the problem at source i.e.

- Through support for prospective parents, to help them make healthy nutritional choices, to avoid obese parents having obese children.
- Through limitations on the food sold and advertised to children, to avoid adolescent obesity in particular.
- Through measures to regulate the size and content of mass produced food (to help make healthy choices the easy choices for both adults and children).

> 'By 2018 it is estimated the number of people with three or more multiple conditions will have grown from 1.9 million to 2.9 million. Continuing to focus on individual conditions rather than individuals leads to fragmented, poorly coordinated care, which is inefficient, ineffective and delivers poor patient experience.'[97]
>
> *Dr Martin McShane and Dr Edward Mitchell - Health Service Journal 2013*

Non communicable diseases (NCD) often have very similar lifestyle causes and these lifestyle causes can lead to co morbidities. So simply trying to treat each individual NCD as it finally manifests itself doesn't seem the most efficient or effective response. This is a clear example of prevention being better than cure.

As we have seen diet is a significant factor here. Exercise is also very important and should be encouraged and facilitated.

However, on pragmatic grounds, it is easier to ensure a healthy diet - by action to ensure the quality of food available to the public. This tackles the issue at source. Conversely, it is harder to ensure people take exercise. We would need to monitor the movements of every individual and have sanctions in place for non-participants to ensure this.

We also know that obese people are less likely to take exercise than people of a normal weight.[98] As we have already seen, a healthy diet is more effective than dieting or exercise for controlling weight, so improved diet is likely to lead to more people exercising, thereby enhancing the health benefits.

It is true that the NHS faces challenges from other lifestyle related illnesses (in particular smoking and alcohol). So action to ensure healthier food and drink is only part of the solution.

However, smoking and alcohol already generate significant revenue through the levels of duty levied, so make a sizeable financial contribution to the government, whereas there is currently no equivalent tax on unhealthy food and beverages to help meet NHS costs.

To summarise:

- Achieving the required £22 billion of NHS efficiency savings by 2020/2021 is likely to prove extremely

difficult.

- This means there needs to be more focus on reducing demand for NHS services.
- We can’t avoid an ageing population, as the people who are ageing were born decades ago and are already with us.
- Reducing levels of alcohol consumption and smoking would be helpful on health grounds but unfortunately would not reduce the financial challenge, as reduced demand would be cancelled out by lower revenue from the duty on tobacco and alcohol.
- Exercise should be strongly encouraged but cannot easily be achieved through government action without significant financial investment. There is a further challenge here. Exercise can be encouraged but cannot be guaranteed.
- The one aspect of demand on the NHS which is capable of being reduced significantly by government action, without adverse financial consequences, is demand due to illness arising from poor diet. This is because the quality, content and size of food and drink products can be addressed at source, whether through voluntary agreement with the food and beverage industry or, if that is not possible, through regulation. This therefore merits serious consideration.

11. AN EXPENSIVE COCKTAIL FOR GOVERNMENT?

> 'We have reported previously our long-standing concerns about multinational companies avoiding tax, the role played by tax advisers in promoting company structures designed to avoid tax, and the effectiveness of HMRC and HM Treasury in tackling these problems.'[99]
>
> *House of Commons Public Accounts Committee February 2015*

The financial benefits of the food industry for the government are reasonably clear – nearly 3½ million jobs and tax revenue.

Furthermore, where the food industry is providing healthy food (like vegetables, fruit, pulses, whole grains, nuts and oily fish) it is making a positive contribution to public health.

However, there is also an expensive cocktail, which the July 2015 budget has only recently begun to address. Zero hours contracts, part time jobs and low pay all limit income tax and National Insurance revenue – and mean in-work State Benefits for the employees of food manufacturers and retailers can exceed corporation tax payments. The example below is for the four largest supermarkets in the UK but is likely to apply equally, if not more so, to fast food companies, as they often combine corporation tax avoidance with low wages, a point which has frequently been reported in the media in recent years.

Employer	Number of low paid employees	Total public subsidies per year	Tax in latest year	Pre-tax profit in latest year
Asda	120,000	£221.3 million	£151 million	£913.8 million
Morrisons	83,000	£189.5 million	£62 million	- £176 million
Sainsbury's	107,000	£181.5 million	£182 million	£898 million
Tesco	209,000	£364.3 million	£519 million	£2.191 billion

Source: Citizens UK, April 2015[100]

There are also the costs of poor diet related health to the NHS (some £6 billion a year[83]) - and to State Benefits through disability and limiting long term illness.

Measures to avoid corporation tax are not illegal and are not unique to companies in the food and drinks industry. In themselves they may be seen as a reasonable price to pay to secure investment and jobs. Indeed the Chancellor has cut corporation tax rates progressively from 28% to a proposed 18% in order to show that Britain is 'open for business.'

Similarly, the food and beverage industry is not unique in its use of zero hours contracts or in low pay for low skilled jobs. Retail companies are another example here.

However, when tax avoidance combines with low wages and an increase in health costs then the arithmetic

begins to change. Here are a few points to consider:

- As reported above, in three of the UK's big four supermarkets, low wages mean the government is currently paying more in-work State Benefits to staff than it received in corporation tax from the supermarkets. This is likely to be equally true if not truer of many US based fast food chains, where corporation tax avoidance has been widely reported.[101]
- In one recent year a major US fast food company paid just £22 million of corporation tax in the UK relative to turnover of £4.6 billion – and a major US soft drinks company paid just £41 million on a turnover of £6.6 billion. We report turnover here, rather than profit, as we are mindful of cases such as a major US coffee bar chain which apparently operated in the UK for 16 years without reporting a profit and only finally reported a profit after significant media scrutiny.
- According to Bloomberg, in one recent year the 48 largest food and non-alcoholic drink companies operating in the UK paid around £631 million in corporation tax, an average of just over £13 million per company. For such large and successful companies this seems relatively modest.
- In 2014/15 an adult on the minimum wage needed to work 24 hours a week before they started to pay National Insurance (NI) and 30 hours per week before they started to pay income tax. For anyone under 21 the minimum wage is lower, meaning the hours worked before NI and Income Tax are payable is correspondingly higher. This means the government is likely to be losing significant tax revenue where staff are low paid and part time.
- Zero hours contracts, part time contracts and agency workers can result in employers avoiding employer National Insurance payments (and obviously avoid employee NI payments too). As one major fast food chain admitted in 2013, 90% of its workers are on zero hours contracts. In an interview with the BBC in August 2015, the Chief Executive confirmed that the company was committed to continuing its use of zero hours contracts.
- Half the UK's 6.8 million part time workers are estimated to be earning less than the NI threshold (according to the Resolution Foundation). Many of these will be working in the food industry.
- Poor diet-related ill health cost the NHS £5.8 billion. That is according to "The economic burden of ill health due to diet, physical inactivity, smoking, alcohol and obesity in the UK": an update to 2006–07 NHS costs Scarborough et al102. The BMA estimate it currently costs £6 billion p.a.
- Food high in S3RC is a significant cause of obesity. Obesity also results in above average unemployment (limiting income tax and National Insurance revenue and increasing State Benefits payments).
- Food companies (like companies in other sectors) have also been accessing government funding for apprenticeships, job creation and staff training. In itself this is unremarkable but all adds to the expensive cocktail for government relative to the level of tax returns received.

