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Improving children's diet

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Summary

This report is about improving children's diet. It examines the importance of a healthy diet during childhood in helping to protect against a range of conditions. These include conditions such as obesity, tooth decay and (increasingly) type 2 diabetes that can affect children themselves, as well as a range of chronic diseases that may occur later in their adult life. The report also looks at recent trends in child health and diet, and examines the key factors that help to shape children's dietary choices. Finally, the report describes current policy to encourage healthy eating in schools and in the wider world and analyses options for further policy in this area. Among the main findings are that:

- There is widespread agreement over what constitutes a healthy diet. National and international expert bodies have set reference values for dietary intakes of saturated fat, salt, sugars and energy and agree that a healthy diet should be rich in fruit and vegetables (chapter 2).
- Data from dietary surveys suggest that children are eating too much salt, sugars and saturated fats and too few fruit and vegetables. Other research shows a rise in childhood obesity and in conditions such as type 2 diabetes, which was previously considered to be a condition associated with middle age. Diet is likely to be a key factor behind these trends, although the available evidence does not allow the extent of its contribution to be assessed relative to other factors such as changes in patterns of physical activity (chapter 3).
- A wide range of factors influences what children eat. Among the key factors identified in chapter 4 are innate and acquired preferences: children are born with a preference for sweet tastes and rapidly acquire a liking for energy-dense foods which they associate with the pleasurable feeling of satiating their appetite. Other factors include the way that foods are presented, the availability of different types of food in schools and elsewhere, and the activities of companies who market their products in a way that is specifically designed to appeal to children.
- Chapter 5 examines the wide range of policy initiatives that are already underway in schools and in wider communities, to try and encourage children to eat healthier diets. These include schemes to improve access to fruit and vegetables in schools and in communities, a healthy schools standard, teaching about healthy diets and food preparation skills in the National Curriculum and initiatives to improve food labelling and people's understanding of it. In general, such initiatives have been widely welcomed, although there has been a perceived need for greater co-ordination between different sectors. However, there is a growing recognition that more may need to be done if further progress is to be made. Chapter 5 thus also examines a range of additional policy options to discourage children from eating foods that may contribute to an unhealthy diet.

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1 Introduction

Worldwide, the World Health Organisation (WHO) estimates that, in 2001, chronic diseases such as cardiovascular heart disease, diabetes, obesity, some types of cancer, stroke and respiratory conditions contributed to nearly 60% of the 56.5 million total reported deaths.¹ Projections suggest that chronic diseases will account for almost three-quarters of all deaths worldwide by the year 2020.²

Such diseases are largely preventable through population-wide measures to encourage 'healthier' dietary choices, increased levels of physical activity and to discourage tobacco smoking. The WHO is currently formulating a Global Strategy on diet, physical activity and health, which will evaluate the evidence of the relationship between diet, physical activity and chronic disease and suggest population-based interventions to reduce the burden of such diseases globally.³

Recent years have seen an increasing focus on improving children's diet as part of the overall strategy for preventing chronic disease. This focus has arisen for a number of reasons. First, there is evidence that young people in the UK and elsewhere are eating too much fat, sugar and salt and too few fruit and vegetables.⁴ It also appears that children's diets have not improved over the past 10-15 years; indeed if anything, consumption of fruit and vegetables has declined over this time.

Second, there is evidence that some of the chronic conditions of concern – most notably diabetes and obesity – are increasingly affecting children.⁵ For instance, studies suggest that there are now twice as many obese children (1 in 10) in the UK as there were 10 years ago, and that this is a trend seen elsewhere in the developed world.⁶

Finally, there is a growing realisation that diseases normally associated with adult life such as cardiovascular heart disease, diabetes, stroke, cancers and respiratory diseases may have their roots in poor eating habits during childhood. Poor dietary choices and lifestyle preferences acquired during childhood are likely to be carried on into adult life.

This report presents information about what children currently eat, how this has varied in recent years and examines the evidence linking diet with ill health. It outlines what is known about the factors that influence children's dietary choices and examines the options available to policy makers for improving children's diets.

¹ The World Health Report, 2002, '*Reducing risks, promoting healthy life*', WHO, Geneva, 2002.

² The World Health Report, 1998, '*Life in the 21st century: a vision for all*', WHO, Geneva, 1998.

³ www.who.int/hpr/global.strategy.shtml

⁴ *National Diet and Nutrition Survey 1997*, Food Standards Agency 2000.

⁵ *Diet, nutrition & the prevention of chronic diseases*, Joint WHO/FAO expert consultation, WHO, Geneva, 2002. (WHO technical report series; 916).

⁶ *Tackling Obesity in England*, 2001, National Audit Office

2 Background – diet and health

2.1 Background

The importance of children's diets

A healthy diet provides all of the energy and nutrients needed for life. It is particularly important that children eat both the right amount and the right types of food because:

- diet is a key factor affecting the growth and development of a child;
- a healthy balanced diet can help prevent diseases in childhood such as anaemia, dental decay and childhood obesity;
- and, in the longer term, can protect against diseases in later life such as heart disease, stroke, obesity and certain types of cancers.

Different dietary components

A healthy diet consists of a range of different nutrients. These include:

- vitamins and minerals;
- protein;
- fats;
- carbohydrates (sugars and starches);
- fibre.

Essential nutrients

Some of these – vitamins, minerals and proteins - are essential in that there are specific deficiency signs and symptoms linked to inadequate dietary intakes. For instance, low vitamin C is associated with scurvy, while vitamin D deficiency can lead to rickets. In the case of these essential nutrients, national and international expert bodies (see box 1) set dietary reference values to indicate average or minimum requirements (see box 2). Some of the essential nutrients may also be associated with adverse effects if intakes are too high. While this is not generally likely to occur through a normal diet, vitamin and mineral supplements provide people with the means to achieve very high and potentially harmful intakes. For this reason, expert advisory bodies may also recommend a safe upper limit.⁷

Non-essential nutrients

Other nutrients are not essential as such – for instance there is no specific deficiency disorders associated with low intakes of sugars. Aside from certain essential fatty acids,⁸ the main role of fats, sugars and starches within the diet is to provide energy. Here, the focus of expert advisory bodies is to give guidance on the proportion of energy coming from these different sources. This is based on research into the links between diet and diseases such as cancers and heart disease.

In addition to giving advice on what constitutes too much or too little of a particular nutrient, advisory bodies also publish overall guidance on what to eat to achieve a healthy, balanced diet. This is based on evidence that eating certain types of foods – most notably fruit and vegetables – can help protect against some of the common diseases of adult life.

⁷ For instance, in 1997 the Committee on Toxicity (COT) recommended a maximum intake of 10mg a day for vitamin B6 from dietary supplements because of concerns over adverse health effects. As outlined in POSTnote 105, November 1997, the scientific basis of the advice was questioned by the dietary supplements industry and others.

⁸ In practice, the requirements for essential fatty acids are extremely low, and will be more than met by anyone eating a diet that has an adequate overall energy intake.

Box 1 Main bodies involved in diet and nutrition policy

FSA - the Food Standards Agency takes the lead where diet and nutrition impact upon the area of food safety. It is responsible for:

- monitoring and surveillance of the nutrient content of food and the nutrient content of the diet;
- providing information about the nutrient content of individual foods and advice on the diet as a whole;
- defining what constitutes a balanced diet for subsequent use in health education material;
- advising on legislation relating to nutritional aspects of food, including labelling and claims, dietary supplements sold as food, fortified foods and functional foods;
- practical guidance relating to nutritional aspects of the food chain, including production and catering;
- representing the UK in international negotiations on issues relating to the nutritional content of food;
- formulating policy and providing advice to Ministers on the above;
- commissioning research on food and diet appropriate to the above.

DoH - the Department of Health takes the lead on public health aspects of diet and nutrition including:

- wider public health policy issues including nutritional aspects of diseases such as cardiovascular disease, cancer, osteoporosis and obesity, where nutritional status is one of a number of risk factors;
- issues concerning vulnerable groups (e.g. pregnant women and children);
- health education on wider behavioural issues like nutrition, smoking, drinking, and physical activity;
- links with the NHS and health professionals, breast-feeding promotion in the NHS, clinical nutrition and dietetics including hospital catering and nutritional therapy;
- health surveillance of the population;
- representing the UK in international negotiations on dietary issues relating to health;
- formulating policy and provide advice to Ministers on the above;
- commissioning food and diet research appropriate to the above.

Other UK health departments (National Assembly for Wales Health Department, Scottish Executive Health Department and Northern Ireland Executive Department of Health, Social Services and Public Safety) also have responsibilities in the above areas. DoH and FSA share responsibility for (and for providing policy advice on) surveillance of the nutritional status of people, and for defining the health education message on nutritional issues, taking account of both food and wider health issues.

HDA - the Health Development Agency is a special health authority charged with improving the health of people and communities in England, in particular, to reduce health inequalities. It works with other bodies to gather evidence of what works, to advise on standards and develop the skills of health improvement workers. Its activities to date have included publishing and disseminating guidance for supporting the preventive aspects of the National Service Framework for Coronary Heart Disease.

COMA – the Committee on Medical Aspects of Food and Nutrition Policy was disbanded in March 2000, as part of the process of establishing the FSA. It was charged with providing the Government with advice on matters relating to nutrition, diet and health based on an expert assessment of the available evidence. Much of current policy on diet, nutrition and health is based on COMA's advice.

SACN - the Scientific Advisory Committee on Nutrition is the expert committee established to replace COMA. It advises the FSA, DoH and other government bodies on matters including the nutrient content of individual foods, advice on diet and the nutritional status of people. The Committee published advice on dietary salt intake in May 2003.

EVM - the Expert Group on Vitamins and Minerals was set up in 1997 to advise on safe upper levels of vitamin and mineral consumption; it has reviewed available evidence on some 34 vitamins and minerals.

WHO – the World Health Organisation is currently formulating a Global Strategy on Diet, Physical Activity and Health, expected to be published in 2004. As part of this strategy, and in conjunction with the Food and Agriculture Organisation (**FAO**) of the United Nations, WHO organised a consultation to “draw on the latest scientific evidence available and to update recommendations for action by governments, international agencies and concerned partners in the public and private sectors. The overall aim of these recommendations is to implement more effective and sustainable policies”.⁹ A final draft report from this expert consultation group was published in March 2003.¹⁰

⁹ *Diet, nutrition & the prevention of chronic diseases*, Joint WHO/FAO expert consultation, WHO, Geneva, 2002. (WHO technical report series; 916).

¹⁰ Available at www.who.int/hpr/NPH/docs/who_fao_expert_report.pdf

2.2 Expert advice on what constitutes a healthy diet

Dietary components of most relevance to public health

Some of the dietary components outlined above are more relevant to public health than others. The following factors have been identified by expert advisory bodies as being particularly important, and will form the focus of this report:

- salt - because high dietary intakes have been linked with increased risk of heart disease;
- energy – because high intakes of some types of fat have been linked with increased risk of heart disease and excess energy intakes is one factor behind obesity;
- added sugars – because of concerns over tooth decay;
- iron – because of concerns about anaemia in some population sub-groups;
- fruit and vegetables – because increasing consumption protects against various diseases of adult life.

Bodies such as the WHO, COMA, SACN and EVM (box 1) have published advice in the form of a range of different dietary reference values (box 2) for the various different vitamins and minerals, for protein and for fibre intakes. These are given in the Annex, while the advice for salt, fats and energy, added sugars, iron and fruit and vegetables – and the evidence on which it is based – is summarised in more detail in the following sections.

Box 2 Different types of advice on diet

Individual variations within a population

Advice published by the various bodies described in box 1 has to take account of the wide variation between individual requirements within the population. For instance, people vary in the rate at which they metabolise and absorb different nutrients, in their energy requirements, etc. In addition, requirements for a particular nutrient may vary at different points in people's lives (e.g. pregnant women are advised to take supplements of folic acid). For these reasons, advisory bodies publish their advice in different forms. These are discussed in more detail below.

Dietary reference values

These are yardsticks against which the intakes of individuals or groups of people can be assessed. They are usually based on scientific evidence of the amounts needed to maintain health by members of the population and may take several different forms:

- Lower reference nutrient intake (LRNI) – the amount that is enough for the small proportion (~3%) of the population with low needs. Most people will need more than the LRNI.
- Estimated average requirement (EAR) – an estimate of the average requirement for a nutrient. In a population, some will need to consume more and some less than the EAR.
- Reference nutrient intake (RNI) – the amount that is sufficient for the majority (~97%) of the population. This is considerably higher than the amount of a nutrient actually needed by most people.

Population goals

These are population-based public health instruments. They are based on scientific evidence of the desirability of increasing (e.g. fruit and vegetables) or decreasing (e.g. salt) consumption of particular dietary components within the population, but the target values themselves are often set to take account of what is achievable in practice.

Upper levels

While it is important to consume enough of each essential nutrient, too high an intake may also cause adverse effects. This is particularly true of vitamins and minerals, where the availability of supplements provides consumers with the means to achieve very high intakes. The Expert Group on Vitamins and Minerals (EVM, see box 1) advises the FSA on the safety of vitamin and mineral supplements and has recently reviewed the evidence available for 34 such nutrients.¹¹ Sufficient evidence was available to allow the Group to establish a safe upper level (SUL) for only 9 of these. In the case of a further 22 vitamins and minerals only limited data were available, and the Group was confined to issuing guidance rather than being able to give more categorical advice on what constitutes a safe upper level.

¹¹www.foodstandards.gov.uk/science/ouradvisors/vitandmin/evmreport#h_2

Salt

Of the various different vitamins and minerals present in food, particular attention has focused on salt. This is because, while sodium is an essential mineral at all stages of life, there is a growing body of evidence linking high dietary salt intakes with increased risk of hypertension (high blood pressure).¹² COMA set dietary reference values for sodium and chloride in 1991 (see table 1 in the Annex) for infants, children and adults.¹³ The RNI (box 2) of 1.6g sodium for adults is equivalent to around 4g of salt per day.

COMA looked more closely at the link between salt and blood pressure in 1994.¹⁴ It concluded that salt intake is an important factor influencing the rise in blood pressure observed with age and recommended a reduction in the average intake of salt by the adult population from the then level of 9g/day to 6g/day. This target was set as an achievable goal that would deliver a demonstrable health benefit for the UK population; it was not seen as representing an optimal level of intake. COMA also recommended a similar proportionate reduction in the salt content of children's diet, but lacked the evidence to assign numbers to this recommendation.

More recently, the FSA asked SACN (the expert body that replaced COMA, see box 1) to review evidence on salt intakes published since the 1994 report with a view to making recommendations for children. SACN considered more than 150 scientific papers and published a report in May 2003.¹⁵ Among the main findings in the report are that:

- The evidence linking salt intake with blood pressure is now much stronger than it was when COMA last reviewed the issue (see box 3 for an overview of the available research);
- SACN endorsed the dietary reference values previously set by COMA (see table 1 below) for adults, children and infants;
- SACN also endorsed the COMA recommendation that average daily intakes for adults should be reduced from current levels (~9g/day) to 6g/day – this is slightly higher than the 5g/day maximum recently proposed by the WHO;¹⁶
- SACN considered that average daily intakes for children should be lower, and set new target values with intakes varying according to age (see table 1, below);
- SACN reiterated that the average daily target intakes for children and adults should not be seen as optimal intakes, but rather as achievable goals for the target populations;
- Most (up to 75%) salt in foods is added during processing; FSA and DoH are thus consulting with industry to find ways of reducing levels of salt used in food processing (section 5.3);
- While people can reduce the amount of salt they add to food, there is also a need for better food labelling so consumers can readily assess the salt content of the food available in the supermarket (section 5.3).

Table 1 Dietary reference values and target values for salt¹⁷

Age	RNI (g sodium/day)	RNI (g salt/day)	Target value (g salt/day)
0-6 months	0.184	0.5	Less than 1.0
7-12 months	0.276	0.7	1.0
1-6 years	0.598	1.6	2
7-14 years	1.38	3.6	5
15+ years	1.6	4.0	6

¹² Salt consists of 40% sodium and 60% chloride (1g of sodium is equivalent to around 2.55g of salt).

¹³ *Dietary Reference Values*, DoH, 1991.

¹⁴ *Nutritional aspects of cardiovascular disease*, DoH, 1994.

¹⁵ *Salt and Health*, SACN report, 2003 (www.sacn.gov.uk).

¹⁶ *Diet, nutrition & the prevention of chronic diseases*, Joint WHO/FAO expert consultation, WHO, Geneva, 2002. (WHO technical report series; 916).

¹⁷ Sources, *Salt and health*, SACN report, 2003 and *Dietary Reference Values for food energy and nutrients for the UK*, DoH, 1991.

Box 3 Salt and health – an overview of the evidence

Variations in blood pressure among the UK population

In the UK, it is well established that blood pressure tends to increase with age across the population. For instance, in England some 16% of 16-24 year old men have high blood pressure compared with 73% of those over 75 years (the figures for women are 4% and 78% respectively). The fact that such a rise is not seen among all populations suggests that it is not an inevitable consequence of aging but rather linked to environmental factors such as diet. It is also known that individuals vary in their response to salt intakes. It has been suggested that some ('salt sensitive') people may be susceptible to increased blood pressure as a result of salt intake whereas other ('salt resistant') people may be less susceptible. But SACN concluded that salt sensitivity had not been sufficiently well characterised to develop tests to identify salt sensitive individuals, and that population-based measures to reduce salt were thus likely to yield greater benefit.

Salt intake and blood pressure

Evidence of an association between salt intake and high blood pressure is available from:

- Animal research – there is a large body of evidence from experiments on mice and rats that increasing levels of salt in the diet increases blood pressure. SACN drew attention to one study on chimpanzees, because of these animals' close similarity to humans. In this study, the average blood pressure of 13 animals fed increasing levels of dietary salt rose significantly over a 20 month period compared with that of a control group (13 animals fed an identical diet without the salt supplements). Once the salt supplements were discontinued, the animals' blood pressures slowly returned to normal. SACN saw this as clear evidence of a dose-response relationship between dietary salt and blood pressure.
- Observational studies in humans – a number of studies have attempted to establish if populations with diets that are high in salt intake have higher average blood pressures than those from countries with lower levels of salt in their diet. In the largest such study (the Intersalt study), which collected data on salt intakes (by measuring sodium excretion) and blood pressure from over 10,000 adults from 32 countries, found no statistically significant overall association between salt intake and blood pressure. A significant link was found between salt intake and increasing blood pressure *with age*, but the importance of this is unclear as the study was not originally designed to investigate this hypothesis.
- Intervention studies in humans – the SACN report considered a number of trials which studied the effect of low-salt diets on blood pressure. Two of the most significant of these are the DASH sodium trial¹⁸ and the TOHP II study¹⁹. In the DASH sodium trial, a stepwise reduction in blood pressure was observed as dietary salt levels were progressively lowered. The biggest reductions in blood pressure were seen when low salt intakes were combined with a special diet rich in fruit, vegetables and low fat dairy products, suggesting that a whole diet approach may be the most successful means of reducing blood pressure within a population. In the TOHP II study, blood pressures were significantly reduced by a lowering of dietary salt over a period of 6 months, although these benefits were diminished after 3 years. SACN considered this study shows how difficult it is for people to adhere to dietary regimes over a long period of time, and suggested that it was thus important to find ways of reducing the salt content of processed foods. A recent meta-analysis analysed the pooled results of some 28 studies (17 involving people with high blood pressure and 11 with normal blood pressure) where the diets had been maintained for at least 4 weeks.²⁰ It showed that even a modest reduction in salt intakes leads to a significant lowering of blood pressure, both in people with and without high blood pressure.

Long-term impact of salt intake

Relatively few studies have investigated whether lowering dietary salt levels actually reduces rates of illness and death from heart disease in the longer term. Part of the reason for this is the difficulty in teasing out the effects of dietary salt from those of the other main risk factors such as smoking and cholesterol levels. Overall, SACN concluded that "*the findings from most studies suggest that a high salt intake has adverse effects on cardiovascular disease mortality and incidence*" but that "*data on the impact of a reduction in salt intake on subsequent health outcomes and mortality is limited and the available evidence reflects the difficulties of isolating the effects of salt intake from other factors*".

Early life experience

There is concern that exposure to high salt levels in the diet during early life may be a key factor in determining high blood pressure later in life. Research has shown that infants fed low sodium diets (breast milk or specially formulated diets) have lower blood pressure than those reared on higher sodium diets such as milk formula, and that this difference persists throughout childhood and into adolescence. However, SACN noted that the evidence is limited and that "*it is not clear whether sodium intake in isolation is a factor in the development of hypertension in the young which then tracks into adulthood*".

Source: *Salt and health, SACN report, 2003.*

¹⁸ Appell, LJ et al, New England Journal of Medicine, 336 [16], 1117-24, 1997.

¹⁹ TOHP II, Archives of Internal Medicine, 157 [6], 657-67, 1997.

²⁰ McGregor, GA and He, FJ in press, cited in Salt and Health, SACN report, 2003.

Energy

Average energy requirements

Average daily energy requirements vary significantly from one individual to another and are determined by two main factors. First, by a person's basal metabolic rate – the amount of energy required to keep the body 'ticking over' while at rest – which varies according to size, gender and age. Second, by the amount of physical activity that a person undertakes. This varies considerably from one person to another, and is also likely to vary with age. Taking these factors into account, COMA published estimated average energy requirements for different age groups for males and females in 1991 (see table 2).²¹ These were based on the assumption that average levels of physical activity within the population were quite low, both during work/school hours and leisure time. In addition to the figures given in table 2, COMA also recommended an increase in energy intakes (of 0.8MJ/day) for women in the final three months of pregnancy and for women breastfeeding (from 1.0-2.4 MJ/day depending on the infants age and the extent to which the infant has been weaned onto other energy supplies).

Table 2 COMA estimated average requirements for energy

Age	Estimated average requirement (MJ/day)		Age	Estimated average requirement (MJ/day)	
	Male	Female		Male	Female
0-3 months	2.28	2.16	11-14 years	9.27	7.92
4-6 months	2.89	2.69	15-18 years	11.51	8.83
7-9 months	3.44	3.2	19-49 years	10.6	8.1
10-12 months	3.85	3.61	50-59 years	10.6	8.0
1-3 years	5.15	4.86	60-64 years	9.93	7.99
4-6 years	7.16	6.46	65-74 years	9.71	7.96
7-10 years	8.24	7.28	75+ years	8.77	7.61

Dietary energy and weight gain

The body can break down three main classes of nutrients for energy: fats, carbohydrates and protein.²² The rise in obesity among children and adults seen in developed countries since the 1980s (section 3.2) has focused attention on dietary energy as a possible factor behind these trends. Obesity is known to be a complex, multi-factor condition arising from an imbalance between energy intake and energy expenditure, with individual predisposition being mediated by genetic and other factors. Anything that raises energy intake, or that lowers energy expenditure, can cause weight gain and, in the longer term, lead to obesity.

As outlined in box 4, it has generally been assumed that fat – the most energy-dense of the macronutrients – was the single most important dietary factor in weight gain. The American Heart Association recommended that US citizens reduce their overall intakes of fat (to less than 25% of total energy intake) by eating less meat, eggs and whole milk dairy products and to replace fats with carbohydrates such as bread, pasta, fruit and vegetables. However, despite more than 20 years of such advice, and against a background of a decline in the proportion of energy derived from fats in the diets of American children, US rates of childhood obesity have risen steadily.²³ Some see this as evidence that non-dietary factors are the main driving force behind the obesity epidemic. Others suggest that it puts the spotlight on dietary factors besides fat. Several possible factors have been suggested as summarised in box 4. They include over-consumption of energy-dense foods, sugar-sweetened soft drinks and other foods rich in added sugars, bigger portion sizes, and the general rise in intakes of 'fast' foods.

²¹ DoH, *Dietary reference values for food energy and nutrients for the UK*, 1991, HMSO.

²² Alcohol is also a dietary source of energy. COMA assumes that, on average, alcohol provides around 5% of total energy intake.

²³ Ebbeling CB, *The Lancet*, 360, 473-82, 2002.

Box 4 Some dietary factors suggested as possible causes of obesity

Fats

Fat has always been assumed to be the dietary factor most likely to cause weight gain because it is the most energy-dense (see below) of the macronutrients. However, population studies do not show any consistent links between dietary fat intakes and bodyweight in children and young adults, and the rise in childhood obesity has come at a time when the proportion of energy derived from fat by children in the US has declined. Official advice in the US has now swung behind the position adopted by COMA, which is that it is the type of dietary fat consumed that is important, rather than the overall amount.

Carbohydrates – high glycaemic index diet

The decline in the proportion of fat consumed in the US diet has been compensated by a rise in consumption of carbohydrates, in the form of foods such as potatoes, soft drinks, breads, breakfast cereals, cakes and biscuits. Such foods have a high glycaemic index (GI) – i.e. cause a significant rise in blood glucose levels shortly after being eaten – and may help to stimulate appetite. Research suggests that a high GI diet can stimulate hunger and cause over-eating in adolescents, and is linked with flab, heart disease and type 2 diabetes in adults. While it has been suggested²⁴ that the switch from a high fat to a high carbohydrate diet may actually have been one of the causes of the rise in obesity in the US, this has not been established in long-term human studies.

Free sugars – sugar sweetened soft drinks

Recent attention has focused on the possible role of free sugars as a possible factor in increasing obesity rates. Sugar-sweetened soft drinks have been a particular focus because of the rapid rise in their rates of consumption by children (the British Soft Drinks Association estimates that UK consumers drank 207 litres of soft drinks in 2002 compared with around 160 litres in 1990). The recent WHO/FAO report recommended restricting consumption of free sugars to less than 10% of total energy since this was “*likely to contribute to reducing the risk of unhealthy weight gain*”.²⁵ In particular it noted that:

- Free sugars contribute to the overall energy density of diets and promote a positive energy balance. It cited research in humans showing that total energy intake increased at least in the short-term as the energy density of the diet is raised (whether by free sugars or fat). On the other hand, diets that are limited in free sugars have been shown to reduce total energy intake and encourage weight loss.
- Drinks that are rich in free sugars may increase overall energy intake by reducing appetite control. Research suggests that people tend to reduce their food intakes to compensate for energy intake to a lesser extent following consumption of high sugar drinks than they do after eating the equivalent energy intake in food form. Thus, research suggests that consumption of soft drinks that are rich in free sugars leads to a higher energy intake and increase in body weight compared with energy free drinks, and that children with a high intake of sugar-sweetened drinks are more likely to be overweight.

However, these findings are controversial, since other studies suggest that free sugars in the diet have no effect on excess weight. For instance, a multi-centre, randomised trial tested the effects on body weight and blood lipids in overweight individuals of altering the ratio of fat to carbohydrate, and of complex carbohydrates to sugars. It found a greater weight reduction in people given a high complex carbohydrate diet relative to those on a high sugar diet, but this was not statistically significant. Other studies have suggested that people whose diet is high in free sugars may have lower total fat intakes, although some have questioned the methodology of such studies. Overall, research in this area demonstrates the plausibility of the hypothesis that diets high in free sugars can contribute to excess energy intakes and weight gain, but does not reveal whether this has been a factor in the rise in childhood obesity.

Energy density and satiety

Energy density is the amount of energy contained in a given weight of food. Fatty foods tend to be energy dense, containing more than twice as much energy as an equivalent weight of high protein or carbohydrate food. Satiety is a measure of the extent to which a food is reported as satisfying hunger over a period of time. A food's satiety index is a reflection of its energy density as well as its physical (e.g. bulk) and chemical (e.g. rate at which it is absorbed) properties. Foods that have low energy density but high satiety scores (e.g. boiled potatoes and many fruits) can reduce overall energy intakes. Those with high energy density and low satiety (e.g. fatty foods) may encourage 'snacking' and increase energy intakes.

'Fast' food and portion size

Research suggests that increasing portion size increases energy intake, but that this effect is seen only in children aged 5 or older. Younger children tend to consume the same amount irrespective of the portion size they are given. Increased consumption of 'fast' food – which tends to be energy dense, high in the fats that increase risk of heart disease, has a high glycaemic index, and is increasingly being marketed in large portion sizes – is another factor that has been suggested as a possible cause of rising obesity rates. While research suggests that overall energy intakes are greater among adolescents who regularly consume 'fast' foods, there is no research linking fast food with obesity in children.

²⁴ Taubes G, New York Times Magazine, July 7, 2002.

²⁵ *Diet, nutrition & the prevention of chronic diseases*, Joint WHO/FAO expert consultation, WHO, Geneva, 2002. (WHO technical report series; 916).

While it is plausible that such factors have had a role to play in the rise in childhood obesity, there is insufficient evidence from research to allow the relative contribution of each to be assessed. It is also important to remember that diet is only part of the story; falling levels of physical activity are also likely to have played an important role.

In the UK, COMA took the view that total fat consumption was less important than consumption of different components of fats (some of which increase the risk of heart disease, while others protect against it; see next section). Totting up the levels for different types of fat suggested by COMA gives a total fat intake of around 33% of energy intake (see table below). COMA assumed that, on average, people would obtain 15% of their energy requirements from protein and a further 5% from alcohol, leaving 47% of the energy requirement to be met by carbohydrates. As outlined in more detail in the following sections, COMA recommended that only 10% of total energy should come from added sugars, with 37% coming from other carbohydrates such as starches (see table). This recommendation was based on the observation that there were no known detrimental effects of high starch intakes. As outlined in box 4, this view has been questioned by researchers who suggest that high carbohydrate intakes can stimulate hunger and thus increase energy intakes (an as yet unproven hypothesis).

Also shown in table 3 are the recently published WHO expert consultation group's dietary recommendations.²⁶ While the COMA and WHO figures are largely comparable, the 10% goal for added sugars merits a special mention. The COMA figure is based solely on concerns over tooth decay, whereas the more recent WHO figure was set partly because it was "*likely to contribute to reducing the risk of unhealthy weight gain*". As outlined in box 4, this is controversial and has been hotly contested by the food industry which points to other research that fails to implicate sugar as a factor in excess energy intakes and weight gain. Overall, it is not currently possible to assess what contribution dietary sugar has made to the observed increases in childhood obesity.

Table 3 COMA & WHO estimates/recommendations for energy

Macronutrient	COMA (% total energy)	Basis	WHO (% total energy)
Total fat	33%	Sum of COMA recommendations for fatty acids	15-30%
Added sugars	10%	Recommendation based on concerns over tooth decay	<10%
Other carbohydrates (e.g. starch)	37%	Recommendation based on no evidence of harmful effects of high starch intake	55-70% (total carbohydrates)
Protein	15%	COMA estimate of average intake	10-15%
Alcohol	5%	COMA estimate of average intake	

Fats and fatty acids

Fats in food consist mainly of the various different types of fatty acids described in box 5. There are around 16 main types of fatty acid in foods, and these differ in a number of ways (see box 5). They include naturally occurring saturated and unsaturated fatty acids as well as the man-made hydrogenated fats found in foods such as margarine. In addition, foods from animal sources such as meat, poultry, eggs and dairy products contain cholesterol, another type of fat. Research on the health impacts of the different types of fatty acids suggests:²⁷

²⁶ *Diet, nutrition & the prevention of chronic diseases*, Joint WHO/FAO expert consultation, WHO, Geneva, 2002. (WHO technical report series; 916).

²⁷ COMA reviewed this evidence in the early 1990s (DoH 1991, *Dietary reference values for food energy and nutrients for the UK*, HMSO and DoH 1994, *Nutritional aspects of cardiovascular disease*, HMSO). A more recent review is Kris-Etherton P et al, *American Heart Association scientific statement*, *Journal of Nutrition*, 131, 1322-26, 2001.

Box 5 Different types of fats - fatty acids and cholesterol

Fatty acids

Fats found in foods are generally in the form of triglycerides. These consist of three fatty acids – long chains of between 14 to 18 carbon atoms - linked to a smaller, central molecule (glycerol). The fatty acids that are commonly found in foods fall into several different categories, each with different properties:

- **Saturated** fatty acids – these are fatty acids that contain the maximum possible number of hydrogen atoms bonded to the carbon chain. These types of fatty acids are mainly associated with animal fats found in meat, poultry and dairy products.
- **Unsaturated** fatty acids – are those that have some of the hydrogen atoms missing. They include **monounsaturated** fatty acids (with just two missing hydrogen atoms) that are found in olive oil, rapeseed oil and nuts. **Polyunsaturated** fatty acids have more than two missing hydrogens and are found in oils from fish, maize, soybean and sunflower.
- **Essential** fatty acids - two of the polyunsaturated fatty acids are essential (i.e. small amounts must be eaten in the diet as the body cannot make them for itself). They are linoleic acid, which helps reduce blood cholesterol levels, and alpha linolenic acid, which helps inhibit blood clot formation.
- **Cis and trans** fatty acids - unsaturated fatty acids occur in one of two different 'shapes', that are chemically identical but which have different spatial arrangements. These are known as cis and trans versions; most unsaturated fatty acids found in nature are cis versions.
- **Hydrogenated** fats – polyunsaturated fatty acids such as those found in vegetable oils can be converted from their natural states into products such as margarine and solid vegetable fat (shortening) by a process that involves adding more hydrogen atoms to the carbon chain (hydrogenation). Products such as margarines, where the hydrogenation process is only partially complete, may contain a high proportion of trans fatty acids.

Cholesterol

Cholesterol is a waxy component found in fats that is essential in the production of cell membranes, some hormones and various other processes. The body produces cholesterol in the liver and it is also found in foods from animal sources such as eggs yolks, meat, poultry, fish and whole milk products. Like other fats, cholesterol cannot dissolve directly in the bloodstream: it has to be transported in the blood attached to carrier molecules (lipoproteins). There are several types of these, but the two of main importance are:

- **LDL cholesterol** – cholesterol in the blood is most commonly found bound to low density lipoprotein. This is sometimes known as 'bad' cholesterol because it is this form that can clog arteries. People with high levels (above 160mg/100ml) of LDL cholesterol are at increased risk of heart disease and stroke.
- **HDL cholesterol** – 25-30% of cholesterol in the blood is bound to high density lipoprotein. This type is sometimes called 'good' cholesterol because researchers think that HDL clears cholesterol from the bloodstream. High levels of HDL cholesterol are thought to protect against heart disease, whereas low levels (below 40mg/100ml) increase the risk of both heart disease and stroke.