It was encouraging to see, in the July 2015 Budget, that the Chancellor had recognised a number of these issues. In particular he proposed to reduce the scope for corporation tax avoidance, to introduce a new National Living Wage, to reduce in-work State Benefits and to introduce a levy on larger employers to help cover the cost of apprenticeships.

However, the cocktail remains expensive. If we take the new National Living Wage as an example, it is scheduled to rise to £9 per hour by 2020 but there are a number of caveats. For instance:

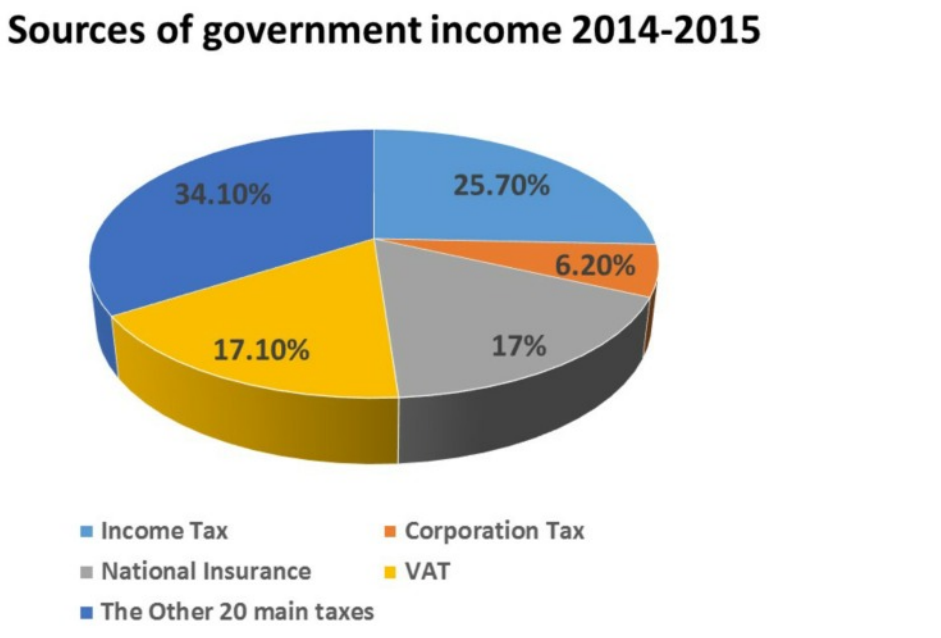
- It won't start until April 2016, at which stage it will be only 50 pence per hour more than the October 2015 adult minimum wage.[103]
- It won't apply to under 25's. As a result the credit rating agency Moody's is already warning that employers may start hiring fewer over 25's.[104]

As a result National Insurance and Income Tax revenue from employees in the food and beverage industry is likely to remain low.

The National Living Wage is a step forward. Over time it may encourage higher productivity, rather than companies relying on low wage, low skill employees. If so, this would be helpful, as low productivity has unfortunately been a feature of the UK economy. Indeed the Chancellor has described this as the 'challenge of our times.'

However the National Living Wage doesn't address issues like employers choosing to employ workers who are younger, on zero hours contracts, on part time contracts or as agency workers – each of which can help them avoid employer (and employee) National Insurance payments. In other words income tax and NI revenue from this sector is likely to remain relatively low.

This matters because Income tax, National Insurance and corporation tax provide nearly half the government's annual revenue.



(Institute for Fiscal Studies)

There is a further dimension. Other products whose consumption constitutes an increased health risk, like tobacco and alcohol, are subject to significant levels of duty. This generates revenue for the government, which in turn can be used to help support the NHS.

This means the food and beverage industry is in an unusually privileged position. Where it produces food high in S3RC these are known to increase health risks. However the industry has so far avoided duty being charged on its products. In the case of soft drinks, for example, we know of no evidence that people require soft drinks to survive (unlike water), so it is not an essential product.

We mention this not because we wish to see the food and beverage industry treated more harshly than other industries or because we wish to see food prices rise.

However, it would seem only fair that if the food and beverage industry is to continue to enjoy its privileged position then it should make a more significant, verifiable contribution to the production and retailing of healthy food – and that it would be reasonable for government to expect this of the industry and to take this into account in the event of it being lobbied on this issue by the industry.

12. IS A VOLUNTARY APPROACH TO FOOD QUALITY WORKING?

> 'Based on seventeen evidence reviews, some of the RD (Responsibility Deal) food interventions could be effective, if fully implemented. However the most effective strategies to improve diet, such as food pricing strategies, restrictions on marketing and reducing sugar intake, are not reflected in the RD food pledges.[105]
>
> *Has a public–private partnership resulted in action on healthier diets in England? An analysis of the Public Health Responsibility Deal food pledges*

Some companies would argue they are already well down the road, through the Public Health Responsibility Deal and/or are making a public commitment to help tackle obesity.

For instance Tesco's Corporate Responsibility Committee has identified, as one of its three big ambitions: 'To improve health and through this help to tackle the global obesity crisis'.[106]

The Public Health Responsibility Deal offers a number of potential benefits, including more rapid action than legislation and avoiding legal challenges by the food industry.

Voluntary action across the food industry is reported to have reduced salt levels by 15% over six years. This was achieved through incremental changes to avoid too drastic a change in taste at any one time and through 90 companies agreeing to work to the same objective, thereby minimising business risk. It is a very positive step forward.

However, a review by the London School of Hygiene and Tropical Medicine (cited above) found limited information, reported in different ways by different companies. It also concluded:

- Most Responsibility Deal partners appear to have committed to interventions that probably were already underway.

- The Responsibility Deal food pledges do not reflect the most effective strategies to improve diet – such as reducing sugar levels.

- Voluntary agreements need to push partners to go beyond business as usual.

Media reports have also shown examples of backsliding by food companies, particularly when it comes to sugar. For example Action on Sugar reported that the highest sugar containing cereals have either stayed the same or increased since 2012.[107]

There is also evidence of companies launching new products with even more sugar, like breakfast bars and breakfast drinks – which Kantar Worldpanel report have seen significant sales growth.

Overall the verdict appears to be that voluntary agreements, like the Responsibility Deal, have potential but much depends on their remit and how they are implemented and monitored.

To have credibility as a genuine contribution to public health there need to be agreed targets in key areas like sugar reduction, as well as independent assessment and verification arrangements.

13. PART OF THE PROBLEM OR PART OF THE SOLUTION?

Parts of the food and beverage industry have been under fire in recent years, on at least four fronts

- From a health perspective, for the high levels of sugar, salt and fat in many products.
- From an employment perspective, for paying low wages and for increasing use of zero hours contracts and agency staff.
- From a tax perspective, for the various measures taken to avoid corporation tax and employers' National Insurance.
- From suppliers like farmers, for the way they have sometimes been treated.

All this is likely, over time, to impact on reputation and thereby on profits and share valuation, potentially leading to shareholder concerns.

Some investment banks have prepared detailed reports covering nutritional aspects, like JP Morgan on obesity. It is likely that such reporting will improve as consumer concerns about this issue and the associated reputational and commercial risks, grow. As JP Morgan commented, "as investors, we need to understand companies' strategies for addressing obesity and related health issues, and whether they are set to gain competitive advantage from those strategies".[108]

Action to address health concerns would go some significant way to addressing threats to company and brand reputation. If what a company produces is suspect then it is more vulnerable to attack on other fronts.

As explained earlier, consumers see the role played by food manufacturers as more important than the role played by government and doctors when it comes to health – and McKinsey identified three interventions as particularly important when tackling obesity i.e. portion control, reformulation and high calorie food/beverage availability.

This matters too because what the public views as 'healthy' food is changing in the light of research findings and media coverage. For example:

- Compared to research conducted in 2004, consumers have a broader level of understanding about what constitutes a 'healthy' diet. This now includes a greater emphasis on factors such as eating fresh fruit and vegetables and having a balanced diet. That's the verdict of a 2012 report from Leatherhead Food Research.[110]
- Recent consumer research commissioned by BENEO with 5,000 consumers in five different European markets reveals that people are starting to differentiate between "good" and "bad" carbohydrates.[109]
- There also seems to be increasing consumer concern about sugar. In a recent Nielsen survey more European respondents were now seeking to eat less sugar and chocolate than to eat less fat.[111]

> "Broadly speaking, this research indicates a greater engagement with our health and the food we consume…..this presents numerous opportunities for the food and beverage industry to create products which meet these needs".[112]
>
> *Laura Kempster, Senior Analyst in Leatherhead Food Research's Sensory, Consumer and Market Research Dept.*

This growing public awareness may help explain why Credit Suisse noted growing public support for regulation and potentially taxation and expect consumer associations to be increasingly proactive in raising potential health issues and monitoring advertisement and availability, particularly for children.[113]

In this evolving context food companies (and governments) may wish to consider whether it makes more sense to be seen, by consumers, shareholders, the electorate and the media, to have jumped rather than have been pushed – to be part of the solution rather than part of the problem.

One indicator of a company's commitment here is its annual report. Do either the Chairman's Report or the Chief Executive's refer to action to reduce levels of S3RC? Our review of company annual reports indicates that currently this is the exception.

We therefore suggest that inclusion of action to reduce levels of food high in S3RC becomes standard practice in the Chairman's Report or the Chief Executive's Report, as a simple but practical way of helping identify which food and beverage companies are giving priority to producing and marketing healthier food.

14. HEALTHIER FOOD – BETTER FOR BUSINESS?

> "Health is going mainstream…… As consumers around the globe search for better, healthier and smarter solutions that fit their lifestyle and specific needs, the motivation for manufacturers and retailers to foster strategies for a healthier world is powerful. But much more needs to be done."[114]
>
> *Susan Dunn, Executive Vice President, Global Professional Services, Nielsen 2015*

Here are a few examples of the commercial value of healthier food:

- Four studies by the Hudson Institute, covering consumer packaged goods (CPG) food companies and restaurant chains[115] found that lower-calorie products drove virtually all of the growth at the HWCF (Healthy Weight Commitment Foundation) member companies studied in the US. They accounted for 52.5 percent of sales and 99 percent of sales growth. Companies that grew their lower-calorie products increased total sales. Companies that didn't recorded total sales declines.

- A 2015 report from consumer research company Nielsen[116] found that over 78% of European respondents were changing their diets in order to lose weight - using methods such as cutting down on fats, eating less chocolate and sugary sweets and consuming fewer processed foods. 79% of respondents were willing to pay a premium for health benefits.

- US soft drinks shares have been underperforming relative to the rest of the consumer staples stocks (according to the Financial Times). Globally sales of bottled water have overtaken sales of fizzy drinks for the first time (according to beverage market research company Canadean). In the UK, AG Barr, makers of the iconic fizzy drink Irn Bru is now selling more bottled water than carbonated drinks.

> "For companies with brands as strong as Coca-Cola or Pepsi, the biggest risk to sales growth and profitability is a negative public image."[117]
>
> *Credit Suisse Research 2013 report "Sugar consumption at a crossroads".*

In the UK there still seems to be some time lag between a stated consumer desire for healthier products and what some people actually purchase, possibly due to issues of availability and perceived cost. A survey by consumer research company dunnhumby, which examined what consumers bought, reported in 2014 that

- 25% of customers in the UK have a high health commitment (i.e. they consciously buy healthy products).