- **Saturated fatty acids and heart disease** - increasing intakes of C14 and C16 saturated fatty acids raises blood cholesterol. There is a large body of evidence that shows that high blood levels of 'bad' (LDL) cholesterol (see box 5) are associated with increased risk of heart disease. Clinical trials show that drug interventions that reduce blood cholesterol levels can lower rates of heart disease, but have no effect on overall death rates. There is no direct evidence that reducing blood cholesterol by dietary means actually reduces rates of heart disease although this is widely assumed to be the case. COMA recommended that average saturated fatty acids should contribute no more than 10% of the total energy intake (table 4).
- **Unsaturated fatty acids** – monounsaturated fatty acids do not appear to have any effect on blood cholesterol levels *per se*. Replacing saturated fatty acids with monounsaturated fatty acids in the diet helps reduce levels of 'bad' (LDL) cholesterol in the blood without affecting levels of 'good' (HDL) cholesterol. Substituting saturated fatty acids with polyunsaturated fatty acids may reduce overall blood cholesterol levels (both 'good' and 'bad' cholesterol) and there is evidence that certain classes of polyunsaturated fatty acids in vegetable oils and fish help protect against heart disease.²⁸ People in Mediterranean countries who consume low overall levels of fat in the diet but a relatively high proportion of unsaturated fatty acids (e.g. from fish and olive oil) are renowned for having very low heart disease death rates. COMA and WHO recommendations for average daily intakes of monounsaturated and polyunsaturated fatty acids are given in table 4.

²⁸ Hu FB et al, New England Journal of Medicine, 337, 1491-99, 1997.

- **Trans fats** – recent research suggests that partially hydrogenated fatty acids increase risk of heart disease and type 2 diabetes.²⁹ COMA recommended that it would be prudent to restrict intakes of trans fatty acids to the (then) current estimated intakes (table 4).
- **Dietary cholesterol** – the available evidence suggests that dietary cholesterol has a relatively small effect on blood cholesterol levels. COMA recommended that there should be no increase in dietary cholesterol intakes.

Table 4 COMA and WHO dietary reference values for fatty acids

Fatty acid	COMA average population intake (as % of total energy)	WHO population dietary intake goals (as % of total energy)
Saturated fatty acids	10%	<10%
Monounsaturated fatty acids	12%	
Polyunsaturated fatty acids	6% (including 1% linoleic acid, 0.2% linolenic acid)	6-10%
Trans-fatty acids	2%	<1%
Total fatty acids	30%	
Equivalent to total fat	33%	15-30%

Sugars

Sugars are simple compounds made up of carbon, hydrogen and oxygen (carbohydrates) that dissolve in water and which are found naturally in a wide range of foods. The most common sugars consist of just one (e.g. glucose or fructose) or two (e.g. sucrose or lactose) basic sugar units; when large numbers of sugar units link together they form more complex carbohydrates that are insoluble (e.g. starch or cellulose).

Sugars and tooth decay

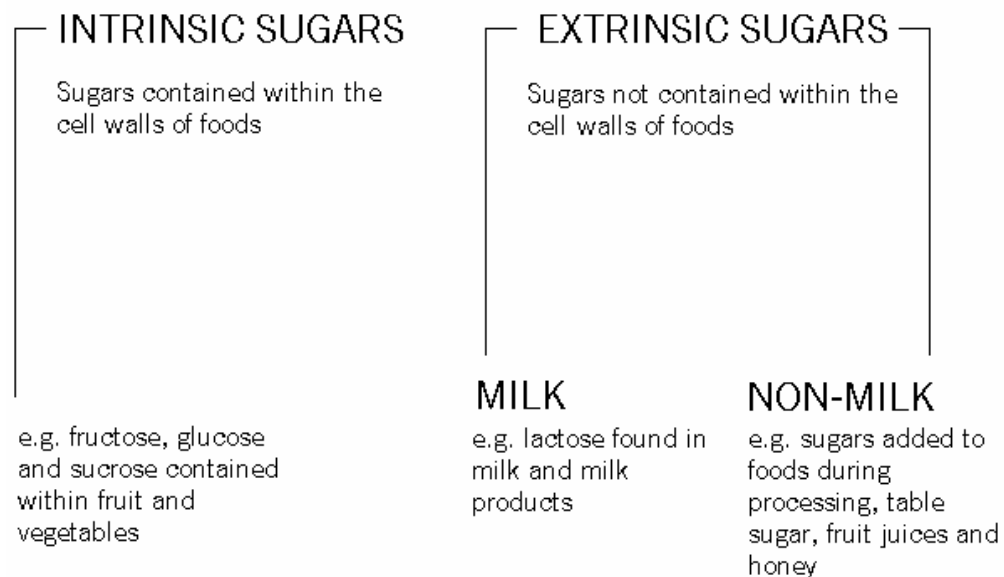
Aside from the possible contribution to excess energy intakes (discussed in the previous section), the main concern over dietary sugar is its potential to cause dental caries (tooth decay). COMA looked at the evidence linking sugars with tooth decay in 1991.³⁰ It concluded that the effects of sugars in this area were determined not only by the (chemical) nature of the sugar, but also by its (physical) availability within a food. For this reason, COMA proposed a new classification for sugars (see figure 1). In this scheme, a distinction is made between:

- Intrinsic sugars, which are those that are present within the cell walls of foodstuffs and which are thus not readily available to the bacteria that cause tooth decay (see box 6);
- Extrinsic sugars, which are those that are **not** contained within the cell walls of foods and which are thus readily available to cause tooth decay. These include all sugars added to foods during processing or by the consumer (e.g. table sugar) as well as sugars that occur naturally in foods such as milk, milk products, fruit juices and honey.

Of the three classes of sugars illustrated in figure 1, COMA considered that it is the non-milk extrinsic (NME) sugars - mainly in the form of sucrose - that are of most concern (see box 6 for a summary of the evidence). COMA suggested that these NME sugars were a much more significant cause of tooth decay than either intrinsic sugars (because of their relative unavailability) or milk sugars (which are readily available but which are not a major cause of tooth decay because of the presence of other protective factors in milk). It thus concluded that a reduction in dietary intakes of NME sugars would be an effective means of reducing tooth decay among the population at large, recommending that NME sugars should not account for more than 10% of total energy intake. As discussed in more detail later, average NME sugar consumption in the UK is significantly higher than COMA's reference value.

²⁹ Salmeron J et al, American Journal of Clinical Nutrition, 73, 1019-26, 2001.

³⁰ DoH 1991, *Dietary reference values for food energy and nutrients for the UK*, HMSO.

Figure 1 COMA's classification scheme for sugars

Source: DoH 1991, *Dietary reference values for food energy and nutrients for the UK*, HMSO.

COMA's conclusions were challenged by the sugar industry. The industry disagreed with COMA's distinction between intrinsic and extrinsic sugars in general, suggesting that all carbohydrates have the potential to be fermented into acid and thus cause tooth decay. COMA agreed that the intrinsic/extrinsic classification scheme was not ideal, but argued that it was the best available and that the balance of the evidence (see box 6) supported its focus on NME sugars as a significant cause of tooth decay. The industry also took issue with COMA's recommendation to reduce NME sugar intakes, arguing that non-dietary approaches (such as fluoridation and promoting dental hygiene) would be more effective tools for reducing dental caries. However, COMA felt that *"despite the benefits of fluoridation there remains a significant prevalence of caries in the population which would be responsive to reduced (NME) sugars consumption"*.³¹

Sugars and nutrient dilution

In addition to concerns over tooth decay, it has also been suggested that NME sugars might cause nutrient dilution. Foods that are high in NME sugars (such as sugar-sweetened drinks) tend to be high in calories (energy) but low in other essential micronutrients such as certain essential vitamins and minerals. It has thus been suggested that people who receive a large part of their energy requirements from such foods may not receive sufficient of these essential micronutrients.

However, COMA and other expert bodies have examined evidence from dietary surveys in the US and in Europe, and found no evidence that nutrient dilution was an issue for the general population.³² Indeed, the available evidence suggests that intakes of most types of micronutrients increase as sugar consumption rises. COMA thus concluded that, in general, *"higher percent energy from sugars does not result in inadequate micronutrient intakes"*. The Committee noted that nutrient dilution might still be an issue for specific sub-groups of the population such as those with very low levels of energy consumption, young children or the elderly, although little research is available in this area.

³¹ www.doh.gov.uk/coma/sugar.htm

³² www.doh.gov.uk/coma/sugar.htm

Box 6 Sugar and tooth decay

Tooth decay

Dental caries is caused by bacteria (*Streptococcus mutans* and strains of Lactobacilli) present in plaque. These bacteria are capable of breaking down sugars and certain other carbohydrates present in food into acid that dissolves the minerals (calcium and phosphate) present in tooth enamel. The extent of tooth decay that can be caused by various different types of foods depends on a number of factors (see below).

Different types of carbohydrate

Two types of evidence have been used to assess the potential of foods to cause tooth decay:

- Laboratory studies that measure the amount of acid produced from different types of foods by cultures of the bacteria found in plaque. These studies consistently show that NME sugars in foods are rapidly broken down into the acids which dissolve tooth enamel. There is also some evidence from this type of study that acid can be produced from foods containing other types of carbohydrates, such as intrinsic sugars and highly heat processed starch. While such studies show that different types of carbohydrate have the potential to cause tooth decay, they reveal little about the extent to which this actually happens (some of the studies do attempt to assess the impact of acid produced on tooth enamel, but it is not clear whether the laboratory conditions accurately mimic those found in the mouth).
- Population studies looking for links between different levels of sugar consumption and rates of dental caries. These types of (epidemiological) studies show a consistent association between high rates of refined (i.e. NME) sugar consumption and increased rates of dental caries, although other factors (notably fluoridation, see below) are also important. On the whole, diets high in other types of carbohydrate such as starches and intrinsic sugars (fruit and vegetables) are not associated with elevated rates of dental caries, although there are occasional exceptions to this rule (e.g. one study showing high rates of tooth decay among South African fruit pickers).

Having considered the available evidence from both types approach, COMA concluded that NME sugars were the most important form of dietary carbohydrate involved in dental caries.

Frequency of sugar consumption

Other studies suggest that the relationship between the amount of NME sugar consumed in the diet and the rate of dental caries is not straightforward. For instance, a Swedish study³³ suggests that the frequency of consumption of sugar is at least as big a factor in determining dental caries rates as the overall amount of sugar consumed. COMA has recognised frequency of sugar consumption as a factor in tooth decay and has called for greater emphasis on raising the public's awareness of the importance of patterns of sugar consumption.

Fluoride and other factors

The extent to which foods cause tooth decay also depends on a number of other factors. For instance some foods may contain substances (such as calcium) that protect teeth from the action of acids, whereas other foods themselves contain acids that exacerbate tooth decay. The physical properties of a food are also important as they help determine factors such as how long a food stays in the mouth, how much residue is left in contact with the teeth, and how much saliva (which dilutes acid and thus helps protect teeth) is produced. But perhaps the biggest non-dietary factor affecting dental caries is the use of fluoride in toothpaste and drinking water. Exposure to moderate levels of fluoride helps prevent tooth decay mainly by promoting the formation of new tooth enamel. Only around 10% of the UK population has fluoridated water supplies, but fluoride toothpaste has been widely available for many years and accounts for more than 90% of sales of toothpaste products. Increasing use of fluoride is seen as one of the main factors behind the downward trends in the numbers of decayed, missing and filled teeth observed across all age groups since the early 1980s (see section 3).

Iron

Iron is an essential component of proteins involved in the transport of oxygen around the body and in other metabolic processes. Deficiency in iron causes anaemia, which manifests itself as symptoms such as low birth weight, increased risk of infection and death, and impairment of physical and cognitive development. WHO considers iron deficiency to be the world's most common nutritional disorder, with an estimated 2 billion (around 30% of the world population) people affected by anaemia.³⁴ It is a particular concern in children because infants, toddlers and teenage girls are at greatest risk of developing anaemia as they have the greatest requirements. As discussed in more detail in the following chapter, there is evidence from dietary surveys that a significant minority of UK children have low iron intakes.

³³ Gustafsson BE et al, Acta Odontologica Scandinavica, 11, 232-364, 1954.

³⁴ www.who.int/nut/ida.htm

Not all of the iron present in the diet is absorbed by the body – in fact, a typical healthy adult absorbs only around 15% of the available iron. However, the amount absorbed can vary considerably depending on a number of factors:

- The amount of iron already stored in the body, with the amount absorbed increasing as body stores are depleted and diminishing as stores are replenished.
- The chemical nature of the iron. Meat, poultry and fish contain the haem form of iron, which is readily absorbed by the body. Iron from staple food plants such as rice, maize, soybeans, black beans and wheat exists in the non-haem form, which is less efficiently absorbed.
- The presence or absence of other dietary factors can significantly affect the absorption rate of non-haem iron. For instance, vitamin C (from fruit and vegetables) and various meat proteins can increase iron absorption, whereas calcium, tannins/polyphenols (factors found in tea) and phytates (found in legumes and some other plant foods) can reduce it.

COMA considered variation in absorption rates along with a number of other factors when recommending dietary reference values for iron.³⁵ The values for infants and children reflect the need for increasing intakes of iron with age to take account of increasing blood and tissue masses. Pre-menopausal women need higher intakes of iron to offset losses through menstruation. While COMA considered the increased needs of pregnancy should be balanced by the cessation of menstrual iron loss, the FSA advises pregnant women to eat plenty of iron-rich foods such as red meat, pulses, green vegetables and fortified breakfast cereals.

Table 5 COMA dietary reference values for iron

Iron	LRNI(mg/day)	EAR(mg/day)	RNI(mg/day)
0-3 months	0.9	1.3	1.7
4-6 months	2.3	3.3	4.3
7-12 months	4.2	6.0	7.8
1-3 years	3.7	5.3	6.9
4-6 years	3.3	4.7	6.1
7-10 years	4.7	6.7	8.7
11-18 years men (women)	6.1 (8.0)	8.7 (11.4)	11.3 (14.8)
19-49 years men (women)	4.7 (8.0)	6.7 (11.4)	8.7 (14.8)
50+ years	4.7	6.7	8.7

Source: DoH 1991, *Dietary reference values for food energy and nutrients for the UK*, HMSO

Fruit and vegetables

It has long been recognised that fruit and vegetables are a vital component of a healthy diet, but it is only relatively recently that research evidence has begun to emerge as to the true scale of the benefits they can bring. There have been a number of reviews of this evidence during the 1990s and these include:

- A WHO review in 1991 on diet, nutrition and the prevention of chronic disease;³⁶
- A COMA review in 1994 that examined the links between diet and heart disease;³⁷
- A COMA review in 1998 that examined the links between diet and cancer.³⁸

These and similar reviews have concluded that high dietary intakes of fruit and vegetables:

- Reduce rates of illness and premature deaths from chronic diseases. Studies consistently show that such rates are lower among populations consuming high levels of fruit and vegetables in their diet than those with low fruit and vegetable intakes.
- Protect against various forms of cancer, most notably those affecting the respiratory (e.g. lung) and digestive (e.g. oesophagus, stomach and colon/rectum) tracts. Research suggests

³⁵ DoH 1991, *Dietary reference values for food energy and nutrients for the UK*, HMSO.

³⁶ WHO, 1990, *Diet, Nutrition and the Prevention of Chronic Diseases*, WHO Technical Report Series 1990 (797).

³⁷ DoH, 1994. *Nutritional Aspects of Cardiovascular Disease*, COMA, HMSO.

³⁸ DoH, 1998. *Nutritional Aspects of the Development of Cancer*, COMA, HMSO.

that populations with low fruit and vegetable intakes had twice the risk of contracting such cancers than those with higher intakes.³⁹

- Protect against heart disease. Two recent reviews of evidence from population studies have shown that high fruit and vegetable diets can reduce the risk of coronary heart disease by some 20-40%.^{40,41} There is also some evidence that diet can be used to treat heart disease, although this requires rigid adherence to a very strict dietary (mostly vegetables, grains, beans and fruit with virtually no animal products) and lifestyle regime.⁴² Finally, it is also known that increasing intakes of fruit and vegetable in the diet can reduce blood cholesterol levels and blood pressure; both are known risk factors for heart disease.
- Protect against stroke. There is increasing evidence that a diet high in fruit and vegetables may also help to reduce the risk of stroke, with some reviewers claiming risk reduction to be as much as 25%.⁴³

Based on this research evidence, the WHO recommended in 1991 that people should eat 400g – roughly five portions – of fruit and vegetables each day. This recommendation has since been endorsed by COMA and by other expert bodies around the world, been incorporated into the NHS plan and forms the basis of a series of policy initiatives described in section 5. Overall, the NHS plan estimates that eating at least 5 portions of fruit and vegetables could lead to a reduction of up to 20% in death rates from chronic diseases such as cancer, stroke and heart disease.⁴⁴ Further information on fruit and vegetable portions is given in box 7.

What is it in fruit and vegetables that helps protect against these chronic diseases? A number of potential factors have been identified and mechanisms suggested by which they might exert a protective effect. As outlined in box 8, fruit and vegetables are a rich source of vitamins, fibre, antioxidants and a wide range of other chemicals (called phytochemicals) which have a number of potentially protective effects. The full benefits of a high fruit and vegetable diet reflect a range of different components acting together rather than being attributable to any single factor.

Box 7 Fruit and vegetable portions

What constitutes a fruit or vegetable?

All fresh, frozen, chilled, canned, 100% juice and dried fruit and vegetables plus beans and other pulse vegetables, such as kidney beans, lentils and chick peas, count towards the 5-a-day target. The only exception is potatoes which consist mainly of starch and thus do not contain the protective factors outlined in box 8. Fruit/vegetable juice and pulses count for only one portion each per day, irrespective of how much is drunk or eaten. This is because fruit juices do not contain the high levels of fibre required in a balanced diet. Pulses on the other hand are high in fibre, but contain lower levels of the vitamins, minerals and other nutrients found in fruit and vegetables.

What constitutes a portion?

The WHO recommends at least 400g of fruit and vegetables per person per day, and notes that this is roughly equivalent to 5 portions (80g per portion). In real life, a single portion of fruit could consist of 1 medium apple, or 1 medium banana, or 2 small satsumas, or 3 dried apricots, or 1 glass of 100% fruit juice. One portion of vegetables is the equivalent of, for example, 3 heaped tablespoonfuls of cooked carrots, peas or sweetcorn, or 1 cereal bowl of mixed salad.

Source: www.doh.gov.uk/fiveaday/portionsfaqs.htm

³⁹ Block G et al, *Nutrition and Cancer*, 18, 1-29, 1992.

⁴⁰ Klerk M et al, in *Fruit and vegetables in chronic disease prevention*, Wageningen, Holland, Grafisch Bedrijf Ponsen and Looijen BV, 1998.

⁴¹ Ness AR and Powles JW, *International Journal of Epidemiology*, 26, 1-13, 1997.

⁴² Ornish D et al, *Journal of the American Medical Association*, 280, 2001-07, 1998.

⁴³ Klerk M et al, in *Fruit and vegetables in chronic disease prevention*, Wageningen, Holland, Grafisch Bedrijf Ponsen and Looijen BV, 1998.

⁴⁴ DoH, 2000, *The NHS plan: A plan for investment, a plan for reform*, TSO.

Box 8 Protective components present in fruit and vegetables

Antioxidants

Carotenoids (coloured pigments found in plants) such as β -carotene, vitamin A and lutein have been shown to reduce the risk of some types of cancer. The mechanism by which this occurs is unknown, although it has been suggested that such compounds acts as antioxidants, mopping up free radicals that might otherwise damage DNA and cause mutations. Plants also contain other antioxidants including vitamins C and E and minerals (calcium and selenium) that have been shown to reduce cancer risk in human population studies or to inhibit tumour formation in animal studies, presumably by a similar mechanism. Antioxidants such as vitamin C, carotenoids, flavonoids (found in soy and onions), allium compounds (found in leeks, garlic and onions) are thought to protect against heart disease and stroke by reducing the oxidation of LDL cholesterol in the blood, thus reducing its clogging effects in arteries.

Dietary fibre

Fibre is generally defined as that component of foods that resists being broken down by the enzymes produced in the digestive tract. Fruit, vegetables and grains are high in dietary fibre. A number of studies have suggested that diets rich in these foods are associated with a reduced risk of various types of cancer, although it is not clear whether this is attributable to the high fibre content or to some other feature of the diet (for instance, high fruit and vegetable diets tend to be low in fat). It has also been suggested that the soluble fibre found in fruit and vegetables helps control blood cholesterol levels and that this protects from heart disease.

Other phytochemicals

Plants also contain hundreds of other compounds (phytochemicals) that may be responsible for their protective effects. These include flavonoids, a large family of plant pigments that can act in a wide range of ways (e.g. as antioxidants, anti-virals, or anti-inflammatory agents), saponins and other plant sterols which are thought to help reduce levels of cholesterol and other lipids in the blood and folate, a component of vitamins B6 and B12 that helps to control blood levels of homocysteine (a risk factor for heart disease).

2.3 Overview

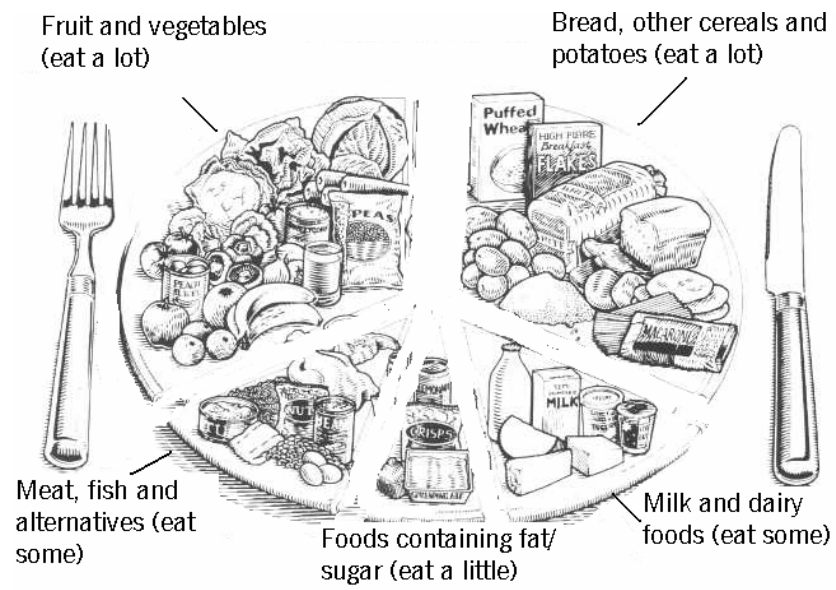
Overall, advice from expert groups on eating a balanced and healthy diet can be summarised as:

- Energy – no more than 33% of total energy from fats, no more than 10% from NME sugars with starch and other carbohydrates providing the bulk of the rest.
- Fats – in addition to reducing overall intakes of fats, people should reduce their intakes of saturated and trans fatty acids (to no more than 10% and 2% of total energy respectively).
- NME sugars – average intakes of NME sugars should be reduced (to less than 10% of total energy) because of the risk of tooth decay.
- Salt – average salt intakes should also be reduced because of the risk of high blood pressure and heart disease.
- Fruit and vegetables – people should eat at least five portions a day because of the protective effects against chronic diseases such as cancer and heart disease.

In practice, this means eating a balanced diet consisting of a mixture of different foods including plenty of fruit and vegetables and starchy foods, moderate amounts of meat, fish, milk and dairy products with small intakes of fatty and sugary foods. This has been illustrated in the FSA balance of good health plate (see figure 2) and encapsulated in the FSA's guidelines for a healthy diet:

- Enjoy your food;
- Eat a variety of different foods;
- Eat plenty of foods rich in starch and fibre;
- Eat plenty of fruit and vegetables;
- Don't eat too many foods that contain a lot of fat;
- Don't have sugary foods and drinks too often;
- Eat the right amount to be a healthy weight.

Figure 2 The FSA's balance of good health plate



3 Background – trends

This section looks at the evidence available on what children are actually eating, how this has changed over time, and how it matches up with the expert advice outlined in the previous section. It also presents data showing recent trends in diet-related conditions such as obesity, tooth decay and diabetes and analyses the likely long-term consequences of these trends.

3.1 Dietary trends

Dietary surveys

Information on what children eat is available from the National Dietary and Nutrition Survey (NDNS), a programme jointly sponsored by the FSA and DoH. This programme is divided into four separate, national surveys of different age groups:

- Children aged 1½ to 4½ years (published in 1995);⁴⁵
- Young people aged 4 to 18 years (published in 2000);⁴⁶
- Adults aged 19 to 64 years (published in 2002);⁴⁷
- And people aged 65 years and over (published in 1998).⁴⁸

Of these, the most relevant to this report is the survey of young people aged 4 to 18 conducted in 1997 and published in 2000. As outlined in box 9, this survey collected details of what people ate, took physical measurements of height, weight, etc., and included a blood and urine sample so that levels of certain micronutrients in the body could be measured. Prior to this survey, the national data on young peoples' diets had last been collected in 1983, in a survey of 10-11 and 14-15 year olds sponsored by the Ministry of Agriculture, Fisheries and Food (MAFF).⁴⁹

Box 9 The National Dietary and Nutrition Survey (NDNS) of young people, 1997

The NDNS programme was a joint initiative, established in 1992, between the Department of Health (DoH) and Ministry of Agriculture, Fisheries and Food (MAFF); responsibility for the programme transferred from MAFF to the Food Standards Agency in April 2000. It aims to provide a comprehensive snap shot of the dietary habits and nutritional status of the population of Great Britain. The part of the survey that looked at young people was conducted throughout 1997 (to take account of seasonal variations), collecting information on young people's diet and nutritional status as well as surveying their oral health. It involved some 2,700 young people aged 4-18 living in private households. An initial interview collected information about the young person, their eating habits and their household. Participants were then invited to:

- Keep a 7 day (weighed intake) diary of all food and drink they consumed in and out of the home;
- Have certain physical measurements taken (e.g. blood pressure, height, weight and waist);
- Keep a 7 day bowel movement diary;
- Keep a seven-day record of physical activity;
- Give blood and urine samples for biochemical analysis;
- Undergo an oral health interview and examination.

The results of the survey were published in two separate volumes in 2000. The first reports on findings from the diet and nutrition aspects of the survey, and the second covers the findings from the oral health component of the survey.

Source - <http://www.data-archive.ac.uk/findingData/snDescription.asp?sn=4243>

⁴⁵ Gregory JR et al, *National Diet and Nutrition Survey: children aged 1½ to 4½ years*, Volume 1, HMSO, 1995.

⁴⁶ Gregory JR et al, *National Diet and Nutrition Survey: young people aged 4 to 18 years*, Volume 1, TSO, 2000.

⁴⁷ Hendersen L et al, *National Diet and Nutrition Survey: adults aged 19 to 64 years*, Volume 1, TSO, 2002.

⁴⁸ Finch S et al. *National Diet and Nutrition Survey: people aged 65 years and over*, Volume 1, TSO, 1998.

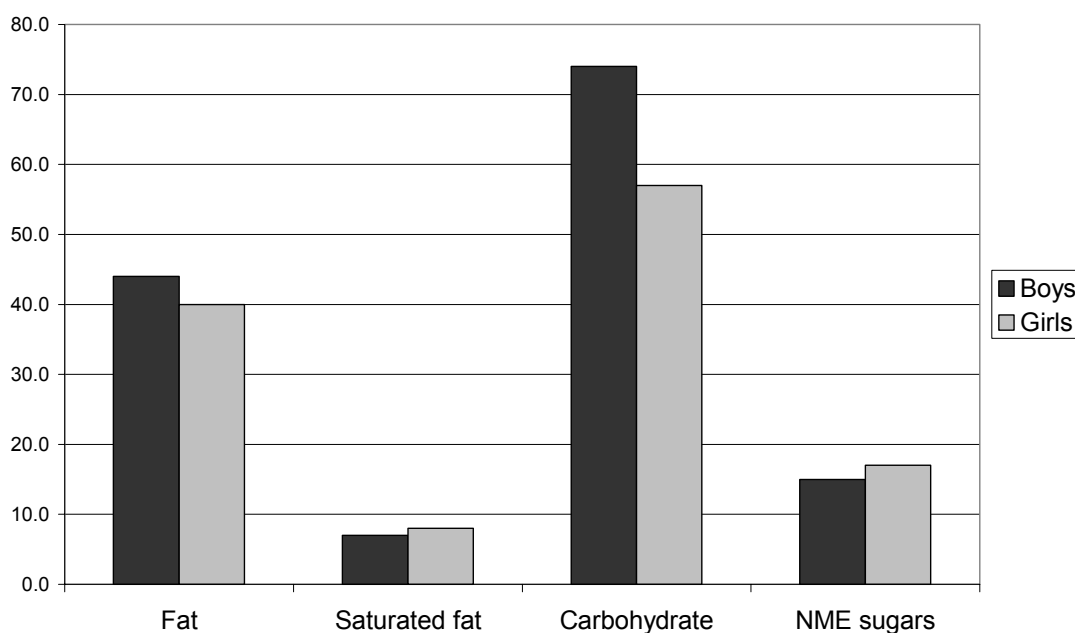
⁴⁹ DoH, *The diets of British schoolchildren*, Report on health and social subjects no 36, HMSO, 1989.

Main findings from the 1997 NDNS for young people

Among the main findings of the 1997 survey were:

- *Energy* – average energy intakes across all age ranges were lower than the requirements estimated by COMA (set out previously in table 2) both for males and females. This difference was most pronounced among girls aged 15-18, leading some to suggest that this group may have under-reported their energy intakes (as outlined in box 9, the survey relies on participants keeping an accurate dietary diary). Overall energy intakes among the 11-14 year olds were lower than those recorded in comparable age groups in the 1983 survey. The fact that children in the 1997 survey were, on average, heavier and taller than those in the 1983 survey suggests that energy requirements have declined over this period, presumably as a result of children adopting a more sedentary lifestyle.
- *Fats* – on average, males derived 35% and females 36% of their total energy from fats. This is in line with the COMA recommendation of 35% of food energy from fats. However, average intakes of saturated fat were significantly higher than COMA's recommendation of no more than 11% of total energy (14.2% for males and 14.3% for females).⁵⁰
- *NME sugars* – average intakes of NME sugars exceeded the COMA recommendation of 10% (11% if no energy is derived from alcohol) of total energy. On average, males derived 16.7% and females 16.4% of their food energy from NME sugars. Soft drinks (75% of the survey group drank sugar-sweetened carbonated drinks) and chocolate confectionery were the main sources of NME sugars.
- *Salt* – average intakes of both sodium and chloride were around twice the levels (RNIs) recommended by COMA for adults (average intakes were above 8g salt per day compared with the 4g/day recommended by COMA). These intakes exclude any salt added either during cooking or at the table.
- *Vitamins* – intakes of vitamins were generally comfortably above the levels recommended by COMA (Annex) with the exception of vitamins A and D. For vitamin A, some 20% of females and 12% of males in the older age range had intakes below the lower reference levels recommended by COMA, which may reflect low intakes of vegetables (the main source of vitamin A). Biochemical tests of blood samples showed that 13% of 11-18 year olds had poor vitamin D status, though this was highly seasonal, occurring during the winter months.
- *Minerals* – while people in the younger age groups generally exceeded reference intakes of minerals, intakes of zinc, potassium, magnesium and calcium were below reference levels in all older age groups, and iron intakes were particularly low in up to 50% of older girls. Biochemical analysis of the blood samples confirmed that some individuals had poor nutritional status for iron. For instance, more than 1 in 4 females surveyed had low body stores of iron (as measured by levels of the main iron storage protein ferritin in the blood). Around 3% of boys and 8% of girls aged 4-6 had blood haemoglobin levels below the WHO threshold for defining anaemia.
- *Consumption of fruit and vegetables* – on average, the young people surveyed consumed less than half of the recommended 5 portions of fruit and vegetables a day. The most commonly consumed fruits were apples and pears (eaten by over half the group), bananas (eaten by around 40%) and citrus fruits (eaten by around 1 in 4). Among the most popular vegetables were raw and salad vegetables (eaten by 47% of the males surveyed and 59% of the females) and cooked leafy green vegetables (eaten by around 40% of the group). However, around 1 in 5 of the group ate no fruit at all over the week in which they were surveyed.

⁵⁰ COMA recommended no more than 33% of energy should come from fats, with no more than 10% of total energy coming from saturated fats. But these this assumed that people would derive 5% of energy intake from alcohol. Removing alcohol from the equation increases the recommended thresholds to 35% and 11% respectively.

Figure 3 Proportion of children meeting dietary goals

Source: British Heart Foundation

As illustrated in figure 3, the NDNS shows that a significant proportion of young people do not meet some of the dietary guidelines. It must be remembered that these dietary goals are set in terms of average population intakes, so that it might be expected that not all the population would meet them. Even bearing this in mind, it is evident from figure 3 that fewer than 1 in 10 children meet the dietary goal for saturated fat, and fewer than 1 in 5 the goal for NME sugars.

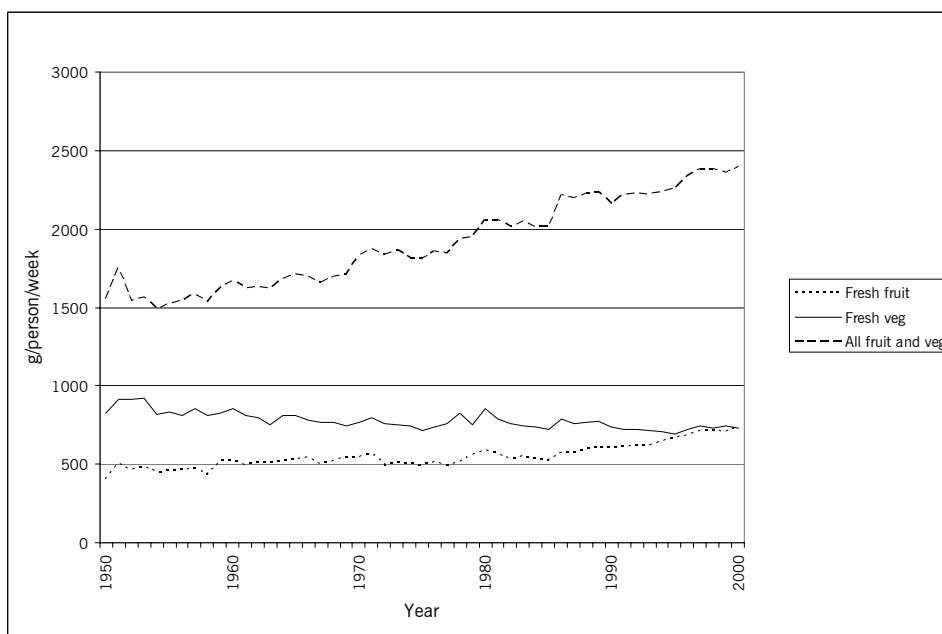
Long-term dietary trends

Data on longer term dietary trends are also available from the National Food Survey (NFS), which has been running as a continuous survey of household food consumption and expenditure since 1940. It samples around 6,000 private households in the United Kingdom, logging details of the amount and cost of all food and drink brought for consumption within the home, and (since 1994) of that consumed outside the home as well. Although this survey collects data across a range of different ages, the data are aggregated and thus cannot be used to study trends in children's diet. Nevertheless, it does provide a clear picture of long-term dietary trends within the UK.

As illustrated in figure 4, the National Food Survey shows that while consumption of fresh fruit has risen steadily since 1950, consumption of fresh vegetables (excluding potatoes) has fallen slightly over this period. Overall, the combined intake of all fruit and vegetables (this includes frozen and tinned products as well as fruit juice) has risen in the last 50 years (figure 4), but is still under 2,400g per person per week, significantly lower than the minimum consumption of 2,800g/person/week recommended by the WHO.⁵¹ The British Heart Foundation has estimated that it will take more than 25 years at current trends for average intakes of fruit and vegetables to meet the levels recommended by the WHO.

⁵¹ WHO recommended a minimum intake of 400g per day, which is 2,800g per week.

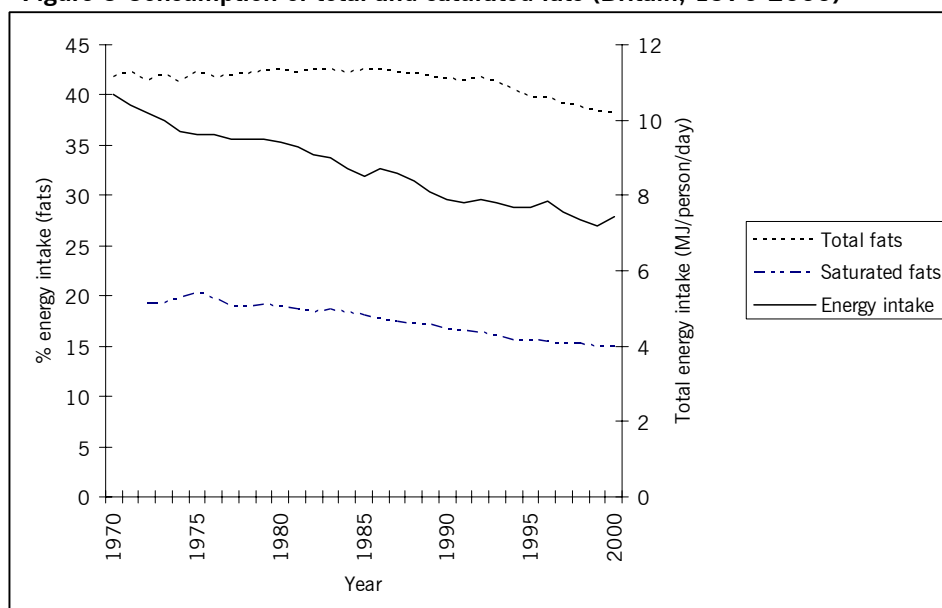
Figure 4 Consumption of fruit and vegetables (Britain, 1950-2000)



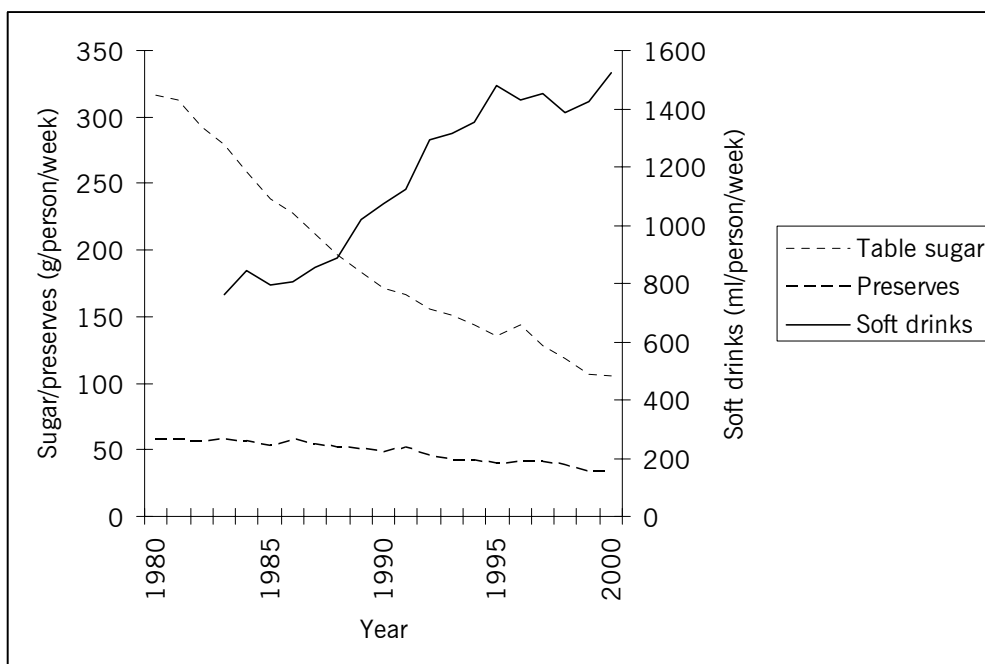
Source: National Food Survey 2000, TSO 2001 (and previous editions)

Figure 5 shows trends in the consumption of total fats since 1970 and saturated fats since 1975 (the first year that this category was included in the survey). Consumption of total fats and saturated fats both show a long-term decline, although the fall in intakes of saturated fats has been occurring for longer (~20 years) than that for total fats (~10 years). However, average intakes of both are somewhat higher than those recommended by COMA. Thus, total fat contributed just over 38% of energy intake compared with the COMA goal of 35% (excluding alcohol), with saturated fat accounting for 15% compared with COMA's target of 11%. On current trends, the British Heart Foundation estimate that it would take around 25 years for the COMA goals to be met.

Figure 5 Consumption of total and saturated fats (Britain, 1970-2000)



Source: National Food Survey 2000, TSO 2001 (and previous editions)

Figure 6 Consumption of table sugar, preserves and soft drinks (Britain, 1980-2000)

Source: National Food Survey 2000, TSO 2001 (and previous editions)

The National Food Survey does not assess intakes of NME sugars as such. However, it does record consumption of foods that are generally high in NME sugars such as table sugar, preserves and soft drinks. As illustrated in figure 6, intakes of table sugar and preserves have declined consistently in the last 20 years or so, but this has been offset by a significant rise in the consumption of soft drinks. Of course, not all of this increase will involve drinks with a high NME sugar content. For instance, in 2000, low-calorie drinks accounted for 23% of the concentrated soft drinks and 37% of ready to drink products.

3.2 Trends in diet-related conditions

Obesity and overweight

Prevalence and trends in children

As outlined in more detail in box 10, obesity is a condition where weight gain has reached the point where it poses a serious threat to health.⁵² It is measured in terms of a person's body mass index (bmi) which is an indication of how much someone weighs taking into account height. For adults, there are internationally agreed cut off points based on different degrees of risk of disease (see box 10). A bmi in the range 20-25 is considered desirable or healthy, with people having a bmi of 25-30 being termed overweight and those with a bmi above 30 being obese.

For children the situation is more complex, because a child's bmi will vary significantly with age. Thus, different bmi cut-off points have to be used to define overweight and obesity in children depending on their age (and gender). It is only relatively recently that such definitions have been formulated and internationally accepted (see box 10).⁵³ Prior to this, different researchers used different definitions of overweight and obesity in children. This led to a situation where although it was widely agreed that the prevalence of overweight and obesity was increasing among children, there was disagreement over the extent of the increase.

⁵² National Audit Office, *Tackling Obesity in England*, NAO, 2001.

⁵³ Cole TJ et al, *British Medical Journal*, 320, 1240-43, 2000.

Box 10 Defining obesity and overweight

Obesity and overweight are defined using the body mass index calculated with the following formula: $\text{bmi} = \text{bodyweight (kilogrammes)} / (\text{height (metres)})^2$. For adults, the cut off points used are:

- bmi <20, a person is underweight;
- bmi 20-25 is the desirable or healthy range;
- bmi 25-30 is classified as overweight, with an increased risk of disease due to excess weight;
- bmi 30-35 is classified as obese (class I), with a moderate risk of disease due to excess weight;
- bmi 35-40 is classified as obese (class II), carrying a severe risk of disease due to excess weight;
- bmi >40 is classified as morbid obesity, carrying a very severe risk of disease due to excess weight;

While the above cut offs are internationally recognised for classifying adults, children are more difficult to assess as their bmi measurements vary with age during the normal course of development. Cut-off points for overweight and obesity for children of different ages were proposed in 2000 by the International Obesity Task Force, based on an international survey of six large growth studies (including one in the UK). The figures are given in the table below for children aged 4-12.

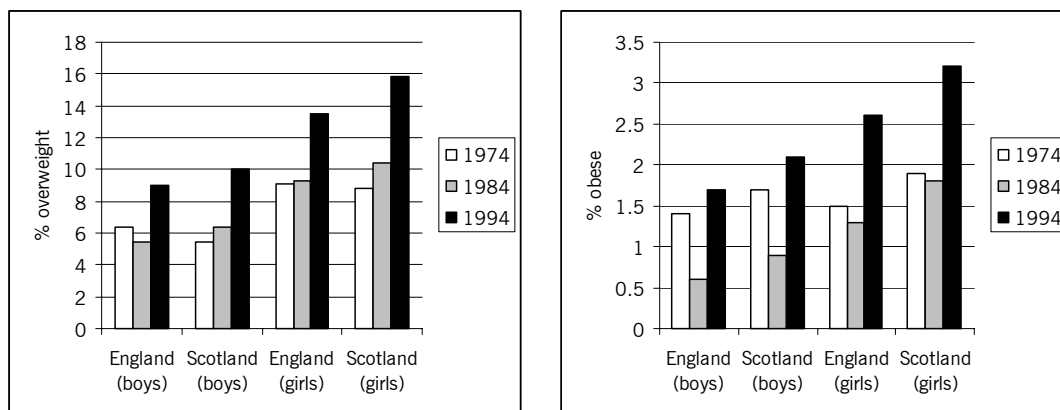
Age (years)	BMI cut off points for overweight (kg/m ²)		BMI cut off points for obesity (kg/m ²)	
	Boys	Girls	Boys	Girls
4	17.6	17.3	19.3	19.1
4.5	17.5	17.2	19.3	19.1
5	17.4	17.1	19.3	19.2
5.5	17.5	17.2	19.5	19.3
6	17.6	17.3	19.8	19.7
6.5	17.7	17.5	20.2	20.1
7	17.9	17.8	20.6	20.5
7.5	18.2	18	21.1	21
8	18.4	18.3	21.6	21.6
8.5	18.8	18.7	22.2	22.2
9	19.1	19.1	22.8	22.8
9.5	19.5	19.5	23.4	23.5
10	19.8	19.9	24	24.1
10.5	20.2	20.3	24.6	24.8
11	20.6	20.7	25.1	25.4
11.5	20.9	21.2	25.6	26.1
12	21.2	21.7	26	26.7

Source: Cole TJ et al, *British Medical Journal*, 320, 1240-43, 2000.

Data on children's height and weight have been collected as part of the National Study of Health and Growth, which ran between 1974 and 1994. A recent study has applied the newly agreed cut off points (box 10) to these data to evaluate trends in obesity and overweight among 4-12 year olds in Scotland and England over this period of time (figure 7). In general, there was little change in the proportion of children classified as overweight between 1974 and 1984 while the proportion of children classified as obese declined over this period (figure 7).

However, as illustrated in figure 7, the period between 1984 and 1994 saw big increases in the prevalence both of overweight and obesity among 4-12 year olds in Scotland and England. The proportion of overweight boys increased from 5.4% in 1984 to 9% in 1994 in England and from 6.4% to 10% in Scotland. For girls, over the same period, the figures rose from 9.3% to 13.5% in England and from 10.4% to 15.8% in Scotland. While the prevalence of obesity among children is lower, it too has risen substantially since 1984 (figure 7). Between 1984 and 1994, the proportion of boys in England classified as obese increased from 0.6% to 1.7% (from 0.9% to 2.1% in Scotland), while the obesity prevalence rate for girls rose from 1.3% to 2.6% (from 1.8% to 3.2% in Scotland).

Figure 7 Trends in prevalence of overweight (left) and obesity (right) in 4-12 year olds

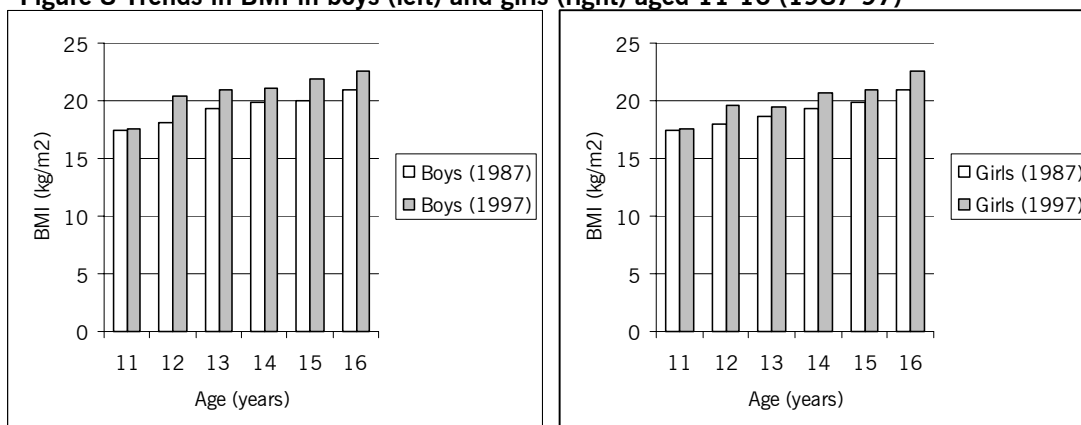


Source Chinn S and Rona RJ, *British Medical Journal*, 322, 24-26, 2001.

More recent analyses of data from the Health Survey for England suggest that this trend has continued since 1994. For instance, it has been estimated that between 1996 and 2001 the proportion of obese children (aged 6-15 years) increased by 3.5%, and that by 2001 8.5% of 6 year olds and 15% of 15 year olds were obese.⁵⁴ However, because this analysis uses a different definition of obesity, the figures are not necessarily comparable with those shown in figure 7.

Another recent study compared data from the 1997 Health Survey for England, which focused on the health of young people, with those from the 1987 National Study of Health and Growth.⁵⁵ As illustrated below, average bmi measurements (figure 8) and average waist circumferences (figure 9) in children across all ages in the range 11-16 years both showed small but significant increases between 1987 and 1997. This suggests that not only are children in the age range 11-16 years increasing in weight in relation to height, but that the weight is – in part at least – being deposited around the abdomen. This is of potential concern because epidemiological studies suggest that abdominal fatness on its own (i.e. without necessarily causing obesity) is linked with increased risk of diseases such as diabetes, hypertension, heart disease and stroke.

Figure 8 Trends in BMI in boys (left) and girls (right) aged 11-16 (1987-97)



⁵⁴ Figures based on obesity being above 95th percentile bmi. Source, *Annual report of the Chief Medical Officer, 2002*, DoH 2003.

⁵⁵ McCarthy et al *British Medical Journal*;326, 624, 2003

Figure 9 Waist circumference in boys (left) and girls (right) aged 11-16 (1987-97)

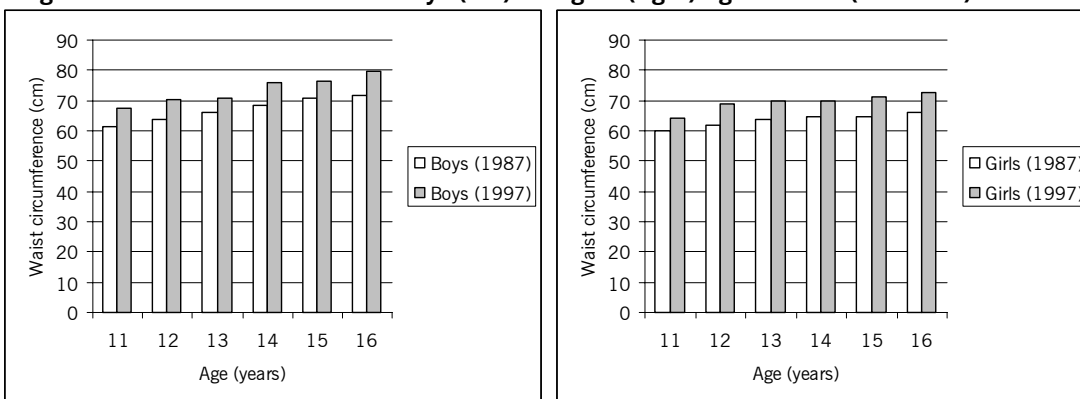
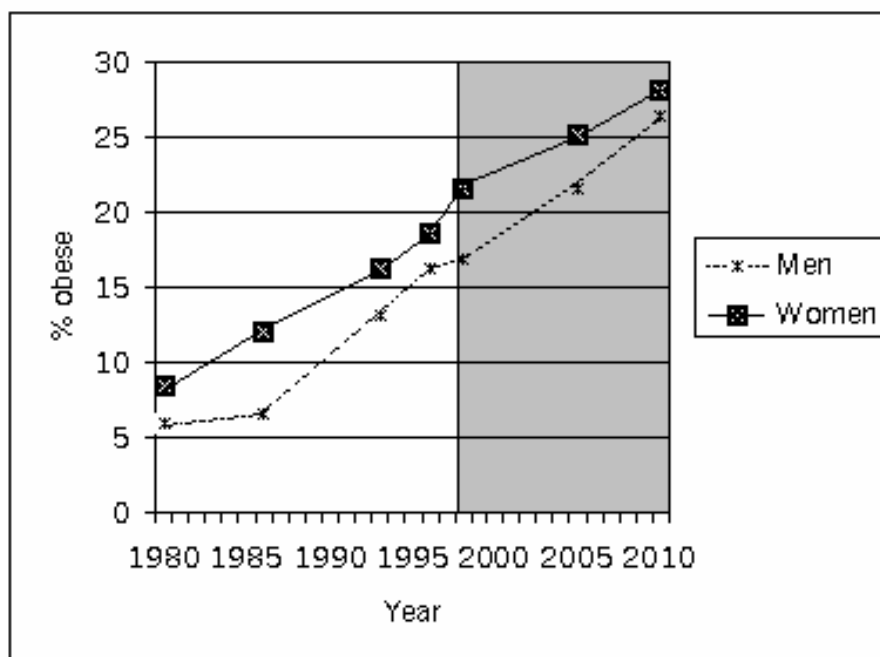


Figure 10 Trends in obesity in adults in England extrapolated until 2010



Source: National Audit Office, *Tackling Obesity in England*, NAO, 2001.

Prevalence and trends in adults

This increase in obesity is not limited to children and young people: it reflects a wider trend among the adult population in the UK and in other developed countries.⁵⁶ As illustrated in figure 10, the prevalence of obesity among men and women in England has almost trebled in the last 20 years. Between 1980 and 1998, it rose from 6% to 17% among men and from 8% to 21% among women. The National Audit Office (NAO) has extrapolated from current trends and estimates that by 2010, over one quarter of the adult population will be obese (this extrapolation is depicted in the grey shaded area of figure 10).⁵⁷ As the NAO has pointed out, obesity is not equally distributed throughout the population, with risk factors including:

- Age – obesity within the population increases with age.
- Ethnicity and gender. Women are more likely to be obese than men and certain ethnic groups are more prone to obesity than others. Obesity is particularly prevalent among black Caribbean and Pakistani women.

⁵⁶ See Wang Y et al, *American Journal of Clinical Nutrition*, 75, 971-77, 2002 for more details of trends on adolescents in the US, Brazil, China and Russia.

⁵⁷ National Audit Office, *Tackling Obesity in England*, NAO, 2001.

- Socio-economic grouping – people (particularly women) in lower socio-economic groups are at higher risk of obesity.
- Regional variations – while obesity is prevalent in every region of England, prevalence varies from region to region with the lowest being South Thames (18%) and the highest the West Midlands (22%).

Causes – possible dietary factors

What are the factors behind the observed increases in the prevalence of obesity? Obesity occurs when individuals take in more energy than they expend, although some people are genetically more susceptible than others. The NAO noted that the increase in obesity has occurred too rapidly to be attributed to some genetic change within the population. It thus concluded that the underlying causes must be related to changes in eating patterns and levels of physical activity.

Table 6 WHO/FAO expert group conclusions on causative/protective factors for obesity

Evidence strength	Decreases risk of obesity	Increases risk of obesity
Convincing	Regular physical activity High dietary intake of fibre	Sedentary lifestyles High dietary intake of energy-dense, micronutrient-poor foods
Probable	Home & school environments that support healthy food choices for children Breastfeeding	Heavy marketing of energy-dense foods and fast food outlets High intakes of sugar-sweetened soft drinks and fruit juices Adverse socio-economic conditions (especially for women in developed countries)
Possible	Low-glycaemic index foods	Large portion sizes High proportion of food prepared outside the home (developed countries) Eating patterns (e.g. strict dieting/ periodic bingeing behaviour)
Insufficient	Increased eating frequency	Alcohol

Source *Joint WHO/FAO expert consultation, WHO, Geneva, 2002..*

As far as changes in eating patterns are concerned, data from the National Food Survey suggest that overall energy consumption has been declining since the early 1970s (see figure 5). However, the NAO has pointed out that the NFS data do not take full account of a number of factors that might contribute to energy intakes. For instance, alcoholic drinks and confectionery brought for consumption in the home (first included in the NFS in 1992) and food and drink consumed outside the home (first included in the NFS in 1994) accounted for some 20% of energy intakes in 1998. There is also a potential problem with under-reporting of energy consumption; anecdotal evidence suggests that snack foods, confectionery and alcoholic drinks tend to be overlooked in diary-based studies such as the NFS.

Overall, the NAO considered that the observed trend to eating food outside the home may be a significant dietary factor behind the observed rise in obesity rates. It pointed out that food eaten outside the home tends to be higher in fat than that prepared in the home and suggested that the ready availability and extensive marketing of energy dense ('fast') foods "*may be contributing to an increase tendency towards over-consumption*" in some people.⁵⁸ This factor has also been identified as a possible cause of obesity in a recent report of a WHO/FAO expert group.⁵⁹ It considered the strength of the evidence for potential causative and protective factors for obesity (see table 6 for a summary), and concluded that heavy marketing of 'fast' (energy-rich, micronutrient-poor) foods was a probable causative agent in obesity.

⁵⁸ National Audit Office, *Tackling Obesity in England*, NAO, 2001.

⁵⁹ *Diet, nutrition & the prevention of chronic diseases*, Joint WHO/FAO expert consultation, WHO, Geneva, 2002. (WHO technical report series; 916).

Other dietary factors implicated in obesity by the expert group included dietary fibre (where it found convincing evidence that high intakes protect against obesity), sugar-sweetened drinks (where the evidence indicated high intake as a probable causative factor), portion size and eating out (which the evidence suggests as possible causative factors). As previously discussed (pages 15 and 16) these conclusions are contested by the food and sugar industries.

Causes – the importance of physical activity

The NAO and the WHO/FAO reports both recognise that dietary factors are only part of the story – changes in patterns of physical activity that have led to children and adults adopting more sedentary lifestyles are also important factors behind the rise in obesity. While there are no comprehensive data available on long-term trends in physical activity, there are some indications of a decline in levels of physical activity paralleled by a rise in sedentary behaviour. For instance, the Health Development Agency (HDA) has noted that data available reveal:

- A decline in the number of young people playing sport at school. A survey commissioned by Sport England showed that the proportion of young people spending two or more hours a week on sport in school declined from 46% in 1994 to 33% in 1999.⁶⁰
- A fall in the proportion of children walking to school. Since 1989/91, the proportion of primary school children walking to school has fallen from 62% to 56%, while over the same period the number being driven to school has risen from 27% to 36%.⁶¹
- The decline of walking as a mode of transport – the average distance walked per year fell from 244 miles in 1975 to 191 miles in 2000.⁶²
- A decline in the proportion of children cycling to school. Just 2% of secondary pupils currently cycle to school compared with 5% in 1989/91.
- A rise in sedentary pastimes such as watching TV, playing computer games or accessing the internet. Data from the Independent Television Commission (ITC) shows that the average 4-15 year old watches ~2.5 hours of TV a day (research also shows a strong correlation between the number of hours spent watching TV and increased risk of obesity). In 2002, ~50% of households with children had home internet access; on average children log on 10 times a month.

Consequences

Rising rates of obesity in children are a particular concern because they pose significant risks for the health of the future adult population. Research suggests that overweight adolescents have a 70% chance of becoming overweight or obese adults; this increases to 80% if one or more parent is overweight or obese.⁶³ Obesity is known to be an important risk factor for mortality (a young adult with a bmi of 35kg/m² has twice the mortality risk compared with one with a bmi in the healthy range of 20-25kg/m²) and a range of chronic diseases⁴⁸ in adult life, including:

- Coronary heart disease, which is the most common cause of premature death among obese people. The NAO estimates that obesity was directly responsible for around 1 in 5 (some 28,000) heart attacks and 1 in 3 (more than three quarters of a million) cases of hypertension in England in 1998. Overall, the National Heart Forum has projected that meeting the Government's targets for obesity (no more than 6% in men and 8% in women) would reduce coronary heart disease cases and deaths by over 3%.⁶⁴

⁶⁰ Sport England, *Young people and sport in England*, Sport England, 1999', 2000.

⁶¹ Department of the Environment, Transport and the Regions, *Transport Statistics Bulletin, National Travel Survey 1996-98*, Update, DETR, 1999.

⁶² National Audit Office, *Tackling obesity in England*, NAO, 2001.

⁶³ Although it should be noted that there is some debate as to whether it is 'fatness' (adiposity) or build that tends to track through an individual's life (see Wright CM et al, *British Medical Journal*, 323, 1280-1284, 2001).

⁶⁴ National Heart Forum, *CHD – estimating the impact of changes in risk factors*, TSO, 2002.

- Type 2 diabetes (see below) is strongly associated with obesity – for instance women who are obese are 12 times more likely to develop it than women who are of a healthy weight. The NAO estimates that obesity directly caused more than a quarter of a million cases (around 1 in 2 of total cases) of type 2 diabetes in England in 1998. As discussed in more detail in the following section, recent years have seen the appearance of type 2 diabetes, which was previously considered to be a disease of adulthood, in schoolchildren.
- Cancers – the links between cancer and obesity are less clear cut. The evidence is strongest for colon cancer: obesity increases the risk of this type of cancer by nearly three times in both men and women. Other types of cancer linked to obesity include cancer of the breast, endometrium, ovary, cervix and gall bladder in women and rectal and prostate cancer in men.
- Osteoarthritis and back pain are common complications associated with obesity, most likely resulting from excess weight rather than metabolic factors.
- Other diseases – obesity has also been linked with a number of other conditions including respiratory diseases (which can disrupt sleep patterns) and reproductive disorders.

In addition to these chronic diseases, obesity also has social and psychological consequences. This can include stigmatisation, with obese schoolchildren being taunted by their peers about their appearance, and obese people in general being subject to discrimination and prejudice. Research suggests that obesity is closely linked with low self-image and self-confidence and depression, although it is not clear whether obesity causes such problems or vice versa.

Table 7 Diseases attributed to obesity and costs of treating them (1998)

Disease	No. cases caused by obesity (%of total cases)	Cost of treatment (£M)
Hypertension	794,276 (36%)	134.8
Type 2 diabetes	270,504 (47%)	123.5
Angina	90,776 (15%)	84.7
Heart attack	28,027 (18%)	42.4
Osteoarthritis	194,683 (12%)	34.8
Stroke	20,260 (6%)	16.7
Others	115,728	33.2

Source: National Audit Office, *Tackling Obesity in England*, NAO, 2001.

The NAO has estimated the costs of obesity among the adult population to the NHS and to the wider economy in 1998:

- Direct costs of treating obesity itself – £9.4M, most (£6.8M) being GP consultations.
- Direct costs of treating diseases caused by obesity - £469.9M, comprising GP consultations (£44.9M), hospital bills (£177.7M) and prescription costs (£247.3M). Angina, heart attacks, type 2 diabetes and hypertension accounted for most (80%) of this cost (table 7).
- Indirect costs of obesity - £2,149.5M, due to loss of earnings caused by premature death (£827.8M arising from 31,000 deaths attributed to obesity) and by absence from work through sickness (£1,321.7M arising from 18 million days of sickness attributed to obesity).
- Grand total - £2,628.9M. NAO estimates that on current trends (see figure 10), the costs will rise a further £1,000M to a total of around £3,600M by 2010.

Type 2 diabetes

Prevalence and trends

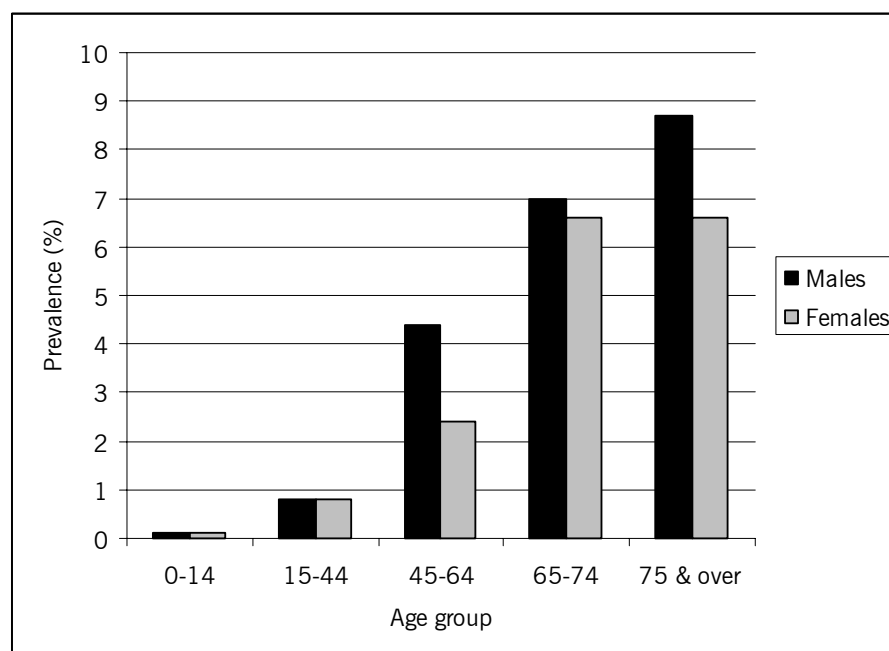
Diabetes is a condition caused by irregularities in the body's (in type 1 diabetes) supply of, or (in type 2) response to, the hormone insulin. Since insulin helps cells absorb glucose from the blood, people with diabetes are characterised by having abnormally high levels of blood glucose. Type 1 diabetics are incapable of making insulin and thus need regular supplementary doses of the hormone via injections or pumps.

Type 2 diabetics can usually make insulin, but their capacity to respond to it is diminished (they develop insulin resistance), so they need dietary or drug interventions to reduce the levels of glucose in their blood.⁶⁵ Of these two main types of diabetes, type 2 is most common accounting for around 90% of all UK cases.

Recent data on the prevalence of diabetes in the UK are available from two main sources. First is the Health Survey for England, which asks a nationally representative sample of adults to report diagnoses of diabetes and other diseases they have received from their doctor. Second is a one-off survey of diabetes among the population of Tayside, which trawled through electronic records to assess the number of diagnosed cases among the local population (including children). Data from these and other surveys suggest that:

- The prevalence of diabetes increases with age and is higher in men aged 45 or above than it is in women (figure 11).
- The overall prevalence of diabetes among the adult (over 16 years) population is around 3%, and among the total population (i.e. including children) is around 2.2%.
- This means that there around 1.3 to 1.4 million diagnosed diabetics in the UK, of whom around 1.15M have type 2 diabetes.
- There are nearly as many undiagnosed cases of diabetes as diagnosed cases⁶⁶ – the research charity Diabetes UK estimates there are a further 1 million undiagnosed diabetics in the UK.

Figure 11 Prevalence of diabetes by age and sex (England, 1998)

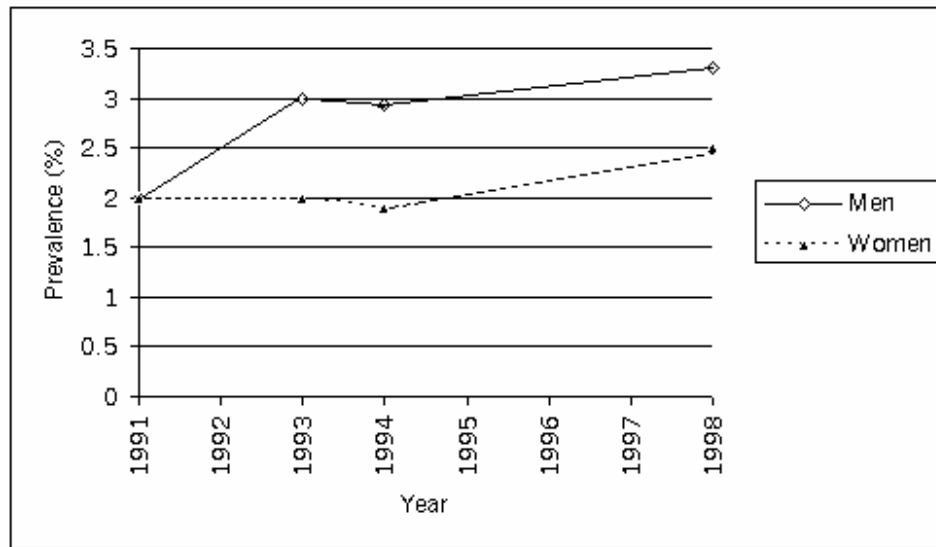


Source: *Tayside Regional Diabetes Network (1999) Annual Report: Demographics.* (www.diabetes-healthnet.ac.uk).

⁶⁵ In some cases of type 2 diabetes the body produces abnormal insulin.

⁶⁶ Yudkin JS et al, *Diabetes Care* 16, 1530, 1993.