- 25% of customers have moderate health commitment (i.e. they sometimes buy healthy products).

- 50% of customers have low health commitment (i.e. what they buy isn't based on health considerations).

However, dunnhumby noted that the 25% who had a high health commitment were the most lucrative market for retailers.

As Credit Suisse have identified, long-term trends in consumption are set by those with higher education and higher income. The expansion of higher education in the UK means increasingly educated consumers and we

are starting to see a move to healthier lifestyles, from our own health behaviour change survey to the downward trend in alcohol consumption among young people.

Some companies are already experiencing the benefits of a healthy approach. For example, in January 2013 the supermarket chain Lidl was the first in the UK to ban sweets and chocolates from all its checkouts. By the summer of 2015 Kantar Worldpanel was reporting that Lidl had achieved a record market share.

Moreover companies who focus only on the UK market are unlikely to see significant growth over the coming years – compared with the potential for growth in emerging economies.

> " You are never going to become a global player by producing goods just for UK retailers … All the research shows that as emerging market consumers move into the ranks of the middle classes, they start to buy better quality products and more branded food products. There is real scope for British companies to try to win business in emerging markets."[118]
>
> *James Chadwick, Head of Food and Beverage, Scotland Grant Thornton 2015*

Competitive advantages are potentially available throughout the food chain i.e. to raw ingredient manufacturers, wholesalers, retailers and food outlets.

The UK already has one significant source of competitive advantage. It has world class universities, who have increasingly been working in partnership with business, for example through commissioned research, through Knowledge Transfer Partnerships and with support from Innovate UK (formerly The Technology Strategy Board).

A good example of this university – business collaboration within the food industry came when Marks and Spencer developed the 'Fuller Longer' range, with input from researchers at the University of Aberdeen. This soon became the company's bestselling diet range.[119]

> 'The Fuller Longer range of dishes was based on research with human volunteers which demonstrated the efficacy of high protein, moderate carbohydrate diets in sustained appetite control, leading to weight loss. The interaction took the concept of protein-induced satiety from the laboratory directly to application in the commercial food industry setting, with great commercial success for the industry partner.'
>
> *University of Aberdeen Research website*

One question for UK based food companies is therefore this. Do they want to commit their time and resources focusing on what looks set to prove a shrinking, lower value consumer group, nationally and internationally - or to make the most of the global business potential arising from the growing desire for healthier food?

15. HEALTHIER FOOD – HOW FEASIBLE IS THIS?

> 'In the process of self-regulating and educating the public to take advantage of healthier choices, the beverage manufacturing industry has one advantage: in most cases, it already provides a healthier alternative of the fully caloric version (which is not the case for the tobacco and alcohol industry)'.[117]
>
> *Sugar consumption at a crossroads - Credit Suisse*

Reformulation can be a complex process. For example companies may need to consider the impact on taste, shelf life and food safety. And changes may have knock on effects that need to be addressed.

For example Premier Foods have identified that reducing the salt content of Italian sauces can make them taste more acidic and reducing the salt content of Indian sauces can make them taste too hot, thereby requiring further reformulation.

And some soft drinks companies have found customers willing to try new low calorie options but then sometimes reverting to higher calorie products. According to 'The Grocer,' Coca-Cola's Sprite brand saw a significant decline in sales when it reformulated its recipe. And consumer preference for 'natural' rather than 'artificial' ingredients can be a further challenge when seeking to reformulate.

Experiences like this have led some in the food industry to argue that there is no simple way to reduce the fat, sugar and salt content of food while maintaining texture, flavour and microbial stability.

It is true that reformulation can be a challenge. However:

a. Reformulation is a relatively routine process for the food industry.

b. New technologies are emerging. These include:

- Salt microspheres (essentially converting salt grains into salt dust, which provides the same salt taste but with less salt).[120]
- Fat micro-aeration (which injects water into fat molecules, providing the same taste and consistency but with less fat).
- Adding salt aroma to a reduced salt product (which uses the smell of salt to give consumers the impression that food contains more salt than is actually the case).[121]
- Natural alternatives to sugar, which can sometimes be used in conjunction with a reduced level of sugar to ease the transition for consumers – as with Coca-Cola Life in Argentina (which is sweetened with half Stevia and half sugar leading to a 50% reduction in calories).[122]
- Flavour delivery particles, which can cut sugar content by half while retaining the same taste. Israeli company DouxMatok has created a carrier particle coated with sugar molecules using non-covalent bonding. This increases the surface area, meaning the same sweetness can be achieved with less sugar, costing less, and without needing to use artificial sweeteners. However DouxMatok are still working on the issue of lightness and volume.[123]

c. Food and drink companies can claim an element of corporation tax relief for Research and Development (including staffing, subcontractor, heat, light, power, software and project equipment costs) – and are already claiming over £1 billion a year from the government for this. They can also claim a further 10% reduction on their corporation taxes under the patent box scheme.[124]

In the food and drinks industry, Research and Development can take place in many ways. In the context of healthier foods, it can be used to create and develop new 'healthier' recipes and formulations, create sugar substitutes, reduce the number of calories or find nutritionally better alternatives for a host of other ingredients.

d. Food companies have already made some progress, like reducing the salt content of food by 15% over 6 years and removing sweets from supermarket checkouts in response to consumer concerns. And in 2015 companies like Tesco and Coca Cola have announced plans to gradually reduce the sugar content of their carbonated drinks.

This shows that progress is possible, for instance by incremental reductions over time to avoid too drastic a change in taste for consumers.

And reformulation isn't needed where food companies already have healthy products with the potential to grow sales. For example the Food and Drink Federation reports that

- A major soft drinks company which also provides non beverage products increased the percentage of younger shoppers who buy porridge oats from 10% to 22%.[125]

As regards taste, this may also not always be as big an issue as has been claimed, according to a small scale test for a BBC programme in 2015.

There are also other commercial alternatives to reformulation, like portion control, as in the example below and in the example of companies like Mars and Nestle who have been reducing the size of their confectionery.

> 'Late last year, the three soft drink giants, The Coca Cola Company, PepsiCo, and Dr Pepper Snapple, announced their aim of reducing calorie consumption through their offerings by 20% by 2025 in the U.S. These companies plan to achieve this through the promotion of low-calorie substitutes and smaller packs, which provide lower cumulative calories in one go'.[126]
>
> *Forbes February 2015*

It may also be worth noting that health concerns don't represent an existential threat to business. People will always need to eat and drink.

And consumer behaviour is sometimes nuanced. For example people may want their everyday foods to be healthy, but feel treats (like chocolates or eating out) may be treated more as indulgences, with less need to be healthy.

So we will always need a food industry. Its future isn't at risk in the way the tobacco industry's is in the UK.

Indeed, our analysis suggests that producing healthier food and being seen to do so should have positive commercial benefits for food and beverage companies. It should enable them to increase market share and profits amongst the country's (and the world's) increasingly better educated, more health conscious consumers.

16. WHAT NEEDS TO BE DONE?

In the light of our findings we ask the government to consider our recommendations:

1 To help tackle obesity, reduce the risk of preventable illness at each key stage in life and reduce pressure on the NHS:

1.1 A multi partner task force to be convened, with a remit to reduce pre-school obesity within the lifetime of a single Parliament, to include:

- Measures to encourage an appropriate quality and quantity of nutrition during the first 1000 days of life (from conception
- Identifying which new born babies are most at risk of obesity and providing targeted support for the parents.

1.2 To reduce obesity in adolescence, as well as longer term preventable illness (such as Type 2 Diabetes), update the Responsibility Deal to include

- Targets for overall sugar reduction, to include a specific target for reducing the provision of sugar sweetened drinks.
- A ban on the online advertising to children of food high in sugar, salt and refined carbohydrates (SS-RC).
- Independent monitoring and assessment.

In the event of appropriate progress not being achieved through voluntary arrangements and self-regulation the government to introduce regulation to achieve this.

1.3 To enable adults to make healthy choices in a less obesogenic environment:

- The advertising budget for Public Health England to be set as a proportion of the UK's commercial advertising expenditure on food high in S3RC, to seek to ensure adults are receiving reasonably balanced communications regarding food whose regular consumption increases health risks.
- Local authorities to be given the discretion to introduce differential business rates, to control the number of fast food outlets and encourage more local businesses which help rather than hinder public health.

2. Achieving Global Market Leadership

To enable the UK to achieve global market leadership in the production, sale and marketing of healthier food – and to help achieve the Chancellor's target of doubling UK exports:

- Current corporation tax relief on R&D for the food industry to be amended to incentivise the research and development of healthier mass produced food.
- The Department of Business, Innovation and Skills to work with the food and beverage industry, health experts, universities, consumer research organisations and consumer groups to develop a business strategy for global market leadership – including identifying any measures the government could reasonably take to assist this, for consideration by Parliament no later than autumn 2017.

REFERENCES

1. Nutrient Profiling Technical Guidance April 2009 - http://www.food.gov.uk/sites/default/files/multimedia/pdfs/techguidenutprofiling.pdf
2. Carbohydrates and health–SCAN - https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/445503/SACN_Carbohydrates_and_Health.pdf
3. de Koning L, Malik VS, Kellogg MD, et al Sweetened Beverage Consumption, Incident Coronary Heart Disease, and Biomarkers of Risk in Men. Circulation. 2012;125:1735-1741.
4. He FJ, Li J, MacGregor GA. Effect of longer term modest salt reduction on blood pressure: Cochrane systematic review and meta-analysis of randomised trials BMJ 2013; 346 doi:10.1136/bmj.f1325.
5. Eat less saturated fat - http://www.nhs.uk/Livewell/Goodfood/Pages/Eat-less-saturated-fat.aspx
6. Aune D, Norat T, Romundstad P, et al. Whole grain and refined grain consumption and the risk of type 2 diabetes: a systematic review and dose-response meta-analysis of cohort studies. 2013;28:845-58.
7. Malik VS, Schulze MB, Hu FB. Intake of sugar-sweetened beverages and weight gain: a systematic review. Am J Clin Nutr. 2006;84:274-88.
8. Complications of obesity - http://www.nhs.uk/Conditions/obesity/Pages/complications.aspx
9. Akbaraly TN, Brunner EJ, Ferrie JE, et al. Dietary pattern and depressive symptoms in middle age. Br J Psychiatry. 2009;195:408-13.
10. Sánchez-Villegas A, Delgado-Rodríguez M, Alonso A, et al. Association of the Mediterranean dietary pattern with the incidence of depression: the Seguimiento Universidad de Navarra/University of Navarra follow-up (SUN) cohort. Arch Gen Psychiatry. 2009;66:1090-8.
11. Jacka FN, Pasco JA, Mykletun A, et al. Association of Western and traditional diets with depression and anxiety in women. Am J Psychiarty. 2010;167:305-11.
12. UCL study finds new evidence linking fruit and vegetable consumption with lower mortality. https://www.ucl.ac.uk/news/news-articles/0414/010413-fruit-veg-consumption-death-risk
13. Mudryj AN, Yu N, Aukema HM. Nutritional and health benefits of pulses. Applied Physiology, Nutrition, and Metabolism, 2014,39:1197-1204.
14. Wu H, Flint AJ, Qi Q, et al. Association between dietary whole grain intake and risk of mortality - two large prospective studies in us men and women. JAMA Intern Med. 2015;175:373-384.
15. Sofi F, Cesari F, Abbate R, et al. Adherence to Mediterranean diet and health status: meta-analysis. Br Med J. 2008;337:a1344 doi:10.1136/bmj.a1344
16. Shu Wen Ng, Cliona Ni Mhurchu, Jebb SA, et al. Patterns and trends of beverage consumption among children and adults in Great Britain, 1986–2009. Br J Nutr.2012;108:536–551.
17. British People Spend Nearly £30 Billion On Takeaways And Fast Food Every Year. http://www.huffingtonpost.co.uk/2014/03/26/takeaways-british-favourite-fast-food-spending_n_5033233.html
18. Grover SA, Kaouache M, Rempel P, et al. Years of life lost and healthy life-years lost from diabetes and cardiovascular disease in overweight and obese people: a modelling study. Lancet – Diabetes and Endocrinology. 2015;3:114-122.
19. Obesity - http://www.kingsfund.org.uk/time-to-think-differently/trends/healthy-behaviours/obesity
20. Adult Obesity and type 2 Diabetes. https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/338934/Adult_obesity_and_type_2_diabetes_.pdf
21. Health risks of adult obesity. http://www.noo.org.uk/NOO_about_obesity/obesity_and_health/health_risk_adult
22. Obesity and mental health - http://www.noo.org.uk/uploads/doc/vid_10266_Obesity%20and%20mental%20health_FINAL_070311_MG.pdf
23. Employers' attitude to Obese candidates - http://www.crosslandsolicitors.com/site/crossland_news/Employer_survey_obese_candidates_2015_html
24. Cesarean delivery in the United Kingdom: Time trends in the General Practice Research Database - http://www.bu.edu/bcdsp/2012/07/12/cesarean-delivery-in-the-united-kingdom-time-trends-in-the-general-practice-research-database/
25. Earle S. Factors affecting the initiation of breastfeeding: implications for breastfeeding promotion. Health Promot. Int. 2002;17:205-214.
26. O'Reilly JR; Reynolds RM. The Risk of Maternal Obesity to the Long-term Health of the Offspring. Clin Endocrinol. 2013;78:9-16.
27. Understanding satiety: Feeling full after a meal - http://www.nutrition.org.uk/healthyliving/fuller/understanding-satiety-feeling-full-after-a-meal.html
28. Wansink B, Shimizu M, Brumberg A. Association of nutrient-dense snack combinations with calories and vegetable intake. Pediatrics 2013;131:22–29.
29. Rethink your drink – Centre for Disease and prevention. http://www.cdc.gov/healthyweight/healthy_eating/drinks.html
30. Houchins JA, Tan SY, Campbell WW, et al. Effects of fruit and vegetable, consumed in solid vs beverage forms, on acute and chronic appetitive responses in lean and obese adults. Int J Obesity.2013;37:1109-1115.
31. Grimes CA, Riddell LJ, Campbell KJ, et al. Dietary Salt Intake, Sugar-Sweetened Beverage Consumption, and Obesity Risk. Pediatrics 2013;131:14–21.
32. Slavin JL. Dietary fiber and body weight. Nutrition 2005; 21(3):411-418. http://www.nutritionjrnl.com/article/S0899-9007(04)00304-1/abstract