Figure 12 Recent trends in prevalence of diabetes (England 1991-98)

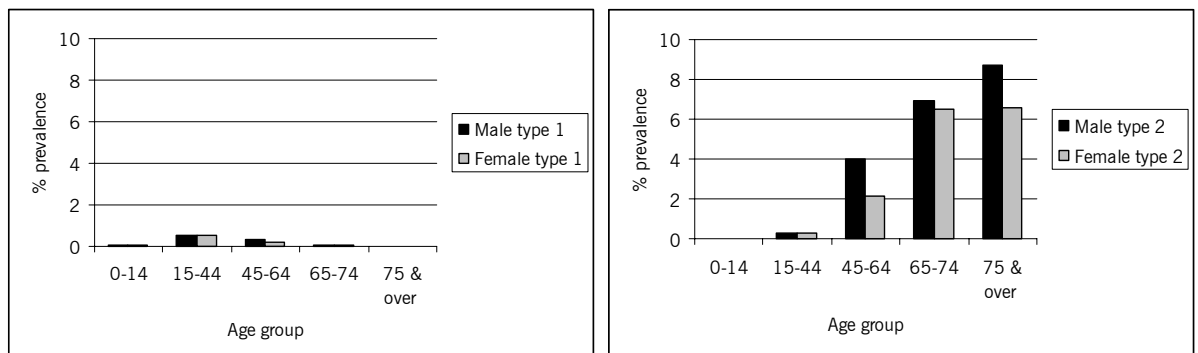


Source: Joint Health Surveys Unit, Health Survey for England 1998, TSO 1999.

There is some evidence that the prevalence of diabetes has been increasing among the adult population in recent years. Data from the Health Survey for England (figure 12) show that since 1991, the prevalence of diabetes has risen both in men (from 2% to 3.3%) and women (from 2% to 2.5%). However, this survey did not include data on prevalence among children. The survey in Tayside did collect data on children, but the one-off nature of the exercise means that no information is available to see whether this trend is also occurring in children.

While there is no systematic evidence to show whether diabetes is an increasing problem for UK children, a paper published in 2002 detailing the emergence of four cases of type 2 diabetes among obese white UK adolescents (3 girls and 1 boy aged 13-15) is giving rise to concerns.⁶⁷ Prior to this, type 2 diabetes was regarded as being a disease of adulthood; the Tayside survey found no cases of type 2 diabetes among 0-14 year olds (figure 13) and a very low prevalence among under 45s (0.3%). Before the 2002 report, the only cases seen in UK schoolchildren were among ethnic groups with a high predisposition to diabetes.

Figure 13 Prevalence (%) of types 1 (left) and 2 (right) diabetes (England 1998)



Source: Tayside Regional Diabetes Network (1999) Annual Report: Demographics. (www.diabetes-healthnet.ac.uk).

⁶⁷ A research group based in Bristol published a paper reporting the cases in March 2002 (Shield J et al, Archives of Disease in Childhood, 86, 207-208, 2002.)

The main focus of concern over these recent cases lies with the possibility that they might mark the start of an upwards trend in type 2 diabetes among schoolchildren. Part of the reason for this concern is that (as discussed in more detail later) obesity is a risk factor for type 2 diabetes, so the rise in childhood obesity described in the previous section might be expected to be paralleled by a rise in diabetes. And part of the reason is that an increase in type 2 diabetes among children has already been reported in countries where the rise in childhood obesity has been more pronounced than that seen in the UK.

While the overall prevalence of type 2 diabetes among US adolescents is low (less than 1%), studies show that this type of diabetes is accounting for an increasing proportion of newly diagnosed diabetes among schoolchildren (in the early 1990s type 2 accounted for less than 5% of child diabetes – by the late 1990s this increases to around 30-35%). Other research in the US has found that 1 in 4 obese children and 1 in 5 obese adolescents had impaired glucose tolerance, a condition that is often associated with going on to develop type 2 diabetes.⁶⁸ A similar picture is seen in Japan, where research has shown a rise in diagnosed type 2 diabetes among schoolchildren from 2 per 100,000 in 1975 to 8 per 100,000 in 1995.⁶⁹

Causes

As noted previously, type 2 diabetes is the result of the body no longer responding normally to its own insulin, and/or of the body not producing enough insulin. Although the exact causes are not known, risk factors that have been identified include:

- Age – as shown in figure 13, the vast majority of cases of type 2 diabetes occur in people age 45 years or older.
- Family background – type 2 diabetes tends to run in families and is more common in Asian and African-Caribbean communities. Several genetic factors have been identified as being implicated with diabetes and genetics is at the forefront of current diabetes research.
- Obesity – nearly 3 in every 4 people who develop type 2 diabetes are overweight, and the prevalence increases with the degree of obesity. Risk factors for obesity such as physical inactivity are also predictive factors for type 2 diabetes.
- High blood pressure and/or abnormal fat levels in the blood.
- Impaired glucose tolerance (characterised by high blood glucose levels)
- Having had diabetes during pregnancy or having given birth to a baby weighing more than 9 pounds.

Recent research has begun to shed some light on the mechanisms behind some of these statistical associations. For instance, a paper published in 2001 suggested that the link between obesity and type 2 diabetes could be at least partly explained by the role of a previously unknown hormone called resistin.⁷⁰ This is produced by fat cells, and seems to incite cells to resist the action of insulin. It has also become apparent that there is a high degree of overlap between the risk factors above and risk factors for other conditions such as cardiovascular and heart disease. Indeed, many of the risk factors for type 2 diabetes form part of the so-called metabolic syndrome, a cluster of symptoms that is thought to increase the risk of dying from a heart attack by three- to four-fold.⁷¹

⁶⁸ A person with impaired glucose tolerance has higher than normal levels of glucose in the blood, but not high enough to 'qualify' for a diagnosis of diabetes.

⁶⁹ Kitagawa T et al, *Clinical Pediatrics*, 37, 111-5, 1998.

⁷⁰ Stepan CM et al, *Nature*, 409, 307-12, 2001.

⁷¹ The metabolic syndrome is defined as having three or more of the following: abdominal fat (waist >40" in men and >35" in women); high blood sugar (>110mg/dL) after fasting; high blood triglycerides (>150mg/dL); low high density lipoprotein (<40mg/dL); and high blood pressure (130/85 or higher).

Consequences

People who develop type 2 diabetes may notice a number of everyday consequences including headache, blurred vision, thirst, frequent urination and a dry, itchy skin. In the longer term, the consequences are potentially much more serious, with type 2 diabetics being linked with:

- Decreased life expectancy (reduced on average by 20 years for type 1 diabetics and 10 years for type 2).⁷²
- Cardiovascular disease - research suggests that type 2 diabetes increases the risk of heart attack in women by a factor of around four, and doubles the risk of stroke.⁷³
- Kidney disease – the high levels of glucose in the blood that are characteristic of diabetes can impair kidney function and may eventually lead to kidney failure. Diabetes is responsible for 1 in 6 cases of renal replacement therapy in the UK.
- Vision problems – high glucose levels can also damage small blood vessels in the eye, leading to impairment of vision and, in some cases, to blindness (diabetes is the most common cause of blindness among people of working age). Around 1 in 2 diabetics experience problems with their vision within 15 years of receiving their diagnosis.
- Damage to the nervous system and circulatory problems – around 1 in 2 people with diabetes experience symptoms related to nerve damage caused by a combination of decreased blood flow and high blood sugar levels. This may manifest itself in many ways, from a tingling or loss of sensation in the limbs and feet to paralysis and loss of muscle control. In extreme cases, infections can become gangrenous and result in amputation.
- Women with diabetes have an increased risk of losing the baby before or during birth, and of the baby being born with a congenital abnormality or dying during infancy.
- Skin disorders and infections – these are a potential problem for diabetics as high blood sugar levels mean that minor abrasions such as blisters and corns can easily become infected.

DoH estimates that around 5% of total NHS resources and up to 10% of hospital in-patient resources are taken up caring for people with diabetes.⁷⁴ The research charity Diabetes UK puts the total cost to the NHS at around £5.2 billion each year.⁷⁵ In general, people with diabetes are twice as likely to be admitted to hospital and likely to stay twice as long as patients without diabetes. Around 1 in 5 diabetics requires social services, with the average annual cost per person being estimated at £2,450 in 1999.

Overall, the WHO estimate that 150 million people have diabetes worldwide, and that this number may well double by the year 2025.⁷⁶ It suggests that much of this increase will occur in developing countries and will be due to factors such as population growth, ageing, unhealthy diets, obesity and sedentary lifestyles, and that in developed countries such as the UK. The appearance of type 2 diabetes in earlier age groups is a particular concern, as the longer people live with type 2 diabetes the more likely they are to encounter complications. A recent analysis of the likely impact of the upwards trend in diabetes noted that it had the potential to cripple the budgets of both developed and developing nations.⁷⁷

⁷² DH National Service Framework for Diabetes, www.doh.gov.uk/nsf/diabetes/

⁷³ Cho E, et al, *Diabetes Care*; 25, 1142-8, 2002.

⁷⁴ DoH *National Service Framework for Diabetes*, www.doh.gov.uk/nsf/diabetes/

⁷⁵ Diabetes UK, *Fact sheet No 3, Diabetes: Costs and complications*, Diabetes UK, 2001.

⁷⁶ WHO, *Factsheet No 138, Diabetes Mellitus*, WHO, 2002.

⁷⁷ Zimmet P et al, *Nature*, 414, 782-7, 2001.

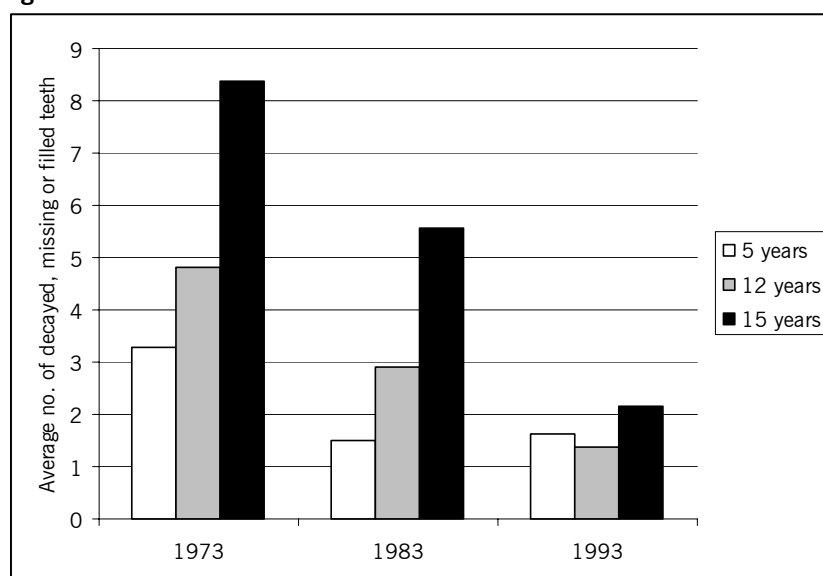
Oral health

Information on the oral health of children is available from two main sources:

- A National Children's Dental Health Survey conducted every 10 years. The most recent figures available are for 1993; the latest survey is scheduled to take place in November 2003, will be published in summer 2004, and will consist of dental examinations of a random selection of more than 12,000 schoolchildren aged 5 to 15 years backed up with questionnaires filled in by the examined children's parents/guardians.
- Surveys of schoolchildren carried out by the British Association for the Study of Community Dentistry (BASCD) on a more regular basis in England and Wales.

There has been a significant improvement in children's oral health since 1973, when the national survey was first conducted. Overall, the average number of decayed, missing or filled teeth fell by over 50% among 5 year olds and by more than 75% among 12 and 15 year olds between 1973 and 1993 (see figure 14 below).

Figure 14 Oral health of UK schoolchildren 1973-1993

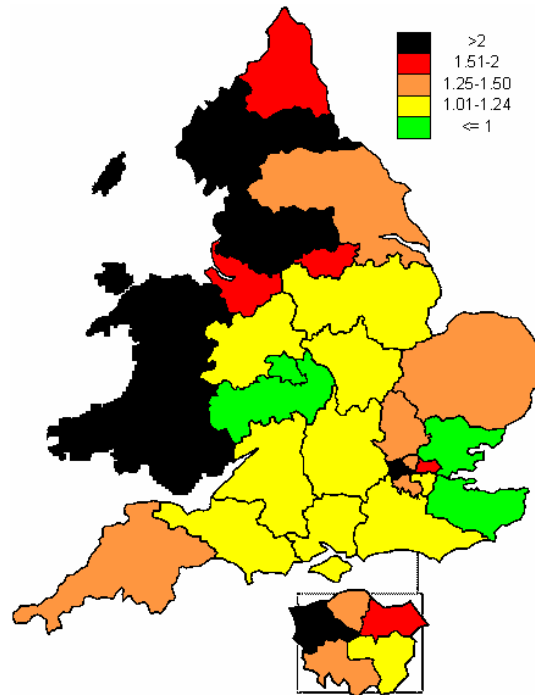


Source: *National Children's Dental Health Survey 1993, DoH, London*

However, as illustrated by figure 15, these overall trends mask considerable variations in oral health from one region to another. For instance, 5 year olds in Wales and in some regions of Northern England have, on average, twice as many decayed, missing or filled teeth as those in certain regions of the South East of England. These variations may reflect a number of different factors including economic deprivation, social exclusion, cultural differences and the extent to which drinking water is fluoridated.⁷⁸

⁷⁸ A systematic review of the benefits and risks of fluoridation and health was commissioned by the Government and published in October 2000 (www.york.ac.uk/inst/crd/fluorid.htm).

Figure 15 Average number of decayed, missing or filled teeth (5 year olds, 2001/02)



Source: BASCD survey 2001/02, Community Dental Health 20, 45-54, 2003.

4 Background – children's food choices

This section looks at what is known about the various factors that influence children's food choices. These include:

- Individual factors, including the mother's nutritional status, the development of tastes, and eating behaviours;
- Social factors related to the context in which a child chooses food;
- Availability – economic and other factors that affect a child's access to different types of food;
- The foods themselves – properties of the food products (colour, texture, shape, etc.);
- Marketing and other promotional activities targeted at children.

4.1 Child development

Maternal nutrition

Evidence from epidemiological studies suggests that maternal nutrition is a factor in determining foetal size and that low foetal size (as determined by birth weight or placental size) is associated with increased risk of the foetus developing conditions such as type 2 diabetes and glucose intolerance in later life⁷⁹. Other research suggests that indicators of poor maternal diet such as low bmi or maternal obesity may be linked with the child being at increased risk of cardiovascular disease in later life. The Medical Research Council (MRC) is funding a programme of research at the Environmental Epidemiology Unit at the University of Southampton to study how maternal diet can be optimised to improve child development and maximise health during childhood and in adult life.

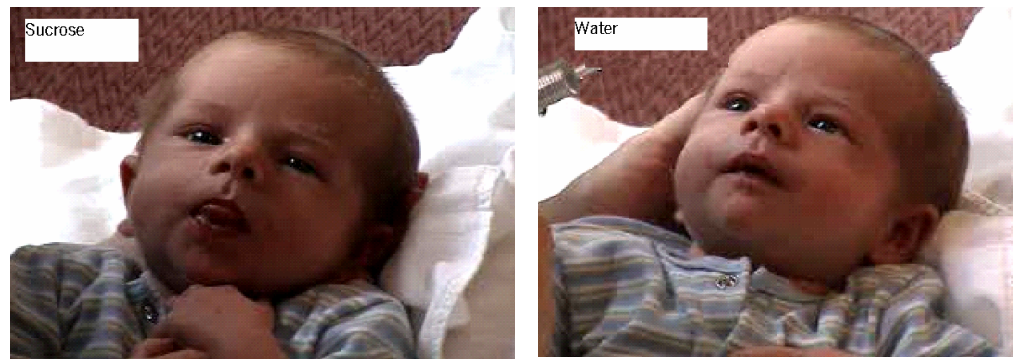
Tastes

Adult humans are capable of distinguishing five main tastes: sweet, sour, salt, bitter and umami (the unique taste imparted by monosodium glutamate and related compounds). The ability to detect these varies according to the stage of an infant's development:

- Sweet – babies are born with an innate preference for sweet tastes, as illustrated in figure 16 which shows a two week old baby's facial reaction to a sucrose solution (the picture on the left) compared with its reaction to water (right). Other research has shown that infants of just a few days old can differentiate between sugars, preferring very sweet sugars like sucrose and fructose to less sweet sugars such as glucose and lactose. It is thought that this preference for sweet tastes may reflect the baby's exposure to sweet-tasting amniotic fluid, and may serve a protective function (in nature sweetness usually indicates sources of energy/nutrients).
- Salt – research suggests that babies cannot detect the taste of salt when they are born. Rather, this is an ability they develop some 4 to 5 months after birth, when facial reaction studies show that they demonstrate a preference for moderate salt concentrations (compared with water). It is thought that this ability develops irrespective of exposure to salt.
- Sour – it appears that baby's are born with an innate dislike of sour tastes. This is illustrated in figure 17, which shows a two week old baby's reaction to lemon juice (picture on the left) compared with water (right). There are few studies of reactions of infants to sour tastes, so it is not known whether preferences change as infants develop. Overall, the dislike of sour tastes may be protective in that such tastes are often associated with toxins in nature.

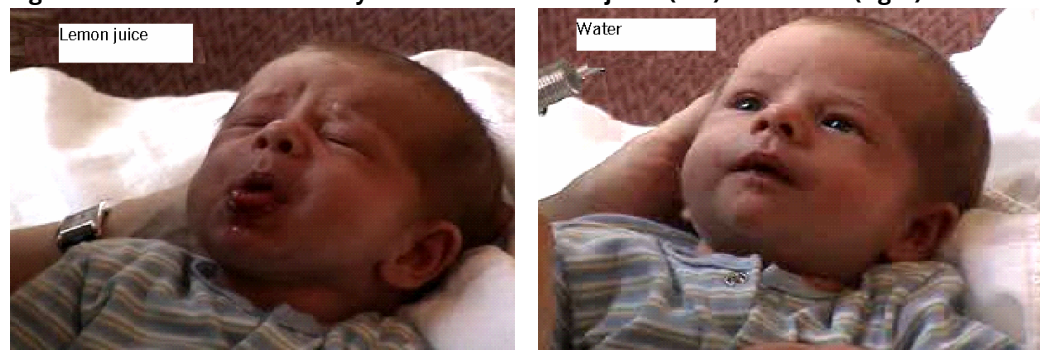
⁷⁹ Philips DIW, Diabetes Care, 21 (supplement 2), B150-155, 1998.

Figure 16 A two week old baby's reaction to sugar solution (left) and water (right)



Source: Courtesy of Lucy Cooke, Cancer Research UK Health Behaviour Unit, UCL..

Figure 17 A two week old baby's reaction to lemon juice (left) and water (right)



Source: Courtesy of Lucy Cooke, Cancer Research UK Health Behaviour Unit, UCL..

- Bitter – research suggests that babies can differentiate between moderately and strongly bitter tastes from birth. In facial recognition tests, new born babies did not respond to moderate concentrations of bitter substances such as quinine and uric acid, but responded by grimacing as the concentration was increased. It also appears that this response may strengthen as infants develop, as other research suggests that older infants (around 180 days old) reject even low concentrations of uric acid and moderately bitter tasting foods such as greens.
- Umami – there is little evidence as to whether new born babies can detect umami as such, although one study showed that babies preferred soup made with monosodium glutamate (MSG) as compared with the same soup without MSG.

Overall such research suggests that children have an innate preference from an early age for sweet and/or salty foods, and a tendency to reject bitter and/or sour foods. However, as discussed in more detail below, these innate tendencies can be modified through learning and experience.

Learned preferences

In addition to the innate preferences described above, children also learn to like different types of foods. Two main factors affect such learning processes:

- A general fear of new foods, which means that such foods are likely to be rejected until a child learns that there are no harmful consequences associated with eating them.
- Rapid acceptance of certain new foods where a child learns that eating the food is associated with pleasurable consequences.

Lack of harmful consequences

This general tendency to reject new foods, sometimes referred to as neophobia (fear of the new), is assumed to be a genetically based mechanism to protect children from eating new foods indiscriminately, thus minimising exposure to potentially harmful foodstuffs. Research conducted in the early 1980s suggests that while children will initially reject a new food (unless it is sweet or salty, see above), they may eventually come to accept it once they have learned that it is not associated with any unpleasant or harmful consequences.⁸⁰ However, overcoming this inertia requires repeated exposure, with children needing to taste a new food on anything up to 10 occasions before they accept it. Once a child has accepted a particular type of new food (e.g. bananas), then it will tend to accept similar foods (e.g. peaches) more readily.

Recent research at the Cancer Research UK Health Behaviour Unit suggests that such approaches can successfully be built into programmes designed to improve children's diets. In studies designed to see whether children (aged 3-5) could be persuaded to consume a previously disliked vegetable, parents and their children were assigned to one of three groups. In a test group, parents asked their children to taste the vegetable every day for 14 days. In one of the other two (control) groups, the parents tried their usual methods to persuade the children to eat the vegetable; while in the other control group the parents gave their children advice on healthy eating. After 14 days, the researchers measured increase in consumption of the vegetable and found that this rose more than twice as much in the test group asked to taste the vegetable every day than in either of the control groups. The authors suggested that findings concerning the benefits of early and repeated taste exposure should be included in guidance to parents on healthy eating.

Association with pleasurable consequences

There is also evidence that children's general fear of new foods can be rapidly circumvented where consumption of a food is strongly associated with pleasurable consequences. The main relevant factor identified to date is energy density; children rapidly learn to prefer energy dense foods because they associate them with the pleasurable feelings of having their hunger satisfied (satiety).⁸¹ This means that children are more likely to choose energy dense (e.g. 'fast foods') that are high in fat and sugar than relatively energy dilute foods such as fruit and vegetables. However, such preferences are seen across all food types. Thus, recent research suggests that where choice is restricted to energy dilute foods such as fruit and vegetables, children tend to choose those with the highest energy density (such as bananas, potatoes, apples and grapes) over those with the lowest energy density (such as courgettes, leeks, melons and cabbage).

4.2 Social factors – the context in which food choices are made

Since eating is often a social process, involving school meals, family dinners, etc., children's dietary choices are influenced by the behaviours of other peoples' eating habits. In particular, research suggests that the behaviour of peers, siblings, other family members, carers and teachers may be important in helping to shape children's eating habits. Children are more likely to accept healthy foods if they see people they respect eating them. Equally, if such people show a strong dislike for a particular food, then the child is less likely to try it.

⁸⁰ Birch LL and Marlin DW, *Appetite*, 30, 323-31, 1984.

⁸¹ Kern DL et al, *Physiology and Behaviour*, 54, 71-76, 1993.

For very young children the strongest influences are their siblings and parents, whereas school age children are likely to be just as influenced by peers and teachers. For instance, children aged 3-4 years can be persuaded to change their eating patterns for different vegetables by eating meals with a peer group whose preferences differ from their own.⁸² There is also a considerable body of evidence suggesting that food cultures tend to run in families, with children of all ages tending to adopt the food preferences (whether for 'healthy' or 'unhealthy' foods) of their parents.

What practical lessons can be learned from such research for improving children's diets? Schools are an important setting for children's meals, and teachers can play a key role in encouraging children to eat healthier diets. Research in the US has assessed the effectiveness of different approaches that teachers can take to encourage children to sample foods:

- Modelling, where children see teachers or other adults sampling the foods;
- Choice, where teachers offer children foods from a limited variety of 'healthy' choices;
- Insisting, where teachers insist that children try at least one bite of the foods offered;
- Reward, where children are given tangible rewards for tasting new foods;
- Repeat exposure, where children are offered the same food over again.

Modelling

Of these various approaches, it appears that teacher modelling is most successful. For instance, a questionnaire survey of experienced teachers in the US found that the teachers rated modelling as the most effective way of getting children to try new foods, and reward as the least.⁸³ This was backed up by research that measured the effectiveness of the different approaches which found that modelling was most successful at getting children to try new foods. However, it was important for the modellers to be enthusiastic about the foods they were tasting. Thus, teachers who enthused about the food they were sampling after they had tasted it ("Mmm! I love mangoes") were more successful at getting children to try the food than those that made more generalised statements ("I like to try new foods") before tasting.

Reward

A strategy commonly used by parents at home to try and encourage children to eat more 'healthy' foods is reward: "Eat your greens and you can have some ice cream". However a number of studies have suggested that such methods are not very effective, and may even be counter-productive. Research suggests that while the approach may have some short-term benefit in getting children interested in trying new foods, in the longer term it may make the food even less attractive to the child.⁸⁴ In general it appears that using one type of food (e.g. ice cream) as a reward for eating another (e.g. spinach) is particularly counter-productive: it merely reinforces the attractiveness of the reward food (ice cream) at the expense of the rewarded food (spinach).

The 'food dudes'

Knowledge of the psychological and social factors that influence children's food choices can be used as the basis of programmes designed to encourage children to eat healthier diets. One such programme is the 'food dudes' initiative, developed by the University of Bangor's Food Research Unit. As outlined in box 11, this involves showing primary school children videos which portray food and vegetable eating superheroes in their battle against the evil 'junk punks', who are out to drain the world's life force by depriving it of fruit and vegetables.

⁸² Birch, L, *Child Development*, 51,489-96, 1980.

⁸³ Hendy HM and Raudenbush B, *Appetite*, 34, 61-76, 2000.

⁸⁴ Birch LL, et al, *Child Development* 55, 431-39, 1984.

Box 11 The 'food dudes'

The food dudes is an example of a programme to encourage children to eat a diet rich in fruit and vegetables. Put together by the Food Research Unit at the University of Bangor, the programme is based on knowledge of the key psychological factors influencing children's food choices. It consists of two main components:

- Video adventures featuring hero figures (the food dudes, see figure on the right) who enjoy eating fruit and vegetables and which provide social models for the children to imitate;
- Small rewards such food dude stickers, notebooks and pens to encourage children to try new foods.



In their adventures, the food dudes battle against the 'junk punks', a gang of 'baddies' intent on draining the world's 'life force' by depriving it of fruit and vegetables. In the process, the heroes are depicted as enjoying eating a wide range of fruit and vegetables and enthuse about their taste and health-giving properties. The programme is designed to:

- encourage children to repeatedly taste new fruit and vegetables;
- provide opportunities for children to experience others reacting positively to such foods;
- encourage children to see themselves as fruit and vegetable eaters and be proud to be associated with such a culture.

To date, the scheme has been tested in nursery and primary schools, and has shown promising results in each setting. Although the results have yet to be published in a peer reviewed journal, the programme has increased consumption of a wide range of fruits and vegetables, particularly in more deprived areas. For instance, in a primary school in Salford, the programme more than doubled consumption of fruit at lunchtime, and trebled intakes of vegetables. There is also some evidence that the effects are long-lasting: one trial has shown that high fruit and vegetable consumption was maintained or even increased up to 15 months after the programme was finished. Interviews conducted with parents also suggest that the programme has a permanent effect, helping to increase children's consumption of fruit and vegetables in the home as well as in school. The Bangor Food Research Unit has developed the programme as a self-contained package that can be administered by primary school teachers, across the full age range of their pupils.

Sources www.psychology.bangor.ac.uk/research/bfru and www.fooddudes.co.uk

As part of the programme, children are encouraged (through non-food rewards) to taste a range of fruit and vegetables repeatedly. Results of pilot evaluations in nursery and primary schools have been very positive with sustained increases being achieved in children's consumption of fruit and vegetables over a period of at least 15 months.

4.3 Availability

Different settings

Another key factor in determining children's food choices is availability: children can only eat foods that are readily available to them in the home, at school or in the wider world. Parents are largely responsible for foods brought into the home, although young children exert an influence through 'pester power'. As described in more detail in the following chapter, policy in this area focuses on food labelling and public health campaigns to try to persuade people to buy more 'healthy' foods for consumption in the home. Parents may also exert some influence on food eaten in schools, through the selection of items for packed lunches. More than half of primary school children have packed lunches in preference to school meals. A recent survey commissioned by the Food Standards Agency (FSA) showed that only 1 in 5 packed lunches met the minimum nutrition standards set for primary school meals, with the vast majority containing foods that are high in salt, sugars and saturated fat.⁸⁵

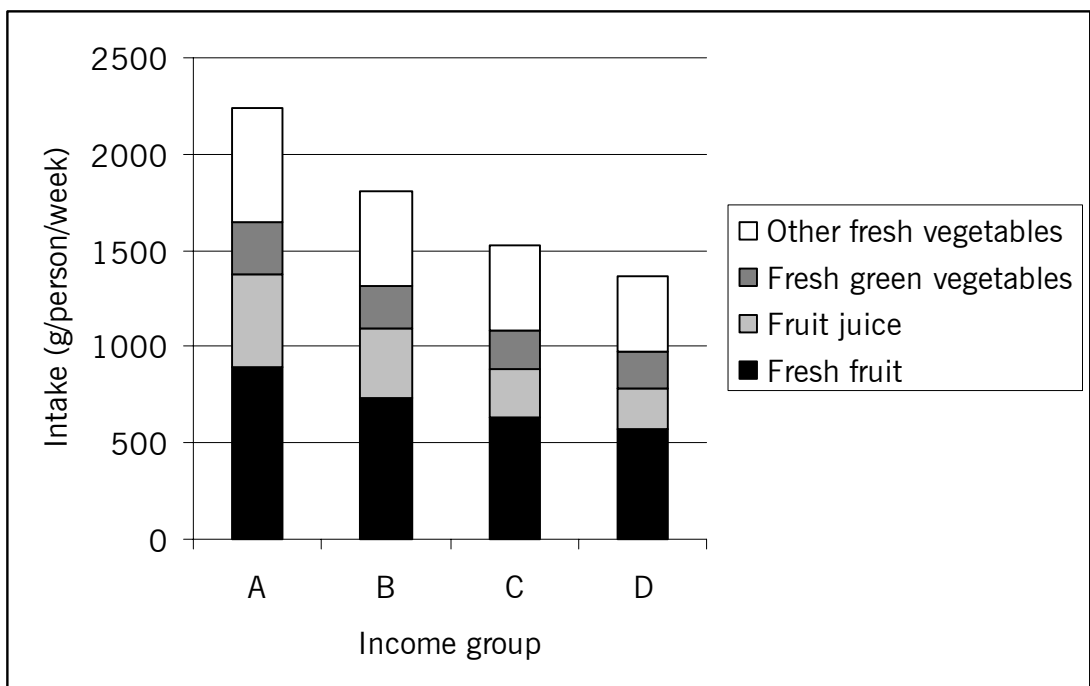
⁸⁵ www.foodstandards.gov.uk/multimedia/pdfs/lunchsurvey.pdf

Other issues include the nutritional composition of school meals, the availability of snacks and soft drinks via vending machines and other school-based outlets, and schemes such as the National School Fruit Scheme which makes fruit and vegetables freely available to all 4-6 year olds through schools in England. In the wider world, children have a certain amount of spending power (e.g. through pocket money), and food companies spend considerable amounts of money promoting their products directly to children. Issues to do with school-based policies to encourage healthier eating patterns and the promotion of foods are discussed in more detail in section 5.

'Food deserts'

The idea that affordability and location are key factors in determining people's access to a healthy diet is well established. Data from national surveys such as the National Food Survey show that consumption of fresh fruit and vegetables varies from one region to another, being highest in London and lowest in Scotland. Such data also show that people who earn most are more likely to have a healthy diet than those on low incomes (figure 18), with consumption of fresh fruit and vegetables being highest among those with the greatest weekly income (group A, earning £725 per week or more) and lowest among those with the smallest weekly income (group D, earning less than £180 per week). However, such surveys do not allow more localised comparisons to be made.

Figure 18 Fresh fruit and vegetable consumption by income group (Britain, 2000)



Source: National Food Survey 2000, TSO 2001. Note income group reflects gross weekly income of the head of household with A being £725 per week or more, B £375-£725, C £180-£375 and D under £180.

During the 1990s the term 'food deserts' was coined to describe areas where residents do not have access to an affordable and healthy diet. For instance, a report published in 1998 by the Social Exclusion Unit stated that "*some areas have become 'food deserts' exacerbating the problems those on low incomes face in affording a healthy diet*".⁸⁶ These were typically seen as being relatively poor, densely populated urban areas where residents did not have ready access to large supermarkets and were thus denied the benefits of choice and competitive pricing. For a myriad of different reasons – low rates of car ownership, poor public transport, lack of storage facilities such as freezers, the trend towards out of town hypermarkets, etc. - people living in such areas were thought to be dependent on local shops which may not have a wide variety of fresh fruit and vegetables and even where these were available, tended to be relatively expensive.

How common are these 'food deserts', how many people are affected by them and what impact do they have on people's lives? Despite the widespread acceptance of 'food deserts' in policy circles, there is surprisingly little evidence outlining the extent of the problem. As detailed in box 12, a few small-scale studies during the 1990s attempted to compare the cost of 'healthy' and 'unhealthy' foods in more or less affluent areas. The results of such studies are largely inconclusive: 'healthy' foods are generally more expensive than 'unhealthy' foods but no clear picture emerges as to how prices vary between deprived and more affluent areas. Groups such as Sustain point out that there is more to the concept of 'food deserts' than the price of foods: factors such as the location of supermarkets and the availability of public transport also have to be taken into account.⁸⁷ To date there has been no systematic analysis of the extent to which living in a deprived area restricts access to 'healthy' foods.

4.4 Food properties

Manufacturers know that the various properties of food – its taste, colour, texture, packaging, etc. – can be designed to appeal to children of different ages. This section briefly outlines the properties of food that children find particularly appealing and the way that manufacturers take these into account when designing products specifically intended for children.

Taste

As described previously, children are born with an innate preference for sweet foods and develop a liking for salty foods within a few months of birth. There is also evidence children are more likely to learn to like energy-dense foods that satisfy their appetites. In general, younger children prefer blander tastes with which they are familiar, and tend to explore more exciting tastes as they get older.

Colour

Children tend to prefer vivid colours such as red, blue and purple and tend to be less keen on 'duller' colours such as browns. Manufacturers can use bright colours to make products that appeal directly to children. For instance, a recent 'hit' product in the US is a bright green ketchup, which has a novelty value that appeals to children but which is not so novel as to be off-putting (children are at least familiar with the notion of eating green foods).

Texture

Children's preferences for texture vary with age. Young children prefer foods that are smooth and soft, so manufacturers develop versions of products to fit with such tastes; examples include smooth peanut butter and pureed fruit yoghurts. By the time they are 10-12 years, children develop a liking for more complex textures, and are more likely to select 'crunchy'/chewy foods.

⁸⁶ The Social Exclusion Unit, 'Bringing Britain together: a national strategy for neighbourhood renewal', Cm 4045, 1998.

⁸⁷ Sustain, 'Hunger from the inside: the experience of food poverty in the UK', Sustain, 2002.

Box 12 Evidence concerning 'food deserts'

Despite the prominence of 'food deserts' in policy debates, there is little in the way of evidence to illustrate the extent of the problem. A recent review of the evidence that is available examined a number of small UK surveys comparing the availability and price of foods in different areas:⁸⁸

- A survey from 1990 of food prices in 9 supermarkets in different areas. This showed that the cost of a 'healthy' basket of food was more expensive than that of an 'unhealthy' basket irrespective of whether it was purchased in a poor or an affluent area. But it also showed that both baskets were cheaper in the poor areas than in the affluent areas.⁸⁹
- A survey of the price of food in different size shops. This paper concluded that small shops generally had a more limited range of foods available and were more expensive than supermarkets.⁹⁰ This finding applied to a number of different UK regions studied, but the survey did not compare affluent and disadvantaged areas.
- A pilot study conducted in Glasgow in 1992 looking at the cost of baskets of 'healthy' and 'unhealthy' foods in 10 stores in a relatively affluent area compared with a relatively disadvantaged area.⁹¹ This study suggested that the 'healthy' food basket cost more in the deprived area than it did in the affluent area. The researchers took pains to point out that the study was designed as a pilot, and that the choice of stores was neither systematic nor randomised. This means that the study was not necessarily powerful enough to detect differences between the locations, and that the results should thus be interpreted with caution.
- More recent research, also conducted in Glasgow, found that big supermarkets were more likely to be sited in or near to deprived areas.⁹² In a related study, the researchers found that a basket of 57 basic food items was likely to be the same price or cheaper in deprived than in more affluent areas.⁹³

Overall, these studies seem to agree that a 'healthy' basket of foods is likely to cost more than an 'unhealthy' basket, but the evidence over whether food is less readily accessible and/or more expensive in poorer areas is equivocal. As the review acknowledged, this does not mean that food deserts do not exist – merely that there is little in the way of evidence as to the extent and impact of 'food deserts' in the UK. The most recent research suggests that market forces may be reversing previous trends and leading to supermarkets once more being built in city centres and nearer to deprived areas. For instance, a recent study looked at the impact of the development of a new supermarket in a deprived area of Leeds. Researchers compared the diets of people from 600 households before and after the new supermarket was opened in the area. Prior to the supermarket, 70% of the survey households were beyond 500 metres of a shop selling a variety of healthy foods and the average length of journey to do the main food shopping was around 2.5km. After the new supermarket opened, average distance travelled for food shopping fell to under 1 km with the number of people doing their food shopping on foot increasing by threefold. Perhaps most importantly the researchers found that the diets of some of those surveyed improved once the supermarket had opened, with those who had the poorest diets prior to the supermarket increasing their fruit and vegetable consumption by a third.

Sources: Cummins S and Macintyre S, *British Medical Journal*, 325, 436-38, 2002.

Wrigley N et al, *Environment and Planning*, 34, 2002.

Smell

The olfactory senses associated with food do not develop until a child is 4-5 years old, and so young children are far more influenced in their choices by a food's colour, taste, etc. than they are by its smell.

Presentation

The way a food is presented is also an important factor in food choices. Manufacturers often choose shapes that are designed to appeal to children, with recent examples including dinosaur shaped chicken nuggets and space-ship shaped pasta. Packaging is also an important factor, with some products – 'squeezable' ketchup bottles for instance - being specifically designed to be easily used by children. As discussed in more detail below, packaging is also used to promote foods, with a wide range of cartoon characters and other popular figures being pressed into service to make food products more attractive to children.

⁸⁸ Cummins S and Macintyre S, *British Medical Journal*, 325, 436-38, 2002.

⁸⁹ Mooney, C, *Journal of Human Nutrition and Dietetics*, 3, 111-120, 1990.

⁹⁰ Piachaud D and Webb J, *The price of food: missing out on mass consumption*, LSE publications, 1996.

⁹¹ Sooman A et al, *Health Bulletin (Edinburgh)*, 51, 276-284, 1993.

⁹² Cummins S and Macintyre S, *British Food Journal*, 101, 545-53, 1999.

⁹³ Cummins S and Macintyre S, *Urban Studies*, 39 (11), 2115-30, 2002.

4.5 Marketing foods to children

In addition to the factors discussed above, the various different ways that foods are promoted could also influence children's diets. A particular issue for debate in recent years has been the targeting of advertising and other promotional activities at children. This section describes the various different approaches used by food companies to market their products to children, looks at the extent to which these are employed and discusses research that evaluates the likely impact of such activities.

Different promotional activities

Manufacturers can target their products at children in a wide variety of different ways. This can include directly advertising their products to children via television, radio, comics and magazines, and increasingly through the internet. Such advertising is regulated by bodies such as the Independent Television Commission, Radio Authority and the Advertising Standards Authority, as outlined in more detail in box 13. It can also entail less direct approaches which involve linking a product (e.g. through sponsorship or endorsement) to events, personalities, cartoon characters, music, TV shows, films, etc. that are particularly popular with children. There is also a wide range of other promotional activities, some of which take place in school. Of these different types of activities, two in particular have been the subject of recent debate:

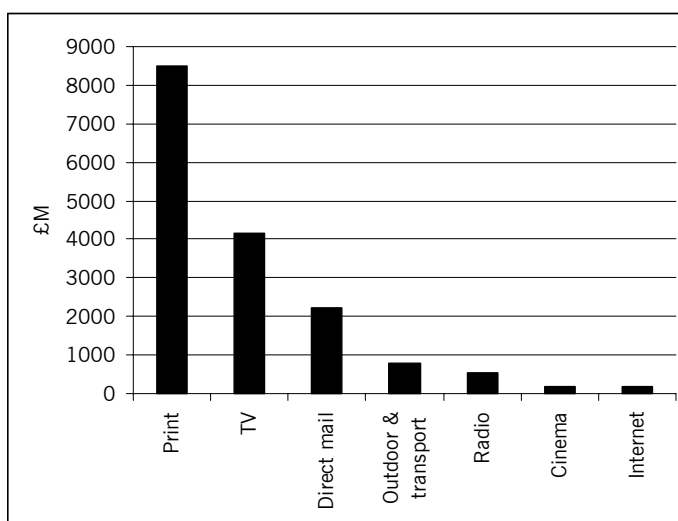
- TV advertising of foods high in fat, sugar and/or salt during children's programmes;
- Promotion of such foods involving schools.

TV advertising

How much advertising is targeted at children?

There is no doubt that TV advertising is big business with companies spending around £4 billion on TV adverts in 2002.⁹⁴ However, to put this in perspective it should be remembered that TV is only one form of advertising. In round figures, total advertising expenditure in the UK is more than £16 billion a year, so TV advertising represents approximately one quarter of all advertising spend (see figure 19). Getting more detailed information on the amount spent on advertising particular categories of products (such as certain types of foods or drinks) or adverts targeted at particular audiences (children or adults) is more difficult because the food and advertising industries regard this as commercially sensitive information.

Figure 19 Advertising spend by media category, UK 2002



Source: The Advertising Association (<http://www.adassoc.org.uk/inform/stats.html>).

⁹⁴ Figure from the Advertising Association (www.adassoc.org.uk/inform/stats.html).

Box 13 UK regulation of advertising

Television

Television advertising is regulated by the Independent Television Commission (ITC). Under the Broadcasting Act 1990, the ITC has to consult interested parties and draw up a code governing standards and practice in television advertising, which is reviewed on a regular basis. A Broadcast Advertisement Clearance Centre vets all adverts shown by the ITV companies, Channel 4, Channel 5, BSkyB and some other cable and satellite channels; much of this work is carried out in collaboration with advertising agencies at the script stage. The Code aims to ensure that television advertising does not mislead, encourage harmful behaviour or cause widespread or exceptional offence, and requires adverts to be clearly separated from programmes and regulates the frequency and duration of commercial breaks. Among the requirements in the code are that advertisers should **not**:

- harm, distress or mislead children, nor place undue pressure on them to purchase advertised products;
- encourage or condone excessive consumption of any food;
- disparage good dietary practice (comparisons between products must not discourage the selection of options such as fresh fruit and vegetables which accepted dietary opinion recommends should form a greater part of the average diet);
- encourage or condone damaging oral health care practices.

ITC monitors programme outputs to ensure compliance with the code, and also receives complaints from the public. In 2001, there were nearly 8,000 complaints about some 2,000 different adverts; complaints were upheld (either wholly or partially) for 135 of these adverts. Where complaints are upheld, ITC can require advertisements to be withdrawn, and can impose a range of sanctions (including financial penalties) on the company concerned. ITC has also drawn up a Code of Programme Sponsorship, to ensure that sponsors who pay to be associated with a programme do not exert influence on its editorial content. Overall, ITC figures show that UK TV companies received net advertising revenues of £3.4 billion in 2001, and a further £84M in sponsorship. ITC will be one of the five regulatory bodies replaced by the single new communications regulator, OFCOM, when it launches in December 2003.

Radio

The Radio Authority licenses and regulates all commercial radio services, including national, local, cable, satellite and restricted (e.g. localised hospital and student radio and special event radio) services, on analogue and digital platforms. It has published (after consultation) codes regulating advertising and sponsorship, and can impose sanctions on licensees who break the rules; these can include broadcast apologies/corrections, fines and the shortening or revocation of licences. Among the main stipulation in the Advertising Code concerning food adverts is that "*Advertising must not suggest that confectionery and snack food products may be substituted for balanced meals*". The Radio Authority has also been earmarked to be subsumed into the new communications regulator OFCOM.

Non-broadcast media

The Advertising Standards Agency (ASA) regulates advertising on non-broadcast media, such as print, cinema adverts and some areas of the internet. These include paid-for adverts such as banners, pop-ups, sales promotions and commercial e-mails but exclude general product information on home pages. ASA administers the British Code of Advertising, Sales Promotion and Direct Marketing to ensure that adverts are "*legal, decent, honest and truthful*". Among the stipulations in this code are that adverts:

- addressed to, targeted at or featuring children should contain nothing which is likely to result in their physical, mental or moral harm, or to exploit their credulity, loyalty, vulnerability or lack of experience;
- targeting children should not encourage them to make a nuisance of themselves to parents or others;
- should not exaggerate the appeal or performance of a product;
- should not make children feel inferior or unpopular for not buying the advertised product;
- should not encourage children to eat or drink at or near bedtime, to eat frequently throughout the day or to replace main meals with sweets and snacks.

In 2001 the ASA received 12,600 complaints, 73 of which concerned adverts targeting children. A total of 12 of these complaints were upheld by the Authority relating to 8 adverts.

Sources: www.itc.org.uk, www.radioauthority.org.uk, www.asa.org.uk, www.ofcom.org.uk

In general, estimates suggest that:

- TV companies within the EU earn around £220M a year from advertising to children.⁹⁵
- Food advertising accounts for around £600M (or around 15%) of the £4,000M spent on TV advertising in the UK each year. It is estimated that food adverts to children account for around 2% of TV advertising.⁹⁶

⁹⁵ This figure is based on the an estimate produced by the European Group of Television Advertisers which suggested that its members within the EU earned €320M a year from advertising during children's programmes.

⁹⁶ These figures are for 1998 and are taken from the Food Advertising Unit, Edited Proceedings of TV Advertising and Children: Ethics and Public Policy, 1999, FAU.

- The charity Sustain estimates that the food industry spends around £300M per year promoting foods that are high in fat, sugar and/or salt.⁹⁷

Surveys of adverts shown during children's programmes suggest that adverts for foods feature prominently. For instance, Sustain was commissioned by the Co-op supermarket to conduct a survey of TV food and drink adverts targeted at children.⁹⁸ The researchers monitored all adverts shown in 3 programme 'slots' for children (five early morning 'Big Breakfast Shows', five after-school slots on Children's ITV and one Saturday morning AM show) over the course of a week in March 2001. These were compared with adverts monitored in a late evening adult slot during the same week. Among the main findings of the study were:

- Food adverts were shown more frequently during the children's programmes (food adverts accounted for 45-58% of all adverts) than during the adult programming (21%).
- Adverts for cakes, biscuits and confectionery were more likely to feature during children's programmes (accounting for 24-53% of all food adverts) than during the adult schedule (13%).
- The overwhelming majority of the foods advertised during both the adult (86%) and children's (95-99%) programmes were high in fat, sugar and/or salt.
- There were no adverts for fresh fruit and/or vegetables during either the adult or children's programmes.

Research in other countries presents a similar picture. For instance, a survey in California showed that children watched an average of 21 TV adverts an hour, just under half of which were advertising foods. Over 90% of the foods advertised were high in fat, sugar and/or salt.⁹⁹

Groups such as Sustain and the Child Poverty Action Group (CPAG) suggest that such surveys show that advertisers are targeting children with adverts for 'unhealthy' foods and that such targeting conflicts with public health-based initiatives to improve children's diets. This issue is explored in more detail in the following chapter.

Do children understand advertising?

A key issue in the debate over advertising to children is the extent to which children are capable of identifying advertising for what it is and are aware of its promotional/ persuasive purpose. Research in this area has focused on the age at which children develop such capabilities. However, measuring children's awareness is not an exact science, and the results of such research are thus open to different interpretations. Those arguing against advertising targeted at children can point to research that concludes that it is only by the time children reach adolescence that most have developed a full understanding of the purpose of advertising.¹⁰⁰ Those seeking to defend advertising to children point to other research that suggests that many children develop awareness of the purpose of advertising at an earlier age.¹⁰¹ However, some general norms can be extracted from such research:

- Under 5s – children below the age of 5 years generally regard advertising as entertainment, and do not understand its purpose.

⁹⁷ Sustain, Protecting Children From Unhealthy Food Advertising, 2003 (www.sustainweb.org/labell_protect.asp).

⁹⁸ Sustain, TV Dinners, Sustain July 2001 (available from www.sustainweb.org).

⁹⁹ Tara HL and Gage M, Advertised foods on children's television, Archives of Pediatrics and Adolescent Medicine, 149 (6), 449-52, 1995.

¹⁰⁰ Bjurstrom E, Children and Television Advertising: A Critical Study of International Research Concerning the Effects of TV Commercials on Children, Report for the National Swedish Board for Consumer Policies, Stockholm, 1994.

¹⁰¹ Young BM, The Child's Understanding of Promotional Communication, International Journal of Advertising and Marketing to Children, 2(3), 191-203, 2000.

- Over 12s – children over 12 have developed an understanding that the purpose of advertising is to provide information about a product and persuade people to buy it, and are capable of placing advertising in this wider, promotional context.
- 7-11 years – between these ages, children develop a fuller understanding of advertising and its purpose, although research results vary as to the exact extent of this understanding at any given age. This variation may reflect differences in the 'advertising literacy' of the populations studied. For instance, studies among populations that have had little exposure to TV advertising (e.g. research conducted a long time ago, or in countries with advertising bans), generally show children to be less aware of advertising and its purpose than studies among comparable populations that have had greater exposure to advertising. Among the core skills that children need to develop to understand advertising are information processing (the ability to store, retrieve and use information) and the ability to take the perspective of other people (i.e. to see the advertiser's point of view).¹⁰²

What impact does advertising have?

In general, research suggests that advertising promotes brand awareness and loyalty. For instance, a recent study shows that the majority of pre-school children recognise logos from companies such as Coca-Cola (81% of 3-6 year olds recognised this logo) and McDonalds (69%), although only a minority of younger children in this age group matched the logos with the relevant products.¹⁰³ There is also evidence implicating television advertising with the number and nature of purchase requests made by young children – so called pester power. For instance, a study of children in the UK aged 3 to 6 years showed that those who watched the most commercial television requested the greatest number of items from Father Christmas and also asked for a higher proportion of branded items.¹⁰⁴ Other research suggests that heavy viewers of television (age 4-10) are more likely to ask for advertised items than infrequent viewers.¹⁰⁵ This is also true among very young children - a study of 3-5 year olds in Austria showed that the more often children watch TV, the more often they ask for products advertised on TV.¹⁰⁶

Surveys of children show that they consider advertising to have an impact on their behaviour. For instance, the Co-op supermarket commissioned a survey of children's and parents' responses to TV commercials for food and drinks.¹⁰⁷ Some 1,216 adults (523 of whom were parents) and 293 children under 11 years old were interviewed and took part in group discussions during February and March 2000. Among the main findings of this research was that:

- The group discussions suggested that older children tended to value advertising as a source of information which guides their purchases, and that offering collectable items is a powerful inducement for children to seek out an advertised product;
- Nearly three in four of the children surveyed reported that they had asked their parents to buy something they had seen advertised on the TV (73%) and a similar proportion (71%) had bought something to get a free gift or collect tokens towards one. Only one in five of the children admitted to accepting a parental "no" for answer – the remainder used various strategies to attempt to obtain a desired item, including pestering parents until they relented (29%), saving up to buy it for themselves (25%) and getting upset (17%).

¹⁰² John DR, *Journal of Consumer Research*, 26(3), 183-213, 1999.

¹⁰³ Dammler A and Middelman-Motz AV, *International Journal of Advertising and Marketing to Children*, 3, 3-8, 2002.

¹⁰⁴ Pine K and Nash A, 2001, referenced in Young BM, *The Child's Understanding of Promotional Communication, An update to 2002*, ITC, London.

¹⁰⁵ Adler RP et al, *The Effects of Advertising on Children: Review and Recommendations*, 1980, Lexington Books, USA.

¹⁰⁶ Götze E and Schlegelmilch BB, *Impact of Television Advertising on Purchase Requests of Pre-School Children: An Empirical Analysis*, 29th EMAC Annual Conference, Rotterdam, May 23-26, 2000 (CD-ROM).

¹⁰⁷ *Blackmail*, The Co-op, 2000. Available at www.pdf.co-operative.co.uk/pdfs/blackmailsignoff.pdf

Overall, assessing the impact that TV advertising has on children is difficult. TV is just one of the factors that may help to shape children's food preferences and which help to fuel 'pester power'. Disentangling its influence from that of other factors such as family, friends, availability of foods, etc. is far from easy. At one level it is clear that advertising 'works', insofar as commercial organisations would not spend large amounts of money promoting their products if it were not effective. On the other hand, advertisers argue that advertising is most effective in helping people to choose between one brand and another, rather than encouraging market growth in particular categories of products.¹⁰⁸ Thus, the argument goes, advertising will not encourage children to eat more fast food, but it may encourage them to eat different fast foods.

Research published by the Food Standards Agency (FSA) in September 2003 has looked further at the question of whether food promotion influences children.¹⁰⁹ The research was conducted at The University of Strathclyde and took the form of two main systematic literature reviews to establish the extent and nature of food promotion to children and its likely effect on their food knowledge, preferences and behaviour. The research reached the following conclusions:

- There is a lot of food advertising to children;
- The advertised diet is less healthy than the recommended one;
- Children enjoy and engage with food promotion;
- Food promotion is having an effect, particularly on children's preferences, purchase behaviour and consumption;
- This effect is independent of other factors and operates at both a brand and category level.

In drawing the conclusions about the effects of food promotion the researchers acknowledge that the literature does not provide '*incontrovertible proof*'. Indeed they note that hard and fast proof of promotional effects will never emerge; rather it is more a question of making judgements based on the weight of the available evidence. In the view of the researchers there was sufficient evidence to suggest that food promotion does effect children's diet although they acknowledge that not all studies point to this conclusion. The research also points out the lack of studies attempting to assess how strong the effects of food promotion are relative to the various other factors that influence children's food choices.

Attitudes to TV advertising to children

Attitudes to advertising targeted at children vary considerably throughout Europe. The Television without Frontiers Directive aims to ensure access to broadcasts from all member states throughout the EU. It sets out the circumstances under which member states can restrict broadcasts for various reasons, including for the protection of children and also harmonises rules on advertising (for instance prohibiting TV adverts for tobacco) and sponsorship. Many member states (and some non-EU states) have implemented specific rules to regulate TV advertising to children that go beyond the provisions of the Directive. For instance, Sweden, Norway, and Poland have each effectively banned TV advertising targeted at children. Other countries have opted to ban advertising of particular categories of products (TV adverts for toys are prohibited in Greece) or regulated particular types of programming (Belgium and Ireland ban all advertising during children's programmes whereas Italy has banned advertising during cartoons).

In general, prohibitions on TV advertising to children enjoy a high level of public support in those countries where they have been introduced. For instance, a survey by the Swedish Consumers' Association conducted in 2001 found that 88% of Swedes polled supported the ban on TV advertising or wanted to expand it. Only 12% of those polled did not want any type of ban

¹⁰⁸ Food Advertising Unit, *Edited Proceedings of TV Advertising and Children: Ethics and Public Policy*, 1999, FAU.

¹⁰⁹ www.foodstandards.gov.uk/multimedia/pdfs/foodpromotiontochildren1.pdf

advertising targeted at children and 82% thought there should be more restrictions on advertising to children via media other TV.¹¹⁰

Surveys in the UK suggest that there is some support among the public for a tightening of the regulations governing advertising to children. For instance, among the 1,200 or so adults surveyed in the research commissioned by the Co-op supermarket:¹¹¹

- 67% agreed strongly that there should be stricter rules about advertising to children (18% agreed slightly with this statement);
- 56% agreed strongly that TV advertising of sugary/fatty foods should be banned during children's programmes (21% agreed slightly);
- 36% agreed strongly that all TV advertising aimed at children should be banned during children's programmes (19% agreed slightly).

Promotion of foods involving schools

Sponsorship and collector schemes

Recent years have seen a rise in the levels of commercial promotion targeted at schools. It has been estimated that industry spends more than £300M a year on educational sponsorship and related activities such as:

- Sponsored resources, such as videos, CDs, posters, wall charts, fact sheets, leaflets and books. There are thousands of such resources available to teachers on a wide range of subjects, including resources on nutrition sponsored by food companies.
- Sponsored activities such as games, competitions and projects.
- Collector schemes, where children are encouraged to collect wrappers from certain products, or tokens from supermarkets. Current examples include schemes run by Walkers crisps, Cadburys chocolate (where schools redeem product wrappers for books and sports equipment respectively) and Tesco's (where schools redeem vouchers for computers).

Such sponsorship has potential benefits both to schools and to business. From the school's point of view, the resources are usually free or inexpensive and many are relevant, attractively presented and easy to use. From a business point of view, cause-related marketing offers a way of promoting brand awareness (e.g. by the placing of company or product logos on teaching resources) and of marketing products and services (e.g. through collection schemes). But there are also potential pitfalls, the most obvious being that companies could use such approaches as a blatant marketing tool or as a way of disseminating biased or inaccurate information. Consumer and health groups are also concerned that such activities may conflict with messages about food and healthy eating in the school environment.

Recognising these potential concerns, the National Consumer Council (NCC) drew up best practice principles to encourage high standards in sponsored educational materials in 1988; these have since been revised by the Consumers' Association and the Incorporated Society of British Advertisers (ISBA) in association with the DfES.¹¹² The principles are designed to ensure that commercial activities in schools are consistent with genuine educational benefit. They encourage schools to adopt - in consultation with teachers, governors, pupils and parents - a single policy on developing commercial activities to ensure a consistent approach throughout the school. As detailed in box 14, the key issues covered by the principles include:

- Educational value and content;
- Branding;

¹¹⁰ www.sweden.se/templates/Article___3143.asp

¹¹¹ *Blackmail*, The Co-op, 2000. Available at www.pdf.co-operative.co.uk/pdfs/blackmailsignoff.pdf

¹¹² www.isba.org.uk/public_documents/ISBA_CA_Schools_principles.pdf

- Consultation and testing;
- Distribution of materials;
- Collector schemes.

Availability of different foods in schools

Another issue that has received considerable attention in recent years is the availability of high salt/fat/sugar foods and drinks in school lunches and through outlets on school premises such as tuck shops, canteens and vending machines. Nutritional standards for school meals were laid down by government (by the then Department of Education and Science) until 1980, when the Education Act left it to individual local authorities to set nutritional standards for the meals they provided. Following concerns about the nutritional adequacy of school meals and children's diets in general, the government re-introduced compulsory nutritional standards for school lunches in England and Wales in 2001, along with a duty to provide paid meals on request for all children over compulsory school age (and all full-time pupils under 5 years).

Box 14 Best practice principles for commercial activities in schools

These best practice principles were originally drawn up by the National Consumer Council, but have been recently revised by the Consumers' Association and ISBA in consultation with educational representatives and commercial interests. The aim of the principles is to provide a framework within which schools and business can work together to achieve best practice.

Educational value and content

- All activities should be relevant and add educational value;
- Materials should not encourage unhealthy, unsafe or unlawful activities;
- Any information provided should be accurate, current and clearly distinguish expressions of opinion from statements of fact;
- Explicit sales messages should be avoided where possible, although the guidelines note that this 'may be unavoidable in the context of collector schemes'.

Branding

- The level of branding should be appropriate to the activity.

Consultation and testing

- All materials and activities should be developed in partnership with teachers, pupils, parents and educationalists and piloted where possible.

Distribution of material

- Where possible, companies should seek permission before forwarding materials to schools;
- Resources should be carefully labelled and specify both source and target audience;
- Companies should not impose any restrictions on the school in return for materials/resources (e.g. data collection of pupils; restricted use of suppliers).

Collector schemes

Collector schemes are different from other commercial activities in schools as they often involve direct (financial) participation by schools, pupils and parents. The best practice principles emphasise that the key question is: do the educational benefits outweigh the potential disadvantages? It suggests that the rules governing such a scheme must be made available to collectors, including details of:

- Information on the number of vouchers required;
- The scheme's closing date;
- A policy covering non-availability of the requested item;
- Any restrictions for participation in the scheme;
- A system of redress if the goods received are faulty in any way.

Source: www.isba.org.uk/public_documents/ISBA_CA_Schools_principles.pdf

As outlined in box 15, current UK regulations are based on the food groups used in the FSA's 'balance of good health' model (see figure 2), and apply to all lunches and hot and cold foods provided by schools. Other initiatives to improve access to fruit and vegetables in schools and to promote healthy eating patterns are discussed in more detail in the following section.

Box 15 Nutritional standards for school meals

England and Wales

New regulations introduced in 2001 in England and Wales laid down minimum nutritional standards for school lunches (including packed lunches) and re-introduced the duty to provide paid meals on request for all children over 5 years of age (and all younger full-time pupils). The regulations are based on the five food groups described in the balance of good health model: starchy foods such as bread, potatoes, rice and pasta; fruit and vegetables; milk and dairy foods; meat, fish and other non-dairy protein sources; foods containing fats and/or sugars. Different nutritional standards are specified depending on age:

- Nursery school meals – children should have the chance to choose at least one item from each of the following food groups every day: starchy foods; fruit and vegetables; milk and dairy foods; meat fish and other non-dairy sources of protein. Foods containing fats and/or sugars can be made available, although the guidance warns against consuming sugary/fatty foods and drinks too often.
- Primary school meals – the aim of standards here is to offer primary school children some degree of choice, although cafeteria-style arrangements where children are free to choose any combination of food groups are considered inappropriate for children in this age group. Every school lunch should contain a portion or portions of: starchy foods (chips and other starchy foods cooked in oil should not be served more than three times a week); fruit and a vegetable (these must be available every day and fruit based desserts must be available twice a week); milk and dairy foods; meat, fish or cheese (red meat must be served at least twice a week, and fish at least once a week). Fatty/sugary foods may be made available, but should be limited to no more than 10% of the total food offered in a week.
- Secondary school meals – balanced food selections should be made available to all secondary school pupils, but children should be free to choose any combination of items. At least two items from each of the following food groups should be available throughout the lunch service every day: starchy foods (at least one of which should not be cooked in oil or fat); fruit and vegetables; milk and dairy foods; meat, fish and other sources of protein (red meat must be served at least three times a week, and fish at least twice a week). Fatty/sugary foods may be made available, but should be limited to no more than 10% of the total food offered in a week.

In addition, the guidance strongly recommends that schools make drinking water available to children every day, free of charge, that milk is available as a drink option, and that schools offer some hot food on the menu everyday (particularly during winter).

Scotland

In Scotland, Ministers announced the establishment of an expert panel in November 2001 to make recommendations for wide ranging improvements in the delivery of school meals. The Panel included representatives from a wide range of interests and consulted widely to ensure that the views of all interested parties were taken into account. It reported in November 2002, making detailed recommendations on nutritional standards (based on the main food groups) for school meals in Scotland.¹¹³ Following a consultation exercise in spring 2003, the recommendations are expected to be implemented in Scottish schools by 2004-2006.

Northern Ireland

In Northern Ireland, the Department for Education and Employment published nutritional guidelines in July 2000. These were used as the basis for recommendations for compulsory nutrition standards for school meals based which came into force in September 2002.¹¹⁴ As with the standards described above, the Northern Ireland nutrition standards are based on the main food groups described in the balance of health model and aim to give children access to a healthy and varied diet.

¹¹³ 'Hungry for Success, A Whole School Approach to School Meals in Scotland', Final Report of the Expert Panel on School Meals, 2002, available from www.scotland.gov.uk/library5/education/hfs-00.asp

¹¹⁴ 'Catering for Healthier Lifestyles – Compulsory Nutrition Standards for School Meals', DENI, Northern Ireland, available from www.deni.gov.uk/schools/meals/new_resources/healthy_eatingtrial1.HTML

5 Policy – existing policy and the way ahead

Previous sections of this report have outlined the links between diet and health, examined recent trends in children's diets and diet-related conditions such as obesity, diabetes and tooth decay, and analysed the factors that affect children's food preferences and choices. They raise important issues across a wide spectrum of policy areas. In many cases, these issues have been recognised and policy measures put in place to address them. This section outlines current policies relevant to improving children's diets and examines other potential policy options for the future.

5.1 Current policy – an overview

Improving diet and nutrition is a key feature of government policy to improve the nation's health. A large number of policy initiatives involving a wide range of government departments and agencies is already in place. Those most relevant to improving children's diets are summarised in table 8. Among the main government departments and agencies involved are:

- Department of Health (DoH). Reducing dietary levels of fat, salt and sugar while encouraging increased consumption of fruit and vegetables is a central plank of DoH initiatives to reduce early deaths and illness from cardiovascular heart disease and some types of cancer. A second major policy aim is to reduce health inequalities. Specific policies (see table 8) to achieve these aims include the 5 A DAY and National School Fruit schemes, which aim to improve access to fruit and vegetables, and the Healthy Start and Infant Feeding initiatives to improve the diet of infants and young children, particularly those from deprived backgrounds.
- Department for Education and Skills (DfES) has responsibility for monitoring and evaluating the new Compulsory National Nutritional Standards for school meals and to improve children's health through its National Healthy School Standard. DfES is also responsible for the content of the National Curriculum and has a joint Food in Schools initiative with DoH to promote food awareness, education and skills.
- Food Standards Agency (FSA) takes the lead in food labelling and has a series of initiatives aimed at improving nutritional labelling (table 8). It also provides consumers with information about the food they eat, and conducts surveys of the nutritional composition of different foods to inform policy.
- Department for Environment, Food and Regional Affairs (Defra) is responsible for farming policy and promoting the UK fruit and vegetable industry. It is currently involved in negotiations to reform the Common Agricultural Policy (CAP) that could potentially have a major impact on the availability of different types food, and is also exploring the potential for more local food initiatives following recent recommendations.¹¹⁵
- Office of the Deputy prime Minister (ODPM) – which co-ordinates initiatives aimed at reducing social exclusion and improving health in deprived neighbourhoods.
- Health Development Agency (HDA) - works in partnership to provide advice to government and other agencies on how their policies can improve health, particularly the health of the least well off.

Despite the initiatives summarised in table 8, it is widely agreed that there is a need to do more to help reduce consumption of fat, saturated fat, salt and sugars and to increase intakes of fruit and vegetables. The following sections describe the range possible different approaches and analyse the extent to which current policy addresses these.

¹¹⁵ Report of the Policy Commission on the Future of Farming and Food, January 2002, Cabinet Office, London.

Table 8 Examples of current or recent policy relevant to improving children's diets

Lead department/ organisation	Policy area	Main features
Department of Health (DoH)	NHS Plan	Proposed a national campaign to improve the diet of children.
DoH	Our Healthier Nation	Aims to improve the health of the population as a whole by increasing the length of people's lives and the number of years spent free from illness, and to improve the health of the worst off in society.
DoH	Cancer plan	Sets out a comprehensive national strategy for cancer to: save more lives; to ensure people with cancer get the right support, care and treatments; to tackle inequalities in health; and to build for the future (e.g. through research).
DoH	National Service Frameworks (NSFs)	NSFs set national standards to improve the quality of care and reduce variations in health and social services. NSFs have been developed for cardiovascular heart disease and diabetes, and a framework for children, young people and maternity services is currently being developed.
DoH	5 a day	Increase consumption of fruit and vegetables throughout the population by raising awareness of the health benefits and by targeted action to improve access to fruit and vegetables.
DoH/Department for Education and Skills (DfES)	National School Fruit Scheme	Provides a free piece of fruit each day to infant schoolchildren to help improve child health and nutrition. The pilot schemes are currently being expanded to cover all 18,000 primary schools, providing fruit to some 2.5M 4-6 year olds throughout the country, at a cost of £42M.
DoH	Welfare Foods/ Healthy Start	The Welfare Foods scheme was conceived during the 1940s to provide milk and infant formula to mothers and children. Following review and consultation the Healthy Start Scheme will replace Welfare Foods to give pregnant women, mothers and young children in low income groups greater access to a healthy diet. The new scheme will be launched in 2004.
DoH	Infant Feeding	£1 million a year to promote breastfeeding and support midwives and health visitors. Work to encourage breastfeeding focuses on mothers in lower-social groups.
DoH/DfES	Food in Schools	A joint initiative that brings together food-related initiatives in schools and after-school clubs to improve food education and awareness in schools to promote clear and consistent messages about food and nutrition, and to allow children to develop food skills such as cooking.
DfES	Compulsory Nutritional Standards	New regulations introduced in 2001 to impose compulsory nutritional standards for school meals in England and Wales. Similar regulations came into force in Northern Ireland in 2002, and are expected in Scotland from 2004
DfES	National Healthy School Standard	Aims to make the school the setting for improving children's health by encouraging partnerships to address eight key areas: personal, social and health education; citizenship; drug education; emotional health; healthy eating; physical activity; safety; and sex and relationships education.
Food Standards Agency (FSA)	Food labelling	Various consultation and research exercises to improve food labelling (including nutritional) labelling. A Clear Labelling Task Force published advice on label formats in 2002.
FSA	Monitoring/surveys	FSA conducts a range of surveys to provide information for policy making, including surveys of school meal choices, of the fat, sugar, salt content of processed foods, of diet and nutrition among those with a low income, and a nutrient analysis of breakfast cereals.
Department for Environment Farming and Rural Affairs (DEFRA)	Local food	A Working Group on Local Food considered the impact of local food initiatives and the wider issues related to local food to inform Government policy-making reported in April 2003.
DEFRA	Common Agricultural Policy (CAP) reform	Defra is working towards moving funding to environmental protection and rural development, paying farmers to deliver what society wants; to move away from production subsidies, incentives to over-production, and from production controls.
Office of the Deputy Prime Minister (ODPM)	Social Exclusion	A range of measures aimed at reducing social exclusion (e.g. reducing the number of children in low income households).
ODPM	Neighbourhood Renewal	Initiatives aimed at improving housing, health, crime rates, education and job opportunities in deprived neighbourhoods.