33. Liu S, Willett WC, Manson JA, et al. Relation between changes in intakes of dietary fiber and grain products and changes in weight and development of obesity among middle-aged women. Am J Clin Nutr 2003;78:920–7.
34. Hu X, Gao J, Zhang Q, et al. Soy fiber improves weight loss and lipid profile in overweight and obese adults: A randomized controlled trial. Molecular Nutrition & Food Research. 2013;57:2147–2154.
35. Carbohydrate and Health - Scientific Advisory Committee on Nutrition (SCAN) 2015. https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/445503/SACN_Carbohydrates_and_Health.pdf
36. Probiotics, prebiotics and the gut microbiota. http://www.ilsi.org/Europe/Publications/Prebiotics-Probiotics.pdf
37. Darmasseelane K, Hyde MJ, Santhakumaran S, et al. Mode of Delivery and Offspring Body Mass Index, Overweight and Obesity in Adult Life: A Systematic Review and Meta-Analysis. 2014; 9(2):e87896. http://journals.plos.org/plosone/article?id=10.1371/journal.pone.0087896
38. Neu J, Rushing J. Cesarean versus Vaginal Delivery: Long term infant outcomes and the Hygiene Hypothesis. Clin Perinatol. 2011;38:321-331.
39. Hyde MJ, Mostyn A, Modi N, et al. The health implications of birth by Caesarean section. Biological Reviews 2012; 87:229-243.
40. Yan J, Liu L, Zhu Y, et al. The association between breastfeeding and childhood obesity: a meta-analysis. *BMC Public Health* 2014,14:1267-1278.
41. Earle S. Factors affecting the initiation of breastfeeding: implications for breastfeeding promotion. Health Promot. Int. 2002;17:205-214.
42. DiBaise JK, Frank DN, Mathur R. Impact of the Gut Microbiota on the Development of Obesity: Current Concepts. Am J Gastroenterol Suppl.2012;1:22–27.
43. Increasing awareness of invisible calories from alcohol – RSPH http://www.rsph.org.uk/filemanager/root/site_assets/our_work/position_statements/alcohol_and_obesity_final.pdf
44. Reinehr T. Obesity and thyroid function - http://www.endocrine-abstracts.org/ea/0029/ea0029s59.1.htm
45. Britain's happiness in decline. http://news.bbc.co.uk/1/hi/programmes/happiness_formula/4771908.stm
46. Westerterp KR, Speakman JR. Physical activity energy expenditure has not declined since the 1980s and matches energy expenditures of wild mammals. Int J Obes (Lond). 2008;32:1256-63.
47. London residents cycling to work doubles in ten years – ONS http://www.ons.gov.uk/ons/rel/census/2011-census-analysis/cycling-to-work/sty-cycling-to-work.html
48. London transport workers study. Coronary heart disease and physical activity of work. Lancet 1953;265:1053-1057. http://www.epi.umn.edu/cvdepi/study-synopsis/london-transport-workers-study/
49. *Flint E, Cummins S, Sacker A. Associations between active community, body fat, and body mass index: population based across sectional study in the United Kingdom. BMJ* 2014; 349 doi: http://dx.doi.org/10.1136/bmj.g4887
50. Luke A, Cooper RS. Physical activity does not influence obesity risk: time to clarify the public health message. Int. J. Epidemiol. (2013) 42 (6):1831-1836.
51. Trexler ET, Smith-Ryan AE, Norton LE. Metabolic adaptation to weight loss: implications for the athlete. J Inter Soc Sport Nut. 2014,11:7-10.
52. Health Records. Fildes A, Charlton J, Rudisill C et al. Probability of an obese person attaining normal body weight: cohort study using electronic health records. American Journal of Public Health | September 2015. http://ajph.aphapublications.org/doi/pdf/10.2105/AJPH.2015.302773
53. Strasser B. Physical activity in obesity and metabolic syndrome. Ann N Y Acad Sci. 2013;1281:141-59.
54. Trexler ET, Smith-Ryan AE, Norton LE. Metabolic adaptation to weight loss: implications for the athlete. J Inter Soc Sport Nut. 2014,11:7-10.
55. Loveman E, Frampton GK, Shephred J. The clinical effectiveness and cost-effectiveness of long-term weight management schemes for adults: a systematic review. Health Technol Assess. 2011;15):1-182.
56. Mostazir M, Jeffery A, Voss L. Childhood obesity: evidence for distinct early and late environmental determinants a 12-year longitudinal cohort study (EarlyBird 62). *Int J Obes.* 2015;39**:**1057–1062.
57. St-Onge M-P, Keller KL, Heymsfield SB. Changes in childhood food consumption patterns: a cause for concern in light of increasing body weights. Am J Clin Nutr 2003;78:1068-1073.
58. Novak NL, Brownell KD. Role of policy and Government in the obesity epidemic. Circulation 2012;126:2345-2352.
59. Mann T, Tomiyama AJ, Westling E, et al. Medicare's search for effective obesity treatments: diets are not the answer. Am Psychol. 2007;62:220-33.
60. Leibel RL, Rosenbaum M, Hirsch J. Changes in energy expenditure resulting from altered body weight. N Engl J Med. 1995;332:621-8.
61. Slavin J and Green H. Dietary fibre and satiety. Br Nut Found Nut Bul. 2007:32 (suppl 1):32-42.
62. Liu RH. Health-Promoting Components of Fruits and Vegetables in the Diet. Adv Nutr. 2013;4:384S-392S.
63. DiBaise JK, Frank DN and Mathur R. Impact of the Gut Microbiota on the Development of Obesity: Current Concepts. Am J Gastroenterol Suppl. 2012;1:22–27.
64. Howarth NC[1], Saltzman E, Roberts SB. Dietary fiber and weight regulation. Nutr Rev. 2001;59:129-39.
65. The InterAct Consortium - Dietary fibre and incidence of type 2 diabetes in eight European countries: the EPIC-InterAct Study and a meta-analysis of prospective studies. Diabetologia 2015, 58(7):1394-1408.
66. The state of the industry http://www.fdf.org.uk/speeches/bccc11_david_jago.pdf
67. How the world could better fight obesity - http://www.mckinsey.com/insights/economic_studies/how_the_world_could_better_fight_obesity