5.2 Encouraging healthy eating in schools

As outlined in the previous sections of this report, there are good reasons for encouraging children to:

- Increase their consumption of fruit and vegetables;
- Decrease their intakes of foods that are high in fats, sugars and salt.

This section looks at the policy options for encouraging children to eat a healthier diet. In practice, school is an ideal setting for such activities, because it provides an environment where some of level of control over access to food and drink can be achieved, and allows messages about healthy eating to be delivered in an educational context. However, policy in this area is not solely confined to schools. This section also describes policy options for improving children's access to fruit and vegetables in the wider world, and for generating a more general awareness of the health benefits of eating such a diet.

National Healthy School Standard

Healthy eating is one of the themes covered by the joint DfES/DoH National Healthy School Standard (NHSS). The NHSS offers support for education authorities to set up local programmes within established education and health partnerships linking in with other initiatives such as Health Action Zones and Education Action Zones where possible.¹¹⁶ It anticipates that such local programmes will seek accreditation by conforming to national standards that set criteria in three areas: partnerships, programme management and work with schools. The overall aim is to help schools become healthier environments through supporting the development and improvement of local programmes to ensure that a whole school approach is used in working on specific themes. In particular, the healthy eating theme aims to ensure that a school:

- Provides, promotes and monitors healthier food at lunch and break times and in any breakfast clubs where they are provided;
- Includes education on healthier eating and basic food safety practices in the taught curriculum;
- Presents consistent, informed messages about healthy eating. For instance, it requires foods offered in schools (in vending machines, tuck shops and school meals) to complement the taught curriculum (discussed in more detail below).

While the National Healthy School Standard has been widely welcomed, some see a need for further government action to ensure that schools address food and nutrition in a holistic manner. Groups such as the Health Education Trust and the National Heart Forum have pointed out that there is no overall requirement on individual schools to formulate explicit nutrition/food policies. One option here would be to require schools to set clear policies on food/nutrition, and include an assessment of this policy as a formal part of a school's Ofsted inspection.

Food, nutrition and the National Curriculum

As outlined in box 16, the National Curriculum requires all pupils to be taught about food, nutrition and health issues. In general, lessons about the role of food in maintaining a healthy lifestyle are included in science and personal social and health education (PSHE), whereas more practical aspects of food are included in design and technology (D&T). Overall, the aim is to ensure that all young people are taught about the role and value of food in society and the basics of food science and nutrition, have a grounding in food safety and hygiene and have basic food preparation and cooking skills.

¹¹⁶ National Healthy School Standard Guidance, DfES, London, 1999.

While there is widespread agreement that children should be taught about these things, there is considerable debate about the best way of achieving this. Much of the debate has centred on the components taught under D&T. There is a perception that, with the demise of Home Economics, which very few students now take, children are no longer taught practical aspects of food preparation, hygiene and cooking. However, a closer look (box 16) at the food options in D&T from Key Stage 3 onwards suggests that the main practical skills concerned with food preparation, hygiene and cooking are covered.

A key issue here is the proportion of children taking the food options within D&T. While all children receive a basic grounding in the importance of eating more fruit and vegetables and in food design and preparation at Key Stages 1 and 2 (5-11 years), the food component of D&T is optional from Key Stage 3 (11-14 years) onwards. It is thought that the majority of schools teach at least some of the food options at this stage, but there are no official figures to confirm this (practices vary between schools and there are no examination statistics for this age range). By the time pupils reach the end of Key Stage 4 Key (15 and 16 year olds) they will have sat their GCSEs. DfES figures show that in 2002, out 580,700 people attempting GCSEs, some 102,500 (around 18%) attempted the food option of D&T.

One way of increasing the number of children receiving practical lessons on food handling, preparation and cooking would be to make food a compulsory part of Key Stage 3 D&T. Indeed, the government considered a recommendation to this effect from the Qualifications and Curriculum Authority at the last round of curriculum review. However, it decided against such a move on the grounds that this would involve considerable resource implications for those schools that are currently not equipped to teach the food options.

The National School Fruit Scheme

A key element of improving access to fruit and vegetables in schools is the National School Fruit Scheme (NSFS). This scheme was announced in the NHS plan, published in July 2000, which pledged a new national scheme whereby every 4-6 year old in the country would be entitled to a free piece of fruit each day. Pilot schemes were launched in Autumn 2000 (33 schools in 3 areas) and Spring 2001 (550 schools in 27 areas) involving more than 80,000 children. Evaluation of these schemes showed them to have been successful in that they:

- Were popular with staff and children, who looked forward to receiving the fruit (usually at morning break) and ate most of it (80% of the fruit was taken up);
- Had beneficial effects in the classroom, reducing the number of complaints of hunger and improving attention levels;
- Acted as a support for teachers in introducing subjects as diverse as healthy eating, science, literacy and numeracy.

The pilots demonstrated the feasibility of procuring and transporting large quantities of fruit into primary and nursery schools. Schools experienced some difficulties in storing the fruit, and it became apparent that thorough preparation and planning and local co-ordination were key factors in ensuring the success of the scheme. The scheme is currently being scaled up to distribute around 440 million pieces of fruit to over 2 million 4-7 year olds in some 18,000 schools across England each year, with the assistance of some £42M of funding from the National Opportunities Fund. It is envisaged that the scale-up will be complete by 2004.

Box 16 Food and the National Curriculum

Food, nutrition and healthy eating is a key component of the national curriculum. Science and personal, social and health education (PSHE) both require pupils to be taught about healthy eating and the role of food in maintaining a healthy lifestyle, while design and technology (D&T) offers pupils the opportunity to learn more about more practical aspects of food such as preparation and cooking.

Personal, social and health education

At Key Stage 1, children are taught how to make simple choices that improve their health and well-being. Key stage 2 deals with what makes a healthy lifestyle, including the benefits of exercise and healthy eating, what affects mental health, and how to make informed choices. At this stage children are also taught that bacteria and viruses can affect health and that following simple, safe routines can reduce their spread. By Key Stage 3, pupils are taught to recognise the physical and emotional changes that take place at puberty, how to keep healthy and what influences health (including the role of the media) and to recognise and manage risk and make safer choices about healthy lifestyles. Finally, at Key Stage 4 (14-16 years), pupils are taught about the health risks of alcohol, tobacco and other drug use, early sexual activity and pregnancy, different food choices and sunbathing, and about safer choices they can make about the link between eating patterns and self-image, including eating disorders.

Science

At Key Stage 1, children are taught that humans and other animals need food and water to stay alive and that taking exercise and eating the right types and amounts of food help humans to keep healthy. Lessons about the about the functions and care of teeth, about the need for food for activity and growth, and about the importance of an adequate and varied diet for health are included in Science at Key Stage 2. Key Stage 3 includes lessons about the need for a balanced diet containing carbohydrates, proteins, fats, minerals, vitamins, fibre and water and about foods that are sources of these and pupils are also taught that food is used as a fuel during respiration to maintain the body's activity and as a raw material for growth and repair.

Design and technology

Working with food is a compulsory part of D&T at Key Stages 1 (5-7 years) and 2 (7-11 years). Units at these stages cover subjects such as eating more fruit and vegetables, basic food preparation (e.g. making sandwich snacks), and designing and preparing basic food products such as bread or biscuits. From Key Stage 3 (11-14 years) and beyond, food is not a compulsory subject within D&T: schools can choose between food or textiles as the focus of units on understanding and exploring materials, design, production, and quality control. At the last round of curriculum revisions, the government considered a recommendation from the Qualifications and Curriculum Authority to make food a compulsory subject within D&T at Key Stage 3, but decided against doing so because of the potential resource implications for some schools. The proportion of schools choosing foods as the focus of D&T at Key Stage 3 is not known.

Overall, the scheme has been welcomed by all concerned - industry, NGOs, schools, children and parents alike. Key future challenges for the scheme include:

- Showing a positive, sustained impact on children's dietary choices both inside and outside of the school context. For instance, there may be added value in 'joining up' the scheme with other initiatives such as the Food Dudes approach described in box 11.
- Increasing the diversity of fruit and vegetables available in the scheme. The emphasis to date has been very much on the provision of apples, pears, bananas and clementines (or similar soft citrus fruit). Supporters of the scheme accept the need to offer a wider range of fruit, and to make vegetables available in order to maximise the nutritional benefits of the scheme.
- Disseminating advice on best practice. In the pilots, the scheme was most successful in schools which involved catering staff and older pupils in the storage and distribution of the fruit within the school, and where teachers or other adults provided positive models by eating surplus fruit.
- Ensuring that children are not exposed to increased levels of pesticides as a result of the scheme. The Pesticides Safety Directorate has tested fruit procured under the scheme and found that, in general, pesticide residues were well within the accepted limits. No non-approved pesticide residues were detected, although one easy peel citrus fruit of Turkish origin was found to contain a residue of a pesticide (Metalaxyl) at a higher level than recommended.

The Grab 5! Project

To complement the NSFS, which is confined to 4-7 year olds, the charity Sustain has been running a project to promote fruit and vegetables consumption amongst 7-11 year olds with a focus on low income families. The Grab 5! project started in August 2000 with a three year grant totalling £650,000 from the National Lotteries Charities Board. Participating schools received an array of resources including:

- Action Pack giving ideas and practical support on activities such breakfast clubs, fruit tuck shops, playground markets, growing, cooking and tasting schemes;
- Curriculum Pack, linked to the national curriculum to promote the fruit and vegetables theme;
- Model School Food Policy, which it could modify as required to devise its own policy;
- A range of materials and equipment including posters, banners, blenders and prizes to reward children's achievements;
- Support and advice from the Grab 5! Team.

The project was piloted in 26 schools in London (Lambeth), Leeds and Plymouth between September 2001 and July 2002, with the aim of developing a workable model for a national programme of fruit and vegetable promotion. An evaluation of the project was carried out in parallel by the British Heart Foundation Health Promotion Research Group. The evaluation found that the project had increased average consumption of fruit and vegetables from 1.7 items per day to 2.2 items per day, and reduced the overall consumption of high fat snacks. Overall, the project complemented existing school development plans and the National Curriculum and was appreciated by teachers because of its flexibility.

Foodfitness

The Food and Drink Federation (FDF) recently launched its own foodfitness initiative to encourage healthy eating and moderate levels of physical activity. It includes an interactive CD ROM targeted at children age 7-9 years, along with a range of resources for teachers designed to support various parts of the National Curriculum. The CD contrasts the lives of 2 families: the Activators, who are active, in good health and enjoy eating a healthy diet; and the Dolittles, who are overweight, avoid all forms of physical activity and eat a poor diet. Several key messages are promoted by the initiative:

- Aim for 5 fruit and veg a day;
- Base meals on starchy foods;
- Check out more lower fat choices;
- Be active in your daily life;
- Take pleasure in active leisure.

Nutritional standard of food in schools

School meals

As detailed in the previous section (see box 15), compulsory national nutrition standards for school meals were re-introduced in England in 2001. While this move was widely welcomed at the time, groups such as the National Heart Forum and the Health Education Trust have expressed concerns over the standards themselves and the way that they are monitored. Such groups wish to see stricter nutrition-based standards introduced as they are concerned that the current food-based standards allow children too much access to foods that could contribute to an unhealthy diet if chosen consistently. They have also suggested that while current regulations require schools to monitor the nutritional standard of the meals they provide, there is no audit to check whether schools are complying. Such groups thus see a need to set up a national system for monitoring the implementation of the national nutrition standards for school meals. One possible way this could be achieved would be by building it in to each school's Ofsted inspection.

Packed lunches

However, fewer than half of primary school children eat school meals; most eat packed lunches or buy snacks from school tuck shops or vending machines. As noted previously, a recent FSA survey showed that four in five packed lunches in primary schools failed to meet the current nutritional standards for school meals. In response to the survey the FSA has published advice for parents about packed lunches which includes tips such as:¹¹⁷

- Make sandwiches with thickly sliced (wholegrain or wholemeal) bread, or choose rolls or mini pitta breads;
- Cut down on the amount of butter, margarine or mayonnaise used;
- Pick low-fat sandwich fillings such as lean meats including ham or turkey, fish (e.g. tuna), cottage cheese, Edam, mozzarella, or sliced banana;
- Include more fruit – for instance a small box of raisins, a mini tin of fruit juice or fresh fruit such as apples, bananas, a handful of grapes, chopped fresh fruit salad or melon pieces;
- Pack unsweetened fruit juice, flavoured bottled water, flavoured milk and yoghurt drinks rather than drinks that are very high in sugar, such as fizzy colas or 'juice drinks';
- Cut down on crisps, which are high in fat, and choose plain popcorn, breadsticks or dried mixed fruit instead;
- Replace cakes, chocolates and biscuits with scones, currant buns and fruit bread.
- Include some vegetables, such as cherry tomatoes, or sticks of carrot, cucumber, celery and peppers.
- Put some salad in sandwiches or replace sandwiches with a mixed salad;
- Vary packed lunches to make them more interesting and to give children a healthy diet.

Tuck shops

As far as tuck-shops are concerned, there are a number of examples of projects in the UK to promote healthy snacks. For instance, North Tyneside Food Action Group has involved a Community Dietician, Community Services, Dental Health Promotion Services and School Services in its healthier tuck shop project.¹¹⁸ The scheme encourages schools to provide healthier options during break times by providing items such bread rolls, crackers, fruit and vegetables, yoghurts, low-fat savoury snacks and unsweetened drinks instead of the usual fare of crisps and sugar-sweetened drinks. Schools are supplied with a check-list of suggested healthier snacks to provide; those whose tuck shops are compatible with this check list can apply for an award (a £50 start-up pack) from the scheme's sponsor, Sainsbury's. The National Assembly for Wales and the FSA Wales have jointly published a guide for schools wishing to set up a healthy tuck shop, with an emphasis on the provision of fruit and vegetables.¹¹⁹

Vending machines

Schools increasingly have vending machines from which pupils can purchase a variety of snacks and drinks throughout the day. Such arrangements have been criticised because the snacks and drinks sold are often high in fats and/or sugars. Indeed, in the US concerns have reached such a height that schools in some areas have banned vending machines in an attempt to improve children's eating habits. However, such a step means that schools lose out on their share of the income generated – some estimates suggest that this could be as high as \$200,000 a year for a large school. In the UK, the British Nutrition Foundation has suggested that there is no good reason why vending machines cannot provide a range of food and drink that is consistent with healthy eating policies in schools. It points out that such machines can help to alleviate long queues for catering facilities and suggests that schools may:

¹¹⁷ www.foodstandards.gov.uk/news/newsarchive/toplunchboxtips

¹¹⁸ www.coolschools.org.uk/who_can/health/nhs/tuck_shp.htm

¹¹⁹ www.hpw.wales.gov.uk/English/resources/leafletsandposters/fruittuck_e.pdf

- Change the casing of vending machines to minimise (or remove completely) any advertising for products that are inconsistent with healthy eating policies;
- Work with suppliers to ensure that vending machines offer additional choices such as water, low-sugar drinks, milk and fruit juices;
- Consider installing refrigerated machines that offer a wider range of snacks including sandwiches and fruit and vegetables.

Promotion/sponsorship in schools

As noted in the previous section, there is also growing concern over commercial activities in schools, from the use of sponsored teaching materials in classrooms, through to collectors' schemes such as the recent Cadburys scheme where schools redeem chocolate wrappers in return for sports equipment. Schools can clearly benefit from such activities, and best practice principles have been drawn up to give clear guidance on the standards expected.¹²⁰ However, some consumer groups are concerned that these best practice principles do not specifically address food promotions.

Some consumer and health groups have called for such activities to be banned, questioning whether they are consistent with initiatives such as the Healthy School Standard, which encourages schools to deliver consistent messages/policies on healthy eating. At present, schools make decisions individually about what level of commercial activity is acceptable, and in some cases, practices vary within schools from one teacher to another. The National Union of Teachers recently published advice on the use of commercial materials in schools that emphasise the importance of making decisions on a whole school basis.¹²¹ These recommend schools to consider a number of factors in making decisions on whether to use commercial materials:

- the educational content of materials and reliability of information;
- whether the materials contain unacceptable advertising by the sponsoring company;
- whether the materials support healthy eating by pupils;
- the impact on teacher workload, particularly in terms of balancing the benefit to the school against additional bureaucracy for teaching staff;
- value for money;
- the impact on parents, for example being pressurised to buy certain products.

5.3 Encouraging healthier eating in the wider world

In addition to the schools-based initiatives outlined above, there is also a range of policies aimed at improving access to a healthy diet in the wider world. These policies take a life-course approach to try to ensure that pregnant women, infants and schoolchildren have access to a healthy diet. They are focused on helping the underprivileged and providing people with the information to make healthier choices. The NHS Plan (2000) set out the aim of ensuring that children have a healthy start in life. This included a wide range of different policies aimed at improving children's diets and at tackling child poverty. In addition to the National Schools Fruit Scheme described previously, other nutritional policies were outlined including the:

- Infant Feeding Initiative;
- Healthy Start – the reform of the Welfare Foods Scheme;
- Expansion of the Sure Start scheme;
- Five-a-day programme.

¹²⁰ www.isba.org.uk/public_documents/ISBA_CA_Schools_principles.pdf

¹²¹ www.teachers.org.uk/resources/pdf/commercialisation_guidance.pdf

Infant feeding

Benefits of breastfeeding

It is well established that breastfeeding confers significant short- and long-term health benefits for both mother and infant. Among the health benefits linked to exclusive breast feeding are:

- Reduced risk of gastrointestinal, respiratory and other infections in infants;¹²²
- Possibly also reduced risk of a wide range of other disorders such as sudden infant death syndrome,¹²³ asthma and other atopic diseases,¹²⁴ as well as chronic disorders such as obesity¹²⁵ and type 2 diabetes¹²⁶, although the evidence here is less clear cut;
- Health benefits to the mother (e.g. breastfeeding may help protect against developing conditions including breast and ovarian cancer and osteoporosis);
- Breastfeeding delays the re-emergence of the normal menstrual cycle following birth and thus helps to space births.

UK policy

DoH funds an Infant Feeding Survey every five years, the most recent of which was published in 2000.¹²⁷ This shows there is still widespread variation in breast feeding practice throughout the UK. Three factors are particularly associated with this variation:

- The mother's age – the older the mother, the more likely she is to breastfeed her baby. For instance in Scotland, 31% of first-time mothers under the age of 20 breast fed their infant, compared with 82% of first time mothers over the age of 30.
- The mother's educational level – the younger the mother when she left full time education, the less likely she is to breast feed her baby. Thus, some 53% of UK mothers who left the educational system aged 16 or below initially breast fed their infant compared with 88% of mothers who stayed in education until age 18 or more.
- The social class of the mother's partner/husband – the higher the social status, the more likely the mother is to breast feed. For example, 92% of mothers with a partner in social class I breast fed their infant compared with 59% of those with a partner in social class V.

Until recently, the WHO recommended exclusive breastfeeding only until the age of 3-4 months. Part of the reason for this was that WHO considered that infants aged 4 months and over may require more energy than the mother can provide through breastfeeding alone. However estimates of the energy required by infants have since been revised downwards, and the WHO now recommends breastfeeding exclusively for the first 6 months, based on a systematic review of the evidence available in 2002.¹²⁸ Following the latest WHO guidance, DoH recently issued a new recommendation stating that "*Breastfeeding is the best form of nutrition for infants. Exclusive breastfeeding is recommended for the first six months (26 weeks) of an infant's life as it provides all the nutrients a baby needs.*" It is currently pursuing a number of policies in this direction. For instance:

- The NHS Plan (2000) is committed to "*increased support for breastfeeding.*"¹²⁹
- The NHS Priorities and Planning Framework 2003 – 2006 has set a target to increase breastfeeding by 2% per year by focusing on women from disadvantaged groups.¹³⁰

¹²² WHO The Optimal Duration of Exclusive Breastfeeding: A Systematic Review, WHO Geneva, 2002.

¹²³ Ford R et al, International Journal of Epidemiology, 22, 885-890, 1993.

¹²⁴ Saarinen U et al, Lancet, ii, 163-166, 1979.

¹²⁵ For instance, see von Krie R et al, British Medical Journal 319,147-150, 1999 and Gillman M et al, Journal of the American Medical Association 285, 2461-2467, 2001

¹²⁶ Mayer E, Diabetes, 37, 1625-1632, 1988.

¹²⁷ Infant Feeding Survey, 2000, DoH, London.

¹²⁸ WHO The Optimal Duration of Exclusive Breastfeeding: A Systematic Review, WHO Geneva, 2002.

¹²⁹ www.doh.gov.uk/nhsplan

¹³⁰ www.doh.gov.uk/planning2003-2006

- The DoH's infant feeding initiative has funded 80 or so projects across all health regions with the aim of increasing breastfeeding rates amongst disadvantaged groups. Midwives, health visitors, GPs and other health professionals have been engaged in projects to evaluate best practice in encouraging mothers to breast feed their infants. An evaluation of the projects has been commissioned and the results are expected to be published before the end of 2003.
- DoH also co-ordinates an annual National Breastfeeding Awareness Week aimed at increasing breastfeeding rates amongst young mothers from disadvantaged groups.¹³¹
- DoH has also published proposals for the reform of the Welfare Food Scheme, which includes proposals to give more support to breastfeeding women. This is discussed in more detail in the following section.

Policy options

Groups such as the United Nations Children's Fund (UNICEF) have called for further government action to increase breastfeeding rates in the UK, which are currently among the lowest in Europe. In particular, UNICEF's UK Baby Friendly Initiative wishes to see policies to:

- Protect women's rights to breastfeed, by introducing legislation to protect breastfeeding mothers from discrimination or harassment.
- Improve best practice in the health care system. One option here would be to introduce compulsory sections on breastfeeding into the training curriculum of midwives, health visitors and doctors.
- Provide parents with accurate and impartial information. Advertising of breast milk substitutes is subject to a WHO International Code which states that infant formula, other breastmilk substitutes, bottles and teats should not be advertised or otherwise promoted, but that accurate information should be available.¹³² The UK supports the International Code but has introduced only parts of it into law.¹³³ UNICEF has called for the legislation to be expanded to cover all promotion of artificial feeding, arguing that this would support informed decision making (while ensuring that accurate information is available for mothers who choose to bottle feed). It has also suggested that infant feeding education should be included in the National Curriculum.
- Introduce national co-ordinators to support breast feeding. While UNICEF and other groups have applauded the NHS's recent target of increasing breastfeeding by 2% per year, they have called for further funding to integrate breastfeeding more fully into existing health and social policy. Such groups argue that the cost of such policies would eventually be offset by lower treatment costs in the NHS for infections and other conditions that breastfeeding protects against.¹³⁴

Healthy Start

Also included in the NHS Plan (2000) was a reform of the Welfare Food Scheme with the aim of using "the resources more effectively to ensure that children in poverty have access to a healthy diet, [with] increased support for breastfeeding and parenting.". Except for a slight reduction in its overall coverage (it currently covers some 800,000 mothers and children throughout Britain), the Welfare Food Scheme has remained relatively unchanged since it was established more than 60 years ago in response to wartime shortages. It provides means-tested tokens for milk (in liquid form and infant formula) and vitamins to expectant and nursing mothers and under 5s, as well as non-means tested milk to those in day care and for some disabled children.

¹³¹ www.breastfeeding.nhs.uk

¹³² The WHO/UNICEF International Code of Marketing of Breastmilk Substitutes was adopted by a Resolution (WHA34.22) of the World Health Assembly in 1981.

¹³³ The Infant Formula and Follow-on Formula Regulations 1995

¹³⁴ One estimate has suggested that if all babies were breastfed, the NHS would save £35million per year in England and Wales in treating gastroenteritis in bottle-fed infants.

While the Welfare Food Scheme has been of benefit to underprivileged families, it is widely seen as being out of date, partly because of its focus on liquid milk and infant formula. Following a scientific review of the Scheme by COMA in 1999, DoH published proposals for a new Healthy Start initiative to replace the Welfare Foods Scheme in October 2002, with the aim of:¹³⁵

- Broadening the nutritional basis of the scheme to include fruit and vegetables, cereal-based and other foods suitable for weaning, as well as providing liquid milk and infant formula;
- Providing greater access to these foods through a fixed face value voucher, roughly equivalent to the value of seven pints of liquid milk per week (which is the current allocation);
- Registering scheme members through health professionals as a way of tying the scheme in to existing programmes providing advice and guidance on nutrition and breastfeeding.

The Healthy Start proposals were open to consultation until December 2002, and were also the subject of 17 special meetings and events organised by DoH with interested parties in November and December 2002. A summary of the consultation responses was published in March 2003.¹³⁶ In general, the core proposals were well received, although the consultation process identified a number of issues that have yet to be resolved:

- The range of foods. The proposal to include fruit and vegetables was widely supported but guidance would be needed on the recommended form (e.g. tinned, dried, or frozen), with concerns being expressed that some processed fruit and vegetables contained salt or sugar as additives. Many respondents felt that the vouchers should encourage use of fresh rather than prepared foods. There was also agreement that cereal-based foods should be included, but there were concerns that these should not include foods with high sugar or salt content.
- The value of the voucher. There is some support for increasing the value of the voucher to cover the price of a week's supply of infant formula to ensure that mothers who cannot breastfeed will not be tempted to use (cheaper) liquid milk too early. Some respondents wished to see extra support for infants up to 6 months of age.
- Agreement on who will be covered by the scheme. This is largely a matter of balancing the wish to extend the scheme with the pressure for a higher value voucher.
- Distribution. Issues here include deciding how items covered by the voucher – such as vitamins and infant formula - will be distributed. There is some support for phasing out of the NHS clinics that currently deliver some of the Welfare Food Scheme and for including more community initiatives in the Healthy Scheme. On the other hand, there is also a need to work within existing resources and to make it simple for beneficiaries to exchange vouchers.
- Registration. On the one hand there is a need for registration to ensure that the new scheme 'joins up' with other breastfeeding and nutritional initiatives. On the other hand, there is also a need for registration to be clear, simple and uniformly applied, to reduce the burden on NHS staff and encourage participation.
- Impact of the nursery milk provisions on existing initiatives such as the National School Fruit Scheme and plans to introduce free nursery places for 3 year olds.
- The role of existing welfare milk suppliers in the new Healthy Start Scheme. There is a case for incorporating existing supply arrangements into the reformed scheme.

DoH is consulting further to formulate more detailed proposals which will be published later in the year. It is anticipated that there will be a formal consultation on the draft regulations early next year and that the reformed Healthy Start Scheme will be launched later in 2004.

¹³⁵ www.doh.gov.uk/healthystart/healthystart.pdf

¹³⁶ <http://www.doh.gov.uk/healthystart/healthy-start2.pdf>

Sure Start

Sure Start is a key Government policy aimed at tackling child poverty and social exclusion. It is focused on families and children up to the age of four living in the most deprived neighbourhoods. The aim is to improve the health and well-being of such families by improving access to family support, advice on nurturing, health services and early learning. At present, there are some 450 local programmes up and running and this will be expanded to 524 programmes by 2004, involving around 400,000 children. While the design and content of Sure Start programmes varies with local needs, all programmes include a number of core services:

- outreach and home visiting;
- support for families and parents;
- support for good quality play, learning and childcare experiences for children;
- primary and community health care, including advice about family and child health;
- support for children and parents with special needs, including help getting access to specialised services.

Local Surestart programmes include a number of healthy eating initiatives covering topics such as food hygiene, basic healthy eating, healthy snacks, healthy lunchboxes, budgeting, recipes and healthy cooking methods. They may be targeted at families with young children, as well as playgroups, creche workers, and breakfast clubs. There are evident benefits in ensuring that such initiatives link in with the other nutritional programmes described previously.

5 A DAY

The NSFS described previously is part of a larger 5 A DAY initiative to encourage people to eat more fruit and vegetables by raising awareness of the health benefits and improving access to fruit and vegetables through targeted action. Other strands of this initiative are described below.

Local initiatives

All Primary Care Trusts (PCTs) in England have been encouraged to develop local 5 A DAY initiatives, with 66 PCTs in deprived areas targeted to apply for £10M of lottery funding. To date more than 50 such grants have been awarded. These local initiatives have been informed by 5 pilots funded by the DoH, set up to test the feasibility and practicalities of evidenced based community approaches. An evaluation of these initiatives found that they improved access to fruit and vegetables in the areas targeted and increased people's awareness of the health benefits. Over the 12 months of the pilots, the interventions helped reverse falling intakes of fruit and vegetables, and increased consumption among those with the lowest initial intakes.¹³⁷

Communications programme

The 5 A DAY also includes a communications programme to raise awareness of the health benefits of the health benefits of fruit and vegetables. A key part of this programme are the 5 A DAY logo and portion indicator which have been developed in consultation with industry, local and national health, education and consumer organisations, and consumers. Use of the logo/portion indicator has to comply with the strict rules governing portion size and levels of fat, sugar and salt outlined in box 17. The logo is primarily meant for use on promotional materials, whereas the portion indicator is designed for use on foods or food packaging. It is designed to indicate how many of the five daily target portions a single serving of the food provides.

¹³⁷ www.doh.gov.uk/fiveaday/pdfs/keyfindings.pdf

Box 17 5 A DAY Licensing Guidelines Nutritional Criteria

General

The 5 A DAY logo and portion indicator are certification marks under the Trademarks Act and can only be displayed by those who have been granted a license by the DoH. At present, licences will only be granted for products or promotional material aimed at adults. Products specifically aimed at children may not use either the log or the portion indicator, although the logo may be used on fruit and vegetables supplied as part of the National Schools Fruit Scheme. In general, a product may not carry the logo or indicator unless a serving contains at least 1 portion of fruit or vegetables. Small fruits are one exception to this – individual fruits such as kiwi fruits and satsumas (where 1 portion=2 fruits) may display the logo. Use of the marks must be in the overall context of promoting a healthy, balanced diet. In order to encourage people to eat a variety of fruit and vegetables, certain categories can count as only one portion per day towards the 5 A DAY target (see below).

Products that can carry the logo/portion indicator

All fresh, chilled, frozen, canned, dried fruit and vegetables and 100% fruit juice may carry the logo or portion indicator if they conform to the criteria below.

- Fresh fruit and vegetables – portion size is 80g 'as eaten' (e.g. without inedible skin).
- 100% fruit or vegetable juice or 'smoothies' – portion size is 150ml, but only 1 portion counts towards the target per day. These include freshly squeezed, pasteurised, concentrated and long-life products.
- Concentrated purees – the portion size is based on reconstituted weight, but such products can count as only one portion per day.
- Dried fruit and purees – portion size is calculated based on wet/reconstituted weight. Again, such products can provide only one portion per day towards the 5 A DAY target.
- Beans and other pulses – beans such as haricot, butter, soya and kidney beans as well as chick peas and lentils can all count as one portion towards the 5 A DAY target.

Products that cannot be promoted using the logo/indicator

The following products may not be promoted using the 5 A DAY logo or portion indicator:

- Fruit and vegetables with any added fats, sugars or salt. This rules out (for example) any vegetable product with added salad dressing, fruit juices with added sugars, tinned fruit with added sugars and tinned vegetables/pulses with added salt.
- Potatoes, yam, cassava and other starchy staples.
- Nuts, seeds, coconut, marmalades and jams.
- Fruit drinks with other added ingredients such as squashes, and fruit and herb teas, wines or other alcoholic drinks.

Portion size

No one product can claim to supply more than two portions towards the 5 A DAY target. Except where the portion indicator is used on whole pieces of fresh fruit and vegetables, it must be accompanied by an explanation of the portion quantity. For instance, the wording might tell consumers that 1 serving from a pack of dried fruit will supply one of their 5 A DAY portions of fruit and vegetables and that a typical serving is 3 pieces of dried fruit.

Source: 5 A DAY Licensing Guidelines, CMI, Long Hanborough, Oxford.

Work with industry, producers, caterers and retailers

This is designed to improve access to fruit and vegetables and promote the 5 A DAY message. The DoH has published guidance on how local initiatives can work with industry, growers, retailers, schools, caterers and employers to deliver effective 5 A DAY programmes.¹³⁸ At a national level, working closely with retailers can help to ensure that supermarket promotions are consistent with the 5 A DAY message.

An evaluation and monitoring programme

This programme will assess the impact of the programme on consumption, attitudes and awareness. A validated tool has been developed to aid the assessment of fruit and vegetable consumption at a local level, and DoH has also funded the development of tools to assess the impact of the National School Fruit Scheme on children's diets. Monitoring of population trends in BMI, physical activity and fruit and vegetable consumption will be achieved through the Health Survey for England.

¹³⁸ <http://www.doh.gov.uk/fiveaday/pdfs/booklet2.pdf>

5 A DAY challenges

A survey of 1,800 adults age 16 and above throughout Britain commissioned by DoH and published in January 2003 highlights some of the challenges facing the 5 A DAY programme:¹³⁹

- A lack of awareness of the 5 A DAY message. While nearly three quarters (73%) of women correctly identified 5 or more portions of fruit and vegetables as the recommended daily intake, less than half (43%) of the men surveyed were familiar with this basic message.
- Confusion over which foods count. Nearly all respondents (97%) knew that green salad should count towards the target, but only 54% correctly identified baked beans as counting. While nearly four fifths (79%) of people incorrectly identified baked potatoes as counting, a significant minority (13%) thought (incorrectly) that strawberry jam should also count.
- Confusion over portion sizes. Respondents who correctly identified foods which they thought should count towards their daily target were asked what they thought constitutes a portion for each of them. Most (70%) correctly identified the portion size for green salad (a cereal bowl) but fewer (typically around 30%) knew what constituted a portion for satsumas (2 satsumas) and other foods. More detailed guidance is available on portion size to those seeking to use the 5 A DAY logo or portion indicator (see table 19), although it is unclear how widely such information has been disseminated to date.

What counts?

The DoH has issued nutritional guidelines (box 17) on what products can be promoted using the official 5 A DAY logo. These allow fresh, chilled, frozen, canned, dried fruit and vegetables and 100% fruit juice but currently exclude any fruit and vegetables with any added fats, sugars or salts. However, the 5 A DAY logo is being developed in stages and DoH is currently considering how best to develop criteria for use of the logo on foods containing added fat, salt and sugars. In general, there are three main possible approaches:¹⁴⁰

- Exclusion of all but minimally processed foods – i.e. fresh, frozen, canned and dried fruit and vegetables without any added sugars, fat or salt. This is the approach that the current guidance is based on; it is easy to implement but restricts the range of foods covered.
- Informed choice – labelling schemes that help consumers easily establish the energy/fat/sugar/salt content of foods. Examples include a banding system developed by the Coronary Prevention Group that identifies products as being low, medium or high in these components, and a labelling panel developed by the Institute of Grocery Distribution which displays the fat, saturated fat, salt and sugar content of a product. One possibility would be to expand such schemes to include details of fruit and vegetable content with an assessment of how many portions a serving delivers. Such systems allow consumers to make better informed choices, but places the onus firmly on consumers to weigh up the pros and cons of each product for themselves.
- Compositional criteria - developed of nutrient-based criteria to help consumers identify foods with a 'healthy eating' profile. Supermarkets in particular have developed such schemes although to date most of these have focused on foods low in fats, added sugars and salt, rather than on fruit and vegetables. Such schemes are popular with consumers as they relieve them of the responsibility for weighing the pros and cons of each product. However, it is important that appropriate nutritional criteria are used, in order to prevent consumers from being misled.

In developing the additional nutritional criteria needed to allow the 5 A DAY logo to be used to promote composite foods with added sugars, fat and salt, DoH will have to balance the desire to ensure widest possible use of the logo against the need to ensure that it is not used to promote inappropriate products.

¹³⁹ www.doh.gov.uk/public/spn20jan03.htm

¹⁴⁰ www.doh.gov.uk/nutritionforum/nf03_20.PDF

Table 9 Portion equivalents for consumer information

Fruit		Vegetables	
Type	Portion = 80g (as eaten, edible, drained if canned).	Type	Portion = 80g (as eaten, edible, drained if canned).
Apple, dried rings	4 rings	Artichoke	2 globe hearts
Apple, fresh	1 medium apple	Asparagus, canned	7 spears
Apple, puree	2 heaped tablespoons	Asparagus, fresh	5 spears
Apricot, canned	6 halves	Aubergine	1/3 rd aubergine
Apricot, dried	3 whole	Broad/black eye/ butter /cannelloni/kidney/beans, cooked	3 heaped tablespoons
Apricot, fresh	3 apricots	Beansprouts, fresh	2 handfuls
Avocado	Half an avocado	Beetroot, bottled	3 baby whole or 7 slices
Banana	1 medium banana	Broccoli	2 spears
Blackberries	1 handful (9-10 blackberries)	Brussel sprouts	8 Brussel sprouts
Blackcurrants	4 heaped tablespoons	Cabbage	1/6 th small cabbage, or 2 handfuls sliced
Cherries, canned	11 cherries	Carrots, canned	3 heaped tablespoons
Cherries, dried	1 heaped tablespoon	Carrots, fresh sliced	3 heaped tablespoons
Cherries, fresh	14 cherries	Cauliflower	8 florets
Clementines	2 clementines	Celery	3 sticks
Currants, dried	1 heaped tablespoon	Chick peas	3 heaped tablespoons
Damsons	5-6 damsons	Chinese leaves	1/5 th head
Dates, fresh	3 dates	Courgette	1/2 large courgette
Fig, dried or fresh	2 figs	Cucumber	2 inch piece
Fruit juice (100%)	150 ml	Leeks	1 leek (white portion)
Fruit salad, (canned or fresh)	3 heaped tablespoons	Lentils	3 tablespoons
Fruit smoothie	150ml	Lettuce (mixed leaves)	1 cereal bowl
Grapefruit, canned	3 heaped tablespoons	Mangetout	1 handful
Grapefruit, fresh	Half a grapefruit	Mixed veg, frozen	3 tablespoons
Grapes	1 handful	Mushrooms, button	14 button mushrooms
Kiwi fruit	2 kiwi fruit	Onion, dried	1 heaped tablespoon
Mango	2 (2 inch) slices	Onion, fresh	1 medium onion
Melon	1 (2 inch) slice	Parsnip	1 large
Mixed fruit, dried	1 heaped tablespoon	Peas, canned	3 heaped tablespoons
Nectarine	1 nectarine	Peas, fresh	3 heaped tablespoons
Orange	1 orange	Peas, frozen	3 heaped tablespoons
Passion fruit	5-6 passion fruit	Pepper	1/2 pepper
Peach, canned	2 halves or 7 slices	Radish	10 radishes
Peach, fresh	1 medium peach	Spinach, cooked	2 heaped tablespoons
Pear, canned	2 halves or 7 slices	Spinach, fresh	1 cereal bowl
Pear, fresh	1 medium pear	Spring greens, cooked	4 heaped tablespoons
Pineapple, canned	2 rings or 12 chunks	Spring onion	8 onions
Pineapple, fresh	1 large slice	Swede, diced	3 heaped tablespoons
Pineapple, dried	1 heaped tablespoon	Sweetcorn, baby	6 baby corn
Plum	2 medium plums	Sweetcorn, canned	3 heaped tablespoons
Raspberries, canned	20 raspberries	Sweetcorn, cob	1 cob
Raspberries, fresh	2 handfuls	Tomato, puree	1 heaped tablespoon
Satsuma	2 satsumas	Tomato, canned	2 whole
Strawberry, canned	9 strawberries	Tomato, fresh	1 medium or 7 cherry
Strawberry, fresh	7 strawberries	Tomato, sundried	4 pieces
Tangerine	2 small tangerines		

Other '5 a day' type initiatives

The absence of DoH criteria for using the official logo to promote composite foods means that many companies have opted to launch their own schemes to promote such foods. For instance, Sainsbury's has launched a 'way to five' range of products to help its customers get their five daily portions of fruit and vegetables in an "easy and exciting way".¹⁴¹ Many of the products in the range – such as dried fruit snacks, fruit smoothies and prepared fruits, vegetables and salads – may conform to the strict nutritional guidelines laid down for use of the DoH's 5 A DAY logo.

¹⁴¹ www.sainsburys.co.uk/healthyeating/

But the 'way to five' range also includes composite products such as virtually fat free yoghurts, vegetable pizzas, pasta sauces and sponge puddings that would not comply with the current DoH criteria because they contain added salt, sugars or fats. Sainsbury's see the inclusion of such products as an important factor in encouraging its customers to increase their fruit and vegetable consumption within the context of hectic modern lifestyles.

However, some consumer groups have expressed concerns over such schemes. These concerns are illustrated by a recent case heard by the ASA to adjudicate on complaints received about adverts for canned baked beans, spaghetti and tomato soup. As outlined in box 18, the adverts were headlined "5-A-DAY THE HEINZ WAY" and claimed that the products could contribute towards the "recommended five daily portions of fruit and vegetables as part of a healthy balanced diet". Two complaints suggested that the advertising was misleading because of the relatively high salt content of the products, and because it implied official endorsement of such composite products in helping to meet the 5 A DAY target. These complaints were not upheld, because the ASA felt that the adverts were broadly in line with official guidance, did not encourage excessive consumption of the products and promoted them in the context of a healthy, balanced diet. A third complaint, that the adverts for tomato soup misleadingly implied that such a product could contribute 2 portions to the 5 A DAY target, was upheld (see box 18) and the company was told to avoid any such implication in any future advertising.

Box 18 Complaints made about advertising for Heinz products

In a case heard by the Advertising Standards Authority (ASA) in April 2003, the Food Commission (UK) Ltd complained about adverts for canned tomato soup, baked beans and spaghetti issued by HJ Heinz Company Ltd. The adverts were headlined "5-A-DAY THE HEINZ WAY" and claimed that the products could contribute towards the "recommended five daily portions of fruit and vegetables as part of a healthy balanced diet". Each contained an image in the bottom right-hand corner showing five red segments in a circle with the words "5-A-DAY" underneath. Adverts for tomato soup had two of the segments shaded white, and the other two adverts had one shaded segment. Three complaints were made:

- That the advertisements misleadingly implied that the fruit and vegetables in the advertised products were healthy and equivalent to fresh fruit and vegetables, because the complainants believed the products contained relatively high levels of added sugar, fat and salt.
- That the claim "contributes towards your recommended five daily portions of fruit and vegetables" misleadingly implied that official dietary recommendations included composite foods such as the advertised products.
- And that one of the advertisements implied that the product (Heinz Tomato Soup) counted as two portions of the recommended daily five portions of fruit and vegetables.

The first two complaints were not upheld by the ASA. In the case of the first complaint, the Authority noted the advertised products did contain added sugar and salt and that tomato soup also contained added fat. It also noted the levels of added sugar and added fat were well within the daily intake guideline levels but that the level of salt in a portion of each of the three products represented 35-51% of the recommended maximum intake for a woman and 26-36% for a man. But the ASA did not uphold the complaint because the advertisements referred to a healthy, balanced diet and, did not encourage excessive consumption of the advertised products.

On the second complaint, the ASA noted that existing DoH guidance about foods that contributed towards five-a-day included canned and processed foods. Again, because the advertisements referred to a healthy, balanced diet and because they did not encourage excessive consumption of the advertised products, the Authority did not uphold the complaint. None of the advertised products would have met the current criteria laid down by the DoH to display the official 5 A DAY logo or portion indicator because they contain added fats, sugars or salt, although DoH is currently developing nutritional criteria for such foods.

In the case of the third complaint, the advertisers confirmed that the reconstituted fruit and vegetable content of their tomato soup equated to at least two portions of fruit and vegetables. ASA also noted that at the time of the advertisement, no official guidance existed stating that tomato concentrates should count only once towards the 5 A DAY target. However the Authority noted that more recent DoH guidance advised that tomato puree could count only once per day, even if more than one portion was consumed. It considered that the advert exaggerated the product's contribution to a healthy, balanced diet and told the advertisers to avoid the implication in future that similar products counted as more than one portion.

Source: www.asa.org.uk

Such cases have led some consumer and health promotion groups to express concerns that the 5 A DAY message is being 'hijacked' by food companies to promote products that are high in fat, sugars or salt. These groups are also worried that the existence of different 'five a day' promotions with different nutritional criteria has the potential to confuse consumers and to dilute the overall 5 A DAY message. However, food companies and retailers suggest that there is a need to promote as wide a range of products as possible if real progress is to be made towards increasing people's intakes of fruit and vegetables. DoH is consulting to establish common criteria for promotion of composite foods under the 5 A DAY scheme, and both the FSA and DoH are working with industry to reduce the content of salts, fats and added sugars in such foods.

5.4 Reducing intakes of fats, sugars and salt

As outlined in the previous sections, there is a wide range of government initiatives aimed at increasing children's consumption of fruit and vegetables in the school and in the wider world. While health and consumer groups alike have welcomed such policies, they suggest that these initiatives alone will not be sufficient to offset recent trends in obesity and other diet-related conditions. They see scope for a range of additional policies aimed at reducing intakes of foods high in fats, sugars and salt. There is a wide range of possible policy options in this area, although opinion differs as to the most appropriate approach.

A key issue here is what role the state should play. Some, including representatives of the food industry, see individuals as being responsible for making their own dietary choices. They see the role of the state as providing information and education to ensure that these choices are well informed through education, labelling and public health promotions. Central to such a view is that there is no such thing as an unhealthy food, only an unhealthy diet. Thus, groups that subscribe to this view acknowledge that there may be a need for industry to work with government to reduce levels of fats, sugars and salt in food, but see no justification for stricter regulation of the promotion or advertising of foods.

At the other end of the spectrum are those - including the WHO, consumer and health groups - that wish to see diet and nutrition placed much higher up the public health agenda. They see the state as playing a much more proactive role, for instance by stricter regulation of food advertising and promotion, by taxing 'unhealthy' foods or by switching farming subsidies to encourage production of fruit and vegetables.

This section will examine the main policy options for reducing intakes of foods high in fats, sugars and salt. Another key policy area, particularly from the point of view of childhood obesity, is encouraging children to be more physically active. This is beyond the scope of this report, which is focused on improving children's diets, but has been the subject of a previous POSTnote and is also covered in the forthcoming POSTnote on childhood obesity.¹⁴²

Reducing levels of added salts, fat and sugars in processed foods

One area where some progress has been made in recent years is the reduction of levels of fats, salt and sugars in food products. The main target here is the ready meals sector, which has been growing considerably in recent years. According to a recent survey, this sector:¹⁴³

- Was worth £1.78 billion in sales in the UK in 2001, up by 46% since 1997;
- Consists mainly of chilled (53% of sales value) and frozen (40%) pre-prepared meals;
- Is dominated by the big supermarkets, whose branded products accounted for around two thirds of sales value in 2001;

¹⁴² POSTnote 162, October 2001 Health Benefits of Physical Activity

¹⁴³ Source: 'Ready Meals in the UK', Mintel Report, August 2002

- Currently offers relatively few low-fat and low-calorie products (such products account for only a small percentage of new product developments).

Why include salt, sugar and/or fat?

The food industry adds salt, sugars and fats to such products for a variety of reasons. For instance, salt and sugars can act as preservatives, helping to extend the shelf-life of chilled products, while both of these along with fats affect a product's texture and taste. A national survey of manufacturers' use of salt conducted in 2000 by the FDF found that:¹⁴⁴

- 95% of manufactures cited flavour as a reason for adding salt;
- 46% used salt as a preservative;
- 38% used salt for texture;
- In 24% of products surveyed, salt performed a specific purpose (such as preventing vinegar from 'clouding' in pickles, or controlling yeast growth in bread).

Reducing salt levels

FDF has worked closely with the FSA and DoH to reduce salt levels in certain foods and further reductions are planned. For instance, UK bread manufacturers have reduced levels of salt in their products considerably since the late 1990s. An FSA survey of the five most commonly consumed types of bread in 2001, showed that sodium levels (an indicator of salt content) were between 7-21% lower than those found in a comparable survey in 1998. FSA has targeted further reductions in salt levels in a range of processed foods including breakfast cereals, soups and sauces, and the FDF is working to identify products where such reductions could be achieved.

A recent (June 2003) survey commissioned by the FSA of salt levels in ready meals shows that there is still considerable scope for further reductions to be made.¹⁴⁵ Among the key findings in this survey were that:

- Products aimed specifically at children often contained high levels of salt. For instance, some children's meals such as macaroni cheese and shepherd's pie contained 40% of the daily target salt intake (5 g/day) for 7-10 year olds (see table 1, page 5).
- There was wide variation – up to a fourfold difference - in salt levels between similar meals sold by different supermarkets. Such a wide variation does at least demonstrate that it is possible to reduce the salt levels of these types of product significantly.
- On average, 'healthy eating' versions of meals contained lower levels of salt than the standard versions, although the differences were small.

Reducing fat and sugars

Groups such as Foodaware have called for further action to encourage food processors to reduce levels of fat and sugars in their products. For instance, it suggests that manufacturers should undertake a 'fat audit' of all processed foods, to remove unnecessary fat from products and to reduce fat levels wherever possible.¹⁴⁶ It has also called for a review of nutritional labelling to make it clearer and more user-friendly to consumers, and for stricter regulation to control claims concerning salt and fat levels (low, reduced, etc.). These issues are discussed below.

One recent development that might drive companies to reduce levels of fat and sugars in their products is fear of litigation. For instance, in the last 12 months two law suits have been filed against McDonald's claiming its products contributed to obesity. While one of these cases has been dismissed, there are growing concerns within the food industry at the prospect of more such

¹⁴⁴ British Food Journal, 104 No. 2, 84-125, 2002

¹⁴⁵ www.foodstandards.gov.uk/news/pressreleases/readysaltpress

¹⁴⁶ The "fat audit" was proposed by the then government's Nutrition Task Force in the mid 1990s.

claims, particularly in view of the upwards trend in the prevalence of obesity. Some market analysts are already predicting that food companies will be the next target for law firms with experience of claims against the asbestos and tobacco sectors. Indeed, some analysts are ranking food companies according to their 'obesity risk'. Such considerations have led at least one large food company (Kraft) to announce that it is reducing the amount of fat and sugars in its products and reducing the size of portions.¹⁴⁷

Nutritional labelling

Current labelling regulations

In parallel with the efforts to reduce levels of fats, sugars and salt in processed foods, recent years have also seen developments in attempts to provide more detailed, clearer and easily understood information about the nutritional content of foods to consumers via labelling. Under current EU legislation, nutritional labelling is voluntary, unless a nutritional claim is made for the product.¹⁴⁸ If a claim is made about levels of fibre, sugars, fats or salt (sodium) then it must be supported by a declaration of the typical values of the so-called 'big eight':

- Energy, in kilojoules (kJ) and kilocalories(Kcal);
- Protein (g/100g);
- Carbohydrates (g/100g)...
- ...of which sugars (g/100g);
- Fat (g/100g)...
- ...of which saturates (g/100g);
- Fibre (g/100g);
- Sodium (g/100g).

The need for change

However, it has become increasingly apparent that the current labelling is too complicated to be readily understood by the majority of consumers. A consumer research project conducted in 1995 by the government's Nutrition Task Force and the Food Advisory Committee highlighted a number of specific problems with nutritional labelling. It found that consumers had a poor understanding of many of the units (kJ, Kcal and g/100g) and terms (saturates, energy, carbohydrates, sodium, fibre, etc.) used and that while there was a general awareness of the message to reduce intakes of fat, people were unsure of by how much. Overall, the exercise concluded that a focus on fat, saturates and calories would be a step in the right direction towards supplying useful supplementary nutritional information.

This work has been taken forward by the Institute of Grocery Distribution (IGD), which conducted a three year consumer research programme and consulted widely before publishing its guidelines on voluntary nutrition labelling.¹⁴⁹ These recommend that additional information be given on food labels in three main areas:

- Information on the calorie and fat content per serving. This was based on research findings that calories and fat were the most frequently monitored nutrients, and that consumers preferred 'per serving' information to the 'per 100g' format currently in use.
- That guideline daily amounts (GDAs) be widely promoted. These are the predicted daily consumption of different nutrients by an average consumer eating a diet conforming to COMA recommendations, and are based on consumer research suggesting there was a need for such information to allow consumers to put nutritional labelling in context. IGD recommend that GDAs be displayed for calories (2,000 per day for women and 2,500 for men) and fats (70g

¹⁴⁷ The Independent, *Obesity litigants may target Cadbury*, July 3rd, 2003,

¹⁴⁸ The Nutrition Labelling Directive, 90/496/EEC.

¹⁴⁹ Voluntary Nutritional Labelling Guidelines to Benefit the Consumer, IGD, Watford, 1998.

- per day for women and 95g for men). An additional GDA for saturates (20g per day for women and 30g for men) was also agreed. However, because research shows that saturates are poorly understood by consumers, IGD felt that it was inappropriate to recommend highlighting saturates on labels for all products at the current time. Rather, it suggested that companies should be free to declare the saturates GDA if they wished to, and that a longer term educational programme was required to improve consumer understanding in this area.
- Amendments to the current ('big eight') nutritional panel. IGD recommended that information on each of the eight nutrients be presented in a 'per serving' format as well as in the 'per 100g' layout required by the Nutrition Labelling Directive.

On-going initiatives

While the IGD's guidelines have been well received, consumer and health groups feel that there is considerable scope for improving food labelling. The FSA adopted a food labelling action plan in September 2001, which included the following initiatives:

- Mandatory information – the European Commission is currently in the process of reviewing the Nutrition Labelling Directive, and the FSA is pressing for nutrition labelling to be mandatory on all foods.
- Presentation of mandatory information - FSA launched a clear labelling task force in January 2001, to advise on how best to improve the clarity of food labels. The task force reported in January 2002, recommending that improvements on the current formats be consumer-tested; in the meantime, it suggested that the IGD's guidelines should be followed.¹⁵⁰ FSA had already commissioned research to test the reactions of consumers to various different formats for nutritional labelling.¹⁵¹ Further research in collaboration with consumer groups and industry to define the ideal content and format is on-going.
- Control of voluntary labelling – work with consumers, local enforcement authorities and industry to develop and implement a code of practice on voluntary labelling. FSA recently commissioned research from the National Consumer Council (NCC) which recommended that FSA should develop a good labelling guide to encourage transparency.¹⁵²
- Eating out/non-pre-packed foods – work with consumers, enforcement authorities and industry to improve the information provided at catering outlets and for non-packaged foods sold loose.
- Other sources of information (including the internet). FSA is encouraging industry to develop other (off-label) sources of information for consumers such as in-store leaflets. It is also assessing the potential impact of the internet – which remains essentially unregulated and is used to promote food products - on consumer protection.
- Advice and education – FSA is developing a range of resources (with DfES) for use in schools that explain how to use food labels effectively.

While consumer and health groups support mandatory nutritional labelling, it is unclear whether this in itself will have a big impact: FSA figures suggest that around 80% of food products in the UK already carry nutritional labelling, mainly on a voluntary basis.¹⁵³ The British Nutrition Foundation (BNF) has suggested that nutrition labelling may not be relevant (e.g. for spices) or appropriate (e.g. on very small packages) for some foods and that there may be scope for adding or removing nutrients for which information is provided. For instance, it suggests that consumers may not find labelling of protein useful but that there may be grounds for including information on nutrients of greater public health significance such as selenium or trans fatty acids.

¹⁵⁰ Clear Labelling Task Force, Recommendations on Ideal Label Formats, January 2002, FSA, London.

¹⁵¹ Nutritional Labelling, Qualitative Research, Final Report, November 2001, FSA, London.

¹⁵² Bombarded, Baffled and Bamboozled: Consumer's Views on Voluntary Food Labelling', February 2003, NCC, London.

¹⁵³ Food Labelling Review, 2000, FSA, London.

Overall, there is widespread agreement on the need to clarify nutrition labelling. The addition of GDAs on food labels is generally seen as a step forward and has received positive feedback from consumers themselves. However, many consumer organisations prefer a so-called 'banding' scheme developed by the Coronary Prevention Group which labels nutrients as high, medium or low. BNF has also pointed out that GDAs have limitations - they are based on adult averages and are thus not applicable to population groups such as children – and that it is not clear how widely this is understood by consumers. Furthermore, BNF suggests that it may be difficult to get agreement at the EU level to include GDAs. Further progress on improving the clarity and range of nutrition labelling, and in educating consumers how to use it will require close co-operation between FSA, consumer groups and industry.

Claims made on food labels

Groups such as Foodaware also see a need for stricter regulation to control other types of claims made for food products. Typical examples of such claims include:

- 'Light' or 'lite', which manufacturers use to imply that the product contains fewer calories than would be found in a standard version of the same product. Such terms are not defined in law and the FSA recommends that manufacturers explain exactly what the claim means on the label. It points out that a light/lite version of one brand of product may contain almost as many calories as a standard product produced by another manufacturer.
- 'Low fat', 'fat free' or 'reduced fat' - Again, other than a general requirement not to be misleading, such claims are not covered by the law. However the FSA recommends manufacturers to use: 'low-fat' only when a product contains less than 3g fat/100g food; 'fat free' when a product contains less than 0.15g fat/100g food; and 'reduced fat' when a product contains less than three quarters of the fat found in a standard version of the product.
- 'No added sugar' – FSA points out to consumers that this claim means that no sugar is added as an ingredient in the making of a product, but that the product may still contain high levels of sugars (e.g. from fruit) and/or artificial sweeteners.
- 'Reduced salt/sodium' – again, there is no legal definition of this claim, although FSA recommends that manufacturers use it only when a product contains at least 25% less salt than a standard version of the product.
- Health claims – by law, manufacturers are not allowed to make claims that a food can treat, prevent or cure any disease or other adverse condition. Such claims can only be made by medicines that have undergone the stringent licensing procedures. However, manufacturers may claim that a product 'helps maintain a healthy heart' or 'aids digestion' if such claims can be substantiated. A code of practice has been developed by the Joint Health Claims Initiative, to cover claims of this nature. This code is voluntary and sets out acceptable wordings for claims and specifies the evidence needed to substantiate them.¹⁵⁴

Research by the National Consumer Council (NCC) commissioned by the FSA suggests that consumers find claims made under the current voluntary labelling schemes both confusing and misleading.¹⁵⁵ NCC has recommended that the FSA should develop consistent definitions for food claims and publish a good labelling guide to encourage transparency and provide advice on how to promote consumer education on food labels. Other consumer groups such as Foodaware wish to see a review of food labelling to make it clearer and more user-friendly.

Policy here is likely to be influenced by proposals published by the European Commission for a Regulation on nutrition and health claims made on foods. It proposes that claims such as 'low fat' or 'high fibre' should be subject to carefully defined criteria. For instance, the proposals

¹⁵⁴ See also POSTnote number 119, Health Claims and foods and www.jhci.co.uk

¹⁵⁵ NCC, Bamboozled, baffled and bombarded: consumer views on voluntary food labelling, NCC, London.

suggest that a claim of 'low energy' on a product may only be made where the product contains less than 40 kcal/100g (less than 20 kcal/100ml for drinks). The Commission also proposes to draw up a list of permitted (well established) health claims regarding the role of a nutrient in the body. Any novel claims which are not well established will have to be evaluated by the European Food Safety Authority prior to marketing approval. The Commission's proposals have yet to pass through the legislative process and unlikely to be implemented until 2005.

Advertising aimed at children

The concerns of consumer and health groups

In recent years, consumer and health groups have become increasingly concerned about the impact that TV and other forms of advertising and promotion may be having on children's diets. They are concerned that many fatty, sugary and salty foods are promoted in ways that are specifically designed to appeal to young children, citing promotions featuring popular characters from children's TV as examples.¹⁵⁶ For instance, Bob the Builder, the Tweenies and the Teletubbies have featured in a variety of promotions for a wide range of products from fast foods to confectionery. Other marketing tools aimed at young children include the use of toy collection schemes, where toys (often linked with popular children's TV programmes or films) are offered 'free' with fast food meals, and the creation of cartoon characters to promote specific products. Older children are also targeted through advertisements and endorsements featuring pop stars, sports stars and famous football teams.

The chief concerns of consumer and health groups focus on the *cumulative* effect and sheer weight of this marketing activity. Although advertising is subject to the various codes of practice administered by bodies such as the ASA and ITC (Section 4.5), these are designed to ensure that no individual advert violates specific health concerns, for instance by actively disparaging good dietary practice or by encouraging excessive consumption. As far as the weight of marketing activity is concerned, consumer and health groups point to research that shows that the vast majority of food advertising during children's TV is for products that are high in salt, sugars or fat. Such groups wish to see further regulation to counter the cumulative effect of food promotion targeted to children, and single out TV advertising for particular attention.

The industry perspective

The food industry does not agree with calls for stricter regulation of the advertising of food products to children. Its case has been summarised in a position paper to the FSA published by the Advertising Association:¹⁵⁷

- Advertising works by increasing the market share of a brand within a product category rather than by growing markets for whole categories. Thus, effective advertising may make a child more likely to buy (or request) one brand of soft drink than another, but is not designed to lead to an overall increase in the number of soft drinks sold.
- TV advertising should not be singled out for additional regulation as TV adverts are just one of the factors influencing children's eating behaviour; there is little evidence available to allow an assessment of the relative importance of these different factors.
- Industry accepts that fatty, salty and sugary foods are more heavily advertised at children than are fruit and vegetables. However, it argues that there is a place for all types of food within the context of a healthy, balanced diet. Nevertheless there may be a case for increased promotion of those foods considered essential to a healthy, balanced diet.
- Overall, advertising fatty, salty or sugary foods is not undermining children's health. The observed trends in obesity are worrying, but its causes are multiple. Action to increase

¹⁵⁶ Dalmeny K, Food marketing: the role of advertising in child health, *Consumer Policy Review*, 13(1), 2-7, 2003.

¹⁵⁷ Food advertising to children, The Advertising Association, January 2001, www.adassoc.org.uk/position/fsa2.html

children's levels of physical activity are more likely to prove effective at reversing the trend than stricter regulation of food advertising.

- The current regulatory system works well as witnessed by the fact that relatively few consumers register complaints each year concerning advertising to children.
- An advertising ban would not have the desired effect (i.e. of improving children's diets) and would have severe economic implications for food companies and advertising agencies and greatly reduce funds available for investing in children's programming.

Policy options

As discussed previously in Section 4.5, the available research confirms that a disproportionately large percentage of advertising targeted at children is for processed foods, and that the vast majority of these are promoting foods high in fat, sugars or salt. While it is not clear what the relative impact is of the various different factors that influence children's food choices, the most recent research commissioned by the FSA concludes that food promotion does influence children's diet in a number of ways.¹⁵⁸

In general, the main policy issue is whether regulation of advertising foods to children should be left as it is, or whether it should be strengthened in some way. Most within the food industry would favour the first option, for the reasons outlined in the previous section. They suggest that the current regulatory system works well, that further regulation is unnecessary and potentially economically damaging, and that measures to promote a healthy diet and increase levels of physical activity are likely to prove most effective in improving children's diets and overall health.

On the other hand, groups such as the Consumers' Association, the Food Commission and Sustain have all called for European or UK legislation to restrict the marketing of fatty, sugary and salty foods, and for the food industry to cease advertising such foods to children. Foodaware has called for measures to prevent advertising or marketing of such foods in all places frequented by large numbers of children (schools, children's websites, clubs, etc.) or on TV while large numbers of children are likely to be watching. It has also suggested that self-regulatory bodies such as the ITC should consider the cumulative effects of advertising when drawing up codes of practice, and that government should revise statutory regulations to ensure that promotions do not misrepresent a food's contribution (or lack thereof) to a healthy diet.

There seems little immediate prospect of revised legislation at the EU level. While the issue of advertising to children had a high profile during the 2001 Swedish presidency of the Council of Ministers, no agreement was reached. It is being considered as part of a wider ranging review of the Television Without Frontiers Directive, options for which are currently out for consultation. These include the option of mixing legislation with self- and co-regulation. The UK government also seems to favour a self-regulatory approach. In a speech in November 2002 to launch Media Smart,¹⁵⁹ a media literacy initiative to help children understand the role, purpose and context of advertising, the Secretary of State for Culture Media and Sport said:

- *“Neither the government nor OFCOM will allow advertising to control children. OFCOM will have principal responsibility for regulating advertising in the broadcast media. However, we recognise that, in the future context of increasing convergence, it may be that a self-regulatory system can better deliver consistent, comprehensible regulation across the media.”*

¹⁵⁸ www.foodstandards.gov.uk/multimedia/pdfs/foodpromotiontochildren1.pdf

¹⁵⁹ Media Smart (www.mediasmart.org.uk) is designed for primary school children, aged 6-11. It uses a range of teaching and advertising materials to explain the purpose of advertising and how advertisements are made.

When the House of Commons Public Accounts Committee looked at this issue in its recent report on obesity, it noted that *“there is still room for concern, however, about the potentially harmful effects of advertising products high in sugar, salt and fat to children”*. It recommended that the FSA should work with the food industry to develop a code of conduct with regard to the amount and nature of food advertising aimed at children.¹⁶⁰ FSA has announced that it will draw on the conclusions of the recent research to inform and promote open public debate, and will be hosting a series of meetings about the promotion of food to children. This will include a meeting of leading academics to discuss the latest findings, and a public meeting to debate the issues.

Fiscal policy

Another potential approach to encouraging people to eat a healthier diet is through the taxation of foods of low nutritional value, with the money raised used to fund public health nutritional campaigns. Two main approaches have been widely discussed in the US:

- A sizeable tax on foods high in calories, fats or sugars. It has been suggested that such a tax would reduce consumption of these foods, and that the money raised could be used to subsidise ‘healthful’ foods such as fruit and vegetables (thus increasing consumption), and/or to fund healthy eating campaigns.¹⁶¹
- A small tax on foods high in calories, fats or sugars. The US-based Center for Science in the Public Interest (CSPI) published a survey showing that 18 US states already raise a total of around \$1 billion annually through small taxes on soft drinks, confectionery and snack foods. CSPI proposed that all state and local governments levy taxes on foods of low nutritional value and use the revenues to fund health promotion programmes. It suggested that this was more politically feasible than a sizeable tax, and may still generate significant revenues.¹⁶²

A number of groups have made similar suggestions in the UK. The think-tank Demos published a report looking at the issues surrounding food poverty in 2002, which included discussion of a proposed tax on the promotion of all fatty, highly processed and fast foods.¹⁶³ As in the US proposals mentioned above, Demos suggested that the revenue raised by such a measure could be spent funding initiatives to promote consumption of fruit and vegetables. This proposal has been welcomed by Sustain and the Food Commission, although the National Heart Forum has suggested that more work is needed to determine what such a tax might achieve and what impact it might have on consumption among different socio-economic groups. The Institute of Fiscal Studies is currently conducting research in this area.

A recent paper in the British Medical Journal investigated in more detail the effect of increasing value added tax (VAT) on the main sources of dietary saturated fat on premature deaths from heart disease.¹⁶⁴ At present, most foodstuffs are exempt from VAT (currently charged at 17.5%). As outlined in Section 2.2, there is a strong body of evidence linking saturated fat intakes with serum cholesterol levels and risk of heart disease. The paper estimates that extending VAT to cover the main sources of dietary saturates – whole milk, butter, cheese, biscuits, buns, cakes and pastries, puddings and ice cream – while exempting cholesterol neutral foods could prevent some 900-1,000 deaths each year from heart disease. It further suggests that the approach might yield even greater benefits if the revenue raised were used to finance compensatory measures for low-income groups.

¹⁶⁰ Public Accounts Committee, 9th report, session 2001-2002, Tackling Obesity in England, January 2002.

¹⁶¹ French SA et al, American Journal of Public Health, 87, 849-851, 1997.