68. Get People moving to improve nation's health - http://www.parliament.uk/business/committees/committees-a-z/commons-select/health-committee/news/activity-diet-health-substantive/
69. Kral, VE, Daith MS. Influences on child eating and weight development from a behavioural genetics perspective. J Pediatr Psychol.2009;34:596-605.
70. Black JA, Park MH, Gregson J. Child obesity cut-offs as derived from parental perceptions: cross-sectional questionnaire. Br J Gen Pract.2015;65(633):e234-9.
71. The changing shape of the obesity debate. http://populus.co.uk/item/The-changing-shape-of-the-obesity-debate/
72. Change4Life begins £10.9m creative review. http://www.campaignlive.co.uk/article/1193973/change4life-begins-109m-creative-review
73. Ruchat SM, Hivert MF, Bouchard L. Epigenetic programming of obesity and diabetes by in utero exposure to gestational diabetes mellitus. Nutr Rev. 2013;71:S88-94.
74. De Jesus-Laboy KM, Cox LM, Rodriguez-Rivera SM, et al. Restoring the normal microbiota of cesarean-section born infants. http://www.asmonlineeducation.com/php/asm2014abstracts/data/papers/I-741.htm
75. Obesity – UNICEF http://www.unicef.org.uk/BabyFriendly/News-and-Research/Research/Obesity/
76. Modi SR, Collins JJ, Relman DA. Antibiotics and the gut microbiota. http://www.jci.org/articles/view/72333
77. https://www.nice.org.uk/news/article/calls-for-nhs-to-curb-inappropriate-antibiotic-prescribing
78. Tackling obesity through the healthy child programme. http://www.noo.org.uk/uploads/doc/vid_4865_rudolf_TacklingObesity1_210110.pdf
79. Brownell KD, Frieden TR. Ounces of prevention – The public policy case for taxes on sugared beverages. N Engl J Med 2009;360:1805-1808.
80. Lobstein T, Jackson-Leach R, Moodie ML. Child and adsolescent obesity: part of a bigger picture. Lancet 2015;385(9986):2510-2520.
81. Obesity scorecard can identify high-risk cases at birth, say scientists. http://www.theguardian.com/society/2012/nov/28/obesity-scorecard-high-risk-cases-birth
82. Delivering expectations - https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/216029/dh_119470.pdf
83. Food for thought – BMA http://bma.org.uk/foodforthought
84. Preventing child obesity: a long-term evaluation of the HENRY approach. http://www.henry.org.uk/wp-content/uploads/2012/07/Community-Practitioner-2013-long-term-impact-of-HENRY-training1.pdf
85. Health Trainers - https://www.rsph.org.uk/en/policy-and-projects/areas-of-work/wider-public-health-workforce/health-trainers.cfm
86. Lifestyle intervention for expectant Moms - https://portal.bsc.gwu.edu/web/lifemoms/home;jsessionid=ECD4AE78BEE5F39CC3EDD2DCF23DB148.ajp13
87. Wen LM, Baur LA, Simpson JM. Sustainability of effects of an early childhood obesity prevention trial over time: A further 3-year follow-up of the healthy beginnings trial. JAMA Pediatr. 2015 Jun;169:543-51
88. Cameron AJ, Ball K, Hesketh KD. Variation in outcomes of the Melbourne infant, feeding, activity and nutrition trial (InFANT) program according to maternal education and age. Prev Med. 2014;58:58-63.
89. Keita AD, Risica PM, Drenner KL. Feasibility and acceptability of an early childhood obesity prevention intervention: Results from healthy homes, healthy families pilot study. J Obesity 2014 http://www.hindawi.com/journals/jobe/2014/378501/
90. Mostazir M, Jeffery A, Voss L, et al. Childhood obesity: evidence for distinct early and late environmental determinants a 12-year longitudinal cohort study. International Journal of Obesity (2015) 39, 1057–1062.
91. Childhood Obesity - Food Advertising in Context - http://stakeholders.ofcom.org.uk/binaries/research/tv-research/report2.pdf
92. The 21st century gingerbread house. How companies are marketing junk food to children online. https://www.bhf.org.uk/~/media/files/publications/policy-documents/the-21st-century-gingerbread-house.pdf
93. NHS – Five year forward view. https://www.england.nhs.uk/wp-content/uploads/2014/10/5yfv-web.pdf
94. Appleby J. Spending on health and social care over the next 50 years - Why think long term? http://www.kingsfund.org.uk/sites/files/kf/field/field_publication_file/Spending%20on%20health%20...%2050%20years%20low%20res%20for%20web.pdf
95. Prescribing for Diabetes. http://www.hscic.gov.uk/catalogue/PUB14681/pres-diab-eng-200506-201314-rep.pdf
96. Adult obesity and type 2 diabetes. https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/338934/Adult_obesity_and_type_2_diabetes_.pdf
97. Integrating care for people with comorbidities. http://m.hsj.co.uk/5060119.article
98. http://www.hscic.gov.uk/catalogue/PUB13648/Obes-phys-acti-diet-eng-2014-rep.pdf
99. Tax avoidance: the role of large accountancy firms report published. http://www.parliament.uk/business/committees/committees-a-z/commons-select/public-accounts-committee/news/report-tax-avoidance-the-role-of-large-accountancy-firms-follow-up/
100. Taxpayers subsidise big business by an estimated £11 billion a year. http://www.citizensuk.org/taxpayer
101. Where next for zero-hours contracts? http://www.hrmagazine.co.uk/hr/analysis/1151255/where-next-for-zero-hours-contracts
102. Scarborough P, Bhatnagar P, Wickramasinghe KK, et al. The economic burden of ill health due to diet, physical inactivity, smoking, alcohol and obesity in the UK: an update to 2006–07 NHS costs. J Pub Health. 2011:1-9.
103. https://www.gov.uk/government/news/new-national-minimum-wage-rates-announced
104. Grocers could close stores and hire fewer over 25s because of living wage.http://www.retail-week.com/sectors/food/grocers-could-close-stores-and-hire-fewer-over-25s-because-of-living-wage/5077680.article
105. Knai C, Petticrew M, MA. et al. Has a public–private partnership resulted in action on healthier diets in England? An analysis of the Public Health Responsibility Deal food pledges. Food Policy 2015;54:1–10.