¹⁶² Jacobson MF and Brownwell KD, American Journal of Public Health, 90, 854-857, 2000.

¹⁶³ *Inconvenience food: The struggle to eat well on a low income*, 2002, Demos, London.

¹⁶⁴ Marshall T, British Medical Journal, 320, 301-305, 2000.

However, not all agree with the analysis above, nor with the general approach of using food taxes as an instrument to encourage healthy eating. A paper published in the same edition of the British Medical Journal questioned some of the basic assumptions made in the estimate given above. In particular, it queried whether increasing the price of certain food items would actually reduce consumption by the amounts assumed. It also suggested that there are more consumer friendly interventions that are more likely to succeed in reducing blood cholesterol levels. The food and advertising industries would not welcome the idea of raising taxes on foods that have little nutritional value. They suggest that there would be a major difficulty in defining which foods should be subject to the higher rate of tax, and that any such measures may hit low income families hardest, as they spend a higher proportion of their income on food.

5.5 Improving access to healthy diets

Food deserts

As outlined in section 4.3, there has been much recent discussion on 'food deserts' although there is surprisingly little hard evidence outlining the extent of the problem. This lack of evidence has been recognised by the FSA, which has commissioned research¹⁶⁵ at the University of Newcastle to investigate whether 'food deserts' exist, and to:

- Survey the socio-economic status and dietary intakes of a cross-section of people aged 16 and over living in Newcastle.
- Identify food shops in Newcastle and categorise them according to food availability and quality, price and opening hours.
- Assess access to food shops and analyse geographical patterns of more and less healthy diets.
- Look for links between access to food shops, dietary intakes and socio-economic status.

The research started in June 2000, and the final report is expected in 2003. It is hoped the results will inform policy in a range of areas, from social policy through to planning of residential areas and public transport. In the meantime, groups such as Foodaware see a need for action to address the needs of those on low incomes. It points out that people on low income tend to eat fewer fruits and vegetables and less food rich in dietary fibre, and more sweets and biscuits (which provide cheap calories) and higher levels of processed foods rich in saturated fats and sugar. It thus sees a need for:

- Coherent national policies across a wide range of sectors to address issues such as child poverty, through existing schemes such as Surestart and Healthy Start;
- More action at the local level to target disadvantaged communities and encourage initiatives such as community fruit and vegetable cooperatives through the 5 A DAY scheme and subsidised transport links to supermarkets;
- Strategic action at the EU level to assess the impact of agricultural policy on diet and health inequalities and to incorporate this into policy reform.
- Improving awareness of nutrition, diet and lifestyle among the most disadvantaged, and ensuring that special emphasis is given to nutrition, diet and lifestyle education for less academic and less well-off children.

Reform of agricultural policy

Groups such as Sustain see improving the nation's diet as part of a wider, sustainable development, agenda. They argue that it makes little sense to spend public money trying to dissuade people from eating foods high in fats and sugars on the one hand, while using public money to subsidise over-production of sugar and fats (e.g. in the form of dairy products) on the other hand. Such groups are thus calling for agricultural policy to be reformed, to switch the emphasis away from subsidising production, particularly in the dairy and sugar sectors, and

¹⁶⁵ See www.foodstandards.gov.uk/science/research/NutritionResearch/n09programme/n09projectlist/n09010/

towards local production of fruit and vegetables and more environmentally sustainable ways of managing the countryside. This would require action at both national and EU level.

National agricultural strategy

Following the foot and mouth crisis the government set up a Policy Commission on the Future of Farming and Food. It reported in January 2002 (the Curry report), recommending:¹⁶⁶

- Reconnecting farmers with their market and the rest of the food chain, reconnecting the food chain with a healthy and attractive countryside, and reconnecting consumers with what they eat and where it has come from;
- Early, radical reform of the CAP;
- Retargeting of public funds towards environmental and rural development goals instead of subsidising production.

In all, the Commission made over one hundred detailed recommendations, a number of which had a nutritional component. For instance the Commission recommended that DoH, FSA and Defra should work together to produce a strategy on all aspects of encouraging healthy eating, expansion of the National Schools Fruit and Vegetable scheme, the setting up of an industry group to see how the demand for a healthier diet can be met and measures to encourage local food co-operatives. In its response, the government stated that its policy on agricultural reform would be informed by "*analysis of the health impacts of agriculture expenditure*".¹⁶⁷

Defra launched its Strategy for Sustainable Farming and Food in December 2002.¹⁶⁸ This builds on the Curry report and includes:

- Plans for a new entry-level agri-environment scheme, which will pay farmers to farm in a more sustainable way. Once piloted, this will be rolled out nationally in 2005.
- Expansion of existing rural and environmental schemes like Countryside Stewardship including work to improve the targeting of such schemes and make them simpler.
- A new 'whole farm' approach to management and regulation to help farmers plan their business as a whole to meet commercial and regulatory needs. This includes plans to develop an audit-based approach to identify a farm's strengths and weaknesses.
- A new Agricultural Development Scheme to improve competitiveness and marketing, including the priority areas of co-operation, farm assurance and spreading best practice.
- New funding to assist small regional food producers channelled through Food from Britain to enable Regional Development Agencies and Regional Food Groups to expand this sector.
- Increased funding for skills and training.
- A network of demonstration farms - in early 2003 a pilot network of farms will open their doors to share best practice and experiences.
- Improving animal health and combating diseases. This includes a new animal health and welfare strategy, measures to strengthen emergency preparations and renewed efforts to combat illegal meat imports.

However, some groups have suggested that the new strategy does not go far enough to encourage farmers to produce more foods that are likely to contribute to a healthy diet. For instance Sustain has called for immediate action to double UK fruit and vegetable production and the NCC wishes to see the UK use the flexibility allowed under existing CAP rules to channel more funding into sustainable farming to produce high quality foods that consumers want to buy.

¹⁶⁶ Available at www.cabinet-office.gov.uk/farming/index/CommissionReport.htm

¹⁶⁷ Response to the Report of the Policy Commission on the Future of Farming and Food by HM Government, Defra

¹⁶⁸ Available at www.defra.gov.uk/farm/sustain/newstrategy/index.htm

EU agricultural strategy – reform of the CAP

The EU currently subsidises production of sugar and dairy products.¹⁶⁹ While there is widespread agreement about the need to reform the CAP, there is disagreement between Member States about the nature and timing of reforms. An agreement drawn up at the Berlin Council in March 1999 (the Agenda 2000 agreement) brought cereal, milk and beef prices closer to world levels, and agreed the Rural Development Regulation (RDR) which required Member States to draw up seven year (2000-06) plans to provide rural development and agri-environment support. Member States are allowed to divert up to 20% of compensation payments to fund rural development schemes: the UK is currently diverting 2.5% of payments, rising to 4.5% by 2005 (this increase in funds diverted is known as modulation).

Agenda 2000 foresaw the need for reviews of some CAP sectors in 2002-03. The European Commission published a Mid Term Review paper in July 2002 which proposed:

- Breaking the links between subsidies and individual products (decoupling);
- Making payments conditional on meeting certain (e.g. environmental, food safety, animal welfare and occupational safety) standards;
- Substantially increasing support for rural development through modulation;
- Introducing a new farm audit system;
- Bringing in new rural development measures to boost quality production, food safety and animal welfare, and to cover the some of the costs of the farm audit.

Following further negotiations, Member States reached agreement on mid-term CAP reform on June 26th 2003. Broadly speaking, the agreement will eventually phase out payments based on levels of production, replacing them with payments linked to rural development or to meeting certain environmental, human health and animal welfare standards. Member States can start replacing farm subsidies with the new, single payments from January 2005, but may also elect to keep most of their existing subsidies until 2007. While the deal enables Member States to completely decouple support payments in some sectors (arable, beef and sheep), reform of other sectors has either been eased back (e.g. the new payments in the dairy sector will be phased in over three years) or excluded from the agreement altogether (e.g. sugar).

The new deal has been cautiously welcomed by the National Farmers' Union, but has been criticised by some health groups, on the grounds that it prolongs EU subsidy of the dairy and sugar sectors and does too little to encourage farmers to produce foods that will contribute to a healthy diet. For instance, groups such as Foodaware wish to see further reforms to the CAP and to the Common Fisheries Policy in order to:

- Place more emphasis on nutritional value, for example by promoting crop diversity and the production of foods containing higher levels of anti-oxidants.
- Encourage greater consumption of fruit, vegetables, complex carbohydrates, fish and fish oil.
- Encourage a shift in consumption from animal fat to vegetable oils (in the context of an overall reduction in the consumption of fat).

Co-ordination of nutrition strategies

Public health groups are increasingly calling for the development of comprehensive nutritional strategies to co-ordinate the various policy initiatives that promote a healthy diet at the national, EU and international levels.

¹⁶⁹ In 2001, the EU's common agricultural policy (CAP) accounted for €43 billion. Just over 5% (€2.345 billion) of this was earmarked for directly supporting production of milk and milk products, and a further 4% (€1.726 billion) to subsidise sugar production.

England

In England, the government has set up a Nutrition Forum to bring key stakeholders in nutrition together on a regular basis. Its members are drawn from consumers and voluntary organisations, the NHS and other professional health bodies, industry and local and national government. The Forum is intended to assist in developing and implementing nutrition policies and to support an effective, co-ordinated nutrition strategy, with the overall aim of improving health through changes in dietary habits.

One of the key roles of the Nutrition Forum will be to input into the government's new Food and Health Action Plan which is being developed in response to a recommendation made by the Curry report. DoH has established a cross Departmental Steering Group to oversee development of this Action Plan which will be a clear statement of government policy, activities and intent for bringing about a healthier diet for the people of England. It will:¹⁷⁰

- Analyse the current problems related to food and health, including the burden of diet-related disease and patterns of current consumer behaviour;
- Describe existing and planned work on nutrition with commitments to clear policy objectives, at national, regional and detail arrangements for the future co-ordination of nutrition work across government;
- Address policies across government, particularly those related to the Sustainable Farming and Food Strategy, which also have a significant impact upon diet;
- Adopt a life course by targeting solutions appropriate to the needs of people at each stage of life and address, as a priority, the needs of those most at risk of diet related ill-health, such as those on low incomes;
- Secure commitments to action by bodies outside government, such as the food industry;
- Take into account the international context and UK responsibilities within the EU, and WHO.

Scotland

As part of the Health Improvement Challenge and Scottish Diet Action Plan, FSA Scotland has been drawing up a draft diet and nutrition strategy, detailing the objectives and activities planned for 2003-06. A draft was presented to the Scottish Food Advisory Committee in May 2003 for discussion, and is being circulated for wider consultation until September 2003. It outlines FSA Scotland's priorities in relation to diet and nutrition over this period, with particular emphasis on the need for close partnerships with relevant organisations in Scotland in order to ensure effective co-ordination of activities. The final strategy document will be published in autumn 2003.

Wales

'Food and Well Being', the national nutrition strategy for Wales was launched by the Welsh Assembly Government Health and Social Services Minister in February 2003. It:

- Prioritises groups most likely to suffer diet and health inequality such as low income and vulnerable consumers, the elderly, ethnic minority groups, infants, children, young people; middle-aged men, and women of childbearing age.
- Advocates a combination of information and training, local and national initiatives and policies.
- Includes an Action Plan that sets out actions to be led by FSA Wales and the Welsh Assembly Government, and those to be led by other key players. These target the needs of the priority groups (above) and recognise the need for improved physical and economic access to food and support for community food initiatives. Initiatives include a public education campaign to promote healthy eating, a nutrition network and database of projects, and improving the nutrition content of education and training courses for health professionals.

¹⁷⁰ www.doh.gov.uk/nutritionforum/4mar03-4-22.pdf

An EU nutrition strategy?

In its white paper on Food Safety published in January 2000, the European Commission announced its intention to develop “a comprehensive and coherent nutritional policy” and propose “recommendations for dietary guidelines” by December 2000.¹⁷¹ However, to date little progress has been made in this area. While virtually all of the specific recommendations in the white paper concerning food safety have now been implemented, no further proposals relating to a nutrition action plan or to dietary guidelines have been published. Consumer and health groups were broadly supportive of the original proposals and wish to see an EU nutrition strategy to ensure that:

- Consumers have ready access to independent, objective information on diet, nutrition and health;
- Consumers have access to a wide range of foods at affordable prices;
- Food labelling allows consumers to make informed choices about foods at the point of purchase;
- Provision is made for those (e.g. young children) who are unable to make free and/or informed choices;
- Agricultural and other policies do not actively discourage a healthy diet - indeed that these policies do whatever is possible to improve the nutritional quality of the foods available.

While consumer and health groups see scope for an overarching EU nutrition strategy, the Commission sees implementation of health education and promotion initiatives as being the primary responsibility of national authorities. Indeed, the EU Commissioner for Health and Consumer Protection has outlined a more limited role for action at the EU level, suggesting that the EU should support the development of effective strategies, provide EU-wide data and analysis and reinforce EU food labelling laws.¹⁷²

The WHO nutrition strategy

According to the WHO, cardiovascular disease, cancers, diabetes, respiratory disease, obesity and other non-communicable conditions now account for 59 per cent of annual deaths worldwide (56.5 million) and around 46% of the global burden of disease, most of which occurs in developing countries. Unhealthy diet, physical inactivity and tobacco use have been identified as the leading causes. In response to this growing epidemic, WHO has been developing a Global Strategy on Diet, Physical Activity and Health. This has involved meetings in each of the six WHO regions with representatives from 81 of its Member States, as well as consultations with UN organizations and other interested parties including intergovernmental agencies, consumer and health groups and private companies. The last of these formal consultations took place in June 2003, with a meeting in between WHO officials and representatives of some 30 food, beverage and producer associations to discuss ways of working together more effectively to encourage healthier diets and increased physical activity worldwide. It is expected that the Global Strategy will be presented to the World Health Assembly in May 2004.

The evidence base for the Global Strategy has been provided by a joint FAO/WHO working group which reported in March 2003.¹⁷³ This report looked at the available evidence implicating a range of dietary factors, levels of physical activity and environmental/other factors in increasing or reducing the risk of obesity, type 2 diabetes, cardiovascular heart disease, cancer, dental disease and osteoporosis. Where available, the evidence was weighed and categorised as either providing ‘convincing’ or ‘probable’ evidence of increased/decreased risk. So, for example, sugar-

¹⁷¹ www.europa.eu.int/comm/dgs/health_consumer/library/pub/pub06_en.pdf

¹⁷² Byrne D, *The EU and the obesity epidemic*, Eurohealth 9(1), 16-17, Spring 2003.

¹⁷³ www.who.int/hpr/NPH/docs/who_fao_expert_report.pdf

sweetened soft drinks and fruit juices were categorised as being a probable factor in increasing risk of obesity, as was the heavy marketing of energy-dense foods and fast food outlets. Among the main recommendations made by the working group were:

- A range of policies was needed involving all sectors working together to help people maintain healthy dietary and physical activity patterns. The report recommended that these needed to be comprehensive, involving a mix of different actions and take a life-course perspective.
- Various pre-requisites need to be in place for such policies to be introduced. The report highlighted the need for leadership, effective communication, to establish partnerships and for policies to use the full range of measures (legislation, regulation and fiscal) across a wide range of areas (e.g. transport, urban design and agricultural policy).
- A number of specific actions to promote a healthy diet and improve levels of physical activity. These include a surveillance system for monitoring diet, physical activity and related health problems, as well as improving information about fat, salt, sugars and energy density provided in nutrition and health promotion and on food labels. The report noted that the Codex Alimentarius is currently being reviewed and suggested that *“its work in the area of nutrition and labelling could be further strengthened to cover diet-related aspects of health”*.¹⁷⁴ It also suggested that the feasibility of codes of practice in food advertising should also be explored.

However, the WHO/FAO working group's report has been criticised by some respondents to the final consultation exercise. For instance, the Food and Drink Federation (FDF) were concerned that the categorisation of evidence into 'conclusive' and 'probable' was unscientific and out of step with the usual practice of systematic review.¹⁷⁵ It also felt that the report placed too much emphasis on diet and nutrition, and paid too little attention to increasing levels of physical activity. FDF's response to the report also took issue with some of the recommendations, arguing that there was no evidence presented for the need for more stringent regulation of food advertising, nor to support the use of fiscal policies.

5.6 Overview

There is widespread agreement on the need to improve children's dietary and physical activity patterns. Failure to do so will have massive economic and health implications in the years ahead, contributing to increasing rates of obesity, type 2 diabetes, heart disease and cancers. This report has focused on improving dietary patterns. It has described a wide range of policy initiatives that are already in place or are planned for the near future to:

- Improve children's access to a healthy diet (the National School Fruit Scheme, 5 A DAY, Compulsory Nutritional Standards) in general;
- Target food inequalities among children from low income families (Infant Feeding, Healthy Start, Sure Start, Social Exclusion, community 5 A DAY and Neighbourhood Renewal policies);
- Improve children's and parent's knowledge of healthy eating and provide them with basic food skills (National Healthy School Standard, various food labelling initiatives, Food in Schools).

All agree that such policies are a step in the right direction. A key question for Parliamentarians to address is whether such policies – taken in conjunction with initiatives to improve levels of physical activity - will be sufficient to stem the rise in obesity, and protect the current generation of children from the chronic diseases of adulthood. If not then further policy initiatives will be needed. Options for improving dietary patterns further may then have to focus on discouraging

¹⁷⁴ Codex Alimentarius is the intergovernmental standard-setting body through which nations agree on food standards.

¹⁷⁵ For instance, see the Food and Drink Federation's response at:

www.who.int/hpr/nutrition/CommentsExpertConsultationReportOrgs/FoodDrinkFederation.pdf

consumption of foods likely to contribute to an unhealthy diet. This would put the spotlight firmly on energy dense foods and those rich in salt, fat and sugars. Further options here could focus on:

- Stricter regulation of advertising and promotion of such foods targeted at children;
- Fiscal policies that penalise manufactures producing or promoting such products, particularly where the products are designed to appeal to children;
- Measures aimed at reducing portion sizes and levels of salt, fat and sugars in processed foods;
- Further improvements in food labelling and in improving people's understanding of food labels;
- Government-sponsored educational and promotional activities to actively discourage consumption of foods likely to contribute to an unhealthy diet and encourage consumption of foods such as fruit, vegetables and unrefined cereals;
- Reform of agriculture and fishery policies to switch EU subsidies away from overproduction in the dairy and sugar sectors and encourage production of fruit and vegetables.

Such measures would be controversial. Many consumer and health groups argue that some, or all, of the above are necessary if lasting improvements in children's diets are to be achieved. The food industry suggests that such policies are largely untested, would not necessarily address the concerns outlined in this report, and are overly interventionist in approach.

Any further initiatives will have to address the following key issues:

- The balance between policy focused on improving diet and nutrition and that aimed at improving patterns of physical activity;
- The balance between legislation, regulation and fiscal policies on the one hand, and self regulation and voluntary codes of practice on the other;
- The need for co-ordination across all relevant policy sectors at international, EU, national and local levels;
- The need to involve all relevant stakeholders.

Annex – DRVs for various nutrients

Vitamins and minerals

Dietary reference values set by COMA are summarised in tables 1 (vitamins) and 2 (minerals). Such values usually vary with age (vitamin and mineral requirements often increase as infants and children develop) or gender (for instance women of child bearing age lose iron through menstruation and thus have higher average requirements than men). In general, the FSA advises that a healthy balanced diet will provide all the nutrients that most people need. However, some groups may require additional vitamins and minerals in the form of supplements. For instance, DoH recommends women who are pregnant or who are planning a pregnancy to take folic acid supplements because research has shown that this reduces the risks of neural tube defects in unborn babies. Elderly people who are housebound and thus not exposed to sunlight¹⁷⁶ may be recommended to take supplements of vitamin D.

Also given in tables 1 and 2 is EVM guidance on safe upper levels of vitamins and minerals. While the body is capable of getting rid of excess levels of some vitamins and minerals, high levels of others – particularly those that the body stores such as vitamin A and iron - can cause problems. In general, such guidance is mainly aimed at people taking one or more of the wide variety of supplements on the market: only those with particularly unusual dietary habits can substantially exceed their daily requirements without taking supplements. The EVM was hampered in making its recommendations by a general lack of data from large, well-designed trials studying the effects of different levels of intakes in humans. Where such data were available, the EVM was able to recommend safe upper levels for 9 vitamins and minerals (tables 1 and 2). In the case of a further 22 nutrients, it was able to offer only general guidance on upper levels by extrapolating from animal data. Where no guidance on upper levels is shown in tables 1 and 2, there was insufficient data even from animal studies for the EVM to consider.

Protein

Protein can act as a source of energy as well as providing the basic building blocks (the 25 or so different amino acids) needed for growth and tissue repair. While the body can manufacture most of these from scratch, there are a number of essential amino acids that we cannot make and which we thus have to eat pre-formed in the diet. A diet containing a mixture of animal and plant proteins will provide a sufficient mix of amino acids. However two of the essential amino acids are not present in many plant proteins and so vegetarians have to take special care to ensure that they eat a balanced mixture of proteins.

COMA set dietary reference values for protein intake in 1991 (table 3). These are based on the assumption that needs for energy and other nutrients are met and that the protein is high quality (i.e. contains all the essential amino acids required by the body). The figures are thus a reflection on the amount of protein needed to maintain growth and repair processes. They vary with age to take account of the growth needs of children and with gender; pregnant women need higher protein intakes to take account of growth of foetal and maternal tissue, while lactating women need to increase intakes to allow for production of breast milk.

¹⁷⁶People exposed to sunlight are capable of synthesising sufficient vitamin D to meet their needs

Table 1 (Annex) Dietary reference values for minerals

Mineral (unit)	LRNI	EAR	RNI	Guidance on safe upper levels
Calcium (mg/day)				No SUL set. Supplements up to 1,500 mg/day should cause no adverse effect
0-1 years	240	400	525	
1-3 years	200	275	350	
4-6 years	275	350	450	
7-10 years	325	425	550	
11-18 years men (women)	450 (480)	750 (625)	1000 (800)	
19+ years	400	525	700	
Lactating women	+550	+550	+550	
Phosphorous (mg/day)				No SUL set. 250 mg/day supplement should cause no adverse effect
0-1 years	185	310	400	
1-3 years	155	215	270	
4-6 years	215	270	350	
7-10 years	250	325	425	
11-14 years men (women)	350 (370)	580 (480)	770 (620)	
15-18 years men (women)	450 (370)	580 (480)	770 (620)	
19+ years	310	400	540	
Lactating women	+425	+425	+425	
Magnesium (mg/day)				No SUL set. 400 mg/day supplement should cause no adverse effect
0-3 months	30	40	55	
4-6 months	40	50	60	
7-9 months	45	60	75	
10-12 months	45	60	80	
1-3 years	50	65	85	
4-6 years	70	90	120	
7-10 years	115	150	200	
11-14 years	180	230	280	
15-18 years	190	250	300	
19+ years men (women)	190 (150)	250 (200)	300 (270)	
Lactating women	+50	+50	+50	
Iron (mg/day)				No SUL set. 17 mg/day supplement should cause no adverse effect
0-3 months	0.9	1.3	1.7	
4-6 months	2.3	3.3	4.3	
7-12 months	4.2	6.0	7.8	
1-3 years	3.7	5.3	6.9	
4-6 years	3.3	4.7	6.1	
7-10 years	4.7	6.7	8.7	
11-18 years men (women)	6.1 (8.0)	8.7 (11.4)	11.3 (14.8)	
19-49 years men (women)	4.7 (8.0)	6.7 (11.4)	8.7 (14.8)	
50+ years	4.7	6.7	8.7	
Zinc (mg/day)				SUL set at 25 mg supplemental zinc/day
0-6 months	2.6	3.3	4.0	
7 months-3 years	3.0	3.8	5.0	
4-6 years	4.0	5.0	6.5	
7-10 years	4.0	5.4	7.0	
11-14 years	5.3	7.0	9.0	
15+ years men (women)	5.5 (4.0)	7.3 (5.5)	9.5 (7.0)	
Lactating women 0-4 months	+6.0	+6.0	+6.0	
Lactating women 4+ months	+2.5	+2.5	+2.5	
Sodium (mg/day)				No SUL set. COMA concluded that intakes of 3.2 g/day may lead to raised blood pressure in susceptible adults
0-3 months	140		210	
4-6 months	140		280	
7-9 months	200		320	
10-12 months	200		350	
1-3 years	200		500	
4-6 years	280		700	
7-10 years	350		1200	
11-14 years	460		1600	
15+ years	575		1600	

Table 1 (Annex) Dietary reference values for minerals (continued)

Mineral (unit)	LRNI	EAR	RNI	Guidance on safe upper levels
Potassium (mg/day)				No SUL set. 3,700 mg/day supplement should cause no adverse effects
0-3 months	400		800	
4-6 months	400		850	
7-9 months	400		700	
10-12 months	450		700	
1-3 years	450		800	
4-6 years	600		1100	
7-10 years	950		2000	
11-14 years	1600		3100	
15+ years	2000		3500	
Copper (mg/day)				SUL set at 10 mg/day for adults
0-12 months			0.3	
1-3 years			0.4	
4-6 years			0.6	
7-10 years			0.7	
11-14 years			0.8	
15-16 year			1.0	
18+ years			1.2	
Lactating women			+0.3	
Iodine (µg/day)				No SUL set. 0.5 mg/day supplement should cause no adverse effects
0-3 months	40		50	
4-12 months	40		60	
1-3 years	40		70	
4-6 years	50		100	
7-10 years	55		110	
11-14 years	65		130	
15+ years	70		140	
Selenium (µg/day)				SUL set at 0.3 mg/day
0-3 months	4		10	
4-6 months	5		13	
7-9 months	5		10	
10-12 months	6		10	
1-3 years	7		15	
4-6 years	10		20	
7-10 years	16		30	
11-14 years	25		45	
15-18 years men (women)	40 (40)		70 (60)	
19+ years men (women)	40 (40)		75 (60)	
Lactating women	+15		+15	
Other minerals				
Nickel				SUL set at 0.26 mg/day for adults
Boron				SUL set at 0.3 mg/day
Selenium				SUL set at 9.6 mg/day
Tin				No SUL set. 0.22 mg/kg/day should cause no adverse effects
Vanadium				No SUL set. 7.5-10 mg/day supplements may not be safe
Chromium				No SUL set. 10 mg/day intake Should cause no adverse effects
Cobalt				No SUL set. 4.56 mg/day intake should cause no adverse effects

Source: DoH 1991, *Dietary reference values for food energy and nutrients for the UK*, HMSO.

Dietary fibre

Dietary fibre is a term that is commonly used to describe that part of the diet that is not digested. Analysis of this non-digestible portion of the diet shows that it actually consists of a complex mixture of compounds collectively termed non-starch polysaccharides (NSPs). COMA examined the evidence in 1991 and found that:

- Water soluble NSPs may help lower blood cholesterol levels;
- Insoluble NSP intakes are correlated with stool weight and that low stool weights are associated with increased risk of bowel disorders such as cancer and gall stones;

Table 2 (Annex) Dietary reference values for vitamins

Vitamin (unit)	LRNI	EAR	RNI	Guidance on safe upper levels
Vitamin A (µg/day)				No safe upper limit (SUL) set. Intakes greater than 1,500µg/day may be inappropriate
0-1 year	150	250	350	
1-6 years	200	300	400	
7-10 years	250	350	500	
11-14 years	250	400	600	
15-50+ years men (women)	300 (250)	500 (400)	700 (600)	
Pregnant (or lactating) women	+100 (350)	+100 (350)	+100 (350)	
Vitamin B1 (mg/1000 kcal)				No SUL set. Intakes up to 100mg/day should cause no adverse effects
0-1 year	0.20	0.23	0.30	
1 year+	0.23	0.30	0.40	
Vitamin B2 (mg/day)				No SUL set. Intakes up to 100mg/day should cause no adverse effects
0-1 year	0.2	0.3	0.4	
1-3 years	0.3	0.5	0.6	
4-6 years	0.4	0.6	0.8	
7-10 years	0.5	0.8	1.0	
11-14 years men (women)	0.8 (0.8)	1.0 (0.9)	1.2 (1.1)	
15-50+ years men (women)	0.8 (0.8)	1.0 (0.9)	1.3 (1.1)	
Pregnant (or lactating) women	+0.3 (0.5)	+0.3 (0.5)	+0.3 (0.5)	
Vitamin B3 (mg/1000 kcal)				No SUL set. 17mg/day supplement should cause no adverse effects
All ages	4.4	5.5	6.6	
Lactating women	+2.3mg/day	+2.3mg/day	+2.3mg/day	
Vitamin B6 (µg/g protein)				SUL set at 10mg/day/. Long-term effects of supplements 10-200mg/day uncertain. Doses >200 mg/day can cause adverse effects
0-6 months	3.5	6.0	8.0	
7-9 months	6.0	8.0	10.0	
10-12 months	8.0	10.0	13.0	
1 year+	11.0	13.0	15.0	
Vitamin B12 (µg/day)				No SUL set. 1mg/day supplement should cause no adverse effects
0-6 months	0.1	0.25	0.3	
7-12 months	0.25	0.35	0.4	
1-3 years	0.3	0.4	0.5	
4-6 years	0.5	0.7	0.8	
7-10 years	0.6	0.8	1.0	
11-14 years	0.8	1.0	1.2	
15+ years	1.0	1.25	1.5	
Lactating women	+0.5	+0.5	+0.5	
Folate (µg/day)				No SUL set. 1mg/day supplement should cause no adverse effects
0-1 year	30	40	50	
1-3 years	35	50	70	
4-6 years	50	75	100	
7-10 years	75	110	150	
11+ years	100	150	200	
Pregnant (or lactating) women	+100 (60)	+100 (60)	+100 (60)	
Pantothenic acid (mg/day)	No reference values set. Current intakes of around 3-7 mg/day are thought to be adequate			No SUL set. 200mg/day supplement should cause no adverse effects
Biotin (mg/day)	No reference values set. Current intakes of 0.01-0.2 mg/day are thought to be adequate			No SUL set. 0.9 mg/day supplement should cause no adverse effects
Vitamin C (mg/day)				No SUL set. 1000mg/day supplement should cause no adverse effects
0-1 year	6	15	25	
1-10 years	8	20	30	
11-14 years	9	22	35	
15+ years	10	25	40	
Pregnant (or lactating) women	+10 (30)	+10 (30)	+10 (30)	
Vitamin D (µg/day)				No SUL set. 25µg/day supplement should cause no adverse effects
0-6 months			8.5	
6 months-3 years			7.0	
4-64 years			0 (sunlight)	
65+ years			10	
Pregnant (or lactating) women			10 (10)	
Vitamin E (mg/day)	No reference values set. Intakes >4 mg/day (men) and >3mg/day (women) thought to be adequate			SUL set at 727mg/day
Vitamin K (µg/kg bodyweight/day)	No reference values set. Intakes of 1µg/kg/day (adults) and 2 µg/kg/day (infants) are thought to be safe and adequate			No SUL set. 1mg/day supplement should cause no adverse effects

Source: DoH 1991, Dietary reference values for food energy and nutrients for the UK, HMSO.

Table 3 (Annex) Dietary reference values for protein

Age	EAR (g/day)	RNI (g/day)	Guidance on high intakes
0-3 months	-	12.5	COMA recommended intakes should not exceed 2xRNI based on evidence that very high intakes aggravate kidney function coupled with lack of evidence of benefit from high intakes
4-6 months	10.6	12.7	
7-9 months	11	13.7	
10-12 months	11.2	14.9	
1-3 years	11.7	14.5	
4-6 years	14.8	19.7	
7-10 years	22.8	28.3	
11-14 years men (women)	33.8 (33.1)	42.1 (41.2)	
15-18 years men (women)	46.1 (37.1)	55.2 (45.4)	
19-49 years men (women)	44.4 (36.0)	55.5 (45.0)	
50+ years men (women)	42.6 (37.2)	53.3 (46.5)	
Pregnant women	+6	+6	
Lactating women 0-6 months	+11	+11	
Lactating women 6+ months	+8	+8	

Source: DoH 1991, *Dietary reference values for food energy and nutrients for the UK*, HMSO.

- Some NSP components (particularly those found in wheat bran) may bind minerals such as zinc, calcium, iron and copper, making them unavailable for absorption by the body. While this is not usually a problem, people whose diets are marginal with respect to these minerals may need to take care with their NSP intakes.

Taking these factors into account, COMA proposed average daily NSP intakes of 18g/day for adults, within an expected range of 12-24g/day; because of their lower body weight, children should eat less NSPs than adults. The Committee noted that such intakes could readily be achieved by eating NSP containing foods such as cereals, fruit and vegetables. As far as upper limits were concerned, COMA saw no benefit in exceeding NSP intakes of 32g/day as this is the point above which no increase in stool weight is observed.

Acronyms

ASA	Advertising Standards Authority
BHF	British Heart Foundation
BMI	Body mass index
BNF	British Nutrition Foundation
CA	Consumer Association
CAP	Common Agricultural Policy
COMA	Committee on Medical Aspects of food and nutrition policy
CPAG	Child Poverty Action Group
D&T	Design and Technology
Defra	Department for environment, food and regional affairs
DfES	Department for Education and Skills
DoH	Department of Health
DRV	Dietary reference value
EAR	Estimated average requirement
EVM	Expert Group on Vitamins and Minerals
FAO	Food and Agriculture Organisation (of the UN)
FDF	Food and Drink Federation
FSA	Food Standards Agency
GDA	Guideline daily amounts
HAD	Health Development Agency
IGD	Institute of Grocery Distribution
ISBA	Incorporated Society of British Advertisers
ITC	Independent Television Commission
LRNI	Lower reference nutrient intake
MAFF	Ministry of Agriculture, Fisheries and Food
MRC	Medical Research Council
NAO	National Audit Office
NCC	National Consumer Council
NCC	National Consumer Council
NDNS	National Diet and Nutrition Survey
NFS	National Food Survey
NGO	Non-governmental organisation
NHF	National Heart Forum
NHS	National Health Service
NHSS	National Healthy School Standard
NME	Non-milk extrinsic (sugars)
NSF	National Service Frameworks
ODPM	Office of the Deputy Prime Minister
Ofsted	Office for Standards in Education
PCT	Primary Care Trust
PSHE	Personal, Social and Health Education
RNI	Reference nutrient intake
SACN	Scientific Advisory Committee on Nutrition
SUL	Safe upper level
UNICEF	United Nations Children's Fund
WHO	World Health Organisation

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