106. Tesco PLC Annual Report and Financial Statements 2014. http://www.tescoplc.com/files/pdf/reports/ar14/download_annual_report.pdf
107. Cereals still stuffed with sugar - http://www.actiononsalt.org.uk/actiononsugar/Press%20Release%20/146899.html
108. The Proof of the Pudding. http://www.pacifichealthsummit.org/downloads/Nutrition/JPMorgan%20-%20Proof%20of%20the%20Pudding.pdf
109. Consumer research reveals improved understanding of the benefits of low glycaemic Nutrition. http://www.beneonews.com/Press_Releases/2015/Consumer_Research_low_glycaemic_nutrition
110. Diet, Health and Obesity in the UK: State of the Nation 2012. http://www.leatherheadfood.com/diet-health-obesity
111. British and Irish people are the most likely in europe to consider themselves overweight. http://www.nielsen.com/uk/en/press-room/2015/health-and-wellness.html
112. Increasing number of UK consumers have greater awareness of health and well-being. https://www.leatherheadfood.com/increasing-number-of-uk-consumers-have-greater-awareness-of-health-and-well-being
113. Health Care -Is sugar turning the economy sour? https://www.credit-suisse.com/uk/en/news-and-expertise/topics/health-care.article.html/article/pwp/news-and-expertise/2013/09/en/is-sugar-turning-the-economy-sour.html
114. A clean bill of health and wellness: good-for-you goods are set to grow. http://www.nielsen.com/us/en/insights/news/2015/a-clean-bill-of-health-and-wellness-good-for-you-goods-are-set-to-grow.html
115. Lower-calorie foods and beverages fuel growth at healthy weight commitment foundation companies – Hudson Report. http://www.healthyweightcommit.org/images/uploads/HWCF_Hudson_Report_091714.pdf
116. We are what we eat healthy eating trends around the world January 2015. http://www.nielsen.com/content/dam/nielsenglobal/eu/nielseninsights/pdfs/Nielsen%20Global%20Health%20and%20Wellness%20Report%20-%20January%202015.pdf
117. Sugar consumption at crossroads - https://publications.credit-suisse.com/tasks/render/file/index.cfm?fileid=780BF4A8-B3D1-13A0-D2514E21EFFB0479
118. Food and drink sector: Grabbing a slice of the action - https://www.icas.com/news/food-and-drink-sector-grabbing-a-slice-of-the-action
119. http://www.abdn.ac.uk/research/research-impact/fuller-longer-food-169.php
120. SODA-LO®Salt Microspheres. http://www.tateandlyle.com/ingredientsandservices/chooseaningredientorservice/americas/pages/soda-lo%C2%AEsaltmicrospheres.aspx
121. Chiu N, Hewson L, Yang N, et al. Controlling salt and aroma perception through the inclusion of air fillers. LWT - Food Science and Technology 2015;63:65–70.
122. Stevia-sweetened Coca-Cola Life to enter new markets this year - but Coke won't say which ones. http://www.foodnavigator-usa.com/Manufacturers/Stevia-sweetened-Coca-Cola-Life-to-enter-new-markets-this-year-but-Coke-won-t-say-which-ones
123. Flavour delivery particle can cut sugar by half and is cheaper than sugar. http://www.foodnavigator.com/Market-Trends/Flavour-delivery-particle-can-cut-sugar-by-half-and-is-cheaper-than-sugar
124. Tax insight UK http://www.taxinsightuk.com/wp-content/uploads/2013/07/Tax-Insight-R-D-Food-and-Drinks-Industry.-July-2013.pdf
125. Delivering healthy growth: Know your food & diet - PepsiCo UK & Ireland case study. http://www.fdf.org.uk/casestudies/DHG-kyfd- pepsico.aspx
126. Coca-Cola's low-sugar initiative is good for profitability too. http://www.forbes.com/sites/greatspeculations/2015/02/02/coca-colas-low-sugar-initiative-is-good-for-profitability-too/